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Textiles — Determination of fabric propensity to surface fuzzing and to pilling —

Part 3: Random tumble pilling method

Textiles — Détermination de la propension des étoffes à l'ébouriffage en surface et au boulochage —

Partie 3: Méthode de boulochage par chocs aléatoires dans une chambre cylindrique

ICS 59.080.01

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The CEN Secretary-General has advised the ISO Secretary-General that this ISO/DIS covers a subject of interest to European standardization. **In accordance with the ISO-lead mode of collaboration as defined in the Vienna Agreement, consultation on this ISO/DIS has the same effect for CEN members as would a CEN enquiry on a draft European Standard.** Should this draft be accepted, a final draft, established on the basis of comments received, will be submitted to a parallel two-month FDIS vote in ISO and formal vote in CEN.

To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.

Pour accélérer la distribution, le présent document est distribué tel qu'il est parvenu du secrétariat du comité. Le travail de rédaction et de composition de texte sera effectué au Secrétariat central de l'ISO au stade de publication.

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

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 12945-3 was prepared by Technical Committee ISO/TC 38, *Textiles*, Subcommittee SC 24, *Conditioning atmospheres and physical tests for textile fabrics*.

ISO 12945 consists of the following parts, under the general title *Textiles — Determination of fabric propensity to surface fuzzing and to pilling*:

— *Part 3: Random tumble pilling method*

— *Part 2: Modified Martindale method*

— *Part 1: Pilling box method*

Introduction

Pills are formed when fibres on a fabric surface “tease out” and become entangled during wear. Such surface deterioration is generally undesirable, but the degree of consumer tolerance for a given level of pilling will depend on the garment type and fabric end use.

Generally the level of pilling which develops is determined by the rates of the following parallel processes:

a) Fibre entanglement leading to pill formation;

b) Development of more surface fibre;

c) Fibre and pill wear-off.

The rates of these processes depend on the fibre, yarn and fabric properties. Examples of extreme situations are found in fabrics containing strong fibres versus fabric containing weak fibres. A consequence of the strong fibre is a rate of pill formation that exceeds the rate of wear-off. This results in an increase of pilling with an increase of wear. With a weak fibre the rate of pill formation competes with the rate of wear-off. This would result in a fluctuation of pilling with an increase of wear. There are other constructions where the surface fibre wear-off occurs before pill formation. Each of these examples demonstrates the complexity of evaluating the surface change on different types of fabric.

The ideal laboratory test would accelerate the wear processes a), b) and c) by exactly the same factor and would be universally applicable to all fibre, yarn and fabric types. No such test has been developed. However, a test procedure has been established in which fabrics can be ranked in the same order of fuzzing and pilling propensity as is likely to occur in end-use wear.

Particular attention is drawn to annex B which gives advice on the maintenance and checking of the apparatus and liners. It is recommended that annex B be studied prior to carrying out the procedure.

Textiles — Determination of fabric propensity to surface fuzzing and to pilling —

Part 3:
Random tumble pilling method

1 Scope

This part of ISO 12945 describes a method for the determination of the resistance to pilling and change of appearance of textile fabrics using the random tumble pilling tester. This procedure is applicable to all types of woven and knitted apparel fabrics.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 139, *Standard Atmospheres for conditioning and testing*

ISO 3175-1, *Textiles - Dry cleaning and finishing – Part 1: Method of assessing the cleanability of textiles and garments*

ISO 3175-2, *Textiles – Dry cleaning and finishing – Part 2: Procedures for tetrachloroethene*

ISO 6330, *Textiles – Domestic washing and drying procedures for textile testing*

ISO 6330, *Textiles – Domestic washing and drying procedures for textile testing*

3 Terms and definitions

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

3.1

fuzzing

roughing up of the surface fibres and/or teasing out of the fibres from the fabric, which produces a visible surface change.

NOTE 1 This change can occur during washing, dry cleaning and/or wearing.

3.2

pills

entangling of fibres into balls (pills) which stand proud of the fabric and are of such density that light will not penetrate and will cast a shadow.

NOTE 2: This change can occur during washing, dry cleaning and/or wearing.

3.3

pilling

generation of pills over the surface of the fabric.

3.4

pilling resistance

resistance to the formation of pills on the surface of a textile fabric.

3.5

hang ups, jamming or wedges

when specimens either become entangled on the impeller or lie on the side of the cylinder wall resulting in the fabric not tumbling in the required random action.

4 Principle

Specimens are tumbled randomly, under defined conditions, in a lined cylindrical test chamber. Pilling is assessed visually after a defined period of tumbling. Any special treatment of the laboratory sample, i.e. washing, cleaning, has to be agreed upon and shall be advised in the test report.

