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## Textile fibres — Determination of linear density — Gravimetric method

*Fibres textiles — Détermination de la masse linéique — Méthode gravimétrique*

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[ISO 1973:1976](https://standards.iteh.ai/catalog/standards/sist/1971a4ae-11de-4976-b35b-0aa7df0178d6/iso-1973-1976)

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**Descriptors** : textiles, fibres, tests, density measurement, linear density, gravimetric analysis.

## 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 in the process of being transformed into International Standards. As part of this process, Technical Committee ISO/TC 38, *Textiles*, has reviewed ISO Recommendation R 1973-1971 and found it technically suitable for transformation. International Standard ISO 257 therefore replaces ISO Recommendation R 1973-1971 to which it is technically identical.

ISO Recommendation R 1973 had been approved by the member bodies of the following countries : <https://standards.iteh.ai/catalog/standards/sist/1971a4ae-11de-4976-b35b-0aa7df0178d6/iso-1973-1976>

Australia	Iran	South Africa, Rep. of
Brazil	Israel	Spain
Canada	Italy	Sweden
Czechoslovakia	Japan	Switzerland
Denmark	Netherlands	Thailand
Egypt, Arab Rep. of	New Zealand	Turkey
Finland	Norway	United Kingdom
France	Poland	U.S.A.
Germany	Portugal	
Greece	Romania	

The member bodies of the following countries had expressed disapproval of the Recommendation on technical grounds :

Belgium  
India\*  
U.S.S.R.

\* Subsequently, this member body approved the Recommendation.

The member bodies of the following countries disapproved the transformation of the Recommendation into an International Standard :

Belgium  
India

# Textile fibres — Determination of linear density — Gravimetric method

## 1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies a gravimetric method for the determination of the linear density of textile fibres cut from a length in the straightened state.

Two procedures are specified, applicable respectively to

- a) bundles of fibres;
- b) individual fibres.

The procedure for bundles of fibres can be applied only to those fibres which can be kept rectilinear and parallel during preparation of the bundles. It is not applicable to wool or textured fibres.

## 2 REFERENCES

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

ISO 270, *Textile fibres — Determination of length by measuring individual fibres*.

ISO 1130, *Textile fibres — Some methods of sampling for testing*.

ISO 1144, *Textiles — Universal system for designating linear density (Tex System)*.

## 3 PRINCIPLE

The mass and length of either

- a) bundles of fibres or
- b) individual fibres,

in standard condition, are measured and thence a mean value of the linear density is deduced and expressed in appropriate units. For most purposes, the appropriate units in the Tex System are the millitex and the decitex. (See ISO 1144.)

## 4 APPARATUS

**4.1 Balance**, suitable for weighing the bundles of fibres or individual fibres to an accuracy of 1 %.

**4.2 Device for cutting the fibres or bundles of fibres** to a length known with an accuracy of 1 %<sup>1)</sup> and allowing of adjustment of the tension of the bundles to be cut.

**4.3 Textile support fabric**, of a colour contrasting with that of the fibres to be tested.

**4.4 Glass plate**, approximately 10 cm × 20 cm in size, with one polished edge.

**4.5 Forceps**.

## 5 CONDITIONING AND TESTING ATMOSPHERE

The atmosphere for conditioning and testing shall be one of the standard atmospheres for testing specified in ISO 139.

## 6 SAMPLING

Sampling shall be carried out in accordance with ISO 1130.

## 7 PROCEDURE

### 7.1 General

After preconditioning, bring the sample to constant mass in the standard atmosphere. Carry out the test without removal from the standard atmosphere, following either the procedure specified in 7.2 or that specified in 7.3.

### 7.2 On bundles of fibres

**7.2.1** From the final laboratory sample, take ten tufts having a mass of several milligrams and parallelize the fibres of each tuft by carefully combing them several times.

1) It is convenient to use two razor blades set parallel in a holder.

**7.2.2** Cut the middle part of each combed tuft to a given length (as great as possible)<sup>1)</sup>, under the minimum tension necessary to remove crimp, by means of the cutting device (4.2). Take the necessary precautions so that there are no free fibre ends anywhere except at the two ends of the cut bundle.

**7.2.3** Place the ten bundles so obtained on the textile support fabric (4.3) and cover them with the glass plate (4.4), from the edge of which they should protrude slightly.

**7.2.4** From each of the ten bundles in turn, take out five fibres, so as to form a bundle of fifty fibres, in each case drawing the fibres from one cut end. Make at least ten of these bundles and condition them in one of the atmospheres specified in clause 5. Then weigh these bundles individually, using the balance (4.1), to an accuracy of 1 %.

### 7.3 On individual fibres

**7.3.1** From the final laboratory sample, take ten tufts having a mass of several milligrams, and with these form a bundle by repeated halving and doubling<sup>2)</sup>. From this bundle then take a tuft of about fifty fibres and condition them in one of the atmospheres specified in clause 5.

**7.3.2** Weigh all the fibres of this tuft individually, using the balance (4.1), to an accuracy of 1 %<sup>3)</sup>. Determine the length of each fibre by measuring in exactly the same way as specified in ISO 270. For wavy fibres of high rigidity, it is necessary to use a procedure which does not produce stretching in the fibre; this is not ensured by drawing synthetic fibres across an oiled plate.

## 8 EXPRESSION OF RESULTS

### 8.1 On bundles of fibres

**8.1.1** Calculate the mean linear density of the fibres in each bundle, and calculate the mean linear density for all the bundles from these values.

**8.1.2** Calculate the coefficient of variation of the linear densities from the ten results obtained.

**8.1.3** From the coefficient of variation, calculate the 95 % confidence limits.

If the confidence limits are less than 2 %, the number of bundles tested is adequate and the mean of the linear densities for the bundles may be taken as the mean linear density of the sample.

If the confidence limits are above 2 %, the number of bundles tested shall be increased until the confidence limits are less than 2 %, the mean for all the bundles then being taken as the mean linear density of the sample.

### 8.2 On individual fibres

**8.2.1** Calculate the linear density of each fibre by dividing the mass of the fibre by its length. Calculate the mean linear density of these fibres.

**8.2.2** Calculate the coefficient of variation of the individual values for the linear density of each fibre.

**8.2.3** The mean of the values obtained shall be taken as the mean linear density of the fibres in the sample, provided that the 95 % confidence level limits are less than 2 %.

If the confidence limits are too high, the number of fibres tested shall be increased until the confidence limits are equal to or less than 2 %.

## 9 TEST REPORT

The test report shall include the following particulars :

- a) the method of determination (bundles of fibres or individual fibres);
- b) the length of the cut bundle;
- c) the mean linear density of the fibres in the sample;
- d) the 95 % confidence limits.

1) It is common practice to use a length of 1 cm.

2) It is essential to divide the tuft in the width direction and not draw out the fibres by their extremities.

3) The length of the individual fibre (especially if the linear density is low) shall be such that the required accuracy is attained.