



# SLOVENSKI STANDARD SIST EN ISO 4599:2000

01-maj-2000

---

Plastiki - Določitev odpornosti na okoljsko napetostno razpokanje (ESC) - Metoda na upogibni trakovi (ISO 4599:1986)

Plastics - Determination of resistance to environmental stress cracking (ESC) - Bent strip method (ISO 4599:1986)

Kunststoffe - Bestimmung der Beständigkeit gegen umgebungsbedingte Spannungsrissbildung (ESC) - Biegestreifenverfahren (ISO 4599:1986)

Plastiques - Détermination de la fissuration sous contrainte dans un environnement donné (ESC) - Méthode de l'éprouvette courbée (ISO 4599:1986)

<https://standards.iteh.ai/catalog/standards/sist/3122ce03-5ee9-4c66-bb8b-6102fb126b69/sist-en-iso-4599-2000>

Ta slovenski standard je istoveten z: EN ISO 4599:1996

---

## ICS:

83.080.01	Polimerni materiali na splošno	Plastics in general
-----------	--------------------------------	---------------------

**SIST EN ISO 4599:2000**

**en**

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN ISO 4599:2000

<https://standards.iteh.ai/catalog/standards/sist/3122ce03-5ee9-4c66-bb8b-6102fb126b69/sist-en-iso-4599-2000>

EUROPEAN STANDARD

EN ISO 4599

NORME EUROPÉENNE

EUROPÄISCHE NORM

December 1996

ICS 83.080

Descriptors: see ISO document

English version

**Plastics - Determination of resistance to  
environmental stress cracking (ESC) - Bent strip  
method (ISO 4599:1986)**

Plastiques - Détermination de la fissuration  
sous contrainte dans un environnement donné  
(ESC) - Méthode de l'éprouvette courbée  
(ISO 4599:1986)

Kunststoffe - Bestimmung der Beständigkeit  
gegen umgebungsbedingte Spannungsrißbildung  
(ESC) - Biegestreifenverfahren (ISO 4599:1986)

(standards.iteh.ai)

SIST EN ISO 4599:2000

<https://standards.iteh.ai/catalog/standards/sist/3122ce03-5ee9-4c66-bb8b-6102fb126b69/sist-en-iso-4599-2000>

This European Standard was approved by CEN on 1996-11-22. CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

The European Standards exist in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

**CEN**

European Committee for Standardization  
Comité Européen de Normalisation  
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Page 2  
EN ISO 4599:1996

## Foreword

The text of the International Standard from Technical Committee ISO/TC 61 "Plastics" of the International Organization for Standardization (ISO) has been taken over as an European Standard by Technical Committee CEN/TC 249 "Plastics", the secretariat of which is held by IBN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 1997, and conflicting national standards shall be withdrawn at the latest by June 1997.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

## Endorsement notice

The text of the International Standard ISO 4599:1986 has been approved by CEN as a European Standard without any modification.

**(standards.iteh.ai)**

NOTE: Normative references to International Standards are listed in annex ZA (normative).

SIST EN ISO 4599:2000

<https://standards.iteh.ai/catalog/standards/sist/3122ce03-5ee9-4c66-bb8b-6832fb126b69/iso-4599-2000>

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION  
ANALOGUE

.....Y010  
BRUNNEN



**Annex ZA (normative)****Normative references to international publications  
with their relevant European publications**

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN</u>	<u>Year</u>
ISO 178	1993	Plastics - Determination of flexural properties	EN ISO 178	1996
ISO 179	1993	Plastics - Determination of Charpy impact strength	EN ISO 179	1996
ISO 527-1	1993	Plastics - Determination of tensile properties - Part 1: General principles (including Technical Corrigendum 1:1994 to ISO 527-1:1993)	EN ISO 527-1	1996
ISO 527-2	1993	Plastics - Determination of tensile properties - Part 2: Test conditions for moulding and extrusion plastics (including Technical Corrigendum 1:1994 to ISO 527-2:1993)	EN ISO 527-2	1996
ISO 527-3	1995	Plastics - Determination of tensile properties - Part 3: Test conditions for films and sheets	EN ISO 527-3	1996
ISO 2818	1994	Plastics - Preparation of test specimens by machining	EN ISO 2818	1996

