Irish Standard
I.S. EN ISO 10360-5:2010

Geometrical product specifications (GPS) - Acceptance and reverification tests for coordinate measuring machines (CMM) - Part 5: CMMs using single and multiple stylus contacting probing systems (ISO 10360-5:2010)

I.S. EN ISO 10360-5:2010

Incorporating amendments/corrigenda/National Annexes issued since publication:

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This document replaces:	*This document is based on:*	*Published:*
EN ISO 10360-5:2000	EN ISO 10360-5:2010 EN ISO 10360-5:2000	15 September, 2010 6 July, 2001

This document was published under the authority of the NSAI and comes into effect on: 21 September, 2010	ICS number: 17.040.30

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I.S. EN ISO 10360-5:2010

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 10360-5

September 2010

ICS 17.040.30

Supersedes EN ISO 10360-5:2000

English Version

Geometrical product specifications (GPS) - Acceptance and reverification tests for coordinate measuring machines (CMM) - Part 5: CMMs using single and multiple stylus contacting probing systems (ISO 10360-5:2010)

Spécification géométrique des produits (GPS) - Essais de réception et de vérification périodique des machines à mesurer tridimensionnelles (MMT) - Partie 5: MMT utilisant des systèmes de palpage à stylet simple ou à stylets multiples (ISO 10360-5:2010)

Geometrische Produktspezifikation (GPS) - Annahmeprüfung und Bestätigungsprüfung für Koordinatenmessgeräte (KMG) - Teil 5: Prüfung der Antastabweichungen von KMG mit berührendem Messkopfsystem (ISO 10360-5:2010)

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Ref. No. EN ISO 10360-5:2010: E

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Foreword

The text of ISO 10360-5:2010 has been prepared by Technical Committee ISO/TC 213 “Dimensional and geometrical product specifications and verification” of the International Organization for Standardization (ISO) and has been taken over as EN ISO 10360-5:2010 by 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of an identical text or by endorsement, at the latest by March 2011, and conflicting national standards shall be withdrawn at the latest by March 2011.

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.

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Endorsement notice

The text of ISO 10360-5:2010 has been approved by CEN as a EN ISO 10360-5:2010 without any modification.

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I.S. EN ISO 10360-5:2010

INTERNATIONAL STANDARD

ISO 10360-5

Second edition
2010-09-15

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

Part 5: CMMs using single and multiple stylus contacting probing systems

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

Partie 5: MMT utilisant des systèmes de palpage à stylet simple et à stylets multiples

Reference number
ISO 10360-5:2010(E)

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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 10360-5 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 10360-5:2000), which has been technically revised, and ISO/PAS 12868:2009.

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 video probing systems*

— *Part 9: CMMs with multiple probing systems*

The following parts are under preparation:

— *Part 8: CMMs with optical distance sensors*

— *Part 10: Laser trackers for measuring point-to-point distances*

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 chain link 5 of the chains of standards of size, distance, radius, angle, form, orientation, location, run-out and datums.

For more detailed information on the relation of this part of ISO 10360 to other standards and the GPS matrix model, see Annex E.

The acceptance and reverification tests described in this part of ISO 10360 are applicable to coordinate measuring machines (CMMs) that use contacting probes, with or without multiple styli or multiple articulated-probe positions, when measuring a workpiece.

Experience has shown that the multi-stylus errors calculated using this part of ISO 10360 are significant and, at times, the dominant errors in the CMM. Owing to the virtually infinite variety of modern CMM probing system configurations, the tests specified by this part of ISO 10360 have been limited to providing a testing format only. The tests are intended to provide information on the ability of a CMM to measure a feature or features, using a contacting probe and, when relevant, using multiple styli, multiple probes or multiple articulated-probe positions.

The situations to which they are applicable include

— single-stylus probing systems,

— multiple styli connected to the CMM probe (e.g. a star),

— installations using an articulating probing system (motorized or manual) that can be prequalified,

— installations using a repeatable probe-changing system,

— installations using a repeatable stylus-changing system, and

— multi-probe installations.

It is believed that the procedures given in this part of ISO 10360 will be helpful in identifying CMM system uncertainty components for specific measurement tasks, and that the user will be able to reduce errors by removing contributing elements such as long probe extensions and styli, then retesting the new configuration set.

The tests in this part of ISO 10360 are sensitive to many errors attributable to both the CMM and the probing system, and are to be performed in addition to the length-measuring tests given in ISO 10360-2.

The primary objective is to determine the practical performance of the complete CMM and probing system. Therefore, the tests are designed to reveal measuring errors which are likely to occur when such a combined system is used on real workpieces, e.g. errors generated by the interaction between large probe-tip-offset lengths and uncorrected CMM rotation errors. The errors found here differ from those found in the E_{L} tests in ISO 10360-2:2009, 6.5, because with multiple styli the net CMM travel may be very different from the measured length. See Annex C for more information.

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

Part 5: CMMs using single and multiple stylus contacting probing systems

1 Scope

This part of ISO 10360 specifies acceptance and periodic reverification tests of CMM performance with contacting probing systems and is only applicable to CMMs using

— any type of contacting probing system,

— a discrete point probing mode, and

— spherical or hemispherical stylus tip(s).

It complements ISO 10360-7, which is the module for CMMs with video probing systems, and ISO 10360-2, which is universal, i.e. not probe-type specific.

NOTE It is the CMM probing performance tests which are specified by the maximum permissible errors (MPEs), due to the impracticality of isolating the performance of the probing system from that of the CMM, even on a small artefact such as a test sphere.

This part of ISO 10360 applies to CMMs supplied with any of the following:

a) single-stylus probing system;

b) multi-stylus probing systems with fixed multiple styli attached to a single probe (e.g. “star” stylus);

c) multiple probing systems such as those with a stylus for each of their probes;

d) systems with articulating probing;

e) stylus and probe changing systems;

f) manual (non-driven) CMMs.

This part of ISO 10360 is not applicable to non-contacting probing systems, which require different testing procedures.

The terms “multi-stylus size error”, etc., should strictly be written “combined CMM and multi-stylus probing-system size error”, etc. For convenience, the wording has been truncated.

If it is desired to isolate the probing-system performance as far as is practical, the influence of the CMM can be minimized. See Annex C for more information.