

# SLOVENSKI STANDARD

## SIST EN ISO 10360-2:2011

01-november-2011

Nadomešča:

SIST EN ISO 10360-2:2002

SIST ISO 10360-2:2002

---

**Specifikacija geometrijskih veličin izdelka - Preskusi za sprejemljivost in ponovno overjanje koordinatnih merilnih strojev (KMS) - 2. del: Koordinatni merilni stroji za merjenje dolžinskih mer (ISO 10360-2:2009)**

Geometrical product specifications (GPS) - Acceptance and reverification tests for coordinate measuring machines (CMM) - Part 2: CMMs used for measuring linear dimensions (ISO 10360-2:2009)

(standards.iteh.ai)

Geometrische Produktspezifikation (GPS) - Annahmeprüfung und Bestätigungsprüfung für Koordinatenmessgeräte (KMG) - Teil 2: KMG angewendet für Längenmessungen (ISO 10360-2:2009)

Spécification géométrique des produits (GPS) - Essais de réception et de vérification périodique des machines à mesurer tridimensionnelles (MMT) - Partie 2: MMT utilisées pour les mesures de dimensions linéaires (ISO 10360-2:2009)

**Ta slovenski standard je istoveten z: EN ISO 10360-2:2009**

---

**ICS:**

17.040.30	Merila	Measuring instruments
17.040.40	Specifikacija geometrijskih veličin izdelka (GPS)	Geometrical Product Specification (GPS)

**SIST EN ISO 10360-2:2011**

**en,fr,de**

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

[SIST EN ISO 10360-2:2011](#)

<https://standards.iteh.ai/catalog/standards/sist/4cf7975b-96a9-4cb8-a960-b69c8f477e71/sist-en-iso-10360-2-2011>

EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN ISO 10360-2**

December 2009

ICS 17.040.30

Supersedes EN ISO 10360-2:2001

English Version

**Geometrical product specifications (GPS) - Acceptance and  
reverification tests for coordinate measuring machines (CMM) -  
Part 2: CMMs used for measuring linear dimensions (ISO  
10360-2:2009)**

Spécification géométrique des produits (GPS) - Essais de  
réception et de vérification périodique des machines à  
mesurer tridimensionnelles (MMT) - Partie 2: MMT utilisées  
pour les mesures de dimensions linéaires (ISO 10360-  
2:2009)

Geometrische Produktspezifikation (GPS) -  
Annahmeprüfung und Bestätigungsprüfung für  
Koordinatenmessgeräte (KMG) - Teil 2: KMG angewendet  
für Längenmessungen (ISO 10360-2:2009)

This European Standard was approved by CEN on 26 December 2008.

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 CEN Management Centre 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 CEN Management Centre has the same status as the official versions.

<https://standards.iteh.ai/catalog/standards/sist/4cf7975b-96a9-4cb8-a960->

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, 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.



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

**Management Centre: Avenue Marnix 17, B-1000 Brussels**

**Contents**

Page

Foreword.....3

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

[SIST EN ISO 10360-2:2011](https://standards.iteh.ai/catalog/standards/sist/4cf7975b-96a9-4cb8-a960-b69c8f477e71/sist-en-iso-10360-2-2011)  
<https://standards.iteh.ai/catalog/standards/sist/4cf7975b-96a9-4cb8-a960-b69c8f477e71/sist-en-iso-10360-2-2011>

## Foreword

This document (EN ISO 10360-2:2009) has been prepared by Technical Committee ISO/TC 213 "Dimensional and geometrical product specifications and verification" in collaboration Technical Committee CEN/TC 290 "Dimensional and geometrical product specification and verification" 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 June 2010, and conflicting national standards shall be withdrawn at the latest by June 2010.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN ISO 10360-2:2001.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, 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 the United Kingdom.

ITEH STANDARD PREVIEW  
(standards.iteh.ai)  
Endorsement notice

The text of ISO 10360-2:2009 has been approved by CEN as a EN ISO 10360-2:2009 without any modification.

