
International Standard



3875

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

**Conditions of acceptance for external cylindrical
centreless grinding machines — Testing of the accuracy**

Conditions de réception des machines à rectifier les surfaces de révolution extérieures, sans centres — Contrôle de la précision

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Foreword

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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 3875 was developed by Technical Committee ISO/TC 39, *Machine tools*, and was circulated to the member bodies in October 1977.

It has been approved by the member bodies of the following countries:

Australia	India	Spain
Austria	Italy	Sweden
Belgium	Japan	Switzerland
Brazil	Korea, Dem. P. Rep. of	Turkey
Bulgaria	Korea, Rep. of	USA
Chile	Mexico	USSR
Czechoslovakia	Poland	Yugoslavia
France	Romania	
Germany, F. R.	South Africa, Rep. of	

The member body of the following country expressed disapproval of the document on technical grounds:

United Kingdom

Conditions of acceptance for external cylindrical centreless grinding machines — Testing of the accuracy

1 Scope and field of application

This International Standard describes, with reference to ISO/R 230, both geometrical and practical tests on general purpose and normal accuracy external cylindrical centreless grinding machines and gives the corresponding permissible deviations which apply.

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 should 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 described 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 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 0,001 mm (0.000 04 in).

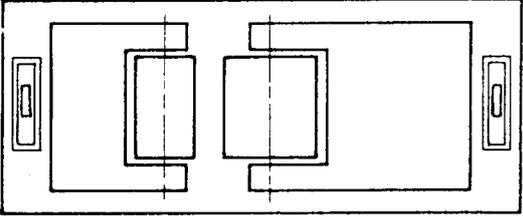
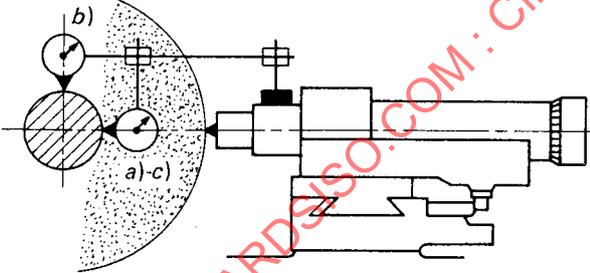
3 References

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

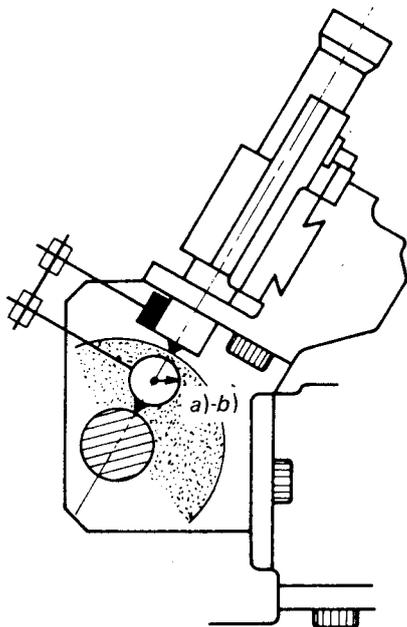
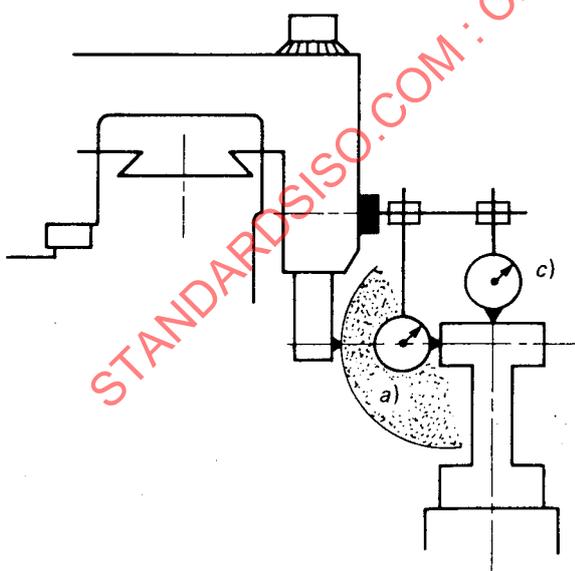
ISO/R 1101/1, *Tolerances of form and of position — Part 1 : Generalities, symbols, indications on drawings*.

