

**Plastid - Vastupidavuse määramine  
keskkonna pingetest põhjustatud  
pragunemisele (environmental stress  
cracking) (ESC) - Kuuli või nõela jälje  
meetod**

Plastics - Determination of resistance to  
environmental stress cracking (ESC) - Part 4: Ball or  
pin impression method

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN ISO 22088-4:2006 sisaldab Euroopa standardi EN ISO 22088-4:2006 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 20.09.2006 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 22088-4:2006 consists of the English text of the European standard EN ISO 22088-4:2006.</p> <p>This document is endorsed on 20.09.2006 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>
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<p><b>Käsitlusala:</b></p> <p>Käesolev standard määrab kindlaks meetodi plastide vastupidavuse määramiseks keskkonna pingest tekitatud pragunemisele (environmental stress cracking) (ESC) konstantse pingestamise testi abil. Test kehtib viimistletud toodete ja proovikehade kohta, mis on tehtud vormimise ja/või mehaanilise töötlemise teel. Testi võib kasutada erinevate keskkonnamõjudele allutatud plasttoodete ja materjalide ESC-hindamiseks kui ka spetsiifilise keskkonna mõjule allutatud plastide ESC-määramiseks.</p>	<p><b>Scope:</b></p> <p>This part of ISO 22088 specifies a ball or pin impression method for the determination of the environmental stress cracking (ESC) behaviour of plastics by means of a constant-strain test.</p>
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**ICS** 83.080.01

**Võtmesõnad:** keskkonnatestid, määramine, plastid, pragunemiskindlus, pragunemistestid, testimine, testimisseade

English Version

**Plastics - Determination of resistance to environmental stress  
cracking (ESC) - Part 4: Ball or pin impression method (ISO  
22088-4:2006)**

Plastiques - Détermination de la fissuration sous contrainte  
dans un environnement donné (ESC) - Partie 4: Méthode  
par enfoncement de billes ou de goupilles (ISO 22088-  
4:2006)

Kunststoffe - Bestimmung der Beständigkeit gegen  
umgebungsbedingte Spannungsrissbildung (ESC) - Teil 4:  
Kugel- oder Stifteindruckverfahren (ISO 22088-4:2006)

This European Standard was approved by CEN on 21 July 2006.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
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EUROPÄISCHES KOMITEE FÜR NORMUNG

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## Foreword

This document (EN ISO 22088-4:2006) has been prepared by Technical Committee ISO/TC 61 "Plastics" in collaboration with 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 February 2007, and conflicting national standards shall be withdrawn at the latest by February 2007.

This document supersedes EN ISO 4600:1997.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

## Endorsement notice

The text of ISO 22088-4:2006 has been approved by CEN as EN ISO 22088-4:2006 without any modifications.

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**Plastics — Determination of resistance to  
environmental stress cracking (ESC) —**

**Part 4:  
Ball or pin impression method**

*Plastiques — Détermination de la fissuration sous contrainte dans un  
environnement donné (ESC) —*

*Partie 4: Méthode par enfoncement de billes ou de goupilles*



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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 22088-4 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 6, *Ageing, chemical and environmental resistance*.

It cancels and replaces ISO 4600:1992, which has been technically revised.

ISO 22088 consists of the following parts, under the general title *Plastics — Determination of resistance to environmental stress cracking (ESC)*:

- *Part 1: General guidance*
- *Part 2: Constant tensile load method* (replacement of ISO 6252:1992)
- *Part 3: Bent strip method* (replacement of ISO 4599:1986)
- *Part 4: Ball or pin impression method* (replacement of ISO 4600:1992)
- *Part 5: Constant tensile deformation method* (new test method)
- *Part 6: Slow strain rate method* (new test method)



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

## Part 4: Ball or pin impression method

### 1 Scope

**1.1** This part of ISO 22088 specifies a ball or pin impression method for the determination of the environmental stress cracking (ESC) behaviour of plastics by means of a constant-strain test.

**1.2** The method is applicable to finished products and to test specimens prepared by moulding and/or machining, and can be used for the assessment of the ESC behaviour of a plastic product or material exposed to different environments, as well as for the determination of the ESC behaviour of different plastics materials exposed to a specific environment.

**NOTE** Alternative methods for the determination of environmental stress cracking by means of a constant-strain test are specified in ISO 22088-3 and ISO 22088-5. A method for the determination of environmental stress cracking by means of a constant-stress test is specified in ISO 22088-2.

**1.3** The ball and pin impression methods are both quick and sensitive procedures for assessing the ESC behaviour of plastics. The methods are well suited for amorphous plastics. They are less appropriate for materials displaying a pronounced tendency for creep and/or stress relaxation, i.e. for semi-crystalline materials. If semi-crystalline materials are tested, pins are more appropriate than balls.

**1.4** The ball impression method is useful for assessing the principal ESC behaviour of the material/chemical combination under consideration. It is less influenced by the near-surface orientation state of the specimens than the pin impression method and the methods in the other parts of this International Standard, where the chemical attacks only the original surface of the material. This, depending on the manner of specimen preparation, may show a considerable degree of orientation.

**1.5** The pin impression method is useful for testing specimens of small thickness and finished parts.

## 2 Normative references

The following referenced documents are indispensable for the application 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 178, *Plastics — Determination of flexural properties*

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

ISO 293, *Plastics — Compression moulding of test specimens of thermoplastic materials*

ISO 294-1, *Plastics — Injection moulding of test specimens of thermoplastic materials — Part 1: General principles, and moulding of multipurpose and bar test specimens*

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

ISO 527-2, *Plastics — Determination of tensile properties — Part 2: Test conditions for moulding and extrusion plastics*

ISO 2557-1, *Plastics — Amorphous thermoplastics — Preparation of test specimens with a specified maximum reversion — Part 1: Bars*

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

ISO 3167, *Plastics — Multipurpose test specimens*

ISO 3290, *Rolling bearings — Balls — Dimensions and tolerances*

ISO 4287, *Geometrical Product Specifications (GPS) — Surface texture: Profile method — Terms, definitions and surface texture parameters*

## 3 Terms and definitions

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

### 3.1

#### oversize

$d_d$   
difference between the diameter of an impressed ball or pin ( $d_b$ ) and the diameter of the drilled and reamed hole ( $d_h$ ) in the test specimen:

$$d_d = d_b - d_h \quad (1)$$

### 3.2

#### deformation step

determination made at a defined oversize

### 3.3

#### deformation step zero

determination made using test specimens that are drilled and reamed only, i.e. without impressing a ball or pin

### 3.4

#### deformation series

number of successive deformation steps beginning with deformation step zero

NOTE Normally, a deformation series consists of seven deformation steps of increasing severity.