

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

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Foreword

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The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to ISO text carry the number of the ISO amendment. For example, text altered by ISO amendment 1 is indicated by A1 A1.

The UK participation in its preparation was entrusted by Technical Committee MTE/1, Machine tools, to Subcommittee MTE/1/2, Machine tools – Accuracy.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

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INTERNATIONAL STANDARD

**ISO
2407**

Third edition
1997-12-15

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

*Conditions d'essai des machines à rectifier les surfaces de révolution
intérieures à broche horizontale — Contrôle de la précision*



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Descriptors: Machine tools, grinding machines (tools), positioning, tests, geometric tests, determination, accuracy, testing conditions.

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established 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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 2407 was prepared by Technical Committee ISO/TC 39, *Machine tools*, Subcommittee SC 2, *Test conditions for metal cutting machine tools*.

This third edition cancels and replaces the second edition (ISO 2407:1984), which has been technically revised.

Annex A and Annex B of this International Standard are for information only.

1 Scope

This International Standard specifies, with reference to ISO 230-1, both geometric and machining tests on general purpose and normal accuracy internal cylindrical grinding machines with horizontal spindle, whether fitted with a facing wheelhead slide or not. It also specifies the applicable tolerances corresponding to the above mentioned tests.

This International Standard deals only with the verification of the accuracy; it applies neither to the testing of the machine operation (vibrations, abnormal noise, stick-slip motion of components, etc.), nor to the checking of its characteristics (such as speeds, feeds, etc.), which should generally be checked before the testing of the accuracy.

This International Standard provides the terminology used for the principal parts of the machine and the designation of the axes with reference to ISO 841.

NOTE In addition to the terms used in two of the three official ISO languages (English and French), Annex A of this International Standard provides the equivalent terms in the German and Italian languages; these are published under the responsibility of the National member bodies for Germany (DIN) and Italy (UNI). However, only the terms given in the official languages can be considered as ISO terms.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 230-1:1996, *Test code for machine tools — Part 1: Geometric accuracy of machines operating under no-load or finishing conditions*.

3 Machine configurations

3.1 Descriptions

The common characteristic of all internal cylindrical grinding machines with horizontal spindle is that they have at least both horizontal workhead and the wheelhead on the bed and the spindles are facing each other.

The workhead may swivel around a vertical axis (B-axis) for grinding conical surfaces.

Depending upon the machine design, one of the two heads (workhead or wheelhead) can move along the X-axis. The wheelhead usually can move along the Z-axis (see Figure 1 and Figure 2).

In some cases these machines are equipped with a facing wheel. This may be accomplished by means of the second wheelhead as shown in Figure 3 or by an additional swivelling wheelhead attachment. This attachment is usually mounted on the workhead with a linear movement (W-axis) parallel to Z-axis and a swivelling movement (C-axis) around the W-axis (see Figure 4).

3.2 Terminology and designation of axes

See Figure 1 to Figure 4 and Table 1.

