

# **SLOVENSKI STANDARD**

## **SIST EN ISO 376:2005**

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**Kovinski materiali – Kalibracija merilnikov sile, ki se uporabljajo za preverjanje preskusnih strojev z enoosno obremenitvijo (ISO 376:2004)**

Metallic materials - Calibration of force-proving instruments used for the verification of uniaxial testing machines (ISO 376:2004)

Metallische Werkstoffe - Kalibrierung der Kraftmessgeräte für die Prüfung von Prüfmachinen mit einachsiger Beanspruchung (ISO 376:2004)

Matériaux métalliques - Etalonnage des instruments de mesure de force utilisés pour la vérification des machines d'essais uniaxiaux (ISO 376:2004)

**Ta slovenski standard je istoveten z: EN ISO 376:2004**

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**ICS:**

77.040.10 Mehansko preskušanje kovin Mechanical testing of metals

**SIST EN ISO 376:2005**

**en**

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
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**EN ISO 376**

November 2004

ICS 77.040.10

Supersedes EN ISO 376:2002

English version

**Metallic materials - Calibration of force-proving instruments used  
for the verification of uniaxial testing machines (ISO 376:2004)**

Matériaux métalliques - Etalonnage des instruments de  
mesure de force utilisés pour la vérification des machines  
d'essais uniaxiaux (ISO 376:2004)

This European Standard was approved by CEN on 20 October 2004.

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.

This European Standard exists 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.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
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EUROPÄISCHES KOMITEE FÜR NORMUNG

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**EN ISO 376:2004 (E)****Foreword**

This document (EN ISO 376:2004) has been prepared by Technical Committee ISO/TC 164 "Mechanical testing of metals" in collaboration with Technical Committee ECISS/TC 1 "Steel - Mechanical testing", the secretariat of which is held by AFNOR.

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 May 2005, and conflicting national standards shall be withdrawn at the latest by May 2005.

This document supersedes EN ISO 376 :2002.

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, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

**Endorsement notice**

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# INTERNATIONAL STANDARD

**ISO  
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Third edition  
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## **Metallic materials — Calibration of force-proving instruments used for the verification of uniaxial testing machines**

*Matériaux métalliques — Étalonnage des instruments de mesure de  
force utilisés pour la vérification des machines d'essais uniaxiaux*

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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 376 was prepared by Technical Committee ISO/TC 164, *Mechanical testing of metals*, Subcommittee SC 1, *Uniaxial testing*.

This third edition cancels and replaces the second edition (ISO 376:1999), which has been technically revised.

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## Introduction

No information is currently provided in this International Standard for determining the uncertainty of a force-proving device or its indicator. An ISO/TC 164/SC 1 working group is currently developing procedures for determining the measurement uncertainty of force-proving devices. Until such information is provided in this International Standard, procedures for determining the measurement uncertainty of force-proving devices can be found in the two first documents listed in the Bibliography.

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# Metallic materials — Calibration of force-proving instruments used for the verification of uniaxial testing machines

## 1 Scope

This International Standard covers the calibration of force-proving instruments used for the static verification of uniaxial testing machines (e.g. tension/compression testing machines) and describes a procedure for classifying these instruments.

This International Standard generally applies to force-proving instruments in which the force is determined by measuring the elastic deformation of a loaded member or a quantity which is proportional to it.

## 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/IEC 17025, *General requirements for the competence of testing and calibration laboratories*

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## 3 Terms and definitions

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For the purposes of this document, the following term and definition apply.

### 3.1

#### **force-proving instrument**

whole assembly from the force transducer through to, and including, the indicator

## 4 Symbols and their designations

Symbols and their designations are given in Table 1.

Table 1 — Symbols and their designations

Symbol	Unit	Designation
$b$	%	Relative reproducibility error with rotation
$b'$	%	Relative repeatability error without rotation
$F_f$	N	Maximum capacity of the transducer
$F_N$	N	Maximum calibration force
$f_c$	%	Relative interpolation error
$f_0$	%	Relative zero error
$i_f$	—	Reading <sup>a</sup> on the indicator after removal of force
$i_o$	—	Reading <sup>a</sup> on the indicator before application of force
$r$	N	Resolution of the indicator
$v$	%	Relative reversibility error of the force-proving instrument
$X$	—	Deflection with increasing test force
$X_a$	—	Computed value of deflection
$X'$	—	Deflection with decreasing test force
$X_{\max}$	—	Maximum deflection from runs 1, 3 and 5
$X_{\min}$	—	Minimum deflection from runs 1, 3 and 5
$X_N$	—	Deflection corresponding to the maximum calibration force
$\bar{X}_r$	—	Average value of the deflections with rotation
$\bar{X}_{wr}$	—	Average value of deflections without rotation
<sup>a</sup> Reading value corresponding to the deflection.		

## 5 Principle

Calibration consists of applying precisely-known forces to the force transducer and recording the data from the indicator, which is considered an integral part of the force-proving instrument.

When an electrical measurement is made, the indicator may be replaced by another indicator and the force-proving instrument need not be recalibrated provided the following conditions are fulfilled.

- The original and replacement indicators have calibration certificates, traceable to national standards, which give the results of calibration in terms of electrical base units (volt, ampere). The replacement indicator shall be calibrated over a range equal to or greater than the range for which it is used with the force-proving instrument and the resolution of the indicator shall be at least equal to the resolution of the indicator when it is used with the force-proving instrument.
- The units and excitation source of the replacement indicator should be respectively of the same quantity (e.g. 5 V, 10 V) and type (e.g. AC or DC carrier frequency).
- The uncertainty of each indicator (both the original and the replacement indicators), shall not significantly influence the uncertainty of the whole assembly of the force-proving instrument. It is recommended that the uncertainty of the replacement indicator should be no greater than 1/3 of the uncertainty of the entire system.