

**Plastid. Vastupidavuse määramine
keskkonna pingetest põhjustatud
pragunemisele (ESC). Paindribameetod**

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

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN ISO 4599:2000 sisaldab Euroopa standardi EN ISO 4599:1996 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 11.01.2000 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN ISO 4599:2000 consists of the English text of the European standard EN ISO 4599:1996.</p> <p>This document is endorsed on 11.01.2000 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p>
--	---

<p>Käsitlusala:</p> <p>Käesolev standard määrab kindlaks meetodi plastide vastupidavuse määramiseks keskkonna pingest tekitatud pragunemisele (environmental stress cracking) (ESC) konstantse eelpingestamise testi abil. See testimismeetod sobib lehtmaterjali ja lamedate proovikehade vastupidavuse määramiseks keskkonna pingest tekitatud pragunemisele. Meetod on eriti sobiv proovikehade lokaliseeritud pinnaosade vastupidavuse määramiseks keskkonna pingest tekitatud pragunemisele.</p>	<p>Scope:</p> <p>Käesolev standard määrab kindlaks meetodi plastide vastupidavuse määramiseks keskkonna pingest tekitatud pragunemisele (environmental stress cracking) (ESC) konstantse eelpingestamise testi abil. See testimismeetod sobib lehtmaterjali ja lamedate proovikehade vastupidavuse määramiseks keskkonna pingest tekitatud pragunemisele. Meetod on eriti sobiv proovikehade lokaliseeritud pinnaosade vastupidavuse määramiseks keskkonna pingest tekitatud pragunemisele.</p>
--	--

ICS 83.080.01

Võtmesõnad: keskkonnatestid, määramine, pingetegur, plastid, pragunemistestid, testimine, vastupidavus juuspragude tekkimisele

ICS 83.080

Descriptors: Plastics, cracking resistance, testing.

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 envi-
ronnement donné (ESC) – Méthode de
l'éprouvette courbée (ISO 4599:1986)

Kunststoffe – Bestimmung der Bestän-
digkeit gegen umgebungsbedingte
Spannungsrißbildung (ESC) – Biege-
streifenverfahren (ISO 4599:1986)

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, the Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

CEN

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

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

Foreword

International Standard

ISO 4599:1986 Plastics – Determination of resistance to environmental stress cracking (ESC) – Bent strip method, which was prepared by ISO/TC 61 'Plastics' of the International Organization for Standardization, has been adopted by Technical Committee CEN/TC 249 'Plastics', the Secretariat of which is held by IBN, as a European Standard.

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

In accordance with the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard:

Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

Endorsement notice

The text of the International Standard ISO 4599:1996 was approved by CEN as a European Standard without any modification.

NOTE: Normative references to international publications are listed in Annex ZA (normative).

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.*