



SLOVENSKI STANDARD
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Geometrical product specifications (GPS) - Inspection by measurement of workpieces and measuring equipment - Part 2: Guidance for the estimation of uncertainty in GPS measurement, in calibration of measuring equipment and in product verification (ISO/DIS 14253-2:2009)

Geometrische Produktspezifikationen (GPS) - Prüfung von Werkstücken und Messgeräten durch Messungen - Teil 2: Leitfaden zur Schätzung der Unsicherheit von GPS-Messungen bei der Kalibrierung von Messgeräten und bei der Produktprüfung (ISO/DIS 14253-2:2009)

Spécification géométrique des produits (GPS) - Vérification par la mesure des pièces et des équipements de mesure - Partie 2: Lignes directrices pour l'estimation de l'incertitude dans les mesures GPS, dans l'étalonnage des équipements de mesure et dans la vérification des produits (ISO/DIS 14253-2:2009)

Ta slovenski standard je istoveten z: prEN ISO 14253-2

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17.040.01 Linearne in kotne meritve na splošno Linear and angular measurements in general

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NORME EUROPÉENNE
EUROPÄISCHE NORM

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ICS 17.040.01

Will supersede ENV ISO 14253-2:2001

English Version

**Geometrical product specifications (GPS) - Inspection by
measurement of workpieces and measuring equipment - Part 2:
Guidance for the estimation of uncertainty in GPS measurement,
in calibration of measuring equipment and in product verification
(ISO/DIS 14253-2:2009)**

Spécification géométrique des produits (GPS) - Vérification
par la mesure des pièces et des équipements de mesure -
Partie 2: Lignes directrices pour l'estimation de l'incertitude
dans les mesures GPS, dans l'étalonnage des
équipements de mesure et dans la vérification des produits
(ISO/DIS 14253-2:2009)

This draft European Standard is submitted to CEN members for parallel enquiry. It has been drawn up by the Technical Committee CEN/TC 290.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CEN 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.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Contents	Page
Foreword.....	3

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Foreword

This document (prEN ISO 14253-2:2009) 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 document is currently submitted to the parallel Enquiry.

This document will supersede ENV ISO 14253-2:2001.

Endorsement notice

The text of ISO/DIS 14253-2:2009 has been approved by CEN as a prEN ISO 14253-2:2009 without any modification.

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DRAFT INTERNATIONAL STANDARD ISO/DIS 14253-2

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

Part 2:

Guidance for the estimation of uncertainty in GPS measurement, in calibration of measuring equipment and in product verification

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

Partie 2: Lignes directrices pour l'estimation de l'incertitude dans les mesures GPS, dans l'étalonnage des équipements de mesure et dans la vérification des produits

iTeh STANDARD PREVIEW

(Revision of ISO/TS 14253-2:1999 and ISO/TS 14253-2:1999/Cor 1:2007)

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ISO/CEN PARALLEL PROCESSING

This draft has been developed within the International Organization for Standardization (ISO), and processed under the **ISO-lead** mode of collaboration as defined in the Vienna Agreement.

This draft is hereby submitted to the ISO member bodies and to the CEN member bodies for a parallel five-month enquiry.

Should this draft be accepted, a final draft, established on the basis of comments received, will be submitted to a parallel two-month approval vote in ISO and formal vote in CEN.

To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.

Pour accélérer la distribution, le présent document est distribué tel qu'il est parvenu du secrétariat du comité. Le travail de rédaction et de composition de texte sera effectué au Secrétariat central de l'ISO au stade de publication.

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ISO/DIS 14253-2

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In accordance with ISO/TC 213 Resolution 823, the attached Technical Specification is being submitted as a Draft International Standard in order to be converted into an International Standard. To expedite circulation, the attached document contains the full text of the published Technical Specification and the related Technical Corrigendum. The editing will be undertaken by the ISO Central Secretariat at the publication stage.

2009

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Contents

	Page
Foreword.....	iv
Introduction.....	v
1 Scope	1
2 Normative references	2
3 Terms and definitions	2
4 Symbols	6
5 Concept of the iterative GUM-method for estimation of uncertainty of measurement	7
6 Procedure for Uncertainty Management — PUMA	8
7 Sources of errors and uncertainty of measurement.....	13
8 Tools for the estimation of uncertainty components, standard uncertainty and expanded uncertainty.....	17
9 Practical estimation of uncertainty — Uncertainty budgeting with PUMA.....	26
10 Applications	30
Annex A (informative) Example of uncertainty budgets — Calibration of a setting ring.....	34
Annex B (informative) Example of uncertainty budgets — Design of a calibration hierarchy.....	41
Annex C (informative) Example of uncertainty budgets — Measurement of roundness	65
Annex D (informative) Relation to the GPS matrix model.....	71
Bibliography.....	73

ISO/DIS 14253-2:1999(E)

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.

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.

