

ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION R 137

DETERMINATION OF WOOL FIBRE DIAMETER PROJECTION MICROSCOPE METHOD

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BRIEF HISTORY

The ISO Recommendation R 137, *Determination of Wool Fibre Diameter-Projection Microscope Method*, was drawn up by Technical Committee ISO/TC 38, *Textiles*, the Secretariat of which is held by the British Standards Institution (B.S.I.).

At its first meeting, held in Buxton in June 1948, the Technical Committee decided to add the subject of fibre testing to its programme of work and to appoint a Sub-Committee SC 6, *Fibre Testing*, to deal with it.

At its second meeting, held in Bournemouth in June 1951, the Technical Committee approved a recommendation from the Sub-Committee SC 6 that methods for the determination of fibre number or fineness should be developed.

When detailed attention was given to the question of wool fibres, the Sub-Committee SC 6 agreed that a method evolved by the International Wool Textile Organisation (IWTO) should be taken as the basis of its work. A first draft proposal on those lines was subsequently prepared and was unanimously adopted at the third meeting of the Technical Committee, held in Southport in May 1956, as a Draft ISO Recommendation.

On 15 October 1957, the Draft ISO Recommendation (No. 181) was distributed to all the ISO Member Bodies and was approved, subject to some editorial amendments, by the following Member Bodies:

Australia	Hungary	Portugal
Austria	India	Romania
Belgium	Israel	Spain
Burma	Italy	Sweden
Canada	Japan	Switzerland
Czechoslovakia	Netherlands	Turkey
Denmark	New Zealand	United Kingdom
France	Norway	U.S.A.
Germany	Pakistan	U.S.S.R.
Greece	Poland	

No Member Body opposed the approval of the Draft.

The Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided, in January 1960, to accept it as an ISO RECOMMENDATION.

DETERMINATION OF WOOL FIBRE DIAMETER PROJECTION MICROSCOPE METHOD

FOREWORD

The method of measuring fibre diameter by the projection microscope is used throughout the world in various forms and is thus appropriate for international standardization. The method is suitable for wool fibres in any form and also for other fibres of reasonably circular cross-section.*

1. SCOPE

This method sets out the procedure and the conditions of measurement for the determination of wool fibre diameter by means of the projection microscope.

2. PRINCIPLE

The principle of the method consists of projection on a screen of the images of the profiles of wool fibre pieces and measuring the width by means of a graduated scale. The operating technique assures a random sampling of the fibres to be measured.

3. APPARATUS

3.1 Microtome

For preparing the test specimen, use a microtome, an instrument for cutting the fibres to a determined length.

The microtome consists of a steel plate with a slot and a steel tongue, fixed to the guides which slide along the plate, adjustable in such a manner that it enters the slot to a pre-determined distance. A steel blade pusher is equal in thickness to the width of the microtome slot and has a stop plate placed at a determined distance from one of its ends: a set of three pushers should be available, the stop plates of which are placed at distances of 0.8 mm, 0.6 mm and 0.4 mm from one of their ends.

TABLE 1.—Choice of pushers

Fibres		Pushers
Form	Average diameter	Distance between stop plate and pusher's end
	microns μ	millimetres
Slivers and rovings	> 27	0.8
	< 27	0.4
Yarns	> 27	0.6
	< 27	0.4

* In the case of dyed, bleached or finished fibres, it should be noted that the diameter may be different from that of fibres not subjected to such treatments. The estimates of fibre diameter obtained at the various stages of processing one lot of wool will not necessarily be the same.

3.2 Projection microscope

The projection microscope comprises a light source, a light condenser, a stage which supports the prepared fibres, an objective, an ocular and a circular screen.

3.2.1 *The stage* is movable in two directions at right-angles by means of an intermediary sliding mechanism capable of successive displacements at 0.5 mm steps.

3.2.2 *The objective and ocular* are capable of providing $500\times$ magnification.

3.2.3 *The circular screen* is able to rotate around its centre in its plane.

If this screen is not transparent, it should carry a transparent scale, 5 cm wide, graduated in millimetres along its underside; this scale can be moved diametrically across the screen between guides.

Transparent screens may carry scales graduated in millimetres along one diameter or along two perpendicular diameters.

In the centre of the circular screen there is a circle whose diameter is equal to a quarter of the optical distance between the ocular and the centre of the screen. All measurements are made inside this circle.

3.2.4 *Calibration.* The projection microscope should be calibrated periodically by means of a micrometer scale (certified accurate), divided in hundredths of a millimetre and placed on the stage. One division of the micrometer (i.e. 0.01 mm), projected on the screen, should cover exactly 5 mm of the graduated scale. The magnification is then equal to $500\times$.

3.3 Mounting medium (for the preparation of the specimen)

Provide a mounting medium with the following properties:

- (a) a refractive index between 1.43 and 1.53,
- (b) suitable viscosity,
- (c) zero water absorption.

Cedar wood oil and liquid paraffin are examples of suitable media.

4. PREPARATION OF SPECIMENS

4.1 Sampling

Specimens in the form of sliver, roving or yarn are placed in the slot of the open microtome, occupying the slot to a sufficient depth. Long fibres are generally thick fibres, and consequently any manipulation resulting in selection of long fibres will give too great an average diameter. Raw wool or loose fibres in any form are sampled as described in Appendix 1.

4.2 Conditioning

Condition the fibres to equilibrium in an atmosphere whose relative humidity is 65 ± 2 per cent and temperature 20 ± 2 °C.*

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