International Standard

ISO 4913

Textiles — Cotton fibres — Determination of length (span length) and uniformity index

Textiles — Fibres de coton — Détermination de la longueur pincée (span length) et de l'indice d'uniformité

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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.

International Standard ISO 4913 was developed by Technical Committee ISO/TC 38, *Textiles*, and was circulated to the member bodies in July 1979.

It has been approved by the member bodies of the following countries :

Australia	Germany, F. R.	Portugal
Belgium	India	Romania
Brazil	Indonesia	South Africa, Rep. of
Canada	Israel	Spain
China	Japan	Sweden
Cyprus	Korea, Rep. of	Switzerland
Czechoslovakia	Libyan Arab Jamahiriya	USA
Denmark	Netherlands	USSR
Egypt, Arab Rep. of	New Zealand	Venezuela
Finland	Norway	
France	Poland	

The member body of the following country expressed disapproval of the document on technical grounds :

Italy

Textiles — Cotton fibres — Determination of length (span length) and uniformity index

0 Introduction

In commercial transactions, the length of cotton fibre is determined by an expert in classing.[1] This length does not, however, provide an indication of length distribution.

This International Standard describes a method of using an optical device for the determination of the minimum length attained by a specified percentage of fibres in a test beard. The ratio of the minimum lengths attained by two specified percentages of fibres in a test beard constitutes a uniformity index.

1 Scope and field of application

This International Standard specifies a method of test for the determination of the length[2] and uniformity index of cotton fibres by scanning a test beard in an optical device.

The method is applicable to fibres taken from raw or partially processed cotton, but not to fibres taken from blends of cotton with other fibres, or to fibres recovered from cotton yarns or fabrics.

2 References

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

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

3 Definitions

For the purpose of this International Standard, the following definitions apply.

3.1 test beard : Cotton fibres protruding from a comb where they have been laid at random, and which have been combed into a beard.

3.2 amount of fibre : A measure of the optical density of a test beard, the distribution of fibres at various distances from the comb being proportional to the optical density.

3.3 length (span length) : The minimum length attained by a specified percentage of the fibres in a test beard, corresponding to a determined percentage of the optical density of the beard.

The first section of the length investigated, which is normally situated at a distance of 3,8 mm from the line of gripping of the comb, is taken as the reference base of 100 % optical density.

3.4 uniformity index : The ratio between two span lengths, the smaller value being expressed as a percentage of the higher value.

NOTE — The length of cotton measured should be reported in millimetres. However, it is accepted that, for the comparison of lengths by the classer, inch units as low as 1/32 in may be used.

4 Principle

Preparation of a test beard either by manual combing or by use of an appropriate automatic apparatus. Measurement of the optical density of this beard, for different values of length.

Calculation, from the values obtained, of the index of uniformity of the fibres in the sample.

5 Apparatus

5.1 Testing instrument, suitable for optically scanning beards of cotton fibres.[3]

5.2 Combs, for preparing and holding test beards.

NOTE — Combs may be either hand type or designed for use in a special test beard preparation device.

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[1] Usually called a "classer".

[2] Usually referred to as "span length".

[3] A suitable instrument is available commercially. Details may be obtained from the Secretariat of ISO/TC 38 (BSI) or the ISO Central Secretariat. Other instruments may be used if adapted to accept the combs.

6 Conditioning and testing atmosphere

The atmosphere used for conditioning and testing textiles shall be that specified in ISO 139, i.e. a relative humidity of 65 ± 2 % and a temperature of 20 ± 2 °C. In tropical regions, a temperature of 27 ± 2 °C may be used, subject to agreement between the interested parties.

7 Sampling

7.1 Take the sample of cotton for testing in accordance with ISO 1130. Other methods of sampling may, however, be used, if agreed between the interested parties.

7.2 Condition the laboratory sample to equilibrium with the standard atmosphere for conditioning and testing textiles (see clause 6), starting from a drier state.

Conditioning by exposure to moving air for at least 4 h is usually required.

NOTE — Cotton is normally received at the laboratory in a relatively dry condition and, for this reason, special pre-conditioning is not usually required. Samples which obviously have more moisture should be subjected to pre-conditioning before conditioning in the laboratory. The pre-conditioning atmosphere should have a relative humidity of between 10 and 25 % at a temperature not higher than 50 °C. An atmosphere with a relative humidity of 65 % at 20 °C will give this pre-conditioning atmosphere when heated to 47 ± 3 °C.

8 Taking and preparation of test specimens

From each sample, take two beards for testing by one of the following methods.