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN ISO 4599:2000

<https://standards.iteh.ai/catalog/standards/sist/3122ce03-5ee9-4c66-bb8b-6102fb126b69/sist-en-iso-4599-2000>

---

# International Standard



# 4599

---

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

---

## Plastics — Determination of resistance to environmental stress cracking (ESC) — Bent strip method

*Plastiques — Détermination de la fissuration sous contrainte dans un environnement donné (ESC) — Méthode de l'éprouvette courbée*

First edition — 1986-04-15

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN ISO 4599:2000](https://standards.iteh.ai/catalog/standards/sist/3122ce03-5ee9-4c66-bb8b-6102fb126b69/sist-en-iso-4599-2000)

<https://standards.iteh.ai/catalog/standards/sist/3122ce03-5ee9-4c66-bb8b-6102fb126b69/sist-en-iso-4599-2000>

---

UDC 678.5/.8 : 620.191.33

Ref. No. ISO 4599-1986 (E)

Descriptors : plastics, tests, environmental tests, cracking tests, determination, crazing resistance, stress factor.

## 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 4599 was prepared by Technical Committee ISO/TC 61, *Plastics*.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

**iTeh STANDARD PREVIEW**  
(standards.iteh.ai)

<https://standards.iteh.ai/catalog/standards/sist/5122ce03-5ee9-4c66-bb8b-6102fb126b69/sist-en-iso-4599-2000>



# Plastics — Determination of resistance to environmental stress cracking (ESC) — Bent strip method

## 0 Introduction

Stress cracking is exhibited by many materials, including plastics. When a plastic material is stressed or strained in air below its yield point, stress cracking may occur after a period of time which may be very long. The stresses may be internal or external or a combination of both. Exposure to a chemical medium simultaneously with the same stress or strain may result in a dramatic shortening of the time to failure. Cracking accelerated in this way is referred to as environmental stress cracking (ESC).

Other modes of failure than stress cracking may result in the shortening of the time to failure in this test, but such modes are included in the term "environmental stress cracking" as known in the trade.

The cracks produced may penetrate completely through the thickness of the material, separating it into two or more pieces, or they may be arrested on reaching regions of lower stress or different material morphology.

The determination of ESC resistance is a complex procedure because it is influenced by many parameters, including:

- test specimen dimensions;
- test specimen state (orientation, structure, internal stress);
- stress and strain;
- temperature of test;
- duration of test;
- test environment;
- failure criterion.

By keeping all but one parameter constant, the influence of the variable parameter on ESC resistance can be assessed. The main objective of ESC measurements is to determine the effect of chemical media on plastics (test specimens and articles). The measurements may also be used to evaluate the influence of the moulding conditions upon the quality of an article, when the failure mode corresponds to that obtained in actual service.

It may not be possible, however, to establish any direct correlation between the results of short-term ESC measurements on test specimens and actual long-term service behaviour.

## 1 Scope and field of application

This International Standard specifies a method for the determination of environmental stress cracking (ESC) resistance of plastics by means of a constant prestrain test. ESC will be indicated by the change of a suitably chosen indicative property of specimens that have been prestrained for a definite time in the environment. The method of test is suitable for determining the resistance of sheets and of flat test specimens to environmental stress cracking, especially the sensitivity of localized surface regions of specimens to ESC.

For the determination of the ESC sensitivity of finished articles or the bulk of a material subjected to a constant strain, see ISO 4600.

The bent strip method is suitable for the determination of ESC caused by gases and liquids as well as by solids containing migrating substances (e.g. polymeric adhesives and materials containing plasticizers) in contact with a specific polymer.

Preferably, this method is used to determine the ESC resistance of rigid plastics with only moderate stress relaxation in time.

For a constant strain test, refer to ISO 4600. For a constant stress test, refer to ISO 6252.

## 2 References

ISO 178, *Plastics — Determination of flexural properties of rigid plastics.*

ISO 179, *Plastics — Determination of Charpy impact resistance of rigid plastics (Charpy impact flexural test).*

ISO 291, *Plastics — Standard atmospheres for conditioning and testing.*

ISO 294, *Plastics — Injection moulding test specimens of thermoplastic materials.*

ISO 527, *Plastics — Determination of tensile properties.*

ISO 2557, *Plastics — Amorphous thermoplastic moulding materials — Preparation of test specimens with a defined level of shrinkage.*

ISO 2818, *Plastics — Preparation of test specimens by machining.*