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ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION
R 270

DETERMINATION OF FIBRE LENGTH BY MEASURING THE LENGTH OF INDIVIDUAL FIBRES

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BRIEF HISTORY

The ISO Recommendation R 270, *Determination of Fibre Length by Measuring the Length of Individual Fibres*, was drawn up by technical Committee ISO/TC 38, *Textiles*, the Secretariat of which is held by the British Standards Institution (B.S.I.).

Work on this question by the Technical Committee began in 1948 and led, in 1956, to the adoption of a Draft ISO Recommendation.

In October 1957, this Draft ISO Recommendation (No. 182 - Part 1) was circulated to all the ISO Member Bodies for enquiry. It was approved subject to a few modifications of an editorial nature, by the following Member Bodies:

Austria	Greece	Portugal
Belgium	Israel	Republic of South Africa
Burma	Italy	Romania
Canada	Japan	Spain
Czechoslovakia	Netherlands	Sweden
Denmark	New Zealand	Switzerland
France	Norway	Turkey
Germany	Poland	United Kingdom
		U.S.S.R.

Three Member Bodies opposed the approval of the Draft:

Hungary India U.S.A.

The Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided, in August 1962, to accept it as an ISO RECOMMENDATION.

FOREWORD

The determination of fibre length by measuring the length of individual fibres has been chosen as the reference method for the following reasons:

1. The fibre length is better defined than by measurement of the fibre held in combs.
2. This is a general method, and its range of application is not limited by the length or diameter of the fibres tested.
3. The risk of accidental or systematic errors is less than with other methods, particularly with collective measurements of the length of a group of fibres.

It should be noted that measurements by this reference method are made on straightened fibres and may give different results from those obtained by other methods of measurement. In the case of fibres which have inherent crimp, straightening the fibre may also introduce errors due to stretching. Nevertheless, the other methods (e. g. the comb sorter) are quicker for some fibres (e. g. cotton and wool) and for this reason may be preferred, for routine tests, to the more exact method of measuring individual fibre lengths.

From the results of individual fibre measurements, the frequency-distribution curve may be obtained, as well as certain other characteristics, such as the modal length, the mean length and percentage frequencies of fibres by number or mass as a function of their length.

It should be stressed that, if the results of individual fibre measurements are to be applied to the bulk source from which a laboratory sample for examination has been drawn, it is essential that

(*a*) the laboratory sample should be drawn in such a manner that it is properly representative of the bulk source as a whole;

(*b*) the number of fibres measured should be statistically adequate to reproduce the range and proportions of lengths in the bulk source.

Methods of sampling are not given in this document, which relates only to the method of measurement.

ISO Recommendation R 270 August 1962

DETERMINATION OF FIBRE LENGTH BY MEASURING THE LENGTH OF INDIVIDUAL FIBRES

1. SCOPE

This method of determining fibre length by measurement of individual fibres applies to all discontinuous textile fibres, except those in which strong inherent crimp would render the procedure inapplicable.

2. PRINCIPLE

The method described below is based on the *individual* measurement of the length of the fibres, straightened and laid out one by one in the measuring zone.

3. APPARATUS

3.1 Polished glass plate set on a dark background for undyed fibres and on a contrasting background for dyed fibres. Manipulation is often eased if a millimeter scale is engraved or photographed on the glass plate.

3.2 Bevelled rule finely graduated in millimetres on the thin edge of the bevel (unless a graduated glass plate is used).

3.3 Tweezers.

3.4 White petroleum jelly or liquid paraffin.

3.5 Velvet cloth stretched on a frame.

4. CONDITIONING

The laboratory sample should be opened out and kept for at least 24 hours in the standard atmosphere for testing textiles. * The measurements should be made in this atmosphere.

5. PROCEDURE

5.1 Select the fibres to be tested at random either from the laboratory sample or from a test sample representative of the random selection technique.

5.2 Smear the glass plate with a small quantity of white petroleum jelly or liquid paraffin. Using the tweezers, arrange a fibre in a straight line on the glass plate and along the scale, if the plate is graduated. Measure the length of the fibre along the attached scale or with the graduated rule. Repeat the operation for each fibre to be tested.

* See ISO Recommendation R 139, *Standard Atmospheres for Conditioning and for Determining the Physical and Mechanical Properties of Textiles.*

5.3 Group the observed lengths in classes, the interval between these being as follows:

Nominal length of fibres	Interval between classes
less than or equal to . . 45 mm	1 mm
more than . . . . . 45 mm and less than or equal to 80 mm	2 mm
more than . . . . . 80 mm	5 mm

5.4 Observe the class limits given by the following deviations:

Interval between classes	Permissible deviations
1 mm	+ 0.50 mm − 0.49 mm
2 mm	+ 1.00 mm − 0.99 mm
5 mm	+ 2.50 mm − 2.49 mm

6. EXPRESSION OF RESULTS

6.1 Method of calculation

Count the number of fibres in each class, of length l_i. Calculate for each class the percentage frequency by number f_i, by the formula:

$$f_i = \frac{n_i}{\Sigma n_i} \times 100$$

the percentage length-biased frequency f'_i by the formula:

$$f'_i = \frac{n_i l_i}{\Sigma n_i l_i} \times 100$$

where n_i = number of fibres in the i^{th} class,
l_i = central length of the i^{th} class,
Σn_i = total number of fibres in all the classes,
$\Sigma n_i l_i$ = sum of the products $n_i \times l_i$ for all the classes.

This calculation coincides with the percentage frequency by mass, if fibres of different lengths have the same mass per unit length, which is not always the case, particularly for the natural fibres.