In other circumstances, particularly when there is an urgent market requirement for such documents, a technical committee may decide to publish other types of normative document:

- an ISO Publicly Available Specification (ISO/PAS) represents an agreement between technical experts in an ISO working group and is accepted for publication if it is approved by more than 50 % of the members of the parent committee casting a vote;
- an ISO Technical Specification (ISO/TS) represents an agreement between the members of a technical committee and is accepted for publication if it is approved by 2/3 of the members of the committee casting a vote.

An ISO/PAS or ISO/TS is reviewed every three years with a view to deciding whether it can be transformed into an International Standard.

Attention is drawn to the possibility that some of the elements of this Technical Specification may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO/TS 14253-2 was prepared by Technical Committee ISO/TC 213, *Dimensional and geometrical product specifications and verification*.

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 conformance or non-conformance with specification*
- *Part 2: Guide to the estimation of uncertainty in GPS measurement, in calibration of measuring equipment and in product verification* [Technical Specification]
- *Part 3: Procedures for evaluating the integrity of uncertainty in measurement values*

Annexes A to D of this Technical Specification are for information only.

Introduction

This Technical Specification is a global GPS technical report (see ISO/TR 14638:1995). This global GPS Technical Report influences chain link 4, 5 and 6 in all chains of standards.

For more detailed information of the relation of this report to other standards and the GPS matrix model, see annex D.

This Technical Specification is developed to support ISO 14253-1. This Technical Specification establishes a simplified, iterative procedure of the concept and the way to evaluate and determine uncertainty (standard uncertainty and expanded uncertainty) of measurement, and the recommendations of the format to document and report the uncertainty of measurement information as given in *"Guide to the expression of uncertainty in measurement"* (GUM). In most cases only very limited resources are necessary to estimate uncertainty of measurement by this simplified, iterative procedure, but the procedure may lead to a slight overestimation of the uncertainty of measurement. If a more accurate estimation of the uncertainty of measurement is needed, the more elaborated procedures of the GUM must be applied.

This simplified, iterative procedure of the GUM methods is intended for GPS measurements, but may be used in other areas of industrial (applied) metrology.

Uncertainty of measurement and the concept of handling uncertainty of measurement being of importance to all the technical functions in a company, this Technical Specification relates to e.g. management function, design and development function, manufacture function, quality assurance function, metrology function, etc.

This Technical Specification is of special importance in relation to ISO 9000 quality assurance systems, where it is a requirement that the uncertainty of measurement is known [e.g. 4.11.1, 4.11.2 a) and 4.11.2 b) of ISO 9001:1994].

In this Technical Specification the uncertainty of the result of a process of calibration and a process of measurement is handled in the same way:

- calibration is treated as "measurement of metrological characteristics of a measuring equipment or a measurement standard";
- measurement is treated as "measurement of geometrical characteristics of a workpiece".

Therefore, in most cases no distinction is made in the text between measurement and calibration. The term "measurement" is used as a synonym for both.

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

Part 2:

Guidance for the estimation of uncertainty in GPS measurement, in calibration of measuring equipment and in product verification

1 Scope

This Technical Specification gives guidance on the implementation of the concept of "*Guide to the estimation of uncertainty in measurement*" (in short GUM) to be applied in industry for the calibration of (measurement) standards and measuring equipment in the field of GPS and the measurement of workpiece GPS-characteristics. The aim is to promote full information on how to achieve uncertainty statements and provide the basis for international comparison of results of measurements and their uncertainties (relationship between purchaser and supplier).

This Technical Specification is intended to support ISO 14253-1. This Technical Specification and ISO 14253-1 are beneficial to all technical functions in a company in the interpretation of GPS specifications (i.e. tolerances of workpiece characteristics and values of maximum permissible errors (MPE) for metrological characteristics of measuring equipment).

This Technical Specification introduces the Procedure for Uncertainty Management (PUMA), which is a practical, iterative procedure based on the GUM for estimating uncertainty of measurement without changing the basic concepts of the GUM and is intended to be used generally for estimating uncertainty of measurement and giving statements of uncertainty for:

- single results of measurement;
- comparison of two or more results of measurement;
- comparison of results of measurement — from one or more workpieces or pieces of measurement equipment — with given specifications [i.e. maximum permissible errors (MPE) for a metrological characteristic of a measurement instrument or measurement standard, and tolerance limits for a workpiece characteristic, etc.], for proving conformance or non-conformance with the specification.

The iterative method is based basically on an upper bound strategy, i.e. overestimation of the uncertainty at all levels, but the iterations control the amount of overestimation. Intentional overestimation — and not underestimation — is necessary to prevent wrong decisions based on measurement results. The amount of overestimation shall be controlled by economical evaluation of the situation.

The iterative method is a tool to maximize profit and minimize cost in the metrological activities of a company. The iterative method/procedure is economically self-adjusting and is also a tool to change/reduce existing uncertainty in measurement with the aim of reducing cost in metrology (manufacture). The iterative method makes it possible to compromise between risk, effort and cost in uncertainty estimation and budgeting.