

ICS 25.040.20

CCS J 53



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

GB/T 16462-1996

Replacing GB/T 16462.1-2007

**Test conditions for numerically controlled turning machines
and turning centres - Part 1: Geometric tests for machines with
horizontal workholding spindle**

(English Translation)

Issued on: December 28, 2023

Implemented on: July 1, 2024

**Issued by: State Administration for Market Regulation, China National
Standardization Administration**

Table of Contents

Preface	
Introduction	
1 Scope	
2 Normative references	
3 Terms and Definitions	
4 General requirements	
4.1 Units of measurement	
4.2 Implementation of GB/T 17421.1-2023 and GB/T 17421.7-2016	
4.3 Leveling of machine tools	
4.4 Inspection sequence	
4.5 Inspection item	
4.6 Inspection Tool	
4.7 Diagram	
4.8 Linear motion	
4.9 Tool holder and tool spindle	
4.10 Classification of machine tools	
4.11 Software Compensation	
4.12 Tolerance	
4.13 Non-inspection axis	
5 Geometric accuracy inspection	
5.1 Workpiece spindle	
5.2 Straightness of axis motion	
5.3 Relationship between linear motion and workpiece spindle	
5.4 Angular errors in linear axis motion	
5.5 Tailstock	
5.6 Tool holder and tool spindle	
5.7 Rotating workpiece spindle or tool spindle	
Appendix A (informative) Error motion of the workpiece spindle and tool spindle rotation axes	
A:1 Rotation accuracy of workpiece spindle	
A:2 Rotation accuracy of tool spindle	
Reference	

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 16462 "Inspection Conditions for CNC Lathes and Turning Centers": GB/T 16462 has released the following part:

- Part 1: Inspection of geometric accuracy of horizontal machine tools;
- Part 2: Inspection of geometric accuracy of vertical machine tools;
- Part 3: Geometric accuracy inspection of inverted vertical machine tools;
- Part 4: Inspection of positioning accuracy and repeatable positioning accuracy of linear and rotary axes;
- Part 5: Inspection of feed rate, speed and interpolation accuracy;
- Part 6: Accuracy inspection of finished specimens;
- Part 7: Evaluation of contour characteristics in the coordinate plane;
- Part 8: Assessment of thermal deformation:

This document replaces GB/T 16462.1-2007 "Inspection Conditions for CNC Lathes and Turning Centers Part 1: Geometric Accuracy of Horizontal Machine Tools" Inspection", compared with GB/T 16462.1-2007, in addition to structural adjustments and editorial changes, the main technical changes are as follows:

- a) The scope of application of the document has been changed (see Chapter 1, Chapter 1 of the:2007 edition);
- b) The terms and definitions of "operating mode of machine tools" are deleted (see 3.3 of the:2007 edition), and the terms and definitions of "tool holder" are added (see 3.3);
- c) Added requirements and instructions for inspection tools (see 4.6);
- d) Delete "dimension range of machine tools" (see 4.11 of the:2007 edition);
- e) Added requirements for non-inspection axes (see 4.13);
- f) Change "refer to the corresponding provisions of the standard" in the inspection method to "according to the provisions of the corresponding provisions of the standard" (see G2~ in Chapter 5 G15, G17~G26, G30,:2007 version of G1~G24);
- g) Added straightness inspection of Z-axis, X-axis, and Y-axis motion (see G3~G5 in 5:2);
- h) G6 has been changed to refer to the parallelism of the workpiece spindle axis to the Z-axis motion (see G6 in 5:3, G3 in 5:2 in the:2007 edition);

i) Added the verticality test of X-axis motion, Y-axis motion and Z-axis motion (see G7 and G8 in 5:3);

j) Changed the perpendicularity of the Y-axis motion to the X-axis motion, the perpendicularity of the X-axis motion to the C' axis, and the coaxiality of the sub-spindle and the workpiece spindle:

