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(JMTBA/JSA)

**Machine tools—Test conditions for
surface grinding machines with vertical
grinding wheel spindle and reciprocating
table—Testing of the accuracy**

ICS 25.080.50

Reference number : JIS B 6251 : 2004 (E)

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Foreword

This translation has been made based on the original Japanese Industrial Standard established by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee, according to the proposal of establishing a Japanese Industrial Standard from Japan Machine Tool Builders' Association (JMTBA)/ Japanese Standards Association (JSA), with the draft of Industrial Standard based on the provision of Article 12 Clause 1 of the Industrial Standardization Law.

This Standard has been made based on ISO 1985:1998 *Machine tools – Test conditions for surface grinding machines with vertical grinding wheel spindle and reciprocating table – Testing of the accuracy* for the purposes of making it easier to compare this Standard with International Standard; to prepare Japanese Industrial Standard conforming with International Standard; and to propose a draft of an International Standard which is based on Japanese Industrial Standard.

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the original JIS is to be the final authority.

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Contents

	Page
Introduction	1
1 Scope	1
2 Normative reference	1
3 General matters	2
3.1 Measuring units	2
3.2 Reference to JIS B 6191	2
3.3 Testing sequence	2
3.4 Tests to be performed	2
3.5 Measuring instruments	2
3.6 Machining tests	2
3.7 Minimum tolerance	2
3.8 Nomenclature of machine parts and coordinate axes	3
4 Geometric tests	4
4.1 Linear axes	4
4.2 Table	9
5 Machining tests	15
Annex 1 (normative) Bibliography	17
Annex 2 (informative) Comparison table between JIS and corresponding International Standard	18

Machine tools—Test conditions for surface grinding machines with vertical grinding wheel spindle and reciprocating table—Testing of the accuracy

Introduction This Japanese Industrial Standard has been prepared based on the first edition of ISO 1985 *Machine tools—Test conditions for surface grinding machines with vertical grinding wheel spindle and reciprocating table—Testing of the accuracy* published in 1998 with some modifications of the technical contents.

Portions given sidelines or dotted underlines are the matters not stated in the original International Standard. The list of modifications with the explanation is given in annex 2 (informative).

1 Scope This Standard specifies, with reference to JIS B 6191, both geometric and machining tests on general purpose, normal accuracy, surface grinding machines with reciprocating table and vertical grinding wheel spindle. It also specifies the applicable tolerances corresponding to the above-mentioned tests.

This Standard is not applicable to surface grinding machines with fixed or rotating tables or to machines having longitudinal traverse of the wheel head.

This Standard deals only with the verification of the geometric accuracy of the machine. It does not apply to the testing of the machine operation (vibrations, abnormal noises, stick-slip motion of components, etc.) nor to the checking of its characteristics (such as speeds, feeds, etc), which should generally be checked before testing the accuracy.

Note : The International Standard corresponding to this Standard is as follows.
In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standard and JIS are IDT (identical), MOD (modified), and NEQ (not equivalent) according to ISO/IEC Guide 21.

ISO 1985:1998 *Machine tools—Test conditions for surface grinding machines with vertical grinding wheel spindle and reciprocating table—Testing of the accuracy* (MOD)

2 Normative reference The following standard contains provisions which through reference in this Standard, constitute provisions of this Standard. The most recent edition of the standard (including amendments) indicated below shall be applied.

JIS B 6191 *Machine tools—Geometric accuracy tests and practical tests—Test methods*

Note : ISO 230-1:1996 *Test code for machine tools—Part 1: Geometric accuracy of machines operating under no-load or finishing conditions* is equivalent to the said standard.

3 General matters

3.1 Measuring units In this Standard, all linear dimensions, deviations and corresponding tolerances are expressed in millimeters; angular dimensions are expressed in degrees (°) and angular deviations and the corresponding tolerances are expressed in principle in ratios of length (e.g. 0.00x/1 000), but in some cases, microradians (μrad) or arcseconds (") may be used for clarification purposes. The equivalence of the following expressions should always be kept in mind:

$$0.010/1\ 000 = 10 \times 10^{-6} = 10\ \mu\text{rad} \doteq 2''$$

3.2 Reference to JIS B 6191 To apply this Standard, reference shall be made to JIS B 6191, especially for the installation of the machine before testing, warming up of the spindle and other moving components, description of measuring methods and recommended accuracy of testing equipment.

In the "Observations" block of the tests described in the following sections, the instructions are followed by a reference to the corresponding clause in JIS B 6191 in cases where the test concerned is in compliance with the specifications of JIS B 6191.

3.3 Testing sequence The sequence in which the tests are presented in this Standard in no way defines the practical order of testing. In order to make the mounting of instruments or gauging easier, tests may be performed in any order.

