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

GB/T 20957.1-2007

**Test conditions for precision machining centre -- Part 1:
Geometric tests for machines with horizontal spindle and with
accessory heads (horizontal Z axis)**

精密加工中心检验条件 第1部分：卧式和带附加主轴头机床几何精度检验(水平Z轴)

(English Translation)

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Foreword

GB/T 20957 "Test conditions for precision machining centers" is divided into ten parts as follows.

--- Part 1. horizontal spindle and with head Geometric tests for machines (horizontal Z-axis);

Universal spindle head Geometric tests for machines (vertical Z-axis) or vertical with vertical primary rotary axis;. --- Part 2

--- Part 3. indexing or continuously indexing spindle head of the whole universal Geometric tests for machines (vertical Z-axis);

--- Part 4. positioning accuracy and linear and rotary axes repeatability test;

--- Part 5. Clamp the workpiece pallet positioning accuracy and repeatability of positioning accuracy test;

--- Part 6. feed rate, speed and accuracy test interpolation;

--- Part 7. finishing accuracy test specimen;

--- Part 8. Evaluation of the contouring performance in the three coordinate plane;

- Part 9. tool pallet conversion and the conversion of the operating time of assessment;
- Part 10. Evaluation of thermal effects.

This section GB/T Part of 120,957.

The partial modification of the use of ISO 10791-1:1998 "Test conditions for machining centers - Part 1. horizontal spindle and with head machine geometry Accuracy test (horizontal Z-axis) "(in English).

And ISO 10791-1:1998 compared to the main technical content of the following modifications.

- According to machine precision grade requirements, tolerance for all test items in ISO 10791-1:1998 on the basis of the compression (Except G21 term compression common ratio of 2.5, the remaining compression common ratio of about 1.6);
- In Chapter 1, "scope" to increase the "linear axis travel greater than 2000mm precision horizontal machining center can also refer use";
- 3.2 increased level machine installation and inspection requirements at ambient temperature;
- Remove the G6 item Inspection "c) in the ZX plane (EBY)" test;
- In the G13, G14, G18, AG2, AG3, AG5, AG6 items of test methods added "its dependent bias and no more than that Tolerance "in the illustrated.

For ease of use, this section made the following editorial changes.

- "This standard" be replaced by "this section";
- With a decimal point instead of a comma as the decimal point, "";
- Title Chapter 3, "a brief description" to "General requirements";
- Of ISO 10791-1:1998 international standard referenced by our country has been adopted as national standards in place;
- Remove the ISO 10791-1:1998 Foreword and Introduction;
- Remove the ISO 10791-1:1998 Annex D (informative).

This section of the Appendix A, Appendix B, Appendix C is a normative appendix.

This part is proposed by China Machinery Industry Federation.

This part of the National Metal Cutting Machine Standardization Technical Committee (SAC/TC22) centralized.

This section drafted by. National Chiao Tung University Kunming Machine Technology Co., Ltd., Beijing Machine Tool Research Institute, Beijing Institute of milling machines, the

machine is limited in the Czech Republic the company.

1 Scope

This section provides precision horizontal machining center (horizontal Z-axis) of the geometric accuracy of requirements and test methods.

This section applies to essentially have four CNC axes, three linear axes (X, Y, Z) and a return trip to 2000mm Additional rotation axis (B ') precision horizontal machining centers, but also for sliding spindle ram or three different forms of additional universal spindle head movement.

This section lists three possible test items additional universal spindle head in the appendix.

--- Appendix A (normative). 45 ° mechanical indexing of the minutes of the spindle head, with two objects of different angular positions of the corresponding inspection Test project (AG1 ~ AG9) only to check whether spindle last location.

--- Appendix B (normative). rotary spindle head having two mutually perpendicular NC rotary axis (test items BG1 ~ BG7).

--- Appendix C (Normative Appendix). 45 ° to divide the continuous indexing spindle head, similar to the first form, but with two NC rotary axis all geometric properties of continuous indexing, the corresponding test items (CG1 ~ CG7) To check the influence of the last position in which the spindle (plane and except axis), two rotary axis positioning accuracy; if their movement and allow locking, these test items can be used for sub-45 ° Spindle head to do more in-depth testing.

Linear axis travel greater than 2000mm precision horizontal machining center can also refer to use.

2 Normative references

The following documents contain provisions which, through reference GB/T 20957 in this section constitute provisions of this section. For dated reference documents Member, all subsequent amendments (not including errata content) or revisions do not apply to this section, however, encouraged to reach under this section Parties to research agreement to use the latest versions of these documents. For undated reference documents, the latest versions apply to this section.

GB/T 17421.1-1998 Test code for machine tools - Part 1. under no-load or finishing conditions Geometric accuracy of machines (Eqv ISO 230-1:1996)

3 General requirements

3.1

section all linear dimensions, tolerances and corresponding tolerances in millimeters; angle deviation tolerances for general use and the corresponding ratio Representation, but in some cases for clarity, but also with micro-radians or arc seconds, equivalent relational expression as follows.

$$0.010/1000 = 10 \times 10^{-6} = 10\mu\text{rad} \sim 2''$$

3.2

This section should be used with reference to GB/T 17421.1, especially heating pre-installation testing tools, spindles and other moving parts, check Recommended precision test methods and testing tools. Installation of the machine level and ambient temperature should meet the following requirements.

--- Reference to GB/T 17421.1-1998 adjust the machine to install the 3.1 level, a level, vertical and horizontal readings does not exceed Specified by the manufacturer;

--- When test, the ambient temperature should be maintained at $20\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$, machine tools and gages in place long enough for the measurement environment (preferably a lot in 12h), in order to ensure a steady state before the test.

3.3

part of the order given in the test project does not represent the actual test sequence. In order to test assembly and disassembly tools and testing convenience, any order for inspection.