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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 24631.2-2024

Replacing GB/T 24631.2-2009

**Geometrical product specifications(GPS) - Straightness - Part
2: Specification operators**

产品几何技术规范（GPS）直线度 第2部分:规范操作集

(English Translation)

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Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part 1: Structure and drafting rules for standardization documents" Drafting is required.

This document is Part 2 of GB/T 24631 "Geometric Technical Specification for Products (GPS) Straightness". GB/T 24631 has been issued the following parts were published.

Part 1: Vocabulary and parameters;-Part 2: Specification of Operation Sets. -this document replaces GB/T 24631.2-2009 "Product Geometric Technical Specification (GPS) Straightness Part 2: Standard Operation" Compared with GB/T 24631.2-2009, the main technical changes are as follows.

The introduction to terms and definitions has been changed (see Chapter 3, Chapter 3 of

the 2009 edition); a) Change the maximum sampling interval and the maximum radius of the probe tip used for the extraction line to requirements (see 4.2.2, 2009 edition) 4.2.2);

Changed the conformity requirements with the specification (see Chapter 5, Chapter 5 of the 2009 edition). c) this document is modified based on ISO 12780-2:2011 "Geometrical Product Specifications (GPS) Straightness Part 2: Set of Specification Operations".

The technical differences between this document and ISO 12780-2:2011 and their reasons are as follows.

Changed the expression "attenuation function" to "transmission characteristic" (see 4.2.1) to match the terminology used for filters Habit;

Deleted "according to ISO 11562" (see 4.2.1) to adapt to the current situation that this standard has been abolished; -the expression "filter transmission from infinite wavelength to" is changed to "cut-off wavelength" (see Table 1), which conforms to the definition of cut-off wavelength.

It also adapts to the current usage of terminology.

The following editorial changes were made to this document.

Replace informative references to ISO/TR 14638 in Annex B with ISO 14638 (see B.1). -

Introduction

Straightness is one of the common shape tolerances in product geometry specifications and is also one of the key indicators for evaluating product geometry accuracy.

It is one of the essential technical elements in the modern production process. Straightness is the most basic item in geometric error and is very important for ensuring zero it plays an important role in the precise matching and movement accuracy of components, improving product reliability and optimizing manufacturing processes.

The standard can not only reduce errors and losses in the manufacturing process, but also significantly reduce the failure rate of products and extend their service life, making the products more with the development of digital measurement technology and product geometry specifications, the relevant definitions in the original standard are different from the current national GPS standards.

The technical requirements lag behind the current production needs and can no longer effectively regulate and guide the current market production situation.

It can better standardize and guide the geometric elements of products, provide technical support for enterprises in the design, manufacturing, inspection and other processes, and guide the manufacturing of high-end equipment in my country.

The development of manufacturing.

GB/T 24631 aims to specify the straightness specifications of component elements and consists of two parts.

Part 1: Vocabulary and parameters. The purpose is to define the terms and concepts related to the straightness of single components.

Part 2: Set of specification operations. The purpose is to define a complete set of specification operations for the straightness of a single component.

This document does not specify a default filter cut-off frequency, stylus tip radius (the stylus tip itself has a certain shape and size, which plays a mechanical filtering role in the measurement, so the probe tip is sometimes also called the probe contact) and related methods this means that a straightness specification must clearly state the values used in the specification to ensure that the straightness specification has unique One nature.

Therefore, if a specification does not clearly state the values to be used for one or more operations, the specification is ambiguous and should be considered ambiguous when a valid value is required.

When proving compliance, vendors MAY use arbitrary values for unspecified sets of operations.

Filtering is necessary for data extraction operations, and additional filtering may or may not be used when extracting data.

It can be a mean line filter (Gaussian filter, spline filter, wavelet filter, etc.) or a nonlinear filter (such as morphological filter). The filter type will affect this affects the definition of cylindricity as well as the set of specification operations and therefore needs to be clearly stated.

NOTE 1 Stylus filtering alone is not sufficient to smooth the profile. In some cases, spurious high frequency components may be generated giving incorrect values. To correct this problem to solve this problem, long-wave channel filtering can be used. The most advanced choice is Gaussian filtering. Gaussian filtering also has some defects, such as possible distortion.

Rather than eliminating certain roughness features, certain waviness features may also be distorted rather than correctly transmitted. New filter designs are being developed within ISO to Filters are used to provide better solutions to these problems.

Note 2: For a given cut-off length, if the probe tip radius is smaller than the specified value, the measured value will usually be larger. This effect can generally be ignored.

If the tip radius is larger than specified, the measured value will generally be smaller. The amount of change depends very much on the surface being measured.

Note 3: In order to eliminate the influence of elastic deformation of the workpiece in the standard operation set, the standard measuring force is selected as 0 N. For metal surfaces with sufficient thickness, the measurement the effect of the force can generally be ignored.

NOTE 4: In the straightness direction, aliasing and other problems in the extraction caused by the higher harmonic components of the skin surface model (see Annex A) may result in non-specification Certainty.

This document does not deal with specific straightness measurement methods.

Product Geometric Specification (GPS) Straightness Part 2: Specification of Operation Sets

1 Scope

This document specifies a complete set of specification operations for the straightness of a single component.

This document applies only to the complete straightness profile of a single component.

Note: The straightness of the axis extracted from a cylindrical surface is specified in ISO 12180-1.

2 Normative references

The contents of the following documents constitute the essential clauses of this document through normative references in this document.

For referenced documents without a date, only the version corresponding to that date applies to this document; for referenced documents without a date, the latest version (including all amendments) applies.

in this document.

ISO 12780-1 Geometrical Product Specifications (GPS) Straightness Part 1: Vocabulary and parameters [Geometric product specifications (GPS)-Straightness-Part 1: Vocabulary and parameters of straightness] Note. GB/T 24631.1-2024 Product Geometry Technical Specification (GPS) Straightness Part 1: Vocabulary and Parameters (ISO 12780-1:2011, MOD) ISO 14253-1 Geometrical Product Specifications (GPS) Measurement and inspection of workpieces and measuring equipment Part 1: Verification to specifications Rules for judging whether a product is qualified or not [Geometrical product specifications (GPS) - Inspection by measurement of workpieces and measuring equipment-Part 1:Decision rules for verifying conformity or nonconform-ity with specifications] Note. GB/T 18779.1-2022 Technical Specification for Product Geometry (GPS) Measurement and Inspection of Workpieces and Measuring Equipment Part 1: Verification of Conformity to Specifications Rules for determining whether a product is qualified or unqualified (ISO 14253-1:2017, IDT) ISO 17450-2 Geometrical product specifications (GPS) General concepts Part 2: Basic principles, specifications, operational sets and non-Degree of certainty [Geometrical product specifications (GPS)-General concepts-Part 2: Basic tenets, specifications, operators, uncertainties and ambiguities] Note. GB/T 24637.2-2020 Technical Specification for Product Geometry (GPS) General Concepts Part 2: Basic Principles, Specifications, Operation Sets and Uncertainties Determination (ISO