
INTERNATIONAL STANDARD



2407

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Test conditions for internal cylindrical grinding machines with horizontal spindle — Testing of accuracy

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up has the right to be represented on that Committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 2407 was drawn up by Technical Committee ISO/TC 39, *Machine tools*, and circulated to the Member Bodies in June 1972.

It has been approved by the Member Bodies of the following countries :

| | | |
|---------------------|-------------|-----------------------|
| Belgium | India | South Africa, Rep. of |
| Chile | Ireland | Switzerland |
| Czechoslovakia | Italy | Thailand |
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| France | Poland | United Kingdom |
| Germany | Portugal | U.S.A. |
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The Member Bodies of the following countries expressed disapproval of the document on technical grounds :

Japan
Sweden

Test conditions for internal cylindrical grinding machines with horizontal spindle — Testing of accuracy

1 SCOPE AND FIELD OF APPLICATION

This International Standard describes, with reference to ISO/R 230, *Machine tool test code*, both geometrical and practical tests on general purpose and normal accuracy internal cylindrical grinding machines with horizontal spindle, and gives the corresponding permissible deviations.

It deals only with the verification of accuracy of the machine. It does not apply to the testing of the running of the machine (vibrations, abnormal noises, stick-slip motion of components, etc.), or to its characteristics (speeds, feeds, etc.) which should generally be checked before testing accuracy.

2 PRELIMINARY REMARKS

2.1 In this International Standard, all the dimensions are expressed in millimetres and in inches.

2.2 To apply this International Standard, reference must be made to ISO/R 230, especially for the installation of the machine before testing, warming up of spindles and other moving parts, description of measuring methods and recommended accuracy of testing equipment.

2.3 The sequence in which the geometrical tests are given is related to the sub-assemblies of the machine and this in no way defines the practical order of testing. In order to make the mounting of instruments or gauging easier, tests may be applied in any order.

2.4 When inspecting a machine, it is not always necessary to carry out all the tests given in this International Standard. It is up to the user to choose, in agreement with the manufacturer, those relating to the properties which are of interest to him, but these tests are to be clearly stated when ordering a machine.

2.5 Practical tests shall be made with finishing cuts and not with roughing cuts which are liable to generate appreciable cutting forces.

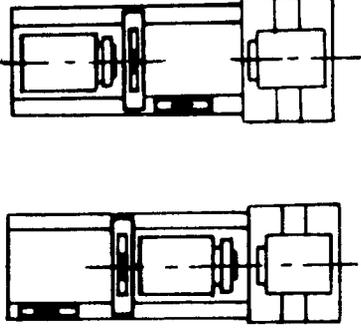
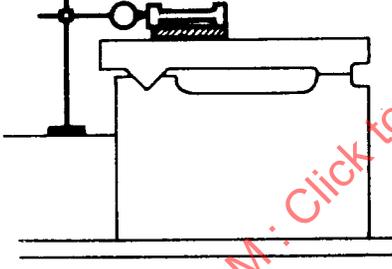
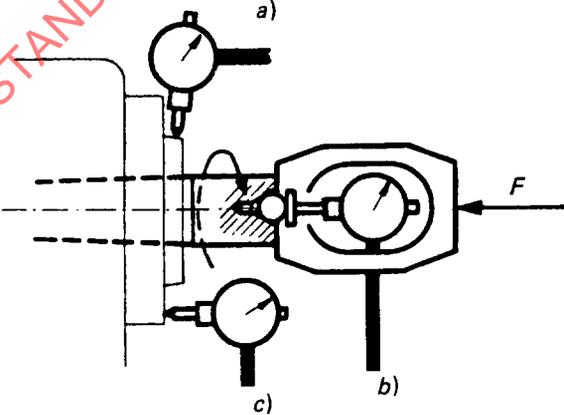
2.6 When the tolerance is established for a measuring range different from that indicated in this International Standard (see 2.311 in ISO/R 230) it should be taken into consideration that the minimum value of tolerances is 0,001 mm (0.000 04 in).