5 Apparatus and auxiliary materials

5.1 Apparatus, a device consisting of one or several horizontally positioned cylindrical test chambers each measuring 146,5 ± 1,5 mm diameter and 151,5 ± 1,5 mm deep with a removable cover. In the centre of each chamber is a horizontal shaft with cross rods (impellers) which rotate at 1200 rpm (+50 / -25 rpm). Two types of test combinations of shaft and cross rods may be used, as agreed upon between interested parties and this shall be stated in the test report.

5.1.1 Impellers with two cross rods and air injection (see annex A figure A1). When rotating the test specimens, air is blown into the chamber with a pressure of 21 kPa (± 2 kPa) to sustain a steady movement of the test specimens, thus avoiding jamming during the test.

5.1.2 Impellers with four cross rods, no air injection (see annex A figure A2).

5.2 Lining Material, two types of lining materials, cork or neoprene may be used. The type of liner shall be agreed between the interested parties and shall be stated in the test report. The liner selected shall conform to the following criteria.

Table 1 — Criteria for liners

Criteria	Units	Cork Liner	~~Neoprene Liner~~
Length	mm	455 ± 2	452 ± 2
Width	mm	146 ± 2	146 ± 2
Thickness	mm	1,5 ± 0,3	3,2 ± 0,4
Hardness	IRHD*	-	60 – 70

* IRHD is an abbreviation for International Rubber Hardness degree.

The neoprene liner shall be run in before the first use according to annex B2. Each cork liner is to be used for one test run only, both sides may be used and then it is discarded.

5.3 Air injection device, (used with apparatus described in clause 5.1.1) to give 21kpa (± 2kpa) pressure in each test chamber in a directed flow, either included in the new testers or as a modification in older testers.

5.4 Vacuum cleaner, home canister type to clean specimens after testing.

Viewing cabinet, illuminated by a white fluorescent tube or bulb (the colour temperature of the light source is not critical) to give uniform illumination over the width of the specimen(s) and masked in such a way that the observer does not look directly into the light. The illuminant should be positioned at an angle between 5 and 15 degrees to the plane of the specimen (see Figure 1). The distance between the eye and the specimen should be between 30 and 50 cm for normal corrected vision.

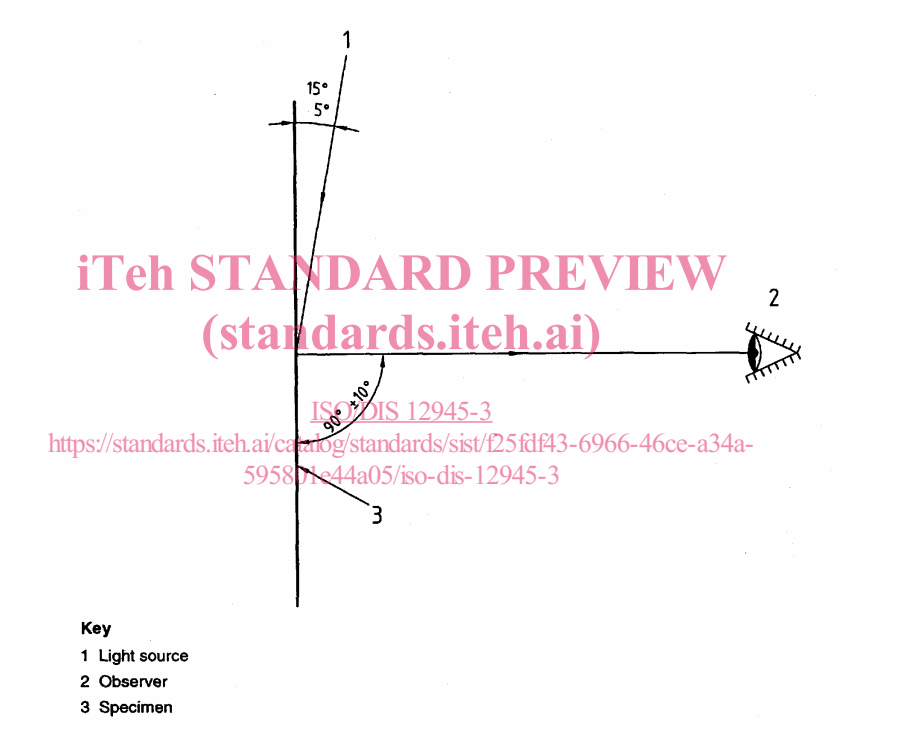

Figure 1 — Illumination of specimens