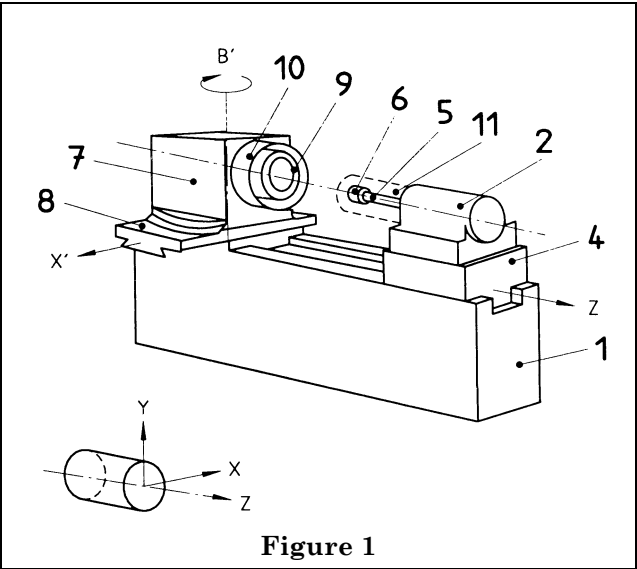


Figure 1

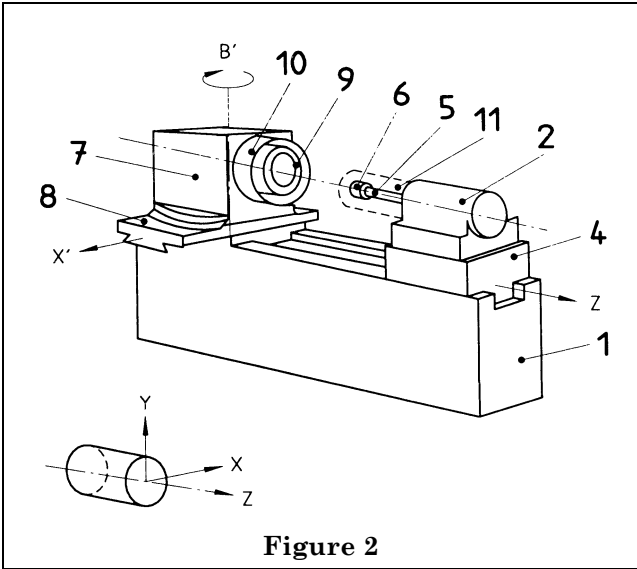


Figure 2

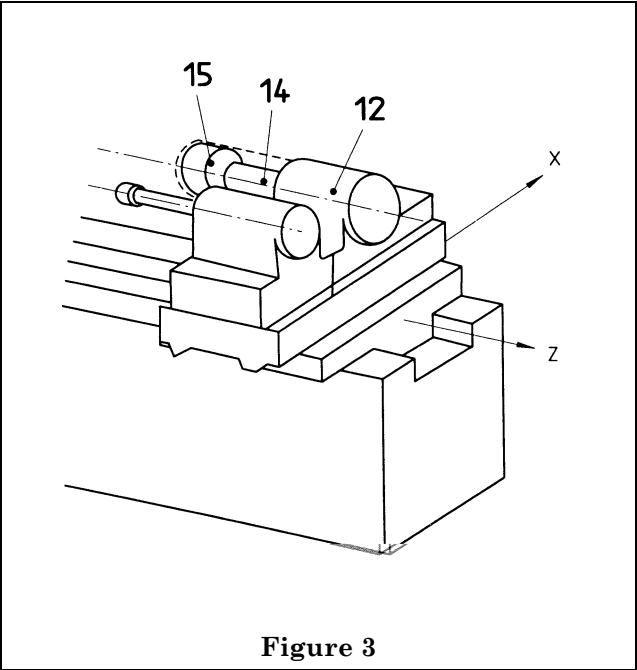


Figure 3

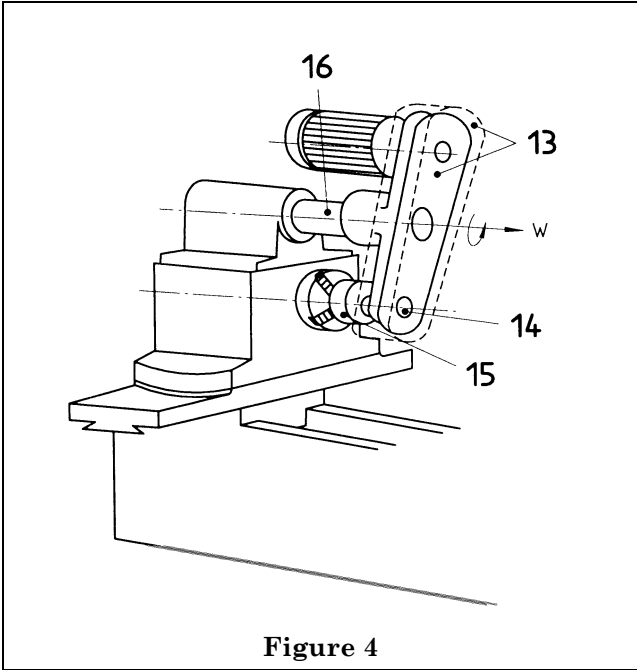


Figure 4

Table 1 — Terminology

Ref.	English	French
1	Bed	Banc
2	Wheelhead	Poupée porte-meule
3	Wheelhead cross slide	Chariot transversal de poupée porte-meule
4	Wheelhead carriage	Chariot de poupée porte-meule
5	Wheel spindle	Broche porte-meule
6	Internal grinding wheel	Meule intérieure
7	Workhead (swivelling)	Poupée porte-pièce (pivotante)
8	Workhead cross slide	Chariot transversal de poupée porte-pièce
9	Workpiece holder	Porte-pièce
10	Workpiece guard	Protecteur de la pièce
11	Wheel guard	Carter de meule
12	Facing wheelhead	Poupée porte-meule à surfacer
13	Swivel arm (with drive and guard)	Bras pivotant (avec dispositif d'entraînement et protecteur)
14	Facing spindle	Broche porte-meule à surfacer
15	Facing wheel	Meule à surfacer
16	Facing wheel quill	Coulant de meule à surfacer

4 Preliminary remarks

4.1 Measuring units

In this International 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 ratios but in some cases microradians or arcseconds may be used for clarification purposes. The equivalence of the following expressions should always be kept in mind:

$$0,010/1\,000 = 10 \times 10^{-6} = 10 \mu\text{rad} \approx 2''$$

4.2 Reference to ISO 230-1

To apply this International Standard, reference shall be made to ISO 230-1, 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 ISO 230-1 in cases where the test concerned is in compliance with the specifications of that part of ISO 230.

4.3 Testing sequence

The sequence in which the tests are presented in this International 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.

4.4 Tests to be performed

When testing a machine, it is not always necessary or possible to carry out all the tests described in this International 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. Mere reference to this International Standard for the acceptance tests, without specifying the tests to be carried out, and without agreement on the relevant expenses, cannot be considered as binding for any contracting party.