NOTE — Test conditions for internal cylindrical grinding machines having a surfacing wheel slide are subject of the Annex to this International Standard.¹⁾

1) At present at the stage of draft Addendum 1 to ISO 2407.

3. TEST CONDITIONS AND PERMISSIBLE DEVIATIONS

3.1 Geometrical tests

| No. | Diagram | Object | |
|-----|---|--|-------------------------------|
| G0 |  | <p>Levelling of the machine.</p> | <p>I c t</p> |
| G1 |  | <p>A – TABLE</p> <p>Checking of straightness of the table movement in the horizontal plane.</p> | <p>for a</p> |
| G2 |  | <p>B – WORKHEAD</p> <p>a) Measurement of run-out of the external register diameter of the spindle;</p> <p>b) Measurement of periodic axial slip of the wheel spindle;</p> <p>c) Measurement of camming of the register face of the spindle (including periodic axial slip).</p> | <p>a)</p> <p>b)</p> <p>c)</p> |

| Permissible deviation | | Measuring instruments | Observations and references to the test code ISO/R 230 |
|-----------------------|----|-----------------------|---|
| mm | in | | |
| | | | |

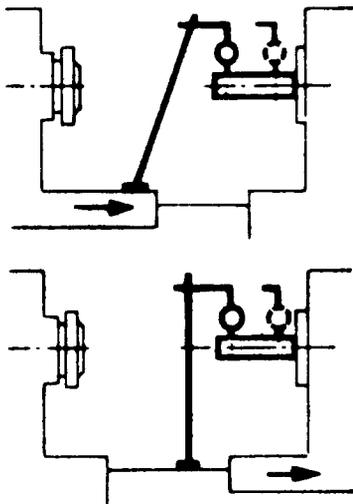
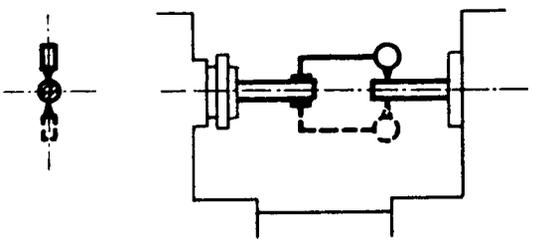
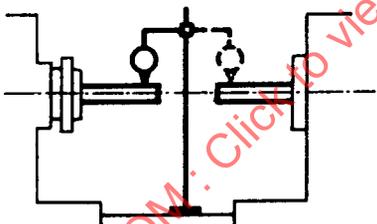
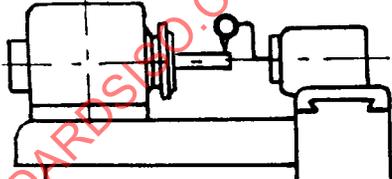
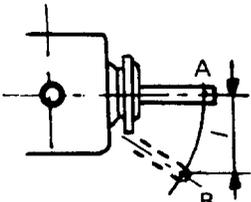
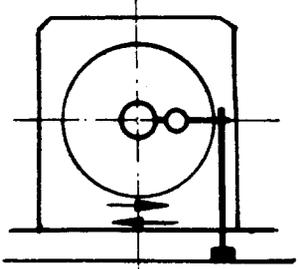
In the case of internal cylindrical grinding machines, no part is to be dismantled (especially in the case of slideways mounted on roller elements). It will be satisfactory to check the levelling with the aid of levels set longitudinally and transversely on the machine according to the manufacturer's specifications.

