

# SVENSK STANDARD

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### **Geometrisk produktspecifikation (GPS) – Rundhet – Del 2: Specifikationsoperatorer (ISO 12181-2:2011)**

### **Geometrical product specifications (GPS) – Roundness – Part 2: Specification operators (ISO 12181-2:2011)**

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Europastandarden EN ISO 12181-2:2011 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN ISO 12181-2:2011.

Denna standard ersätter SIS-ISO/TS 12181-2:2005, utgåva 1.

The European Standard EN ISO 12181-2:2011 has the status of a Swedish Standard. This document contains the official version of EN ISO 12181-2:2011.

This standard supersedes the Swedish Standard SIS-ISO/TS 12181-2:2005, edition 1.

**Förhållandet till övriga delar under samma huvudtitel - Utdrag ur Förord i ISO 12181-2:2011/  
Relations to other parts under the same general title - Extract from the Foreword of  
ISO 12181-2:2011**

ISO 12181 consists of the following parts, under the general title *Geometrical product specifications (GPS) – Roundness*:

- *Part 1: Vocabulary and parameters of roundness*

- *Part 2: Specification operators*

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EUROPEAN STANDARD

**EN ISO 12181-2**

NORME EUROPÉENNE

EUROPÄISCHE NORM

April 2011

ICS 17.040.20

Supersedes CEN ISO/TS 12181-2:2007

English Version

## Geometrical product specifications (GPS) - Roundness - Part 2: Specification operators (ISO 12181-2:2011)

Spécification géométrique des produits (GPS) - Circularité -  
Partie 2: Opérateurs de spécification (ISO 12181-2:2011)

Geometrische Produktspezifikation (GPS) - Rundheit - Teil  
2: Spezifikationsoperatoren (ISO 12181-2:2011)

This European Standard was approved by CEN on 17 March 2011.

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# Contents

Page

<b>Foreword</b> .....	<b>iv</b>
<b>Introduction</b> .....	<b>v</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>1</b>
<b>4 Complete specification operator</b> .....	<b>1</b>
<b>4.1 General</b> .....	<b>1</b>
<b>4.2 Transmission band</b> .....	<b>2</b>
<b>4.3 Probing system</b> .....	<b>4</b>
<b>5 Compliance with specification</b> .....	<b>4</b>
<b>Annex A (informative) Harmonic content of nominally round workpiece</b> .....	<b>5</b>
<b>Annex B (informative) Relationship to the GPS matrix model</b> .....	<b>7</b>
<b>Bibliography</b> .....	<b>9</b>

## **Foreword**

This document (EN ISO 12181-2:2011) 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 October 2011, and conflicting national standards shall be withdrawn at the latest by October 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.

This document supersedes CEN ISO/TS 12181-2:2007.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

### **Endorsement notice**

The text of ISO 12181-2:2011 has been approved by CEN as a EN ISO 12181-2:2011 without any modification.



## Introduction

This part of ISO 12181 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 3 of the chain of standards on form of line independent of datum.

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

For more detailed information on the relationship of this part of ISO 12181 to other standards and the GPS matrix model, see Annex B.

This part of ISO 12181 specifies the specification operators according to ISO 17450-2 for roundness of integral features.

This part of ISO 12181 does not specify defaults for filter UPR, probe tip radius and method of association (reference circle). This means that it is necessary for a roundness specification to explicitly state which values are to be used for these specification operations in order for it to be unique.

Consequently, if a specification does not explicitly state which values are to be used for one or more of these operators, the specification is ambiguous (see ISO 17450-2) and a supplier can use any value for the operator(s) not specified when proving conformance.

Extracting data always involves applying a certain filtering process. An additional filtering of the extracted data might or might not be applied. This additional filter can be a mean line filter (Gaussian, spline, wavelet, etc.) or a non-linear filter (e.g. morphological filter). The type of filtering influences the definition of roundness and the specification operators and, therefore, needs to be stated unambiguously.

NOTE 1 Stylus filtering is not sufficient on its own to smooth a profile. In certain circumstances, it can create spurious high-frequency content, thus giving incorrect values. To correct this, a longwave pass filter is employed. A Gaussian filter is used, since this is the state-of-the-art. This filter has some shortcomings, e.g. it can distort, rather than eliminate some roughness features and it can distort, rather than transmit correctly some waviness features. It is envisioned that new filters under development within ISO provide better solutions for several of these issues.

NOTE 2 If a smaller tip radius than the one specified is used for a given cut-off length, the resulting measured value is generally higher. This effect is usually insignificant. If a larger tip radius is used, the resulting measured value is generally lower. The amount of change is heavily dependent on the surface measured.

NOTE 3 The measuring force of zero N is chosen to eliminate effects of elastic deformation of the workpiece from the specification operator. On metal surfaces with adequate thickness, the effect of normally occurring measuring forces is negligible.

NOTE 4 Aliasing and other problems during extraction (see Annex A) due to the higher harmonic content of the skin model, in the roundness directions, can cause specification uncertainty.

This part of ISO 12181 is not intended to disallow any means of measuring roundness.



# Geometrical product specifications (GPS) — Roundness —

## Part 2: Specification operators

### 1 Scope

This part of ISO 12181 specifies the complete specification operator for roundness of integral features only and covers complete roundness profiles only, i.e. geometrical characteristics of features of the type circle.

### 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 11562:1996, *Geometrical Product Specifications (GPS) — Surface texture: Profile method — Metrological characteristics of phase correct filters*

ISO 12181-1:2011, *Geometrical product specifications (GPS) — Roundness — Part 1: Vocabulary and parameters of roundness*

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 17450-2:2011<sup>1)</sup>, *Geometrical product specifications (GPS) — General concepts — Part 2: Basic tenets, specifications, operators and uncertainties*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 12181-1 and ISO 17450-2 apply.

### 4 Complete specification operator

#### 4.1 General

The complete specification operator (see ISO 17450-2) is a full ordered set of unambiguous specification operations in a well-defined order. The complete specification operator defines the transmission band for the roundness profile, together with an appropriate stylus tip geometry.

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1) To be published. (Revision of ISO/TS 17450-2:2002)