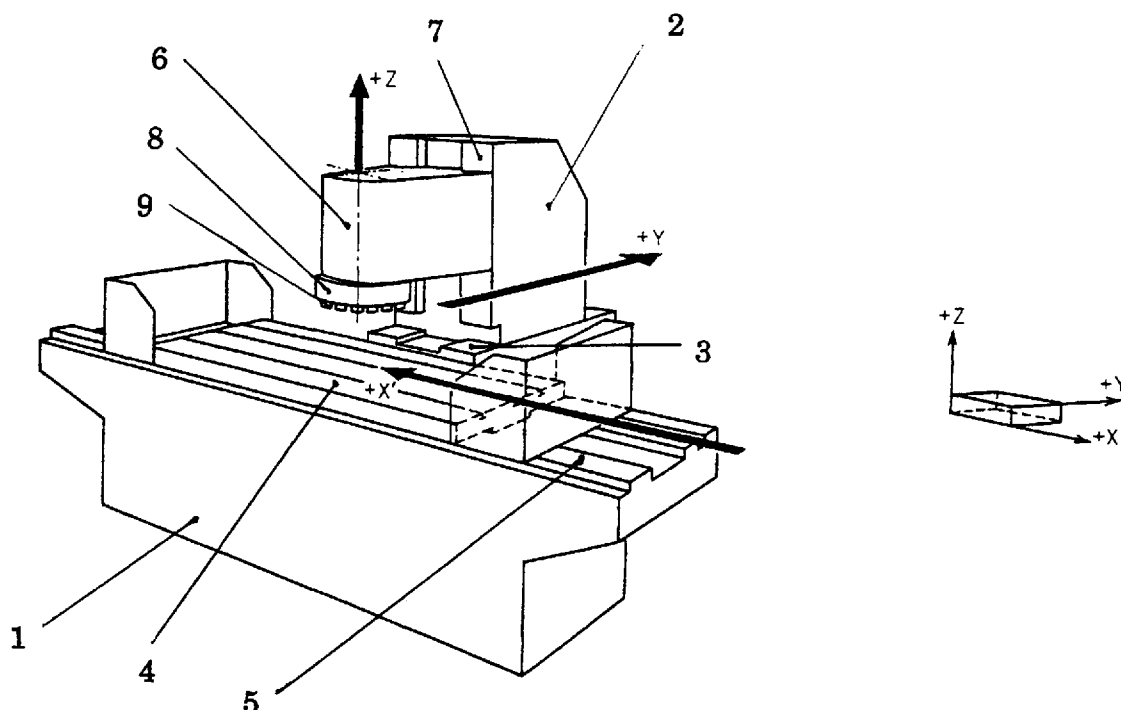
3.4 Tests to be performed When testing a machine, it is not always necessary or possible to carry out all the tests described in this Standard. When the tests are required for acceptance purposes, it is up to the user to choose, in agreement with the supplier/manufacturer, those tests relating to the components and/or the properties of the machine which are of interest. These tests are to be clearly stated when ordering a machine.

3.5 Measuring instruments The measuring instruments indicated in the tests described in the following clauses are examples only. Other instruments measuring the same quantities and having at least the same accuracy may be used. Dial gauges shall have a resolution of 0.001 mm.

3.6 Machining tests Machining tests shall be made with finishing cuts only, not with roughing cuts which are liable to generate appreciable cutting forces.

3.7 Minimum tolerance When the tolerance for a geometric test is established for a measuring length different from that given in this Standard (see 2.311 of JIS B 6191), it shall be taken into consideration that the minimum value of tolerance is 0.005 mm

3.8 Nomenclature of machine parts and coordinate axes Nomenclature of machine parts and coordinate axes is given in figure 1.



Ref.	Term		English
	Japanese character	Reading	
1	ベッド	BEDDO	bed
2	コラム (Y 軸)	KORAMU (Y-ZIKU)	column (Y-axis)
3	コラム案内面	KORAMU-ANNAI-MEN	column slideways
4	テーブル (X 軸)	TÊBURU (X-ZIKU)	table (X-axis)
5	テーブル案内面	TÊBURU-ANNAI-MEN	table slideways
6	といし軸頭 (Z 軸)	TOISI-ZIKUTÔ (Z-ZIKU)	wheel head (Z-axis)
7	といし軸頭案内面	TOISI-ZIKUTÔ-ANNAI-MEN	wheel head slideways
8	といし覆い	TOISI-ÔI	wheel guard
9	といし	TOISI	grinding wheel

Figure 1 Surface grinding machines with vertical grinding wheel spindle and reciprocating table

4 Geometric tests

4.1 Linear axes

Table 1 Geometric tests

Unit : mm	
Object Checking of straightness of the table movement (X-axis) a) in the vertical ZX-plane; b) in the horizontal XY-plane.	
Diagram a) b)	
Tolerance For a) and b) 0.01 for measuring lengths up to 1 000 For each 1 000 increase in length, add 0.01 to the preceding tolerance Maximum tolerance: 0.025	Measured deviation a) b)
Measuring instruments Straightedge, gauge blocks and dial gauge, or taut wire and microscope [for b) only] or optical methods	
Observations and references to JIS B 6191 5.232.1 The dial gauge support should be placed on the grinding spindle nose or on the head near the spindle, the stylus touching a straightedge laid parallel to the general direction of the longitudinal movement of the table. <u>If the spindle can be locked, the dial gauge may be mounted on it. If the spindle cannot be locked, the dial gauge should be placed on a fixed part of the wheelhead. The stylus is to be placed touching a straightedge laid on the table.</u>	