| | | | |
|---|---|--------------------------------|--|
| | | | |
| 0,008 for a 300 mm travel | 0.0003 for a 12 in travel | Straightedge and dial gauge | Clause 5.232.1 The dial gauge support shall be placed on a fixed part of the machine, the stylus shall touch a straightedge laid parallel to the general direction of the longitudinal movement of the table. |
| a) 0,005 b) 0,005 c) 0,01 | a) 0.0002 b) 0.0002 c) 0.0004 | Dial gauge | a) Clause 5.612.2 In the case of a tapered spindle nose the stylus of the dial gauge shall be set normal to the surface which is to be checked. b) and c) Clauses 5.62, 5.621.2, 5.622.1, 5.622.2 and 5.632 For the dial gauge position, see Figures 59 to 64 and 67, clauses 5.62, 5.622 and 5.632. The value of force <i>F</i> to be applied for the tests a), b) and c) shall be specified by the manufacturer. |

| No. | Diagram | Object | |
|-----|---------|--|--|
| G3 | | <p>Measurement of run-out of the taper or of the internal centring register of the spindle :</p> <p>a) at the outlet of the housing;</p> <p>b) at a distance from the outlet equal to $\frac{Da^*}{2}$ [100 mm (4 in) minimum and 300 mm (12 in) maximum].</p> | <p>a)</p> <p>b)</p> <p>for a of 30</p> |
| G4 | | <p>Checking of parallelism of the workhead spindle axis to the table movement (in the case of a moving workhead) or to the longitudinal movement of the grinding wheel spindle (in the case of a moving wheelhead) :</p> <p>a) in a horizontal plane;</p> <p>b) in a vertical plane.</p> | <p>a)</p> <p>for a m of 300</p> <p>b)</p> <p>for a m of 300</p> <p>(Test mandre upwards)</p> |
| G5 | | <p>C – GRINDING SPINDLE</p> <p>Measurement of run-out of the grinding wheel spindle (wheel mounting diameter) :</p> <p>a) at the outlet of the housing;</p> <p>b) at a distance equal to $\frac{Da^*}{2}$ [100 mm (4 in) minimum and 200 mm (8 in) maximum]</p> | <p>a)</p> <p>b)</p> <p>for a m of 200</p> |

* Da = Maximum diameter admissible for workpiece.

| Permissible deviation | | Measuring instruments | Observations and references to the test code ISO/R 230 |
|--|---|---|---|
| mm | in | | |
| a) 0,005 b) 0,015 for a measuring length of 300 | a) 0.0002 b) 0.0006 for a measuring length of 12 | Test mandrel according to the type of spindle nose and dial gauge | Clause 5.612.3 In the case of an internal taper, the test will be made with the aid of a mandrel. In the case of a cylindrical centring register, the test will be made with the aid of the dial gauge and without using a test mandrel. |
| 0,01 for a measuring length of 300 0,025 for a measuring length of 300 Test mandrel end directed upwards) | a) 0.0004 for a measuring length of 12 b) 0.001 for a measuring length of 12 (Test mandrel end directed upwards) | Test mandrel and dial gauge | Clauses 5.412.1 and 5.422.3 |
| 0,01 0,02 for a measuring length of 200 | a) 0.0004 b) 0.0008 for a measuring length of 8 | Test mandrel according to the type of spindle nose and dial gauge | Clause 5.612.3 In the case of an internal taper, the test will be made with the aid of a mandrel. In the case of a cylindrical centring register, the test will be made with the aid of the dial gauge and without using a test mandrel. In this case, the value of <i>a</i>) will be taken as the permissible deviation. |

| No. | Diagram | Object | |
|-----|--|---|--|
| G6 |  | <p>Checking of parallelism of the grinding wheel spindle axis to the table movement in a vertical plane</p> <p style="text-align: center;">OR</p> <p>Checking of parallelism of the grinding wheel spindle axis to the longitudinal movement of the wheelhead in a vertical plane.</p> | <p>for a me of 300</p> <p>(Test man upwards)</p> |
| G7 |  <p style="text-align: center;">Alternative</p>  | <p>Measurement of difference in height between the axis of workhead spindle and the axis of wheelhead spindle.</p> | |
| G8 |   | <p style="text-align: center;">SWIVELLING WORKHEAD</p> <p>Checking of parallelism of the mounting face of the swivelling workhead to the cross traverse of the wheelhead.</p> | fo |
| G9 |  | <p>Measurement of accuracy of repetition of the finish approach of the wheel slide (or the work slide)</p> | |