

**SLOVENSKI  
PREDSTANDARD**

**OSIST prEN ISO 22088-3:2004**

december 2004

---

---

Plastics - Determination of resistance to environmental stress cracking (ESC) - Part  
3: Bent strip method (ISO/DIS 22088-3:2004)

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

[SIST EN ISO 22088-3:2006](https://standards.iteh.ai/catalog/standards/sist/1826b628-9764-46f3-8b9b-03e8a123f221/sist-en-iso-22088-3-2006)

[https://standards.iteh.ai/catalog/standards/sist/1826b628-9764-46f3-8b9b-  
03e8a123f221/sist-en-iso-22088-3-2006](https://standards.iteh.ai/catalog/standards/sist/1826b628-9764-46f3-8b9b-03e8a123f221/sist-en-iso-22088-3-2006)

---

---

ICS 83.080.01

Referenčna številka  
OSIST prEN ISO 22088-3:2004(en)



October 2004

ICS

Will supersede EN ISO 4599:1996

English version

**Plastics - Determination of resistance to environmental stress  
cracking (ESC) - Part 3: Bent strip method (ISO/DIS 22088-  
3:2004)**

Plastiques - Détermination de la fissuration sous contrainte  
dans un environnement donné (ESC) - Partie 3: Méthode  
de l'éprouvette courbée (ISO/DIS 22088-3:2004)

This draft European Standard is submitted to CEN members for parallel enquiry. It has been drawn up by the Technical Committee CEN/TC 249.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CEN 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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

**Warning** : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.



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

**Management Centre: rue de Stassart, 36 B-1050 Brussels**

## Foreword

This document (prEN ISO 22088-3:2004) 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 document is currently submitted to the parallel Enquiry.

This document will supersede EN ISO 4599:1996.

## Endorsement notice

The text of ISO 22088-3:2004 has been approved by CEN as prEN ISO 22088-3:2004 without any modifications.

iTeh STANDARD PREVIEW  
(standards.iteh.ai)

SIST EN ISO 22088-3:2006

<https://standards.iteh.ai/catalog/standards/sist/1826b628-9764-46f3-8b9b-03e8a123f221/sist-en-iso-22088-3-2006>



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

### Part 3: Bent strip method

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

*Partie 3: Méthode de l'éprouvette courbée*

(Revision of ISO 4599:1986)

ICS 83.080.01

STANDARD PREVIEW  
(standards.iteh.ai)

SIST EN ISO 22088-3:2006

#### ISO/CEN PARALLEL ENQUIRY

The CEN Secretary-General has advised the ISO Secretary-General that this ISO/DIS covers a subject of interest to European standardization. **In accordance with the ISO-lead mode of collaboration as defined in the Vienna Agreement, consultation on this ISO/DIS has the same effect for CEN members as would a CEN enquiry on a draft European Standard.** Should this draft be accepted, a final draft, established on the basis of comments received, will be submitted to a parallel two-month FDIS vote in ISO and formal vote in CEN.

**In accordance with the provisions of Council Resolution 15/1993 this document is circulated in the English language only.**

**Conformément aux dispositions de la Résolution du Conseil 15/1993, ce document est distribué en version anglaise seulement.**

**To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.**

**Pour accélérer la distribution, le présent document est distribué tel qu'il est parvenu du secrétariat du comité. Le travail de rédaction et de composition de texte sera effectué au Secrétariat central de l'ISO au stade de publication.**

THIS DOCUMENT IS A DRAFT CIRCULATED FOR COMMENT AND APPROVAL. IT IS THEREFORE SUBJECT TO CHANGE AND MAY NOT BE REFERRED TO AS AN INTERNATIONAL STANDARD UNTIL PUBLISHED AS SUCH.

IN ADDITION TO THEIR EVALUATION AS BEING ACCEPTABLE FOR INDUSTRIAL, TECHNOLOGICAL, COMMERCIAL AND USER PURPOSES, DRAFT INTERNATIONAL STANDARDS MAY ON OCCASION HAVE TO BE CONSIDERED IN THE LIGHT OF THEIR POTENTIAL TO BECOME STANDARDS TO WHICH REFERENCE MAY BE MADE IN NATIONAL REGULATIONS.

**PDF disclaimer**

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

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

[SIST EN ISO 22088-3:2006](https://standards.iteh.ai/catalog/standards/sist/1826b628-9764-46f3-8b9b-03e8a123f221/sist-en-iso-22088-3-2006)

<https://standards.iteh.ai/catalog/standards/sist/1826b628-9764-46f3-8b9b-03e8a123f221/sist-en-iso-22088-3-2006>

**Copyright notice**

This ISO document is a Draft International Standard and is copyright-protected by ISO. Except as permitted under the applicable laws of the user's country, neither this ISO draft nor any extract from it may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, photocopying, recording or otherwise, without prior written permission being secured.

Requests for permission to reproduce should be addressed to either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
Case postale 56 • CH-1211 Geneva 20  
Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
E-mail [copyright@iso.org](mailto:copyright@iso.org)  
Web [www.iso.org](http://www.iso.org)

Reproduction may be subject to royalty payments or a licensing agreement.

Violators may be prosecuted.

