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Nonwovens — Test methods —

Part 4: Determination of tear resistance by the trapezoid procedure

Nontissés — Méthodes d'essai —

Partie 4: Détermination de la résistance à la déchirure par la méthode du trapèze

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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.

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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC38, *Textiles.*

This third edition cancels and replaces the second edition (ISO 9073-4:1997), which has been technically revised.

The main changes compared to the previous edition are as follows:

— the title has been changed to "Nonwovens — Test methods — Part 4: Determination of tear resistance by the trapezoid procedure";

— the value method of single specimen, changed from average value of the series of significant load peaks to maximum force as the test result of a single specimen has been modified.

A list of all parts in the ISO 9073 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Nonwovens — Test methods —

Part 4: Determination of tear resistance by the trapezoid procedure

1 Scope

This document specifies a method for the determination of tear resistance of nonwovens by the trapezoid method.

This document applies to nonwovens.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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, *Textiles — Standard atmospheres for conditioning and testing*

ISO 186, *Paper and board — Sampling to determine average quality*

ISO 3696, *Water for analytical laboratory use — Specification and test methods*

ISO 7500-1, *Metallic materials — Calibration and verification of static uniaxial testing machines — Part 1: Tension/compression testing machines — Calibration and verification of the force-measuring system*

ISO 10012, *Measurement management systems — Requirements for measurement processes and measuring equipment*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
constant rate of extension testing machine
CRE testing machine
tensile-testing machine where one clamp is stationary whilst the other is moving with a constant speed throughout the test and where the entire testing system is virtually free from deflection

3.2
gauge length
distance between the two effective clamping points of a testing device

Note 1 to entry: The effective clamping points (or lines) of jaws can be checked by clamping a test specimen under defined pretension with carbon copy paper to produce a gripping pattern on the test specimen and/or jaw faces.

3.3
tear force
force required to propagate a tear initiated under the specified conditions

4 Principle

Marking of a trapezoid on a test specimen. Clamping of the non-parallel sides of the trapezoid in the jaws of a tensile testing machine. Application of a continuously increasing extension to the test specimen in such a way that a tear propagates across its width. The force to continue the tear over a specified distance is recorded. The arithmetic mean of the maximum force of specimens is taken as the result of testing.

5 Apparatus

5.1 Tensile testing machine, metrological confirmation system of which shall be in accordance with ISO 10012.The constant rate of extension testing machine (CRE testing machine) having the following characteristics:

a) capable of operating at a constant rate of extension of (100 ± 10) mm/min;

b) capable of gauge length to be set to (25 ± 1) mm;

c) provided with means for recording the force applied to the test specimen during the tear test;

d) under conditions of use, accuracy of the apparatus shall be class 1 of ISO 7500-1. The error of the indicated or recorded maximum force at any point in the range in which the machine is used shall not exceed ± 1 %,and the error of the indicated or recorded jaw separation shall not exceed ± 1 mm;

e) if recording of force and extension is obtained by means of data acquisition boards and software, the frequency of data collection shall be at least 8 per second.

If a class 2 tensile testing machine according to ISO 7500-1 is to be used, this shall be stated in the test report.

NOTE Constant rate of traverse type (CRT) tester can also be used when agreed upon between interested parties. There can be no overall correlation between the test results obtained with the CRT-type machine and CRE-type machine.

5.2 Clamping device, comprising the two jaws of the machine, the central points of which are in the line of applied force, the front edges at right angles to the line of applied force and the clamping faces in the same plane. The jaws shall be capable of holding the test specimen without allowing it to slip and designed so that they do not cut or otherwise weaken the test specimen. The width of the jaws should preferably be 100 mm, but shall not be less than the width of the test specimen.

5.3 Isosceles trapezoid template, having dimensions with a tolerance of ± 0,5 % as shown in Figure 1.

5.4 Equipment, in which test specimens can be immersed in water preparatory to wet testing.

5.5 Grade 3 water, in accordance with ISO 3696 for wetting test specimens.

5.6 Nonionic wetting agent.