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Textiles — Determination of the fabric propensity to surface pilling, fuzzing or matting —

Part 3: Random tumble pilling method

Textiles — Détermination de la résistance au boulochage, à l'ébouriffement ou au moutonnement des étoffes —

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

ICS 59.080.01

ISO/CEN PARALLEL PROCESSING

This draft has been developed within the International Organization for Standardization (ISO), and processed under the **ISO-lead** mode of collaboration as defined in the Vienna Agreement.

This draft is hereby submitted to the ISO member bodies and to the CEN member bodies for a parallel five-month enquiry.

Should this draft be accepted, a final draft, established on the basis of comments received, will be submitted to a parallel two-month approval vote in ISO and formal vote in CEN.

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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.

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

This second/third/... edition cancels and replaces the first/second/... edition (), [clause(s) / subclause(s) / table(s) / figure(s) / annex(es)] of which [has / have] been technically revised.

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

- *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 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 A which gives advice on the maintenance and checking of the apparatus and liners. It is recommended that annex A be studied prior to carrying out the procedure.

In bibliography, some listed national standards have been taken into consideration as they refer to the use of the equipment, on which the Part 3 is based.

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Textiles — Determination of fabric propensity to surface pilling, fuzzing or matting — Part 3: Random tumble pilling method

1 Scope

This part of ISO 12945 describes a method for the determination of the resistance to pilling, fuzzing and matting of textile fabrics using the random tumble pilling tester. This method is applicable to most of woven and knitted fabrics, including inlay fabrics (fleeces).

This method is not applicable to fabrics which cannot tumble freely.

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 48, *Rubber, vulcanized or thermoplastic. Determination of hardness (hardness between 10 IRHD and 100 IRHD)*

ISO 139, *Standard Atmospheres for conditioning and 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 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 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

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.

3.5

matting

gathering of the raising fibres from a napped fabric, which produces a visible surface change

4 Principle

Specimens are tumbled randomly, under defined conditions, in a lined cylindrical test chamber. Fuzzing, pilling and matting are assessed visually after a defined period of tumbling.

NOTE Any special treatment of the laboratory sample, i.e. washing, cleaning could be as agreed upon between the interested parties and be described in the test report.

5 Apparatus and auxiliary materials

5.1 Apparatus

The apparatus shall include:

5.1.1 a device consisting of one or several cylindrical test chambers, horizontally positioned, with the inside dimensions of $(152,4 \pm 1,0)$ mm in depth and (146 ± 1) mm in diameter. In the centre of each chamber is a horizontal shaft with cross rods (impellers) which rotate at 1200 rpm (cf. Figure 2). This device shall have a mean capable of sustaining a steady movement of the test specimens (thus avoiding jamming during the test); this functionality may be set by either an air jet (which can blow onto the cylinder wall) or plastic blades (placed on the shaft – see Figure 2 -, which can move physically jammed test specimens from the cylinder wall).

NOTE The use of either air jet device or plastic blades shall be reported.

5.1.2 lining material: neoprene liner. The neoprene liner shall conform to the following criteria as described in Table 1.

Table 1 — Criteria for neoprene liner

Criteria	Units	Neoprene Liner
Length	mm	452 ± 2
Width	mm	146 ± 2
Thickness	mm	$3,2 \pm 0,4$
Hardness	IRHD ^{a)}	60 – 70
^{a)} IRHD is an abbreviation for International Rubber Hardness degree and shall be checked according to ISO 48 (method N, i.e. normal test).		

5.1.3 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 surface 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.

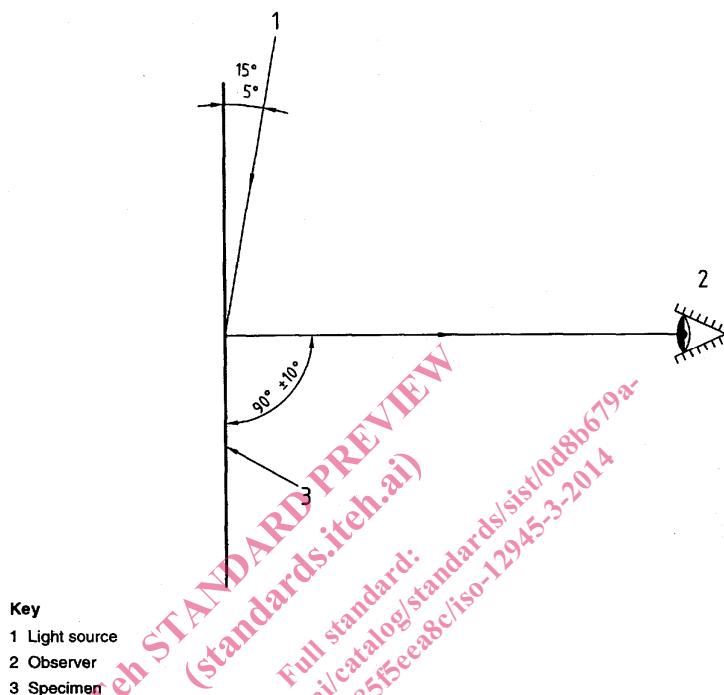


Figure 1 - Illumination of specimens

5.2 Auxiliary materials

5.2.1 Glue, a white water based all-purpose glue, for sealing the edges of the specimens.

NOTE Generally, this kind of glue is an emulsion of polyvinyl acetate.