4 Test conditions and permissible deviations

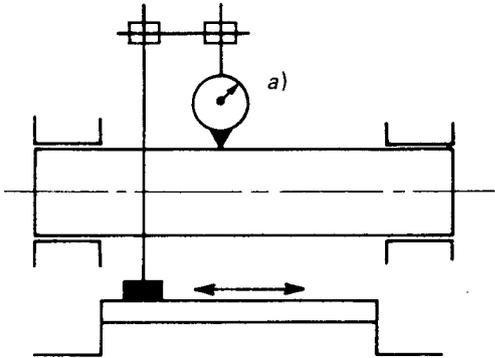
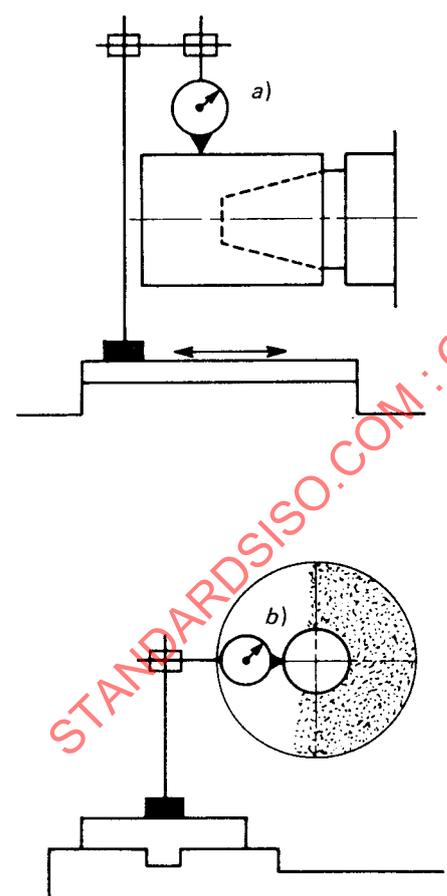
4.1 Geometrical tests

No.	Diagram	Object	mr
G0		Levelling of the machine.	0,1/1
G1		<p>A – GRINDING WHEEL DRESSER</p> <p>Checking of movement of the dressing tool:</p> <p>a) straightness of movement in the plane of action;</p> <p>b) parallelism of movement to the grinding spindle axis in a plane perpendicular to the plane of action;</p> <p>c) parallelism of movement to the grinding spindle axis in the plane of action.</p> <p>NOTE – Test c) applies only for machines with fixed dresser and non-adjustable template.</p>	<p>a) 0,01</p> <p>30</p> <p>b) 0,0</p> <p>30</p> <p>c) 0,0</p> <p>30</p>

Permissible deviation		Measuring instruments	Observations and references to the test code ISO/R 230
mm	in		
0,1/1000	0.004/40	Precision levels	<p>Clause 3.1</p> <p>Levelling of the machine is to be carried out subject to agreement between manufacturer and user.</p> <p>The given permissible deviation is to be regarded as a guideline.</p>
0,003 for any measuring length of 300 0,05 for any measuring length of 300 0,03 for any measuring length of 300	a) 0.00012 12 b) 0.002 12 c) 0.0012 12	Dial gauge, test mandrel and master straightedge	<p>Clauses 5.231, 5.233 and 5.422.3</p> <p>The dial gauges shall be mounted on the dressing tool holder with their styli contacting the test mandrel, which is inserted in the grinding wheel spindle, in the plane of action and in a plane perpendicular to the plane of action.</p> <p>The dressing slide shall be moved with a normal working feed. The measuring distance shall be equal to the maximum width of the grinding wheel.</p> <p>If the machine is provided with a copying mechanism, the copying pin should be engaged with a normal working pressure (stated by the manufacturer) against the master straightedge.</p> <p>Indicated permissible deviations relate to the position of the diamond point.</p> <p>The measuring method gives the sum of errors from the dressing mechanism.</p>

No.	Diagram	Object	mi
G2	 <p data-bbox="327 1120 630 1153">Alternative type of machine</p>	<p data-bbox="869 571 1300 604">B – REGULATING WHEEL DRESSER</p> <p data-bbox="861 683 1308 750">Checking of movement of the dressing tool :</p> <p data-bbox="861 795 1308 862">a) straightness of movement in the plane of action;</p> <p data-bbox="861 1041 1308 1131">b) parallelism of movement relative to the regulating spindle axis in the plane of action;</p>	<p data-bbox="1364 795 1532 828">a) 0,0</p> <p data-bbox="1500 907 1532 940">30</p> <p data-bbox="1364 1041 1532 1075">b) 0,0</p>
		<p data-bbox="861 1153 1308 1209">NOTE – Test b) refers only to machines with fixed dresser and non-adjustable template.</p> <p data-bbox="861 1288 1308 1355">c) parallelism of movement relative to the work support plane.</p> <p data-bbox="861 1366 1308 1422">NOTE – Test c) refers only to machines with a non-gradient slide in the vertical plane.</p>	<p data-bbox="1500 1153 1532 1187">30</p> <p data-bbox="1364 1288 1532 1321">c) 0,0</p> <p data-bbox="1500 1400 1532 1433">30</p>

