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**Textiles — Cotton-fibre stickiness —  
Detection of sugar by colour reaction**

*Textiles — Collage des fibres de coton — Détection de sucre par  
réaction colorée*

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ISO 12027:2012

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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established 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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 12027 was prepared by Technical Committee ISO/TC 38, *Textiles*, Subcommittee SC 23, *Fibres and yarns*.

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## Introduction

Honeydew on the surface of cotton fibre can be transferred to a metallic surface of the spinning machines or rubber rollers, etc., resulting in lapping. As a result, it may lower the efficiency of the yarn production and yarn quality. Cotton stickiness is due mainly to entomological sugars produced by insects, which are designated by the term “honeydew”. This test method is used to evaluate the degree of honeydew contamination by visualization of honeydew droplets in cotton fibre.

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# Textiles — Cotton-fibre stickiness — Detection of sugar by colour reaction

## 1 Scope

This International Standard describes a method for evaluating the degree of cotton-fibre stickiness arising from honeydew contamination through detection of sugar by the colour reaction of a specific treated paper.

## 2 Terms and definitions

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

### 2.1

#### **colour-reaction solution**

solution consisting of *p*-aminobenzoic acid, acetone, phosphoric acid and water

### 2.2

#### **colour-reaction paper**

filter paper containing colour-reaction solution prepared before the testing

### 2.3

#### **brown colour spots**

spots on the tested colour-reaction paper which are developed by reacting honeydew sugars with *p*-aminobenzoic acid placed in a convection oven

### 2.4

#### **stickiness grade**

grade which indicates the incidence of cotton-fibre stickiness

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## 3 Principle

Honeydew droplets that may occur in a specific cotton web with its fixed surface area and mass are transferred to a colour-reaction paper after a press and incubator lap. The resultant paper image may be evaluated by comparing the appearance of the developed brown spots (honeydew reaction) with a series of five visual standards from which a visual grade is assigned, or the resultant paper image of the brown spots may be scanned into an electronic file for image profile analysis.

## 4 Reagents

Use only reagents of recognized analytical grade.

### 4.1 *p*-Aminobenzoic acid.

### 4.2 Acetone (minimum assay to be > 99 %).

### 4.3 Phosphoric acid (minimum assay to be > 85 %).

### 4.4 Water, distilled.

## 5 Apparatus

**5.1 Mechanical opening device**, comprising a rotating opening roller covered with metallic card wire suitable for processing cotton fibres into the homogeneous web.

EXAMPLE Fibre cleaner, miniature carding machine or other.

**5.2 Analytical balance**, weighing to an accuracy of 0,01 g.

**5.3 Glass plates or polished stainless plates**, at least 100 mm × 100 mm 0/+5 mm.

NOTE Each test sample (there are three per sample) requires two plates. A minimum of six glass plates per sample is required.

**5.4 Stopwatch.**

**5.5 Pressing system**, applying a mass of 4 kg on a 100 mm × 100 mm area for 1 min.

**5.6 Filter paper**: cellulose-containing paper (pore size 5 µm) cut into 100 mm × 100 mm pieces.

**5.7 Colour-reaction device**, convection oven or similar device which is uniformly heated and maintained at  $(120 \pm 0,5)$  °C for 5 min at least.

NOTE the air velocity in the oven is about 1 m/s to 2 m/s.

**5.8 Cotton-fibre stickiness replicas**<sup>1)</sup>, the different stickiness replicas are given through five coloured or grey-level images (Figures 1 and 2).

In general, the cotton stickiness grade is assigned by comparing with the grey replicas (Figure 1). It is recommended that coloured replicas (Figure 2) be used as a reference for more precise evaluation.

**5.9 Image analysis device**, comprising image input apparatus like a scanner and image analysis program. All kinds of the commercial scanners can be used, but the resolution of 200 dpi (0,1 mm/pixel) at least is necessary for this test. The image analysis program may be available from KOTITI (Gyeonggi-do, Korea) or may be programmed for oneself.

## 6 Preparation

### 6.1 Sampling and preparation of test specimen

**6.1.1** Take at random three laboratory samples from a cotton bale, each weighing  $(5 \pm 0,1)$  g.

**6.1.2** Remove impurities and prepare three webs, each of mass  $(5 \pm 1)$  mg/cm<sup>2</sup>, by means of the mechanical opening device (5.1).

**6.1.3** Cut one test specimen of 100 mm × 100 mm from each web.

NOTE Card matt, lap, or sliver can also be used as a sample.

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1) Cotton-fibre stickiness replicas are available from KOTITI (Korea Textile Inspection & Testing Institute), 138-7 Sangdaewon-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by ISO of this product.



## 6.2 Colour-reaction solution

**6.2.1** Dissolve  $(10 \pm 0,01)$  g of *p*-aminobenzoic acid (4.1) in  $(300 \pm 1,0)$  ml of acetone (4.2) thoroughly in a 1 000 ml volumetric flask.

**6.2.2** Add  $(10 \pm 0,01)$  ml of phosphoric acid (4.3) to the volumetric flask. Fill the volumetric flask with distilled water (4.4) to the 1 000 ml mark and mix to be sure that all chemicals are thoroughly dissolved.

It is preferable to test immediately after preparing the colour-reaction solution because acetone is volatile. Also, it is recommended that the colour-reaction solution be kept in a bottle under refrigerating conditions. Take into account security precautions to manipulate the solution.

## 6.3 Colour-reaction paper

**6.3.1** Prepare a sheet of filter paper (5.6) by cutting a  $(100 \times 100)$  mm square for each test specimen.

**6.3.2** Wet the filter paper with colour-reaction solution (6.2) and squeeze to remove excess solution by using an instrument such as a wringer [pick-up:  $(70 \pm 5)$  %].

It is recommended that the colour-reaction paper be sealed off and kept under refrigerated conditions. Do not use colour-reaction paper more than 30 days after its production.

## 7 Procedure

### 7.1 Colour-reaction device set-up

Set the colour-reaction device (5.7) in order to obtain a temperature at  $(120 \pm 0,5)$  °C across its entire space.

### 7.2 Transferring honeydew droplets to colour-reaction paper

**7.2.1** Place a sheet of colour-reaction paper (6.3) on the glass or polished stainless plate (5.3).

**7.2.2** Spread a test specimen (6.1) evenly over the colour-reaction paper and cover it with another glass plate or polished stainless plate.

**7.2.3** Load a weight (see 5.5) on the plate for 1 min, timed using a stopwatch (5.4).

**7.2.4** Remove the weight, plate and specimen on the colour-reaction paper.

### 7.3 Colour-reaction phase

Place the colour-reaction paper used in 7.2 in the colour-reaction device and maintain it at  $(120 \pm 0,5)$  °C for 5 min, then take it out of the colour-reaction device. The tested colour-reaction paper doesn't need cooling down or conditioning before the assessment is carried out. It is recommended that the assessment be carried out within 10 min of finishing the test, because the colour of the tested paper becomes darker over time.

**NOTE** The colour shade of tested colour-reaction paper may change according to the performance of the colour-reaction device. When the image of the tested colour-reaction paper is significantly blurred or dark in comparison with the colour replicas (see Figure 2), it is recommended to control the reaction temperature and time.