SLOVENSKI STANDARD
oSIST prEN 17679:2021

01-september-2021

Preskušanje polimernih folij - Pretržni preskus z zarezovanjem trapezoidnega preskušanca

Testing of plastics films - Tear test using trapezoidal test specimen with incision

Prüfung von Kunststoff-Folien - Weiterreißversuch an trapezförmigen Proben mit Einschnitt

Essais sur films plastiques - Essai de déchirure sur éprouvettes trapézoïdales avec incision

Ta slovenski standard je istoveten z: **prEN 17679**

ICS:

83.140.10 Filmi in folije Films and sheets

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English Version

Testing of plastics films - Tear test using trapezoidal test specimen with incision

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (prEN 17679:2021) has been prepared by Technical Committee CEN/TC 249 “Plastics” the secretariat of which is held by NBN.

This document is currently submitted to the CEN Enquiry.

This document is based on DIN 53363:2003-10.

1 Scope

This document specifies a method of determining the tear resistance of a plastic film under specified conditions. It is applicable to products that, because of their flexibility, do not tear when clamped between the grips of a tensile testing machine. The method makes it possible to compare samples of different products provided their thickness does not differ by more than 10 %.

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.

EN ISO 291, *Plastics — Standard atmospheres for conditioning and testing (ISO 291)*

EN ISO 527-1, *Plastics — Determination of tensile properties — Part 1: General principles (ISO 527-1)*

EN 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 7500-1)*

ISO 4593, *Plastics — Film and sheeting — Determination of thickness by mechanical scanning (ISO 4593)*

3 Terms and definitions

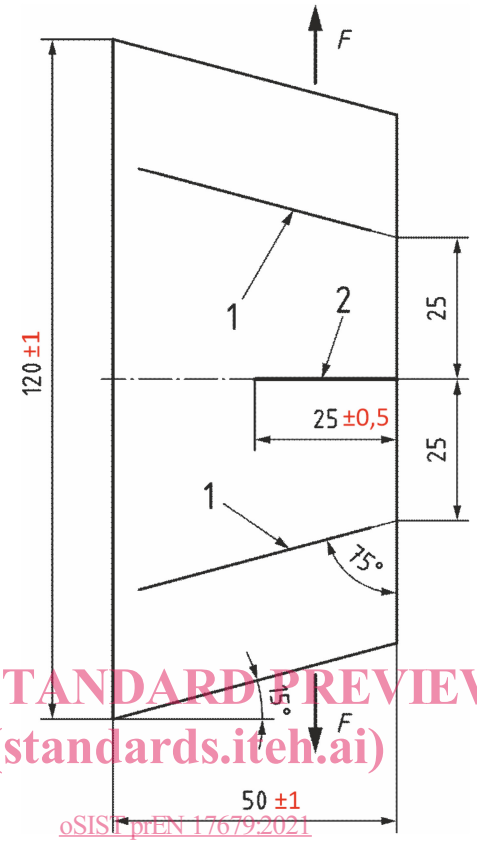
For the purposes of this document, the following terms and definitions apply.

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

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

3.1
tear resistance
ratio of the force with which a trapezoidal specimen as shown in Figure 1 resists tear, to the specimen thickness

Dimensions in millimetres



Key

1 grip clamping marks

2 incision

Figure 1 — Trapezoidal specimen

4 Specimens

4.1 Sampling and specimen preparation

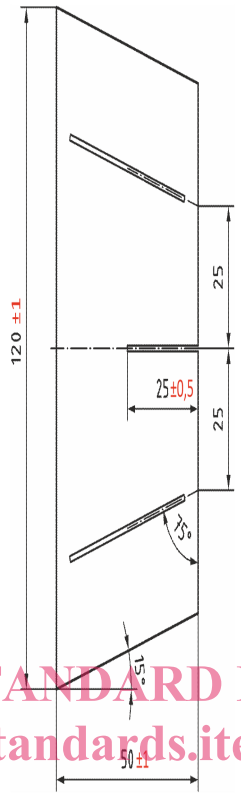
Specimens as shown in Figure 1 shall be cut from the product to be tested. If possible, they should be taken parallel and transverse to the manufacturing direction (machine direction) of the film or sheeting so as to permit determination of the tear resistance in both directions as defined by the direction of the incision.