# Contents

|   |    |
|---|----|
| Foreword.....                             | iv |
| 1 Scope .....                             | 1  |
| 2 Normative references .....              | 1  |
| 3 Terms and definitions.....              | 2  |
| 4 Principle.....                          | 3  |
| 5 Apparatus .....                         | 4  |
| 6 Test specimens .....                    | 5  |
| 7 Conditioning and test atmospheres ..... | 5  |
| 8 Procedure .....                         | 6  |
| 9 Expression of results .....             | 7  |
| 10 Precision.....                         | 8  |
| 11 Test report .....                      | 8  |

STANDARD PREVIEW  
(standards.iteh.ai)

SIST EN ISO 22088-3:2006

<https://standards.iteh.ai/catalog/standards/sist/1826b628-9764-46f3-8b9b-03e5a123f221/sist-en-iso-22088-3-2006>

DRAFT

## 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.

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 part of ISO 22088 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 22088-3 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 6, *Ageing, chemical and environmental resistance*.

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 stress method* (replacement for ISO 6252)
- *Part 3: Bent strip method* (replacement for ISO 4599)
- *Part 4: Ball or pin impression method* (replacement for ISO 4600)
- *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 3: Bent strip method

## 1 Scope

This International Standard specifies a method for the determination of environmental stress cracking (ESC) resistance of thermoplastics by means of a constant strain test. ESC will be indicated by the change of a suitably chosen indicative property of specimens that have been strained for a defined 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 region of specimens to ESC.

For the determination of the ESC sensitivity of finished articles or the bulk of a material subjected to a constant tensile strain, see ISO 22088-5.

The bent strip method is suitable for the determination of ESC caused by gases and liquids as well as 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 that exhibit only moderate stress relaxation during the time of the test.

For a constant strain test, refer to ISO 22088-5. For a constant stress test, refer to ISO 22088-2.

## 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 178:2001, *Plastics — Determination of flexural properties of rigid plastics*

ISO 179 -1:2000, *Plastics — Determination of Charpy impact properties -- Part 1: Non-instrumented impact test*

ISO 291:1997, *Plastics — Standard atmospheres for conditioning and testing*

ISO 293:1986, *Plastics — Compression moulding test specimens of thermoplastics materials*

ISO 294-1:1996, *Plastics — Injection moulding of test specimens of thermoplastic materials - Part 1: General principles, and moulding of multipurpose and bar test specimens*

ISO 527-1:1993, *Plastics — Determination of tensile properties - Part 1: General principles*

ISO 527-2:1993, *Plastics — Determination of tensile properties - Part 2: Test conditions for moulding and extrusion plastics*

ISO 2818:1994, *Plastics — Preparation of test specimens by machining*

ISO 3167:2002, *Plastics — Multipurpose test specimens*

ISO 22088-1:-<sup>1)</sup>, *Plastics — Determination of resistance to environmental stress cracking (ESC) – Part 1: General guidance*

ISO 22088-2:-<sup>2)</sup>, *Plastics — Determination of resistance to environmental stress cracking (ESC) – Part 2: Constant tensile stress method*

ISO 22088-4:-<sup>3)</sup>, *Plastics — Determination of resistance to environmental stress cracking (ESC) – Part 4: Ball or pin impression method*

ISO 22088-5:-<sup>4)</sup>, *Plastics — Determination of resistance to environmental stress cracking (ESC) – Part 5: Constant tensile deformation method*

ISO 22088-6:-<sup>5)</sup>, *Plastics — Determination of resistance to environmental stress cracking (ESC) – Part 6: Slow strain rate method*

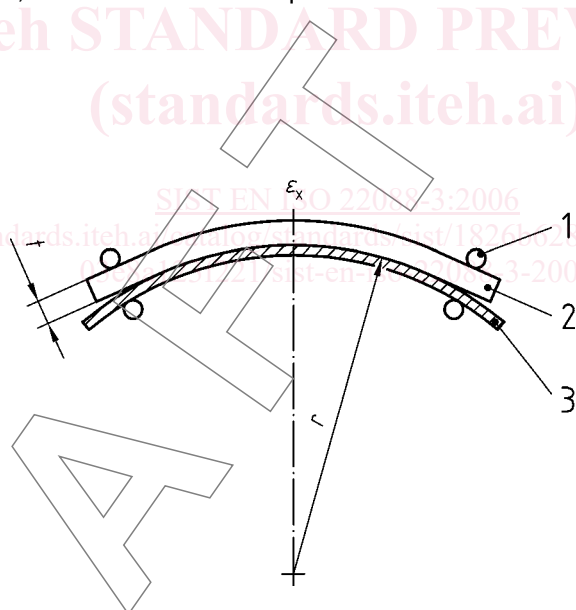
### 3 Terms and definitions

For the purposes of this part of ISO 22088, the following terms and definitions apply.

**3.1 flexural strain,  $\epsilon_x$**   
 the nominal value of the strain in the tensile surface of a flat test specimen of thickness  $d$ , bent over the segment of a circle with radius  $r$ , calculated from the equation

$$\epsilon_x = \frac{d}{2r + d}$$

(See figure 1.)



**Key**

- P : test specimen
- 1 : Tensile surface contacts with test medium.
- 2 : Compressive surface contacts with the form.
- d : thickness of the test specimen
- F : form
- r : radius of form
- c : clamps
- $\epsilon_x$  : nominal strain in the tensile surface

**Figure 1 — Test specimen P with defined strain in the tensile surface**

1), 2), 3), 4), 5) To be published.