SIST EN ISO 10360-2:2011  
<https://standards.iteh.ai/catalog/standards/sist/4cf7975b-96a9-4cb8-a960-b69c8f477e71/sist-en-iso-10360-2-2011>

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

[SIST EN ISO 10360-2:2011](#)

<https://standards.iteh.ai/catalog/standards/sist/4cf7975b-96a9-4cb8-a960-b69c8f477e71/sist-en-iso-10360-2-2011>

INTERNATIONAL  
STANDARDISO  
10360-2Third edition  
2009-12-01

---

---

**Geometrical product specifications  
(GPS) — Acceptance and reverification  
tests for coordinate measuring machines  
(CMM) —****Part 2:  
CMMs used for measuring linear  
dimensions****(standards.iteh.ai)**

*Spécification géométrique des produits (GPS) — Essais de réception et  
de vérification périodique des machines à mesurer tridimensionnelles  
(MMT) —*

[https://standards.iteh.ai/catalog/standards/sist/4cf7975b-96a9-4cb8-a960-](https://standards.iteh.ai/catalog/standards/sist/4cf7975b-96a9-4cb8-a960-b69c)

[b69c](https://standards.iteh.ai/catalog/standards/sist/4cf7975b-96a9-4cb8-a960-b69c) *Partie 2: MMT utilisées pour les mesures de dimensions linéaires*

Reference number  
ISO 10360-2:2009(E)

© ISO 2009

## ISO 10360-2:2009(E)

**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 10360-2:2011](https://standards.iteh.ai/catalog/standards/sist/4cf7975b-96a9-4cb8-a960-b69c8f477e71/sist-en-iso-10360-2-2011)

<https://standards.iteh.ai/catalog/standards/sist/4cf7975b-96a9-4cb8-a960-b69c8f477e71/sist-en-iso-10360-2-2011>

**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2009

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from 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)

Published in Switzerland



# Contents

Page

Foreword .....	v
Introduction.....	vi
<b>1 Scope .....</b>	<b>1</b>
<b>2 Normative references .....</b>	<b>1</b>
<b>3 Terms and definitions .....</b>	<b>2</b>
<b>4 Symbols.....</b>	<b>4</b>
<b>5 Environmental and metrological requirements.....</b>	<b>4</b>
5.1 Environmental conditions .....	4
5.2 Operating conditions .....	5
5.3 Length measurement error, $E_L$ .....	5
5.4 Repeatability range of the length measurement error, $R_0$ .....	5
5.5 Workpiece loading effects .....	5
<b>6 Acceptance tests and reverification tests .....</b>	<b>6</b>
6.1 General .....	6
6.2 Principle.....	6
6.3 Length measurement error with zero ram axis stylus tip offset, $E_0$ .....	7
6.3.1 General .....	7
6.3.2 Measuring equipment .....	7
6.3.3 Procedure .....	8
6.3.4 Derivation of test results .....	9
6.4 Repeatability range of the length measurement error, $R_0$ .....	9
6.5 Length measurement error with ram axis stylus tip offset of 150 mm, $E_{150}$ .....	10
6.5.1 Measuring equipment .....	10
6.5.2 Procedure .....	10
6.5.3 Derivation of test results .....	12
6.6 Dual ram CMMs.....	12
6.6.1 Simplex operating mode.....	12
6.6.2 Duplex operating mode.....	12
<b>7 Compliance with specifications .....</b>	<b>13</b>
7.1 Acceptance test.....	13
7.1.1 Acceptance criteria .....	13
7.1.2 Data rejection and repeated measurements.....	14
7.2 Reverification test .....	14
<b>8 Applications .....</b>	<b>14</b>
8.1 Acceptance test.....	14
8.2 Reverification test .....	15
8.3 Interim check .....	15
<b>9 Indication in product documentation and data sheets.....</b>	<b>15</b>
<b>Annex A (informative) Interim check.....</b>	<b>16</b>
<b>Annex B (normative) Artefacts that represent a calibrated test length.....</b>	<b>18</b>
<b>Annex C (informative) Alignment of gauges .....</b>	<b>23</b>
<b>Annex D (normative) Mathematical adjustments to low CTE artefacts.....</b>	<b>25</b>
<b>Annex E (informative) Location of the single stylus probing test .....</b>	<b>27</b>

**ISO 10360-2:2009(E)**

**Annex F (informative) Relation to the GPS matrix model .....28**  
**Bibliography .....29**

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

[SIST EN ISO 10360-2:2011](https://standards.iteh.ai/catalog/standards/sist/4cf7975b-96a9-4cb8-a960-b69c8f477e71/sist-en-iso-10360-2-2011)  
<https://standards.iteh.ai/catalog/standards/sist/4cf7975b-96a9-4cb8-a960-b69c8f477e71/sist-en-iso-10360-2-2011>

## 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 10360-2 was prepared by Technical Committee ISO/TC 213, *Dimensional and geometrical product specifications and verification*.

