SLOVENSKI STANDARD
SIST EN 14278-3:2004

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Tekstilije - Ugotavljanje lepljivosti bombažnih vlaken - 3. del: Metoda z avtomatsko napravo z vrteļim bobnom za toplotno zaznavanje prisotnosti

Textiles - Determination of cotton fibre stickiness - Part 3: Method using an automatic thermodetection rotating drum device

Textilien - Bewertung der Klebrigkeit von Baumwolle - Teil 3: Verfahren mit dem automatischen Rotations-Thermodetektionsgerät

Textiles - Détermination du collage des fibres de coton - Partie 3: Méthode utilisant un dispositif automatique de thermodétection a tambour rotatif

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English version

Textiles - Determination of cotton fibre stickiness - Part 3: Method using an automatic thermodetection rotating drum device

Textiles - Détermination du collage des fibres de coton - Partie 3: Méthode utilisant un dispositif automatique de thermodétection à tambour rotatif

Textilien - Bewertung der Klebrigkeit von Baumwolle - Teil 3: Verfahren mit dem automatischen Rotations-Thermodetektionsgerät

This European Standard was approved by CEN on 24 December 2003.

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Foreword

This document (EN 14278-3:2004) has been prepared by Technical Committee CEN/TC 248 “Textiles and textile products”, the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2004, and conflicting national standards shall be withdrawn at the latest by September 2004.

Annex A is informative.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Introduction

The aim of this European Standard is to provide an indication of the stickiness potential of a sample of cotton fibres by simulating the tendency of "contaminated" cotton to stick to working surface during the spinning process. This test method does not distinguish between the various types of contamination which may cause stickiness.

Results of this method are not directly related to the determination of sugar content.

This standard consists of the following methods, under the general title "Textiles - Determination of cotton fibre stickiness":

- Part 1: Method using a manual thermodetection device
- Part 2: Method using an automatic thermodetection plate device
- Part 3: Method using an automatic thermodetection rotating drum device

1 Scope

This European Standard describes an automatic technique to simulate the tendency of "contaminated" cotton fibres to stick to working surfaces of textile machines (e.g. card clothing, drafting rollers, crush rolls).

Test specimens can be raw cotton fibre (fibre sampled, e.g. from a bale), or opened fibre, slivers.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 20139 *Textiles - Standard atmospheres for conditioning and testing (ISO 139:1973).*

3 Terms and definitions

For the purposes of this European Standard, the following terms and definitions apply.

3.1
stickiness level
number of sticky points indicating the severity of cotton fibre stickiness

3.2
sticky points
entanglement of fibres or individual fibres that are attached to a working surface as a result of contamination of the cotton by sticky substance

3.3
thermodetection
action of revealing sticky points through the combined application of heat and pressure

3.4
cotton web
thin homogeneous cotton fibre web formed by a special micro-card opening device

3.5
remover
device to take away the non sticking fibres and the cotton web from the rotating drum

4 Principle

A weighed specimen of cotton fibres is formed by hand into a short sliver and delivered by a conveyer to a micro card, where it is opened into a fine web and fed and pressed between two rotating drums maintained at a defined temperature. The web is aspirated from the drums, together with all loose fibres, leaving any sticky points exposed on the drum surfaces. The sticky points are detected, measured and counted by a laser-based optical system.

5 Apparatus

5.1 Automatic system

5.1.1 General

The automatic system comprises a conveyor belt to feed a test specimen into the system, followed by a series of devices that prepare the cotton web, generate the sticky points, regulate and clean the equipment, and detect the sticky points.

The sequence of the devices in the automatic system is as follows.

5.1.2 Micro-card device for the preparation of the cotton web

Micro-card device has the function of forming the cotton web from the test specimen.

Its major working parts are a liker-in roller, a main cylinder, three worker rollers, a doffing roller and a take-off roller. The main cylinder and the rollers are each covered with standard metallic card wire of a type and density appropriate for the respective individual roller functions.

