Irish Standard
I.S. EN ISO 14253-5:2015

Geometrical product specifications (GPS) - Inspection by measurement of workpieces and measuring equipment - Part 5: Uncertainty in verification testing of indicating measuring instruments (ISO 14253-5:2015)

I.S. EN ISO 14253-5:2015

Incorporating amendments/corrigenda/National Annexes issued since publication:

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National Foreword

I.S. EN ISO 14253-5:2015 is the adopted Irish version of the European Document EN ISO 14253-5:2015, Geometrical product specifications (GPS) - Inspection by measurement of workpieces and measuring equipment - Part 5: Uncertainty in verification testing of indicating measuring instruments (ISO 14253-5:2015)

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 14253-5

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English Version

Geometrical product specifications (GPS) - Inspection by measurement of workpieces and measuring equipment - Part 5: Uncertainty in verification testing of indicating measuring instruments (ISO 14253-5:2015)

Spécification géométrique des produits (GPS) - Vérification par la mesure des pièces et des équipements de mesure - Partie 5: Incertitude liée aux essais de vérification des appareils de mesure indicateurs (ISO 14253-5:2015)

This European Standard was approved by CEN on 10 July 2015.

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

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Contents

Page

European foreword

This document (EN ISO 14253-5:2015) has been prepared by Technical Committee ISO/TC 213 “Dimensional and geometrical product specifications and verification” in collaboration with 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of an identical text or by endorsement, at the latest by March 2016, and conflicting national standards shall be withdrawn at the latest by March 2016.

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 14253-5:2015 has been approved by CEN as EN ISO 14253-5:2015 without any modification.

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I.S. EN ISO 14253-5:2015

INTERNATIONAL STANDARD

ISO 14253-5

First edition
2015-09-01

Geometrical product specifications (GPS) — Inspection by measurement of workpieces and measuring equipment —

Part 5: Uncertainty in verification testing of indicating measuring instruments

Spécification géométrique des produits (GPS) — Vérification par la mesure des pièces et des équipements de mesure —

Partie 5: Incertitude liée aux essais de vérification des appareils de mesure indicateurs

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Contents

Page

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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 213, *Dimensional and geometrical product specifications and verifications*.

ISO 14253 consists of the following parts, under the general title *Geometrical product specifications (GPS) — Inspection by measurement of workpieces and measuring equipment*:

— *Part 1: Decision rules for proving conformity or nonconformity with specifications*

— *Part 2: Guide to the estimation of uncertainty in GPS measurement, in calibration of measuring equipment and in product verification*

— *Part 3: Guidelines for achieving agreements on measurement uncertainty statements*

— *Part 4: Background on functional limits and specification limits in decision rules*

— *Part 5: Uncertainty in verification testing of indicating measuring instruments*

— *Part 6: Generalized decision rules for the acceptance and rejection of instruments and workpieces* [Technical Report]

Introduction

This part of ISO 14253 belongs to the general geometrical product specification (GPS) series of documents (see ISO 14638). It influences chain link F of all chains of standards in the general GPS matrix.

The ISO/GPS matrix model given in ISO 14638 gives an overview of the ISO/GPS system of which this international standard is a part. The fundamental rules of ISO/GPS given in ISO 8015 apply to this part of ISO 14253 and the default decision rules given in ISO 14253-1 apply to specifications made in accordance with this part of ISO 14253, unless otherwise indicated.

For more detailed information about the relationship of this part of ISO 14253 to other standards and to the GPS matrix model, see Annex B.

Decision rules for deciding conformity or non-conformity to specifications are based on the measurement uncertainty incurred while testing.

Usual practice in measurement familiarizes metrologists and practitioners with measurement uncertainty. Any possible effect that may affect the measurement result is considered and quantified as an uncertainty component and is eventually included in the combined uncertainty. The purpose of the measurement is to gather quantitative information on a given measurand, and the uncertainty statement expresses how reliable that information is.

In the case of tests of indicating measuring instruments, the purpose of the measurement is to investigate one or more metrological characteristics of the indicating measuring instrument rather than to measure characteristics of features of a workpiece. The uncertainty being evaluated in this case, the test value uncertainty, quantifies the accuracy of the test value. The test detects the quality of the indicating measuring instrument, reported through the test values and not through the test value uncertainty.

The test value uncertainty for indicating measuring instruments is not conceptually trivial to evaluate, and careful consideration is necessary to determine which uncertainty components should and which should not be accounted for.

Some tests of indicating measuring instruments may be relative to quantities other than instrument indications, or a single test may investigate both the instrument indication(s) and other metrological characteristics. An example is a test of a micrometer investigating the indication error (subject to an MPE) as well as the measuring force (subject to an MPL). For tests, or portions of them, relative to metrological characteristics other than instrument indications, this part of ISO 14253 is not applicable: they are about quantities for which the application of the ISO/IEC Guide 98-3 (GUM) and of the ISO 14253-2 is conceptually straightforward, with no need of further guidance in this part of ISO 14253.

A rigorous definition of the test value uncertainty when testing indicating measuring instruments is given. Application of conventional uncertainty evaluation based on this definition and according to the ISO/IEC Guide 98-3 (GUM) and the ISO 14253-2 determines which uncertainty components to account for.

Geometrical product specifications (GPS) — Inspection by measurement of workpieces and measuring equipment —

Part 5: Uncertainty in verification testing of indicating measuring instruments

1 Scope

This part of ISO 14253 specifies concepts and terms for evaluating the uncertainties of the test values derived according to a test protocol agreed upon by the parties and relative to instrument indication(s), obtained in verification testing of GPS indicating measuring instruments.

NOTE The uncertainty of the test values, referred to as test value uncertainty, is not to be confused with the measurement uncertainty associated with using that indicating measuring instrument to measure workpieces. The former only is covered in this part of ISO 14253; for guidance on the latter see the ISO/IEC Guide 98-3 (GUM) and ISO 14253-2.

When a test of an indicating measuring instrument comprises several test values, some relative to the instrument indication and some to other metrological characteristics, this part of ISO 14253 is concerned with the uncertainty of the former only.

This part of ISO 14253 does not provide guidelines to ensure the adequacy of a test protocol; rather, once a test protocol is given, it describes how to evaluate the consequent test value uncertainty.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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 14253-1:2013, *Geometrical product specifications (GPS) — Inspection by measurement of workpieces and measuring equipment — Part 1: Decision rules for proving conformity or nonconformity with specifications*

ISO/TR 14253-6:2012, *Geometrical product specifications (GPS) — Inspection by measurement of workpieces and measuring equipment — Part 6: Generalized decision rules for the acceptance and rejection of instruments and workpieces*

ISO 14978:2006, *Geometrical product specifications (GPS) — General concepts and requirements for GPS measuring equipment*

ISO 17450-2:2012, *Geometrical product specifications (GPS) — General concepts — Part 2: Basic tenets, specifications, operators, uncertainties and ambiguities*

ISO/IEC Guide 98-3:2008, *Uncertainty of measurement — Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)*

ISO/IEC Guide 99:2007, *International vocabulary of metrology — Basic and general concepts and associated terms (VIM)*