

ICS 25.040.20
CCS J50



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

GB/T 17421.1-2023

Replacing GB/T 17421.1-1998

**Test code for machine tools - Part 1: Geometric accuracy of
machines operating under no-load or quasi-static conditions**

机床检验通则 第1部分：在无负荷或准静态条件下机床的几何精度

Issued on: August 6, 2023

Implemented on: March 1, 2024

**Issued by: State Administration for Market Regulation;
Standardization Administration of the PRC**

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Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part

1. Structure and Drafting Rules of Standardization Documents" Drafting. This document is Part 1 of GB/T 17421 "General Principles for Machine Tool Inspection". GB/T 17421 has published the following parts.

1. Geometric accuracy of machine tools under no-load or quasi-static conditions;
2. Determination of positioning accuracy and repeatability accuracy of CNC axes;
3. Determination of thermal effects;
4. Circle inspection of CNC machine tools;
5. Determination of noise emission;

6.Determination of body and surface diagonal position accuracy (diagonal displacement test);

7.Geometric accuracy of the axis of rotation;

10.Determination of measurement performance of CNC machine tool detection systems.
This document replaces GB/T 17421.1-1998 "General Principles for Machine Tool Inspection Part

1.Geometry of Machine Tools under No-Load or Finishing Conditions" "Precision", compared with GB/T 17421.1-1998, in addition to structural adjustments and editorial changes, the main technical changes are as follows:

- a) Changed the scope of application of the document and specified the scope of inapplicability (see Chapter 1, Chapter 1 of the.1998 edition);
- b) Added a chapter of "Normative Reference Documents" (see Chapter 2);
- c) Added a "Terms and Definitions" chapter (see Chapter 3);

1 Scope

GB/T 17421.1-2023 is the first part of the Chinese machine tool test code and it covers geometric accuracy measured with the machine unloaded or quasi-static. It is the document every machine tool acceptance in China rests on, and it is the one that makes the acceptance meaningful: straightness, flatness, parallelism, squareness, coaxiality, rotational accuracy and the accuracy of positioning are all quantities whose measured value depends on how they are measured, on the datum chosen, the instrument used, where it is placed, how the machine was levelled and how long it was allowed to reach thermal equilibrium. This part fixes all of that. It sets the general conditions for the tests including the installation and the thermal state of the machine, the measuring instruments and their uncertainty, and then the definitions and the measurement methods for each geometric quantity, with the diagrams that show where the instrument goes, together with the way tolerances are expressed and the treatment of measurement uncertainty in deciding compliance. The 2023 edition replaces GB/T 17421.1-1998. For a machine tool builder, a buyer accepting a machine or a calibration laboratory in China, this is the reference.

This document specifies the inspection methods for the geometric accuracy and working accuracy of machine tools under no-load or quasi-static conditions. These methods are also applicable Inspection of other types of industrial machinery. This document applies to power-driven machine tools that process metal, wood, etc., which remove workpiece material through cutting or produce plastic deformation. For machining, not suitable for power driven portable hand tools. This document only involves the geometric accuracy inspection of machine tools, and does not involve the operation inspection (such as vibration, component crawling, etc.) and parameter inspection (speed degree, feed

amount). This document does not cover the geometric accuracy inspection of high-speed mechanical movements where the cutting force is usually less than the acceleration force.

2 Normative reference documents

The contents of the following documents constitute essential provisions of this document through normative references in the text. Among them, the dated quotations For undated referenced documents, only the version corresponding to that date applies to this document; for undated referenced documents, the latest version (including all amendments) applies to this document. ISO

1 Geometric Product Specification (GPS) Standard reference temperature for product geometric specification and verification [GeometricalProduct cation]

GB/T 19765-2005 Technical specifications for product geometric quantities (GPS) Technical specifications for product geometric quantities and standard reference temperatures for inspection (ISO 1. 2002,IDT) ISO 230-

6 General principles for inspection of machine tools Part

6.Determination of body and surface diagonal positioning accuracy (diagonal displacement test) [Test

GB/T 17421.6-2016 General principles for machine tool inspection Part

6.Determination of body and surface diagonal positioning accuracy (diagonal displacement inspection) (ISO 230- 6.2002,IDT)

GB/T 17421.7-2016 General Principles for Machine Tool Inspection Part