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Textiles — Test methods for evaluating the electrostatic propensity of fabrics —

Part 4: Test method using horizontal mechanical friction

Textiles — Méthodes d'essai pour l'évaluation de la propension des étoffes électrostatique —

Partie 4: Méthode d'essai de friction mécanique horizontale

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) are worldwide federations of national standards bodies (ISO member bodies and IEC national committees). The work of preparing International Standards is normally carried out through ISO and IEC 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 IEC on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committees responsible for this document are Technical Committee ISO/TC 38, *Textiles* and IEC/TC 101 *Electrostatics* as JWG 26, *Antistatic*, in the lead of ISO/TC 38.

ISO 18080 consists of the following parts, under the general title *Textiles — Test methods for evaluating the electrostatic propensity of fabrics*:

— *Part 1: Test method using corona charging*

— *Part 2: Test method using rotary mechanical friction*

— *Part 3: Test method using manual friction*

— *Part 4: Test method using horizontal mechanical friction*

Introduction

In addition to safety hazards and damage or disruption of sensitive electronic devices and systems which are covered by other International Standards, electrostatic charging of clothing can also cause problems of clinging, uncomfortable shocks and the attraction of airborne dust and other contaminants.

Clothing designed to avoid airborne dust contamination is required in a number of expanding industries relating to precision technology, biotechnology, food, hygiene, etc. It is also generally desirable to have clothing that does not cling or cause uncomfortable shocks.

Test methods are required to evaluate the propensity of fabrics used to make clothing designed to avoid problems associated with electrostatic charging. Test methods are specified in a number of National and International Standards including those published by ISO and IEC. However, the relationship between measurable electrostatic properties and end use performance is rather complex and may require a combination of different test methods depending on application.

The test method described in this International Standard is one of a number of test methods that can be used to evaluate the electrostatic propensity of textile materials.

The test method is based on frictional charging which is one of the main charging mechanisms present in practical wearing conditions. Although the methods described in ISO 18080-2 and ISO 18080-3 also use frictional charging, the results may not be directly comparable in absolute terms because of the different ways in which friction is applied.

Textiles — Test methods for evaluating the electrostatic propensity of fabrics —

Part 4:
Test method using horizontal mechanical friction

1 Scope

This part of ISO 18080 specifies a test method using horizontal mechanical friction with measurement of friction-charged electrostatic potential on specimens of fabric and the time for that potential to decay. The test method is suitable for fabrics of all types of composition and construction that are capable of withstanding frictional charging.

Some fabrics, e.g. fabrics of low strength or loose construction, may not be physically capable of withstanding the manual friction used in this test method or may give false results. In such cases, the test method described in ISO 18080-1 can be used to evaluate electrostatic propensity.

The test method described may not be suitable for evaluating garments and garment materials in relation to safety of personnel and protection of electrostatic discharge sensitive devices.

2 Normative references

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

ISO 105-F01, *Textiles — Tests for colour fastness — Part F01: Specification for wool adjacent fabric*

ISO 105-F02, *Textiles — Tests for colour fastness — Part F02: Specification for cotton and viscose adjacent fabrics*

ISO 3175-2, *Textiles — Professional care, drycleaning and wetcleaning of fabrics and garments — Part 2: Procedure for testing performance when cleaning and finishing using tetrachloroethene*

ISO 3175-3, *Textiles — Professional care, drycleaning and wetcleaning of fabrics and garments — Part 3: Procedure for testing performance when cleaning and finishing using hydrocarbon solvents*

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
antistatic
property of a material that reduces its propensity to acquire electrostatic charges or allows electrostatic charges to dissipate quickly

3.2
conductive
providing a sufficiently high conductivity so that potential differences over any parts of a material or object are not sufficiently large to be of practical significance

3.3
friction-charged electrostatic potential
potential generated on a material by friction with another or same material obtained as voltage

3.4
decay time
time for the impressed voltage to decay to a percentage of the peak voltage

3.5
half decay time
time for the impressed voltage to decay to half of the peak voltage

4 Principle

A specimen is rubbed by a rubbing fabric using a horizontal mechanical friction test apparatus. After rubbing, the specimen pedestal is moved under an electrostatic fieldmeter. Surface potential on the specimen is measured by the electrostatic fieldmeter and recorded against the elapsed time as the potential decays. The friction-charged electrostatic potential, i.e. the peak electrostatic potential, and half decay time are derived from the recorded data.

