
**Geometrical Product Specifications
(GPS) — Acceptance and reverification
tests for coordinate measuring machines
(CMM) —**

Part 2:
CMMs used for measuring size

*Spécification géométrique des produits (GPS) — Essais de réception et de
vérification périodique des machines à mesurer tridimensionnelles
(MMT) — ISO 10360-2:2001*

<https://standards.iteh.ai/catalog/standards/sist/dc35aa12-4516-450a-9868-751914368e59/iso-10360-2-2001>
Partie 2 : MMT utilisées pour les mesures de tailles



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)

ISO 10360-2:2001

<https://standards.iteh.ai/catalog/standards/sist/dc35aa12-4516-450a-9868-751914368e59/iso-10360-2-2001>

© ISO 2001

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.ch
Web www.iso.ch

Printed in Switzerland

Contents

	Page
Foreword.....	iv
Introduction.....	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Requirements for metrological characteristics	2
5 Acceptance test and reverification test.....	3
6 Compliance with specifications	6
7 Applications	7
Annex A (informative) Interim check.....	9
Annex B (informative) Relation to the GPS matrix model.....	10
Bibliography.....	11

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 10360-2:2001

<https://standards.iteh.ai/catalog/standards/sist/dc35aa12-4516-450a-9868-751914368e59/iso-10360-2-2001>

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 3.

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 10360 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

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

This second edition cancels and replaces the first edition (ISO 10360-2:1994), which has been technically revised and whose title has changed.

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 <https://standards.iteh.ai/catalog/standards/sist/dc35aa12-4516-450a-9868-751914368e59/iso-10360-2-2001>
- Part 2: CMMs used for measuring size
- 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 multiple-stylus probing systems
- Part 6: Estimation of errors in computing Gaussian associated features

Annexes A and B of this part of ISO 10360 are for information only.

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 B.

The tests of this part of ISO 10360 have two different technical objectives, which are to test

- the error of indication for size measurement, and
- the probing error,

of which the more important is the test for the error of indication for size measurement. The benefit of this test is that the measured result has a direct traceability to the unit length, the metre, and that it gives knowledge on how the CMM will perform when similar measurement relative to the unit length is performed.

The other test is intended to assess the 3D-probing error as a supplement to the test for the error of indication for size measurement, which only involves the probing system in two dimensions. Because it is not possible to completely isolate the probing errors from other sources of machine error, some measurement errors, of both static and dynamic origin, inherent in the other parts of the CMM measuring system, will affect the results of measurement in this test.

[ISO 10360-2:2001](https://standards.iteh.ai/catalog/standards/sist/dc35aa12-4516-450a-9868-751914368e59/iso-10360-2-2001)

<https://standards.iteh.ai/catalog/standards/sist/dc35aa12-4516-450a-9868-751914368e59/iso-10360-2-2001>

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 10360-2:2001

<https://standards.iteh.ai/catalog/standards/sist/dc35aa12-4516-450a-9868-751914368e59/iso-10360-2-2001>

Geometrical Product Specifications (GPS) — Acceptance and reverification tests for coordinate measuring machines (CMM) —

Part 2: CMMs used for measuring size

1 Scope

This part of ISO 10360 specifies the acceptance test for verifying that the performance of a CMM used for measuring size is as stated by the manufacturer. It also specifies the reverification test which enables the user to periodically reverify the performance of a CMM used for measuring size.

