

# **SLOVENSKI STANDARD**

## **oSIST prEN ISO 17865:2016**

**01-junij-2016**

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**Specifikacija geometrijskih veličin izdelka - Smernice za vrednotenje preskusne negotovosti koordinatnih merilnih strojev (KMS), uporabljenih kot enotipalni in večtipalni sondirni sistemi (ISO/FDIS 17865:2016)**

Geometrical Product Specifications (GPS) - Guidelines for the evaluation of coordinate measuring machine (CMM) test uncertainty for CMMs using single and multiple stylus contacting probing systems (ISO/FDIS 17865:2016)

**iTeh STANDARD PREVIEW**  
Geometrische Produktspezifikation (GPS) - Leitfaden zur Ermittlung der Testunsicherheit von Koordinatenmessgeräten (KMG) bei KMGs mit berührenden Einfach- und Mehrfachtastern (ISO/FDIS 17865:2016)

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Spécification géométrique des produits (GPS) - Lignes directrices pour l'estimation de l'incertitude d'essai des machines à mesurer tridimensionnelles (MMT) pour MMT utilisant des systèmes de palpation à stylet simple (ISO/FDIS 17865:2016)

**Ta slovenski standard je istoveten z: prEN ISO 17865**

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# TECHNICAL SPECIFICATION

**ISO/TS  
17865**

First edition

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## **Geometrical product specifications (GPS) — Guidelines for the evaluation of coordinate measuring machine (CMM) test uncertainty for CMMs using single and multiple stylus contacting probing systems**

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*Spécification géométrique des produits (GPS) — Lignes directrices  
pour l'estimation de l'incertitude d'essai des machines à mesurer  
tridimensionnelles (MMT) pour MMT utilisant des systèmes de  
palpage à stylet simple et à stylets multiples*

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# PROOF/ÉPREUVE

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Reference number  
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## ISO/TS 17865:2016(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.

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](http://www.iso.org/directives)).

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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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](http://Foreword - Supplementary information (standards.iteh.ai))

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

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## Introduction

This Technical Specification is a geometrical product specification (GPS) document and is to be regarded as a general GPS document (see ISO 14638). It influences chain links F of the chain of standards in the general GPS matrix model.

For more detailed information of the relation of this Technical Specification to the GPS matrix model, see [Annex B](#).

The ISO GPS Matrix Model given in ISO 14638 gives an overview of the ISO GPS system of which this Technical Specification is a part. The fundamental rules of ISO GPS given in ISO 8015 apply to this Technical Specification. The default decision rules given in ISO 14253-1 apply to specifications made in accordance with this Technical Specification, unless otherwise stated.

This Technical Specification gives guidance for the evaluation of the test value uncertainty as required by the application of ISO 10360-5.

Before starting any test value uncertainty evaluation, it is recommended that

- the distinction between the *test value uncertainty* and the *measurement uncertainty* is fully understood (the former is used to reduce the acceptance zone in a test, the latter to quantify the reliability of a measurement value) and
- the principle of the tester's responsibility in deciding whether or not to include an uncertainty component in the budget is also understood.

Some details of the above issues are given in ISO/TS 23165, the careful reading of which is recommended.

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# Geometrical product specifications (GPS) — Guidelines for the evaluation of coordinate measuring machine (CMM) test uncertainty for CMMs using single and multiple stylus contacting probing systems

## 1 Scope

This Technical Specification describes how to evaluate the test value uncertainty when testing is performed according to ISO 10360-5.

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

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 14253-1:1998, *Geometrical product specifications (GPS) — Inspection by measurement of workpieces and measuring equipment — Part 1: Decision rules for proving conformity or nonconformity with specifications*

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

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

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

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

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 10360-1, ISO 10360-5, ISO 14253-1, ISO 17450-2, ISO/TS 23165, ISO/IEC Guide 98-3 and ISO/IEC Guide 99 apply.

## ISO/TS 17865:2016(E)

## 4 Test value uncertainty evaluation

### 4.1 Effects of fixturing and bending of the test sphere stem

The following contributors may be relevant in some applications.

- Fixturing of the test sphere: if the test sphere is fixtured loosely or vibrations are present, the test sphere may shift during the measurements, due to, for example, probing forces, vibrations and inertial forces.
- Bending of the test sphere stem: if the test sphere stem is insufficiently rigid, the bending due to probing forces may be a significant source of test value uncertainty.

The influence of these effects can be measured using a displacement sensor (such as a precision indicator or capacitance gauge) when a force equivalent to the probing force (i.e., the force at the instant of point detection) is applied to the test sphere. The distance of this displacement is called  $d_{\text{FIXTURING}}$  for the purposes of this Technical Specification.

Alternatively, two significantly different probing forces can be used to calculate the  $P$  values and then compared in order to assess these fixturing effects.

### 4.2 Form of the test sphere

The formulae that follow in the rest of [Clause 4](#) make use of the form and the uncertainty of the form of the test sphere, which, according to ISO 10360-5:2010, 6.2.3, is to have been calibrated (the form of the test sphere is the same as its sphericity). It is the form of the test sphere (and not the roundness) that is to be calibrated. However, if the roundness of the sphere is calibrated instead of using traces about great circles of the sphere, then, upon agreement of buyer and seller, the roundness calibrations may be used to estimate the form and its uncertainty by using the adjustment factors as given in [Annex A](#).

### 4.3 Test of the probing system form error

The recommended formula for the standard uncertainty of the probing error  $u(P_{F--})$  is Formula (1):

$$u(P_{F--}) = \sqrt{\left(\frac{F_{\text{SPHERE}}}{2}\right)^2 + u^2(F_{\text{SPHERE}}) + \left(\frac{d_{\text{FIXTURING}}}{2}\right)^2} \quad (1)$$

where

$F_{\text{SPHERE}}$  is the form of the test sphere;

$u(F_{\text{SPHERE}})$  is the standard uncertainty in the form of the test sphere stated in the calibration certificate;

$d_{\text{FIXTURING}}$  is the displacement due to the probing force.

The one-sided nature of this test means that the typical 95 % confidence level is achieved with a coverage factor of  $k = 1,645$  instead of the usual  $k = 2$  (the default value given in ISO 14253-1:1998, Clause 4), which applies to two-sided distributions.