5.2.2 Device for cutting test specimens square or round to provide a test area (100 ± 2) cm².

NOTE Studies have shown that the shape of the test specimens do not influence the test results.

5.2.3 Rating standards (optional), a set of 5 photographs numbered 1 to 5 illustrating varying degrees of pilling. The photographs shall be the same size as the test specimens.

5.2.4 Cork liner (optional). If agreed upon between the interested parties, cork liner can be used instead of the neoprene liner (5.2).

NOTE The replacement of the neoprene liner by the cork liner will lead to increase 2 times the testing time as specified in 9.4.

5.2.5 Cotton linters (optional). If agreed upon between the interested parties, cotton linters can be used to highlight the possible occurrence of pills.

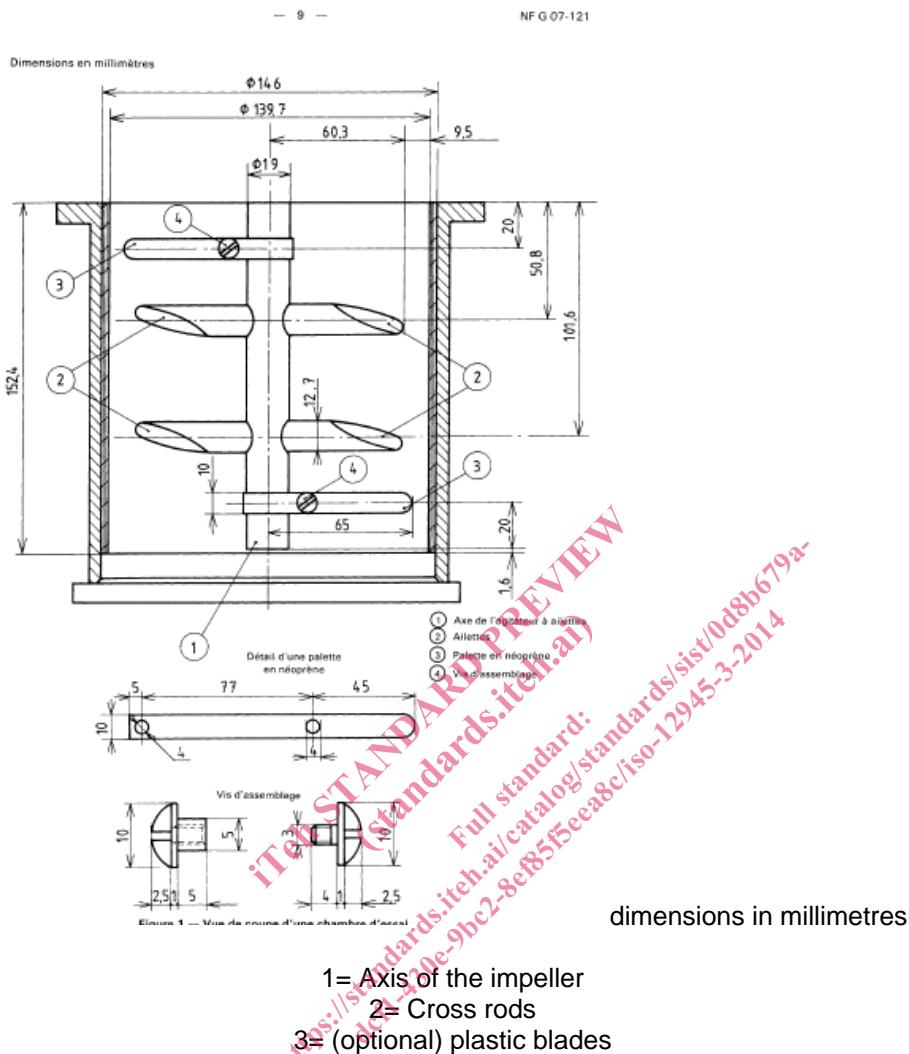


Figure 2 — View of the testing chamber

6 Conditioning and testing atmosphere

The standard temperate atmosphere for conditioning and testing textiles as defined in ISO 139 shall be used.

NOTE: It is recommended that the test specimens be conditioned for at least 16 hours prior to testing.

7 Preparation of test specimens

7.1 Pre-treatment

Samples may be washed or dry cleaned before cutting the test specimens, using conditions appropriate for the fabric end use or conditions agreed upon between the interested parties.

NOTE 1 The procedures described in ISO 6330 or in a part of the series of ISO 3175 may be suitable (cf. Bibliography).