The dimensions and relative speeds of the micro card rollers are such as to deliver a cotton web with a mass per unit area of (4,0 ± 0,2) g/m².

The relative speeds and the clothing of the micro-card rollers are such as to ensure complete take-off of the web, with no contamination of the rollers.

5.1.3 Rotating drum device

The device comprises a pair of smooth hardened steel drums, rotating against each other at a rotation speed of (100 ± 10) min^{-1}. The cotton web is fed under gravity to the two drums and is compressed between them. The surface of the rotating drums, in contact with the cotton web are maintained at a temperature of (35 ± 4) °C (see 5.1.4).

The surface of the rotating drums shall be clean at the point where the web is received and the pressure is applied (see 5.1.4).

5.1.4 Heating and cleaning device

The heating and cleaning device comprises the following components.

For each rotating drum and running in contact with it, a cylindrical brush rotating at 1800 min^{-1}. The cleaning element of the rotating brush is constructed from a mixture of metal wires and polypropylene filaments, in order to be aggressive enough for cleaning sticky deposits and have a good wear resistance.

- For each rotating drum, touching the drum at a tangent, a hardened metal scraper blade whose function is to scrape away any sticky deposits not removed by the cleaning brushes.

NOTE 1 For each rotating drum, mounted in contact with a segment of the circumference of the drum, and located after the rotating brushes and the scraper blades, a stationary or moving roller covered with wiper cloth made of polypropylene non-woven material.

- For each cleaning brush, a vacuum slot which removes the material that was cleaned from the drum by the brush.

- A manual or automatic controller which regulates the pressure exerted by each cleaning brush upon its rotating drum according to the temperature of the rotating drum, which has to be maintained at a certain level (see 5.1.3).

NOTE 2 This aggressive cleaning system is used to clean both the fibres and the sticky materials from the rotating drums in order to prevent second repeated detection of the same deposit again.

5.1.5 Web removal device

The web removal device consists of a vacuum slot mounted just under the rotating drums, whose function is to collect the cotton web after it has passed between the two rotating drums, leaving behind any sticky deposits that adhere to the rotating drums.

5.1.6 Sticky point detection and analysis device

The detection and analysis device comprises:

- For each rotating drum, a vacuum slot is mounted parallel to the axis of the drum (5 ± 0,2) mm from the surface of the drum. The function is to straighten the fibres before counting.

- For each rotating drum, a laser beam is directed parallel to the axis of the drum (1,0 ± 0,1) mm from the surface of the drum, towards a photodiode on the opposite side of the drum. The laser beam of (0,20 +/- 0,01) mm is targeted to a pin hole of (0,70 +/- 0,01) mm diameter in both the source and the target locations. Whenever the laser beam is interrupted, by one or more fibres adhering to the drum, a signal is generated whose amplitude and duration depends on the extent of the interruption. A special software algorithm is used to interpret the signals in terms of the total number of sticky points and their sizes. Results are presented on the computer screen.

5.2 Balance

Balance able to weigh between 3,5 g and 200 g, with an accuracy of 0,1 g.

6 Atmosphere for conditioning and testing

The atmosphere for conditioning and testing as defined in EN 20139 shall be used.

7 Preparation of test specimens

Condition the cotton fibre sample (laboratory sample) during at least 24 h in standard conditions.

NOTE If the cotton fibre sample has a high moisture content, sample pre-drying could be required, because the equilibrium in moisture has to be reached from the dried state.

Weigh each test specimen to be (3,5 ± 0,2) g.

Manipulate each test specimen, by pinching, drawing and rolling, until it is formed into a kind of sliver with a length of (30 ± 3) cm and a diameter approximately 4 cm, more or less uniform along its length.

8 Procedure

8.1 Automatic device set-up

Follow the recommendations of the supplier for cleaning, stabilisation of the instrument, calibration, use of the software.