The acceptance and reverification tests of

— probing error, and

— error of indication for size measurement,

given in this part of ISO 10360, are applicable only to CMMs using contacting probing systems of any type operating in the discrete-point probing mode. [ISO 10360-2:2001](https://standards.iteh.ai/catalog/standards/sist/dc35aa12-4516-450a-9868-751914368e59/iso-10360-2-2001)

This International Standard specifies <https://standards.iteh.ai/catalog/standards/sist/dc35aa12-4516-450a-9868-751914368e59/iso-10360-2-2001>

— performance requirements that can be assigned by the manufacturer or the user of the 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 normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 10360. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 10360 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 3650:1998, *Geometrical Product Specifications (GPS) — Length standards — Gauge blocks*

ISO 10360-1:2000, *Geometrical Product Specifications (GPS) — Acceptance and reverification test 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 10360-2:2001(E)

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

International Vocabulary of Basic and General Terms in Metrology (VIM). BIPM, IFCC, IEC, ISO, IUPAC, IUPAP, OIML, 2nd edition, 1993

3 Terms and definitions

For the purposes of this part of ISO 10360, the terms and definitions given in ISO 10360-1, ISO 14253-1, ISO 14660-1 and VIM apply.

4 Requirements for metrological characteristics

4.1 Error of indication for size measurements

The error of indication of a CMM for size measurement, E , shall not exceed the maximum permissible error, MPE_E , as stated by:

- the manufacturer, in the case of acceptance tests;
- the user, in the case of reverification tests.

The error of indication of a CMM for size measurement, E , and the maximum permissible error of indication of a CMM for size measurement, MPE_E , are expressed in micrometres.

4.2 Probing error

ISO 10360-2:2001

<https://standards.iteh.ai/catalog/standards/sist/dc35aa12-4516-450a-9868-73194308e97b/iso-10360-2-2001>

The probing error, P , shall not exceed the maximum permissible probing error, MPE_P , as stated by:

- the manufacturer, in the case of acceptance tests;
- the user, in the case of reverification tests.

The probing error, P , and the maximum permissible probing error, MPE_P , are expressed in micrometres.

4.3 Environmental conditions

Limits to be respected for permissible environmental conditions such as temperature conditions, air humidity and vibration at the site of installation that influence the measurements shall be specified by:

- the manufacturer, in the case of acceptance tests;
- the user, in the case of reverification tests.

In both cases, the user is free to choose the conditions within the specified limits.

4.4 Probing system

The limits of the probing system configuration (stylus, stylus extensions, stylus orientation, weight of stylus system etc.) to which the stated value or values of MPE_E apply shall be specified by:

- the manufacturer, in the case of acceptance tests;
- the user, in case of reverification tests.

In both cases, the user is free to choose the way in which the components of the probing system are configured within the specified limits.

The form deviation of the stylus tip will influence the measurement results and shall be taken into account when proving conformance or non-conformance with specification.

4.5 Operating conditions

The CMM shall be operated using the procedures given in the manufacturer's operating manual when conducting the tests given in clause 5.

Specific areas in the manufacturer's manual to be adhered to are, for example,

- a) machine start-up/warm-up cycles,
- b) stylus system configuration,
- c) cleaning procedures for stylus tip and reference sphere, and
- d) probing system qualification.

The stylus tip and the reference sphere should be cleaned before the probing system qualification in order to eliminate any residual film that might affect the measuring or test result.

5 Acceptance test and reverification test

ISO 10360-2:2001
<https://standards.iteh.ai/catalog/standards/sist/dc35aa12-4516-450a-9868-751914368e59/iso-10360-2-2001>

5.1 General

In the following:

- acceptance tests are executed according to the manufacturer's specifications and procedures;
- reverification tests are executed according to the user's specifications and the manufacturer's procedures.

5.2 Probing error

5.2.1 Principle

The principle of the assessment method for the probing error is to establish whether the CMM is capable of measuring within the stated maximum permissible probing error, MPE_p , by determining the range of distances of the measured points from the centre of the Gaussian associated sphere.

5.2.2 Measuring equipment

5.2.2.1 Test sphere, with nominal diameter of no less than 10 mm and no greater than 50 mm.

The reference sphere supplied with the CMM for probing system qualification purposes shall not be used for this test.

The form of the test sphere shall be calibrated, since the form deviation influences the test result, and shall be taken into account when proving conformance or non-conformance with the specification.