This third edition cancels and replaces the second edition (ISO 10360-2:2001), which has been technically revised.

ISO 10360 consists of the following parts, under the general title *Geometrical product specifications (GPS) — Acceptance and reverification tests for coordinate measuring machines (CMM)*:

- Part 1: Vocabulary
- Part 2: CMMs used for measuring linear dimensions
- Part 3: CMMs with the axis of a rotary table as the fourth axis
- Part 4: CMMs used in scanning measuring mode
- Part 5: CMMs using single and multiple stylus contacting probing systems
- Part 6: Estimation of errors in computing Gaussian associated features
- Part 7: CMMs equipped with imaging probing systems

**ISO 10360-2:2009(E)****Introduction**

This part of ISO 10360 is a geometrical product specification (GPS) standard and is to be regarded as a general GPS standard (see ISO/TR 14638). It influences link 5 of the chains of standards on size, distance, radius, angle, form, orientation, location, run-out and datums. For more detailed information of the relation of this part of ISO 10360 to other standards and the GPS matrix model, see Annex F.

The tests of this part of ISO 10360 have three technical objectives:

- 1) to test the error of indication of a calibrated test length using a probing system without any ram axis stylus tip offset;
- 2) to test the error of indication of a calibrated test length using a probing system with a specified ram axis stylus tip offset; and
- 3) to test the repeatability of measuring a calibrated test length.

The benefits of these tests are that the measured result has a direct traceability to the unit length, the metre, and that it gives information on how the CMM will perform on similar length measurements.

Clause 3 of this part of ISO 10360 contains definitions that supersede similar definitions in ISO 10360-1:2000.

The revised definitions are required to avoid an ambiguity that would otherwise have been introduced with this issue of ISO 10360-2. Also, definition 3.6 supersedes effectively an identical definition in ISO 10360-1:2000 because the symbols used have been revised and expanded for clarification.

<https://standards.iteh.ai/catalog/standards/sist/4cf7975b-96a9-4cb8-a960-b69c8f477e71/sist-en-iso-10360-2-2011>

# Geometrical product specifications (GPS) — Acceptance and reverification tests for coordinate measuring machines (CMM) —

## Part 2: CMMs used for measuring linear dimensions

### 1 Scope

This part of ISO 10360 specifies the acceptance tests for verifying the performance of a coordinate measuring machine (CMM) used for measuring linear dimensions as stated by the manufacturer. It also specifies the reverification tests that enable the user to periodically reverify the performance of the CMM.

The acceptance and reverification tests given in this part of ISO 10360 are applicable only to Cartesian CMMs using contacting probing systems of any type operating in the discrete-point probing mode.

This part of ISO 10360 does not explicitly apply to:

- non-Cartesian CMMs; however, parties may apply this part of ISO 10360 to non-Cartesian CMMs by mutual agreement;
- CMMs using optical probing; however, parties may apply this approach to optical CMMs by mutual agreement.

This part of ISO 10360 specifies performance requirements that can be assigned by the manufacturer or the user of a CMM, the manner of execution of the acceptance and reverification tests to demonstrate the stated requirements, rules for proving conformance, and applications for which the acceptance and reverification tests can be used.

### 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 10360-1:2000, *Geometrical Product Specifications (GPS) — Acceptance and reverification tests for coordinate measuring machines (CMM) — Part 1: Vocabulary*

ISO 14253-1:1998, *Geometrical Product Specifications (GPS) — Inspection by measurement of workpieces and measuring equipment — Part 1: Decision rules for proving conformance or non-conformance with specifications*

ISO 14660-1:1999, *Geometrical Product Specifications (GPS) — Geometrical features — Part 1: General terms and definitions*

ISO/TS 23165:2006, *Geometrical product specifications (GPS) — Guidelines for the evaluation of coordinate measuring machine (CMM) test uncertainty*

ISO/IEC Guide 99, *International vocabulary of metrology — Basic and general concepts and associated terms (VIM)*