Permissible deviation		Measuring instruments	Observations and references to the test code ISO/R 230
mm	in		
0,003	a) 0.00012	Dial gauge, test mandrel, master straightedge and test straightedge	<p>Clauses 5.231, 5.233 and 5.422.3</p> <p>The dial gauges shall be mounted on the dressing tool holder with their styli contacting the test mandrel or straightedge.</p> <p>The dressing slide shall be moved with a normal working feed. The measuring distance shall be equal to the maximum width of the regulating wheel.</p> <p>If the machine is provided with a copying mechanism, the copying pin shall be engaged with a normal working pressure against the master straightedge.</p> <p>Indicated permissible deviations relate to the position of the diamond point.</p> <p>The measuring method gives the sum of errors from the dressing mechanism.</p>
for any measuring length of			
300	12		
0,03	b) 0.0012		
for any measuring length of			
300	12		
0,05	c) 0.002		
for any measuring length of			
300	12		

No.	Diagram	Object	mr
G3	 <p data-bbox="287 817 590 851">Alternative type of machine</p>	<p data-bbox="845 593 1276 627">C – WORK REST BLADE LOCATION</p> <p data-bbox="845 705 1292 795">a) Checking of parallelism of the work support plane to the grinding spindle axis in the vertical plane.</p>	<p data-bbox="1356 705 1532 739">a) 0,0</p>
		<p data-bbox="845 1355 1300 1467">b) Checking of parallelism of the vertical datum face to the regulating spindle axis or the grinding spindle axis in the horizontal plane.</p> <p data-bbox="845 1489 1300 1568">NOTE – Test b) applies only for machines with fixed work rest blade, fixed dresser and non-adjustable template.</p>	<p data-bbox="1356 1355 1532 1388">b) 0,0</p> <p data-bbox="1484 1467 1532 1500">30</p>

Permissible deviation		Measuring instruments	Observations and references to the test code ISO/R 230
mm	in		
0,05	a) 0.002	Dial gauge and test mandrel	<p>Clauses 5.412.1 and 5.412.4</p> <p>The dial gauge shall be mounted on the work rest blade location surfaces with the stylus contacting the test mandrel.</p>
for any measuring length of 300	12		
0,03	b) 0.0012		
for any measuring length of 300	12		

No.	Diagram	Object	
G4	<p>The diagrams illustrate three measurement methods for a regulating spindle. The top diagram shows a wheel mounting with a force F applied to the left. Two measurement points labeled 'a)' are positioned on the wheel's mounting diameter, and one point labeled 'b)' is on the spindle. The bottom diagram shows a spindle assembly with measurement points 'a)' on the spindle surface, 'c)' on the bearings, and 'b)' on the spindle's axial slip.</p>	<p>D – REGULATING SPINDLE</p> <p>a) Measurement of run-out of the wheel mounting diameter.</p> <p>b) Measurement of periodic axial slip of the spindle.</p> <p>c) Measurement of run-out of the spindle bearings.</p> <p>NOTE – Test c) is to be carried out where applicable.</p>	<p>mr</p> <p>a) 0,0</p> <p>b) 0,01</p> <p>c) 0,00</p>

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Permissible deviation		Measuring instruments	Observations and references to the test code ISO/R 230
mm	in		
0,01	a) 0.0004	Dial gauge and measuring balls	a) Clauses 5.612.1 and 5.612.2 In addition to the specifications of the test code ISO/R 230, checking shall be carried out at both ends of the conical or cylindrical regulating wheel mounting surface. The dial gauge shall be set normal to the surface which is to be checked. When measuring the conical surface no correction in reading of dial gauge is to be carried out.
0,01	b) 0.0004		b) Clauses 5.621.2 and 5.622 The force F shall be determined by the machine manufacturer. The force shall be applied in that direction which corresponds to the normal working condition of the spindle.
0,005	c) 0.0002		c) Clauses 5.612.1 and 5.612.2 This checking shall be carried out on measuring balls located in the centre on the free ends of the spindle.

No.	Diagram	Object	mn
G5		<p>E – GRINDING SPINDLE</p> <p>a) Measurement of run-out of the wheel mounting diameter.</p> <p>b) Measurement of periodic axial slip of the spindle.</p> <p>c) Measurement of run-out of the spindle bearings.</p> <p>NOTE – Test c) is to be carried out where applicable.</p>	<p>a) 0,0</p> <p>b) 0,00</p> <p>c) 0,00</p>
G6		<p>F – FEEDING DEVICE</p> <p>Measurement of accuracy of repetition of the finishing approach of the wheel positioning.</p> <p>NOTE – This test applies only for machines equipped for infeed grinding operations.</p>	<p>0,002</p>