
**Textiles — Tensile properties of
fabrics —**

**Part 2:
Determination of maximum force
using the grab method**

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*Textiles — Propriétés des étoffes en traction —
Partie 2: Détermination de la force maximale par la méthode
d'arrachement (Grab test)*

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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 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 committee responsible for this document is ISO/TC 38, *Textiles*, Subcommittee SC 24, *Conditioning atmospheres and physical tests for textile fabrics*.

This second edition cancels and replaces the first edition (ISO 13934-2:1999), of which it constitutes a minor revision.

ISO 13934 consists of the following parts, under the general title *Textiles — Tensile properties of fabrics*:

- *Part 1: Determination of maximum force and elongation at maximum force using the strip method*
- *Part 2: Determination of maximum force using the grab method*

Introduction

This part of ISO 13934 has been prepared in the context of several test methods for determination of certain mechanical properties of textiles using mainly tensile testing machines, e.g. tensile properties, seam tensile properties, tear properties, and seam slippage. The procedure for these standards agrees where appropriate. The results obtained by one of the methods should not be compared with those obtained by the other methods.

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Textiles — Tensile properties of fabrics —

Part 2:

Determination of maximum force using the grab method

1 Scope

This part of ISO 13934 specifies a procedure for the determination of the maximum force of textile fabrics known as the grab test.

NOTE ISO 13934-1 describes the method known as the strip test.

The method is mainly applicable to woven textile fabrics including fabrics which exhibit stretch characteristics imparted by the presence of an elastomeric fibre and mechanical or chemical treatment. It can be applicable to fabrics produced by other techniques. It is not normally applicable to geotextiles, nonwovens, coated fabrics, textile-glass woven fabrics, and fabrics made from carbon fibres or polyolefin tape yarns.

The method specifies the determination of the maximum force of test specimens in equilibrium with the standard atmosphere for testing and of test specimens in the wet state.

The method is restricted to the use of constant-rate-of-extension (CRE) testing machines.

2 Normative references

ISO 13934-2:2014

<https://standards.iteh.ai/catalog/standards/sist/50117cfl-f93c-4278-8526-413c711dca/bc/13934-2-2014>

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 139, *Textiles — Standard atmospheres for conditioning and testing*

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

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

ISO 10012-1, *Quality assurance requirements for measuring equipment — Part 1: Metrological confirmation system for measuring equipment*

3 Terms and definitions

For the purposes of this document, the terms and definitions in ISO 13934 and the following apply.

3.1

constant-rate-of-extension (CRE) testing machine

tensile-testing machine provided with one clamp which is stationary and another clamp which moves with a constant speed throughout the test, the entire testing system being virtually free from deflection

[SOURCE: ISO 13934-1:2013, 3.1]

3.2

grab test

tensile test in which only the centre part of the test specimen is gripped in the jaws of the testing machine

3.3 maximum force
maximum force recorded when a test specimen is taken to rupture during a test under the specified conditions

[SOURCE: ISO 13934-1:2013, 3.11]

3.4 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 with carbon copy paper to produce a gripping pattern on the test specimen and/or the jaw faces.

[SOURCE: ISO 13934-1:2013, 3.3, modified — “under defined pretension” has been removed from the Note.]

4 Principle

A fabric test specimen, gripped in its centre part by jaws of specified dimensions, is extended at constant rate until it ruptures. The maximum force is recorded.

5 Sampling

Select samples either in accordance with the procedure laid down in the material specification for the fabric or as agreed between the interested parties.

In the absence of an appropriate material specification, the example of a suitable sampling procedure given in [Annex A](#) can be used.

An example of a suitable pattern for cutting test specimens from the laboratory sample is given in [Annex B](#). Avoid test specimens with folded or creased areas, selvages, and areas not representative of the fabric.

6 Apparatus

6.1 CRE machine

The metrological confirmation system of the tensile-testing machine shall be in accordance with ISO 10012-1.

The constant-rate-of-extension (CRE) machine shall have the general characteristics given in [6.1.1](#) to [6.1.6](#).

6.1.1 The tensile-testing machine shall be provided with means for indicating or recording the force applied to the test specimen in stretching it to rupture. Under conditions of use, the 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 %.

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

6.1.3 If recording of force is obtained by means of data acquisition boards and software, the frequency of data collection shall be at least eight per second.

6.1.4 The machine shall be capable of a constant rate of extension of 50 mm/min, with an accuracy of ± 10 %.

6.1.5 The machine shall be capable of setting the gauge length to 100 mm or, if agreed, to 75 mm, to within ± 1 mm.

6.1.6 The clamping device of the machine shall be positioned with the central point of the two jaws in the line of applied force, the front edges shall be at right angles to the line of applied force and their clamping faces shall be 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 faces of the jaws shall be smooth and flat, except that when, even with packing, the test specimen cannot be held satisfactorily with flat-faced jaws, engraved or corrugated jaws can be used to prevent slippage. Other auxiliary materials for use with either smooth or corrugated jaws to improve specimen gripping include paper, leather, plastics, or rubber.

For the grab test, the dimensional clamping area of the fabric shall be $25\text{ mm} \pm 1\text{ mm} \times 25\text{ mm} \pm 1\text{ mm}$. This area can be achieved by either method a) or method b) described below and illustrated in [Annex C](#).

- a) One clamp, $25\text{ mm} \times 40\text{ mm}$ minimum, preferably 50 mm, positioned with the wider direction of the clamp perpendicular to the line of application of the force; a second clamp of the same dimensions positioned perpendicular to the first so that the wider direction of the clamp is parallel to the direction of application of the force.
- b) One clamp, $25\text{ mm} \times 40\text{ mm}$ minimum, preferably 50 mm, positioned with the wider direction of the clamp perpendicular to the line of application of the force; a second clamp, $25\text{ mm} \times 25\text{ mm}$.

6.2 Equipment, for cutting test specimens.

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

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

6.5 Non-ionic wetting agent.

7 Atmosphere for conditioning and testing

The atmosphere for preconditioning, conditioning, and testing shall be as specified in ISO 139.

It is recommended that samples be conditioned for at least 24 h in the relaxed state.

Preconditioning and conditioning are not required for tests in the wet condition.

8 Preparation of test specimens

8.1 General

From each laboratory sample, two sets of test specimens shall be cut, one set in the warp direction and the other in the weft direction (or in the machine and cross-machine directions, where applicable).

Each set shall consist of at least five test specimens, except that if a higher degree of precision is required, more test specimens shall be tested. In accordance with [Clause 5](#) and [Annex B](#), no test specimens shall be cut from within 150 mm of either edge of the laboratory sample. No test specimen taken from the warp direction shall contain the same longitudinal threads, and no test specimen taken from the weft direction shall contain the same picks.