
INTERNATIONAL STANDARD



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Test conditions for vertical turning and boring lathes with one or two columns — Testing of the accuracy — Part I : Lathes with a single fixed or movable table

*Conditions d'essai des tours verticaux à un ou deux montants — Contrôle de la précision —
Partie I : Tours à un seul plateau fixe ou déplaçable*

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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 3655/1 was drawn up by Technical Committee ISO/TC 39, *Machine tools*, and was circulated to the Member Bodies in March 1975.

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

Australia	India	Spain
Austria	Ireland	Sweden
Belgium	Italy	Switzerland
Bulgaria	Japan	Turkey
France	Mexico	United Kingdom
Germany	Romania	U.S.S.R.
Hungary	South Africa, Rep. of	Yugoslavia

The Member Bodies of the following countries expressed disapproval of the document on technical grounds :

Czechoslovakia
U.S.A.

Test conditions for vertical turning and boring lathes with one or two columns — Testing of the accuracy — Part 1 : Lathes with a single fixed or movable table

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies, with reference to ISO/R 230, both geometrical and practical tests on general purpose and normal accuracy vertical turning and boring lathes with one or two columns and with a single fixed or movable table and gives corresponding permissible deviations which apply.

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

2 REFERENCES

ISO/R 230, *Machine tool test code*.

ISO 3655/0, *Test conditions for vertical turning and boring lathes with one or two columns — Testing of the accuracy — Part 0 : General introduction*.

ISO/R 1101, *Tolerances of form and of position — Part 1 : Generalities, symbols, indications on drawings*.

3 PRELIMINARY REMARKS

3.1 In this International Standard, deviations and ranges are expressed in millimetres and in inches.

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

3.3 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.

3.4 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.

3.5 The practical tests shall be made with finishing cuts and not with roughing cuts which are liable to generate appreciable cutting forces.

3.6 When establishing the tolerance for a measuring range different from that given in this International Standard (see 2.311 in ISO/R 230) it should be taken into consideration that the minimum value of tolerance is 0,002 5 mm (0.000 1 in) for geometrical and practical tests.

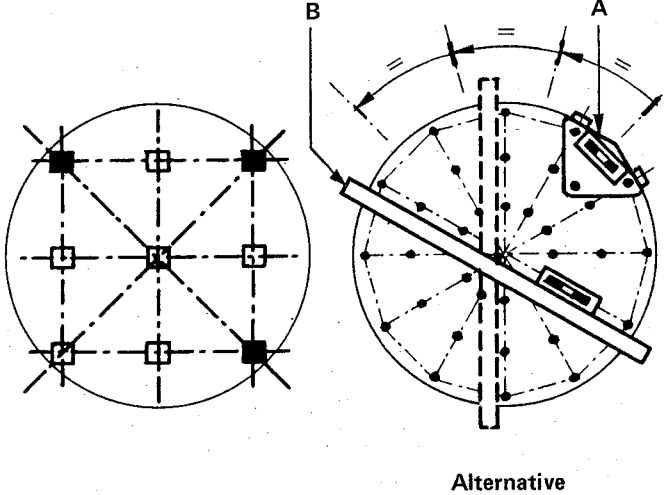
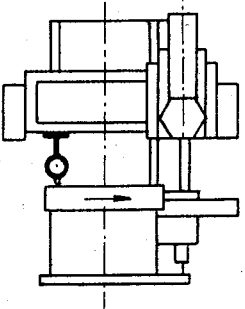
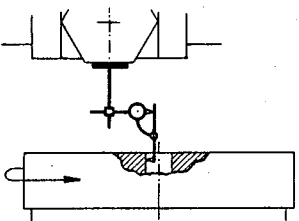
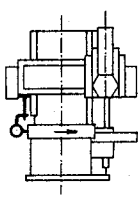
3.7 For table or column movable type, tests shall be carried out setting the column as near as possible to the axis of rotation of the table.

4 DIAGRAMS

For reasons of simplicity, diagrams in this International Standard illustrate only typical designs of machines.

5 TEST CONDITIONS AND PERMISSIBLE DEVIATIONS

5.1 Geometrical tests

No.	Diagram	Object	mm
G 1		A – TABLE a) Levelling This operation is recommended only when checking is carried out with the aid of a precision level, i.e. when the alternative test described in the Observations column is used. b) Verification of flatness of the table surface.	a) 0,06/1000
			b) 0,03 for 1000 For each 1000 mm tolerance : 0,01 0,01 ove 300
G 2		Measurement of camming of the table surface when rotating.	0,02 1000 For each 1000 mm tolerance : 0,01
G 3		Measurement of run-out of the table bore;	0,02 1000
		or Measurement of run-out of the external cylindrical surface of the table (in the case of a table not having a central bore).	For each 1000 mm tolerance : 0,01

Permissible deviation		Measuring instruments	Observations and references to the test code ISO/R 230
mm	in		
0,06/1000	a) 0.0025/40	Straightedge and gauge blocks or precision levels	Clauses 5.322 and 5.323 Alternative test (Checking with the aid of level) 1) Circular-diametrical checking The level shall be placed on a support A provided with isostatic bearings (three bearing points on the table surface and two on the table periphery) – The support shall be moved at positions equally spaced along the table periphery. 2) Radial-diametrical checking The level shall be placed on the table and along a diametrical direction with the aid of a straightedge B. The level shall be moved at positions equally spaced along the straightedge. The procedure shall be repeated moving the straightedge according to the successive positions occupied by the support A. Subject to agreement between manufacturer and user, it is permissible to carry out in G 1b) diametrical checking only.
0,03	b) 0.0012		
for any measuring diameter of :			
1000	40		
(flat to concave)			
each 1000 mm (40 in) increase in diameter add to the tolerance :		Dial gauge	Clause 5.632 The dial gauge shall be placed on a fixed part of the machine and shall be placed as near as possible to the table periphery and approximately 180° from the position occupied by the tool when the table was machined. Rail, railhead and slide locked in position.
0,01	0.0004		
Local tolerance :			
0,01	0.0004		
over any measuring length of :			
300	12	Dial gauge	Clauses 5.611.4 and 5.612.2 The dial gauge shall be placed approximately 180° from the position occupied by the tool when the table was machined. Rail, railhead and slide locked in position. The dial gauge shall also be placed on a fixed part of the machine.
0,02	0.0008		
for a table diameter of :			
1000	40		
each 1000 mm (40 in) increase in diameter add to the tolerance :			
0,01	0.0004	Dial gauge	Clauses 5.611.4 and 5.612.2 The dial gauge shall be placed approximately 180° from the position occupied by the tool when the table was machined. Rail, railhead and slide locked in position. The dial gauge shall also be placed on a fixed part of the machine.
0,02	0.0008		
for a table diameter of :			
1000	40		
each 1000 mm (40 in) increase in table diameter add to the tolerance :			
0,01	0.0004		