Degree requirements (see G9, G10, G12 of 5:3, G5, G4, G6 of:2007 version 5:2);

k) Changed the angular error requirements for Z-axis motion and X-axis motion (see G13 and G14 of 5:4, G7 and G8 of:2007 version 5:3);

l) The consistency requirements for the simultaneous movement distance of the tailstock W axis and the saddle Z axis have been changed (see G16 of 5:5, 5:4 of the:2007 edition G10);

m) Changed the parallelism requirements of the tailstock sleeve axis and the tailstock sleeve taper hole axis for Z-axis motion (see G17 and G18 of 5:5,:2007 G11, G12 of version 5:4);

n) Changed the offset requirements for the Z-axis movement of the workpiece spindle center and tailstock center (see G19 of 5:5, 5:4 of the:2007 edition G13):

This document is modified to adopt ISO 13041-1:2020 "Inspection Conditions for CNC Lathes and Turning Centers Part 1: Geometric Accuracy of Horizontal Machine Tools" test":

The technical differences between this document and ISO 13041-1:2020 and their reasons are as follows:

---Replaced ISO 230-1 (see Chapter 1, 4:2) with GB/T 17421.1-2023 to increase operability and facilitate the preparation of this document application;

---Replaced ISO 230-7:2015 and ISO 230-7 (see 4.2) with normatively quoted GB/T 17421.7-2016, adding possible Operability to facilitate the application of this document;

---Change "refer to ISO 230" to "implement GB/T 17421.1-2023 and GB/T 17421.7-2016" (see 4.2), add Operability to facilitate the application of this document;

---Change "refer to the corresponding provisions of the standard" in the inspection method to "according to the provisions of the corresponding provisions of the standard" (see G2~ in Chapter 5 G15, G17~G26, G30), suitable for my country's national conditions and consistent with other domestic machine tool accuracy inspection standards;

--- Added the requirement of tolerance "0:080/1000 (16")" when $X > 1000$ in the G14 inspection item (see G14 in 5:4), because X the stroke of axis motion (tool holder skateboard motion) can exceed 1000, so this content is added:

The following editorial changes have been made to this document:

---Deleted the content of "note" in Figure 1 and Figure 2;

---Deleted the "measured deviation" column in the accuracy inspection table (see G1~G30 in Chapter 5);

---Deleted Appendix B (informative) "Non-ISO language terms":

Please note that some content in this document may be subject to patents: The publisher of this document assumes no responsibility for identifying patents:

Introduction

GB/T 16462 "Inspection Conditions for CNC Lathes and Turning Centers" belongs to the general inspection standards for CNC lathes and turning centers and establishes the Principles and requirements for accuracy and performance testing:

GB/T 16462 "Inspection Conditions for CNC Lathes and Turning Centers" consists of eight parts:

---Part 1: Inspection of geometric accuracy of horizontal machine tools: The purpose is to standardize the geometric accuracy inspection of CNC horizontal lathes and turning centers methods and corresponding requirements:

---Part 2: Inspection of geometric accuracy of vertical machine tools: The purpose is to standardize the geometric accuracy inspection of CNC vertical lathes and turning centers methods and corresponding requirements:

---Part 3: Inspection of geometric accuracy of inverted vertical machine tools: The purpose is to standardize inverted CNC vertical lathes and inverted vertical turning machines Central geometric accuracy inspection methods and corresponding requirements:

---Part 4: Inspection of positioning accuracy and repeatable positioning accuracy of linear and rotary axes: The purpose is to standardize CNC lathes and turning Inspection methods and corresponding requirements for the positional accuracy of the center's linearity and rotation axis:

---Part 5: Inspection of feed rate, speed and interpolation accuracy: The purpose is to standardize the spindle speed, linearity of CNC lathes and turning centers the movement accuracy inspection method and corresponding requirements for the feed rate of the axis and the trajectory generated by the simultaneous movement of the axis:

---Part 6: Accuracy inspection of finished specimens: The purpose is to standardize a series of cutting inspection methods for standard specimens under finishing conditions:

laws and corresponding requirements:

---Part 7: Evaluation of contour characteristics in the coordinate plane: The purpose is to standardize the contour feature inspection of CNC lathes and turning centers: