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R 1822

METHOD OF TEST FOR WOOL FIBRE LENGTH

USING A SINGLE-FIBRE LENGTH-MEASURING MACHINE

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BRIEF HISTORY

The ISO Recommendation R 1822, *Method of test for wool fibre length using a single-fibre length-measuring machine,* was drawn up by Technical Committee ISO/TC 38, *Textiles,* the Secretariat of which is held by the British Standards Institution (BSI).

Work on this question led to the adoption of Draft ISO Recommendation No. 1822, which was circulated to all the ISO Member Bodies for enquiry in March 1969. It was approved, subject to a few modifications of an editorial nature, by the following Member Bodies :

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

The following Member Body opposed the approval of the Draft :

U.S.A.

This Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided to accept it as an ISO RECOMMENDATION.

ISO Recommendation	R 1822	August 1970

METHOD OF TEST FOR WOOL FIBRE LENGTH

USING A SINGLE-FIBRE LENGTH-MEASURING MACHINE

1. SCOPE

This ISO Recommendation describes a method for the determination of wool fibre length using a machine which semi-automatically measures the length of individual fibres.*

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. 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.

3. APPARATUS

3.1 *A machine* that semi-automatically measures fibre length under controlled tension**, 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 Appendix.

The machine used should be capable of providing results within the confidence limits specified for the number of fibres given in clause 5.3.

3.2 *Two pairs of pointed forceps* with ground ends.

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

3.4 *Apparatus for the preparation of specimens :*

Clip with 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.

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

** 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 gf (1.5 cN) and controlling the amount by friction. The material and surface finish of the presser foot should 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 should be to the nearest millimetre.

4. CONDITIONING AND TESTING ATMOSPHERE

The fibres should be conditioned and the test conducted in one of the standard atmospheres defined in ISO Recommendation R 139 (2nd edition), *Standard atmospheres for conditioning and testing textiles.* *

5. PREPARATION OF SPECIMENS

5.1 Conditioning

Condition the fibres before testing in the standard atmosphere specified in section 4, until they are in equilibrium with that atmosphere. If the laboratory sample is well opened out, conditioning for 1 hour is generally sufficient to achieve a state of equilibrium.

5.2 Sampling

Select the test specimens by using one of the methods for sampling wool fibres described in ISO Recommendation R 1130, *Methods of fibre sampling for testing.* **

5.3 Number of fibres

Determine the number of fibres to be taken for the test, according to the confidence limits required,*** by use of the tables given in ISO Recommendation R 1130, *Methods of fibre sampling for testing.*

6. PROCEDURE

6.1 Testing atmosphere

Conduct all fibre measurements in the standard atmosphere described in section 4.

6.2 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 should be classified by eye, using the short scale bearing marks 5 mm apart.

7. CALCULATION AND EXPRESSION OF RESULTS

7.1 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.

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

**   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.

***   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.

7.2 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 – 5	5	5.2	100	12.5	0.6
5 – 10	4	4.1	94.8	30.0	1.3
10 – 15	8	8.2	90.7	100.0	4.4
15 – 20	12	12.4	82.5	210.0	9.2
20 – 25	25	25.8	70.1	562.5	24.6
25 – 30	20	20.6	44.3	550.0	24.1
30 – 35	12	12.4	23.7	390.0	17.1
35 – 40	8	8.2	11.3	300.0	13.1
40 – 45	3	3.1	3.1	127.5	5.6
	97	100.0		2282.5	100.0

8. TEST REPORT

The test report should 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.

APPENDIX

"W.I.R.A." FIBRE LENGTH MACHINE*

A.1 CHARACTERISTICS

The principal features of this machine are the means for automatically measuring fibre length under controlled tension, means for automatically classifying the fibre lengths into 5 mm groups and means for registering the number of fibres in each of these groups. Figures 1 and 2 illustrate the essential features.**

A.2 CALIBRATION

Switch on the machine, depress the operating key as far as it will go, and check that the fibre detector wire (11) falls into the space between the anvil (3) and the fibre support (12) and that its end just dips into the mercury, thus actuating the stop-motion and stopping the traverse screw (9). If the detector wire does not fall into its correct place, adjust its lateral position by carefully bending it with a dissecting needle at a point near its fixed end. Check also that the fibre detector wire lies parallel to the pressure plate (2) when in the raised position and about 0.5 mm below it. If it does not do so, adjust the vertical position by bending it with a dissecting needle near its fixed end. By means of the forceps, select a fibre and measure its length in the way described in clause 6.2, noting whether the screw (9) is stopped immediately the fibre end slips clear of the anvil. If it does not do so, adjust the level of the mercury until the screw is being stopped satisfactorily on release of a fibre.

A.3 MEASUREMENT

A.3.1 Position the fibres to be measured on a velvet board at a height such that fibres may be gripped and drawn over the approach pad and through the fibre guide (10).

A.3.2 Reset all the counters to zero by rotating the counter reset wheel in a clockwise direction and rotating the counters towards the front of the machine until they are all stopped. The counter reset wheel is then rotated as far as it will go in an anti-clockwise direction, thus freeing the counters.

A.3.3 Measure and record the length of each fibre in the sample in the following way :

Grip the end of a fibre with the pointed forceps and with the operating key in the up position pull the fibre over the approach pad and introduce it into the fibre guide (10).

Depress the operating key with the left forefinger and move the forceps to the right, parallel with the traverse screw (9), until only a short length of the fibre remains to be drawn through the guide.

The forceps do not touch the traverse screw during this operation.

Push the points of the forceps holding the fibre gently forward until they rest in the angle between the traverse screw and the forceps guide bar (8). They will then fall into the nearest approaching groove of the traverse screw and be carried sideways at a constant speed, drawing the fibre between pressure plate (2) and anvil (3) and ultimately stopping the traverse screw. The operating key is still held in the down position during this movement; the forceps should be held at about 90° to the screw whilst being traversed and should not be inclined enough to make them touch the counter keys in passing.

Then move the forceps upwards, quickly raising the counting key which lies immediately above and thus recording the fibre length.

Very short fibres, i.e. less than 5 mm long, should be classified by eye using the short scale with marks 5 mm apart.

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*   The information given on this machine is not intended to favour its use or to give preference to this apparatus. Other apparatus giving equivalent results may be used.

** Full details of the operation of the machine are given in *J. Text. Inst.*, 1953, **44**, 3, T95 : "A machine for measuring the length of single fibres" by S.L. Anderson and R.C. Palmer.