5 Conditioning and testing atmosphere

Unless otherwise agreed or specified, the atmosphere for conditioning and testing shall be a temperature of (20 ± 2) °C and a relative humidity of (40 ± 4) %. If a different temperature or humidity is used for conditioning or testing, record it in the test report.

NOTE For measurements, refer to ISO 139.

6 Apparatus

6.1 Testing apparatus, an example of apparatus is shown in Figure 1 and composed of as the following.

Test apparatus other than that described below may be used after appropriate validation and provided a full description is included in the test report.

— **Rubbing unit**, Figure 1, key 1.

— **Specimen table**, Figure 1, key 2, thickness 1,5 mm ± 0,1 mm and with a hole of 72 mm ± 1 mm diameter. After rubbing, the specimen table is moved so that the specimen is placed under the electric fieldmeter Figure 1, key 3.

— **Specimen holder**, Figure 1, key 4, thickness 1 mm ± 0,1 mm with a hole of 75 mm ± 1 mm diameter positioned so that the centre of the hole in the specimen holder is vertically aligned with the centre of the hole in the specimen table.

— **Electrostatic fieldmeter**, Figure 1, key 3, a rotating sector type with an effective diameter of 40 mm to 45 mm positioned at a distance of 50 mm ± 1 mm from the specimen used to detect the electrostatic potential generated by rubbing.

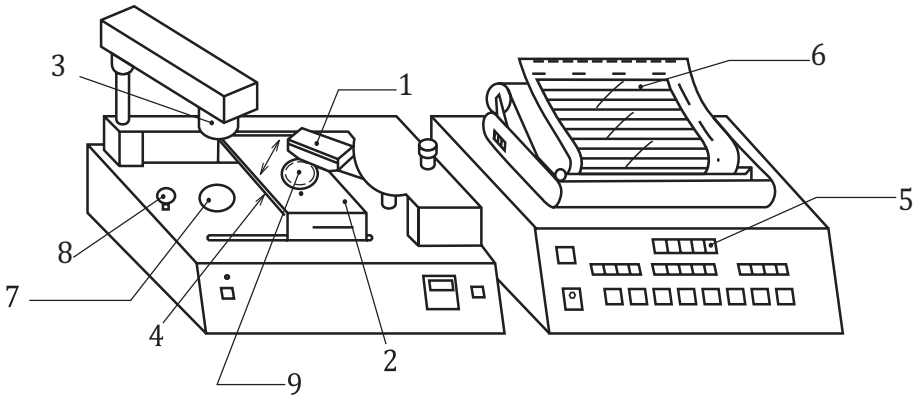
— **Controller**, Figure 1, key 5.

— **Recorder**, Figure 1, key 6.

— **Calibration electrode**, Figure 1, key 7.

— **Calibration electrode pull-up handle**, Figure 1, key 8.

Metal and other conductive components of the test apparatus shall be connected to the ground with a resistance to the ground of less than 10 Ω.

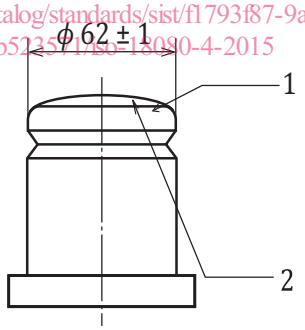


Key

1 rubbing unit
2 specimen table
3 electrostatic fieldmeter
4 specimen holder
5 controller
6 recorder
7 calibration electrode
8 calibration electrode pull-up handle
9 specimen

Figure 1 — Testing apparatus for measurement of friction charged potential and potential decay

Dimensions in millimetres



Key

1 edge curvature radius, approximately 6 mm
2 curvature radius, approximately 250 mm

Figure 2 — Specimen supporting pedestal

6.2 Specimen supporting pedestal, Figure 2, made of wood such as magnolia or oak with a resistance to the ground when installed in the test apparatus of 10^7 Ω to 10^{10} Ω measured under the conditions specified in Clause 5. The pedestal is positioned under the specimen (Figure 1, key 9) and is used to support the specimen during rubbing. The top face of the pedestal is higher than the specimen table by approximately 1 mm, as shown in Figure 4.