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

GB/T 17421.4-2016

Replacing GB/T 17421.4-2003

**Test code for machine tools -- Part 4: Circular tests for
numerically controlled machine tools**

机床检验通则 第4部分：数控机床的圆检验

(English Translation)

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Foreword

GB/T 17421 "General Rules for Machine Inspection" is divided into 11 parts.

--- Part 1. The geometric accuracy of the machine tool under no load or finishing conditions;

--- Part 2. CNC axis positioning accuracy and repeat positioning accuracy of the determination;

--- Part 3. Determination of thermal effects;

--- Part 4. CNC machine circular test;

--- Part 5. Determination of noise emission;

--- Part 6. Determination of body and face diagonal position accuracy (diagonal displacement test);

--- Part 7. Geometrical accuracy test of rotary axis;

--- Part 8. Vibration (Technical Report);

--- Part 9. GB/T 17421 Machine Tool Testing series of standards to estimate the basic equations of uncertainty (Technical Report);

--- Part 10. Determination of CNC machine tool measurement performance;

--- Part 11. Measuring instruments for the inspection of geometrical accuracy of machine tools (Technical Report).

This section GB/T 17421 Part 4.

This section drafted in accordance with GB/T 1.1-2009 given rules.

Our documents that have a consistent correspondence with the normative references in this section are as follows.

--- GB/T 17421.1-1998 General Rules for Machine Inspection Part 1. Geometric accuracy of the machine under no load or finishing conditions (eqvISO 230-1.1996) this section replaces GB/T 17421.4-2003, compared with the GB/T 17421.4-2003, the contents of the

following changes.

- 3.3 with two-way circle deviation G (b) instead of the hysteresis H, because with the general measurement tool is difficult to assess the hysteresis H, while the two-way Circular deviation G (b) contains similar information;
- Chapter 3 increased the average bi-directional radius deviation D terms and definitions;
- 4.6 adds the uncertainty of measurement and testing;
- Added parameters G (b) and D in Appendix A;
- Added Appendix D "Circular Test Using Feedback Signals".

This section uses the translation method identical with ISO 230-4:2005 "General Rules for Machine Inspection Part 4. CNC machine circular test." this part is proposed by China Machinery Industry Federation.

This part of the National Standardization Technical Committee metal cutting machine (SAC/TC22) centralized.

This part of the drafting unit. Beijing Beiyi Machine Tool Co., Ltd., National Machine Tool Quality Supervision and Inspection Center, Sichuan Changzheng Machine Tool Group has Limited company.

1 Scope

GB/T 17421 provisions of this part of the two linear axis linkage circular trajectory generated two-way circle deviation, the average bi-directional radius deviation Difference, circle deviation and radius deviation of the test and assessment methods. The relevant inspection tools are described in 6.6.3 of ISO 230-1:1996.

The purpose of this section is to provide a method of testing the contour characteristics of CNC machine tools.

2 Normative references

The following documents for the application of this document is essential. For dated references, only the dated version applies to this article Pieces. For undated references, the latest edition (including all amendments) applies to this document.

ISO 230-1-1996 General rules of machine tool inspection - Part 1. Geometric accuracy of machine tools under no load or finishing conditions

3 Terms and definitions

The following terms and definitions apply to this document.

Nominal path CNC programming of the circular path, which by the diameter (or radius), the location of the center and the direction of the machine's work area to define, either A full circle, it can be a part of a circle of not less than 90 °.

The actual path the path generated by the machine when moving by the programmed nominal path.

Bi-directional circular deviation G (b) Including the two actual trajectory of the two concentric circles (minimum area circle) the minimum radius difference, a trajectory for the clockwise contour movement, and the other Counter-clockwise contour movement, see Figure 1.

Note 1: Bi-directional circle deviation G (b) can also be assessed using the maximum radius deviation range based on the least squares radius. Least Square Radius calculation is based on 2 Track, that is, clockwise and counterclockwise trajectory.

Note 2: Bi-directional circle deviation G (b) does not include the installation error, ie, the centering error of the inspection tool.

Note 3: The measurement of bi-directional misalignment G (b) requires only calibration of the displacement of the test equipment (no need to calibrate the length of the test equipment for determining the diameter of the track quasi). The measurement of radius deviation F and average bi-directional radius deviation D requires the use of a test tool with a calibrated length and a calibrated displacement (see Appendix A).

Note 4: When all points on a line in a plane are contained between two concentric circles whose radius deviation does not exceed a given value, the line is considered as a circle (See Figure 2 and 6.6.1 in ISO 230-1:1996).

Note 5: G (b) is measured by an external measuring device as described in 6.6.3 of ISO 230-1:1996. Circular test using feedback signal the result is called "Bi-directional circle deviation G (b) f" using the feedback signal.