INTERNATIONAL STANDARD 2403

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Textiles — Cotton fibres — Determination of micronaire value

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FOREWORD

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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 2403 was drawn up by Technical Committee ISO/TC 38, *Textiles*.

It was approved in November 1971 by the Member Bodies of the following countries :

Belgium	Hungary	Romania
Brazil	India	South Africa, Rep. of
Canada	Ireland	Spain
Chile	Israel	Sweden
Czechoslovakia	Italy	Switzerland
Denmark	Japan	Turkey
Egypt, Arab Rep. of	Netherlands	United Kingdom
Finland	Norway	U.S.A.
France	Peru	U.S.S.R.
Germany	Poland	

No Member Body expressed disapproval of the document.

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Textiles — Cotton fibres — Determination of micronaire value

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies a method of determining the micronaire value of loose disorientated cotton fibres taken from bales, laps, and slivers, or other sources of lint cotton.

2 REFERENCES

ISO/R 139, *Standard atmospheres for conditioning and testing textiles.*

ISO/R 220, *Method of sampling raw cotton for testing.*

3 DEFINITION

micronaire value : A measure of the air permeability of a mass of cotton under specified conditions, expressed in terms of an arbitrary scale, the so-called micronaire scale. The micronaire scale is based on a range of cottons to which micronaire values have been assigned by international agreement.

4 PRINCIPLE

Air is passed through a test specimen consisting of a plug of fibres. The permeability is indicated on a scale for recording variations in either the rate of flow through, or the pressure difference across, the plug. The mass and volume of the test specimen are either a constant for a given type of instrument, or varied appropriately in relation to each other. The scale indicating variations in permeability may be calibrated in arbitrary units of micronaire value or marked in the appropriate absolute units of rate of flow or of pressure difference, and a table or graph provided for conversion of the observed readings into micronaire values.

5 APPARATUS AND MATERIALS

5.1 Balance of sufficient capacity to weigh the test specimen required for the airflow instrument used, with an accuracy of ± 0.2 %.

5.2 Airflow instrument, whose principal parts are :

5.2.1 Compression cylinder with perforated ends of such dimensions that with the prescribed mass of specimen each cubic centimetre shall contain between 0.16 and 0.30 g of cotton when compressed.

5.2.2 Means for measuring the air permeability of the specimen, comprising, for example :

a) a suitable air pump;

b) one or more valves or other means for controlling the flow of air through, or the pressure difference across, the specimen in the compression cylinder;

c) a manometer for measuring the required air pressure difference across the specimen and a flowmeter for indicating the rate of airflow through it.

NOTE — Details of certain commercially available instruments which comply with this specification are given in the Appendices to this International Standard. The method of calibration of airflow instruments is described in Appendix X.

5.3 International calibration cotton standards, (See X.1 of Appendix X).

6 ATMOSPHERE FOR CONDITIONING AND TESTING

6.1 Condition test samples in the standard atmosphere for 4 h in moving air (or alternatively for 12 h in still air) or for a shorter time if the change in mass in a 2 h period does not exceed 0.25 % before weighing and testing the specimen. Preconditioning is not required.

6.2 Weigh and test the specimen in the standard atmosphere for conditioning (see ISO/R 139).

7 TEST SPECIMEN

7.1 Take test specimens in accordance with the instructions given in ISO/R 220, or specimens and samples may be drawn in other ways with prior agreement between the parties concerned.

7.2 Remove from the sample foreign bodies such as seed, sand, pieces of stalk and other impurities. Use a test specimen of the size prescribed for the instrument being used. In instruments having a compression cylinder of fixed volume, weigh the specimen to within ± 0.2 % of the specimen size appropriate for the instrument (see Appendices). In instruments having compression cylinders with adjustably varied volume, determine the mass of the specimen with an accuracy of ± 0.2 %.

7.3 Test the number of specimens per sample or per lot or shipment, and specify the scheme for the selection of samples, as agreed between the parties concerned.

8 PROCEDURE

8.1 Before each series of measurements, make the necessary preliminary adjustments appropriate to the instrument in use (see Appendices). From time to time test a minimum of two check specimens from each of three calibration cottons (see Appendix X) covering the range of micronaire values of samples to be tested to determine whether or not the instrument is correctly adjusted and is giving results on the correct level.

8.1.1 Consider the performance of any instrument to be within the requirements of this International Standard if the average results for each such calibration cotton do not differ from its corresponding established values by more than ± 0.10 micronaire scale unit.

8.1.2 Re-test, by the above procedure, cottons giving differences greater than ± 0.10 micronaire scale unit between the average of the two tests and the established value. Accept the results if the difference between the two new micronaire values for such a cotton does not exceed ± 0.10 micronaire scale unit. If the difference continues to be greater than ± 0.10 micronaire scale unit, either re-adjust the instrument and repeat the above check procedure or apply, on the basis of the established differences referred to above, an appropriate correction or adjustment to test values for subsequent samples submitted for testing.

8.2 Pack the test specimen evenly into the compression cylinder, a small portion at a time, fluffing the fibres with the fingers in order to break up any lumps and taking care that all the fibres are inserted in the cylinder. Put the compression plunger in position and lock it.

8.3 Cause air to flow through the specimen at the appropriate flow (or pressure) and note the reading on the airflow (or pressure difference) scale of the instrument to an accuracy of about ± 1 %.

8.4 If a second measurement is required for the same specimen, remove the cotton from the instrument, taking care not to lose fibre, and repeat the procedure given in 8.2 and 8.3.

9 CALCULATIONS AND EXPRESSION OF RESULTS

9.1 For instruments in which the scale is graduated in micronaire values, average the readings for the specimens tested from a sample. If necessary, apply any correction based on 8.1.2 and report the average to the nearest 0.1 micronaire value.

9.2 For instruments in which the scale is graduated in units other than micronaire values, convert the direct readings to micronaire values from a previously established conversion curve or statistical relation as described in Appendix X. Calculate the converted values as described in 9.1.

10 TEST REPORT

The test report shall include the following information :

a) reference to this International Standard;

b) the material source (lint cotton, picker lap, processing waste) and if possible type and/or botanical species (*desi*, Upland, *G. barbadense*);

c) the number of specimens tested, the number of readings per specimen, the number of samples used, and the scheme for drawing them;

d) the average values calculated;

e) the type, make and model of instrument used.

APPENDIX X

METHOD OF CALIBRATION OF INSTRUMENTS

X.1 Calibration of airflow instruments is based on samples of a series of International Calibration Cottons which are available from the Standards Preparation and Distribution, Cotton Division, Consumer and Marketing Service, US Department of Agriculture, PO Box 17723, Memphis, Tennessee, 38112 U.S.A. These are furnished with micronaire values established by the International Calibration Cotton Standards Committee.

X.2 For calibration purposes use the full range of calibration cottons available. They approximately cover the range of the micronaire values of the world's commercial cottons.

NOTE – The routine *checking* and adjusting of the instrument in relation to a section of the instrument's scale is to be distinguished from the more elaborate determination of the locations of numerous points along the full-scale range of the instrument when it is being *calibrated*. Routine *checking* for daily use is described in 8.1 to 8.1.2, Y.2 and Y.3 of Appendix Y and in Z.3 of Appendix Z. *Calibration* of an instrument, such as at the factory, or upon receiving it at the laboratory, or occasionally under other special circumstances at the laboratory is described in the following clauses of this Appendix.

X.3 For each calibration cotton, make a minimum of two test determinations on each of three test specimens. The difference between the test values for the first and second determinations shall not exceed 0.10 unit. If a greater difference is obtained, discard the result and make two determinations on a fresh test specimen. Take the average of the first readings on each of the three test specimens for each calibration cotton.

NOTE – The scale from which the readings are noted may already be graduated in micronaire values (as with most commercially available instruments). For a new instrument it may be a uniformly graduated scale.

X.4 For instruments already fitted with a scale graduated in micronaire values, determine the difference between the average scale reading and the corresponding established value for each cotton. If none of these differences exceeds 0.10 unit, regard the previous calibration of the instrument as satisfactory. If greater differences occur, make appropriate instrument checks and adjustments to bring the instrument performance into compliance with the above requirements. Alternatively a series of appropriate scale corrections may be calculated.

X.5 For instruments fitted with a scale graduated in other than micronaire values

either

– plot a graph showing the average instrument readings as abscissae and the corresponding established values as ordinates and draw a smooth curve to pass evenly through the points

or

– determine statistically the relation between average instrument readings and corresponding established values in the form of an equation.

The deviations between average scale readings and established micronaire value shall not be greater than the equivalent of 0.10 unit, as indicated by the graph or by the statistically established relation, as in X.4.

X.6 Use the calibration curve, or the corresponding statistical relation, to convert final test values yielded by cotton samples into micronaire values. Alternatively fit the instrument with a scale graduated in micronaire values, the markings of which are obtained from the calibration curve or from the statistical relation.

APPENDIX Y

OPERATION OF THE MICRONAIRE[1] AIRFLOW INSTRUMENT

Y.1 There are several models of the Micronaire instrument. They vary only in details of construction and operation. Any details of the operation of a particular model which differ from the instructions given in this Appendix are described in the manufacturer's instructions included with the instrument.

Y.2 Micronaire 60600

Mechanically adjust and check the instrument as follows :

a) Adjust the primary air regulator to give a pressure of 172 kN/m^2 (172 kPa, 1.76 kgf/cm^2) and open the valve that admits air to the instrument. Check the reading after the air flows through the instrument, and make a re-adjustment if necessary.

b) Insert the manometer plug in the compression chamber. Allow the air to enter the chamber and adjust the secondary valve to obtain a pressure 41.4 kN/m^2 (41.4 kPa, 0.42 kgf/cm^2) in the compression chamber. Again, if necessary, after the air flows through the instrument, re-adjust the regulating valve.

c) Insert one of the master orifice plugs, allow the air to enter, and if necessary, turn the calibration screw to bring the float to the position on the curvilinear scale corresponding to the designation of the orifice plug. Repeat these operations, using the other orifice plug or disk.

NOTES

1 Instead of two calibration disks, each with its bore, one disk with two different bores may be used. If the latter is used, close one of the bores with a finger at the lower scale value (2.8), the bore to be closed being especially marked.

2 The scale readings 2.8 and 6.2 respectively correspond to flow rates of 21.1 ± 0.8 l/min and 49.3 ± 1.4 l/min.

Y.3 Micronaire 80400

Mechanically adjust and check the instrument in accordance with 8.1 to 8.1.2 as follows :

a) Operate the foot valve and see if the air pressure behind the filter is between 413 kN/m^2 (413 kPa, 4.22 kgf/cm^2) and 862 kN/m^2 (862 kPa, 8.79 kgf/cm^2).

b) Open the pressure regulator and the upper and lower adjusting valves as far as possible.

c) Insert the control disk in the test chamber and open the foot valve. Operate the pressure regulator so that the mercury column rises to 30.3 kN/m^2 (30.3 kPa, 0.31 kgf/cm^2). The air must pass through both bores of the control disk without hindrance. Operate the foot valve several consecutive times. The mercury must always rise to the same height.

d) Adjust the lower adjusting valve so that the upper edge of the float comes to rest at micronaire value 4.6.

e) Adjust the upper adjusting valve so that the upper edge of the float comes to rest at the upper check mark at about micronaire value 6.0.

f) With one finger, tightly close the upper opening of the control disk. The float will then fall to about the level of the lower check mark.

g) In order to make an exact adjustment, while alternately opening and shutting the upper opening of the control disk, alternately change the lower and upper adjusting valves. Do this until the upper edge of the float corresponds with the two check marks located at about micronaire values of 2.9 and 6.0.

h) Turn the pressure regulator until the mercury column stands at 32.4 kN/m^2 (32.4 kPa, 0.33 kgf/cm^2).

j) By opening and closing the upper opening of the control disk, check whether the upper and lower positions of the float still correspond with the two adjustment marks even after the change of the mercury column from 30.3 kN/m^2 (30.3 kPa, 0.31 kgf/cm^2) to 32.4 kN/m^2 (32.4 kPa, 0.33 kgf/cm^2). If this does not occur, repeat the procedure in g).

1) Mention of the name of a specific or proprietary instrument is not intended to promote, or give preference to, the use of that instrument.