If only one piece of the product is available and its manufacturing direction cannot be determined, specimens are to be taken in two directions orthogonal to each other.

The cut directions shall be marked.

The use of a template as shown in Figure 2, made of a cut-resistant material, will make it easier to cut out the specimen and make the incision with a knife or razor blade, and to apply the grip clamping marks using a pencil, ballpoint pen or grease pencil. The angles should be manufactured to an accuracy of ±0,5°.

Dimensions in millimetres



Template thickness: 2 mm to 3 mm

Figure 2 — Template

4.2 Number of specimens

A minimum of five specimens shall be tested. If specimens are to be tested in both directions, at least five shall be taken for each direction.

5 Apparatus

5.1 Tensile testing machine, class 1, as in EN ISO 7500-1, and equipped with a device for gripping the specimen at the marks (see Figure 1).

5.2 Measuring device, for measuring the specimen dimensions as in ISO 4593.

6 Procedure

Determine the thickness of the specimen as specified in ISO 4593 at five points near the base of the incision and then condition the specimen for 24 h in the standard atmosphere.

Clamp the specimen in the grips of the testing machine, ensuring that the marks coincide with the edges of the grips (see Clause 9). To do so, move the clamping jaws 50 mm apart. Mount the test specimen to the upper clamp of the test machine such that the upper grip clamping mark is parallel to the clamp. Align the lower grip clamping mark parallel to the lower clamp by hand and fix it to the clamp.

Perform the test at a speed of (100 ± 10) mm/min (as specified in EN ISO 527-1) and record the maximum force reading.

Carry out the tear test in a 23/50 standard atmosphere as in EN ISO 291.

NOTE In many cases, additional tests performed at lower and higher temperatures are appropriate. For this purpose, an environmental test chamber is used during testing, capable of maintaining the required temperature to within ± 1 K.

7 Evaluation

Calculate separate arithmetic means for the maximum force readings for each set of specimens (machine and transverse directions) from the values found in the individual tests and then calculate the tear resistance, in N per mm of mean specimen thickness, as determined in accordance with Clause 6.

8 Test report

The report shall refer to this method and include the following details:

a) type and details necessary to identify the product under test;

b) thickness of specimens tested;

c) tear resistance (single values and mean), in N/mm, reported to three significant places;

d) direction of loading with respect to the machine direction of the product tested, if known;

e) any special observations made during loading and specimen condition after testing (e.g. tear pattern);

f) any deviations from this document;

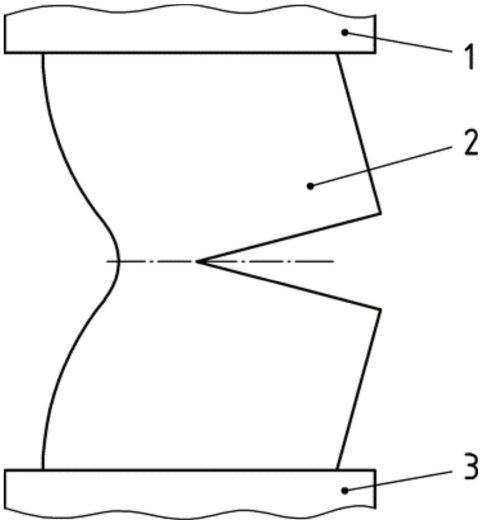
g) date of testing;

h) testing atmosphere if different from 23/50.

9 Explanatory notes

Although the test methods specified in ISO 34-1 and EN ISO 6383-1 can be applied to plastic film as well as to rubber products, it was deemed necessary to provide in addition the alternative method described in the present document. This test method involves securing the trapezoidal specimen (see Figure 1) in the grips of the tensile testing machine at an angle of 2 × 15° (see Figure 3).

In the strip tests according to ISO 34-1 and EN ISO 6383-1, partial surfaces in the area of the incision are loaded with out-of-plane opposing forces. In many applications in practice, this is not an appropriate representation of the actual stress state. For instance, in structural applications like membrane structures made from films, in-plane stress is present. The test method described in the present document involves the resistance to in-plane stress at the tip of a tear.



Key

1 upper grip
2 specimen
3 lower grip

Figure 3 — Specimen shown at start of loading test