8.1 Hand combing method

Place a portion of the conditioned sample on a pair of combs. Distribute a quantity of the cotton in the combs sufficient for each pair of beards and within the tolerances of the instrument, after preparation of the specimen as follows.

Untangle and parallelize the beard of fibres protruding from the outer side of the teeth of the combs by holding one comb in each hand and gently combing the fibres in each comb with the teeth of the other comb. Transfer the fibres from one comb to the other and repeat the combing preparation, if required, to obtain a uniform distribution of fibres on the comb.

Check to see that there is an approximately uniform distribution of fibres on each comb by holding the comb toward the light. If the distribution is not satisfactory, transfer fibres from the denser to the lighter areas of each comb by continuing the combing action, while slightly tilting the teeth of the comb having the lighter area, to transfer fibres from the denser area until a fairly uniform distribution is obtained on each comb.

NOTE — The quantity of cotton, within the limits required by the instrument, does not affect the length values obtained, and operators can quickly learn, through practice, the quantity of fibre convenient for the instrument being used.

8.2 Instrumental method

Place one of the special combs in the combholder with the teeth uppermost. Place the sample in the instrument and press it against the perforated sample plate. Rotate the pivot arm for one complete counter-clockwise revolution, while maintaining evenly distributed pressure over the surface of the sample, to load and comb the specimen into a beard. Remove the loaded comb from the instrument and inspect the test beard. Discard beards that are uneven.

For additional test beards, remove the sample and turn it to present a new surface to the perforated plate; then repeat the operation indicated above.

Clean the instrument periodically to maintain effective combing action. To do this, raise the release button to put the doffer in the cleaning position, rotate the doffer one-half revolution clockwise to clean the combing sector, and return it counter-clockwise one-half revolution to clean the doffer itself.

9 Procedure

9.1 Preparation of apparatus

Set up and adjust the instrument in accordance with the manufacturer's instructions. In particular, for electrical apparatus, before making length tests, allow the instrument to warm up in accordance with the manufacturer's instructions, or until it is electronically stable. Carefully check both electrical and mechanical functions.

NOTE — International Calibration Cotton Standards, available from the US Department of Agriculture, Agricultural Marketing Service, Cotton Division, P.O. Box 17723, Memphis, Tennessee 38117, USA, may be used to calibrate the instrument employed.

Measure test beards of cotton fibres from a laboratory control sample with established length values.

Each operator shall measure separate test beards prepared from a laboratory control sample and obtain acceptable length results before performing similar measurements on test beards from samples with unknown length values. When unacceptable results are obtained from the laboratory control sample, recheck the instrument adjustments and the testing techniques until acceptable results are obtained.

NOTE — Length results obtained are affected by the amount of combing performed on the specimens. Operators quickly learn, through practice, the amount of combing required to obtain acceptable results for the tests on the laboratory control samples. If an automatic instrument is used, the speed of the revolving brushes should be optimized.

9.2 Measurement

Insert the combs with the test beards into the combholder of the instrument. Brush the fibres with firm strokes away from the comb to remove loose fibres and straighten the other fibres without disturbing their distribution in the teeth of the combs, thus completing the preparation of the specimens.

Place the instrument assembly and test beard in the scanning position and manipulate the controls to scan the fibres. Read

directly from the dials of the instrument the corresponding values of span length at the optical density chosen.

Make measurements on test beards taken from the laboratory control sample at least every 2 h during the day to maintain a continuous control of the level of the values.

NOTE — The results obtained are influenced by the intensity of brushing carried out on the test beard, and it is therefore important that the operator should always carry out this brushing in a constant way.

10   Calculation and expression of results

10.1   For each percentage of optical density chosen, calculate the mean of the results of the two tests on each sample, and express the result in millimetres.

10.2   Calculate the uniformity index from the formula

$$\frac{l_{\text{min.}}}{l_{\text{max.}}} \times 100$$

where

$l_{\text{min.}}$ is the smallest length, in millimetres, measured;

$l_{\text{max.}}$ is the greatest length, in millimetres, measured.

11   Test report

The test report shall include the following particulars :

a)   a reference to this International Standard;

b)   the average length at each percentage of optical density chosen, rounded to three significant figures, and the average uniformity index, rounded to two significant figures;

c)   the percentage chosen;

d)   the type of instrument used;

e)   the type of combing used;

f)   the source of the sample, such as raw stock, in-process stock, waste;

g)   details of any operation not specified in this International Standard, or incidents likely to have had an influence on the results.

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