INTERNATIONAL STANDARD

ISO 3089

Third edition
2005-11-15

Machine tools — Test conditions for self-centring, manually-operated chucks with one-piece jaws

Machines-outils — Conditions d'essai pour mandrins à serrage concentrique et à commande manuelle avec mors monobloc

Reference number
ISO 3089:2005(E)

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Published in Switzerland

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 3089 was prepared by Technical Committee ISO/TC 39, *Machine tools*, Subcommittee SC 8, *Work holding spindles and chucks*.

This third edition cancels and replaces the second edition (ISO 3089:1991), which has been technically revised. In particular, the tables and figures have been modified.

Machine tools — Test conditions for self-centring, manually-operated chucks with one-piece jaws

1 Scope

This International Standard specifies, with reference to ISO 230-1, the geometric tests and corresponding tolerances for self-centring, manually-operated chucks for machine tools with more than two jaws.

This type of chuck has jaws known as “one-piece hard jaws”, the relatively large stroke of which allows quick adaptation to the most varied sizes of workpieces without dismounting.

This International Standard deals only with the inspections of rotational accuracy of the chuck, the straightening and the centring of workpieces. It is not applicable to other dynamic quantities, such as measurement of counterbalancing or measurements gripping powers.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

3 Preliminary remarks

All dimensions and tolerances in this International Standard are expressed in millimetres.

4 Accuracy classes

Unlike the previous edition, this International Standard specifies only one accuracy class.

5 Geometric tests

5.1 Master pinion

Tightening of the chuck on the test mandrels (test G3) or on the test rings (test G4 to G7) shall be carried out using the master pinion only. The master pinion is a pinion nominated as the reference pinion.

5.2 Input torque

For geometric tests, the input torque shall be the same — approximately 67 % of maximum input torque as specified by the manufacturer.

5.3 Test mandrels

The test mandrels shall be manufactured from solid steel and hardened to avoid damage to external surface due to the gripping force of the chuck. The accuracy of test mandrels used shall be as specified in ISO 230-1:1996, A.3, for test mandrels of similar diameters.

5.4 Test rings

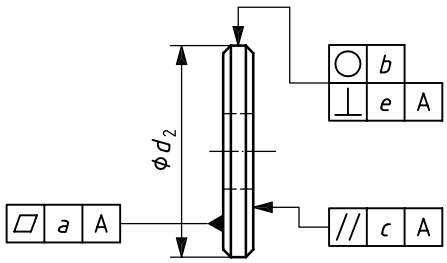
5.4.1 General

Test rings/discs shall be manufactured from solid steel and hardened to avoid damage to the active surfaces due to the gripping force of the chuck. In order to minimize the effects of possible distortions of the test ring, it is recommended that readings be taken next to the jaws.

5.4.2 Accuracy of the test rings for external jaws

The accuracy of test rings/discs for external jaws should satisfy the values listed in Table 1.

Table 1 — Test rings for external jaws

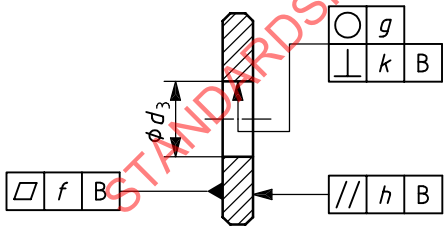


d_2	a	b	c	e
⩽ 200	0,003	0,003	0,003	0,003
> 200 ⩽ 400	0,005	0,005	0,005	0,005

5.4.3 Accuracy of the test rings for internal jaws

The accuracy of test rings for internal jaws should satisfy the values listed in Table 2.

Table 2 — Test rings for internal jaws



d_3	f	g	h	k
⩽ 125	0,003	0,003	0,003	0,003
> 125 ⩽ 315	0,005	0,005	0,005	0,005

5.5 Spindle or face plate accuracy

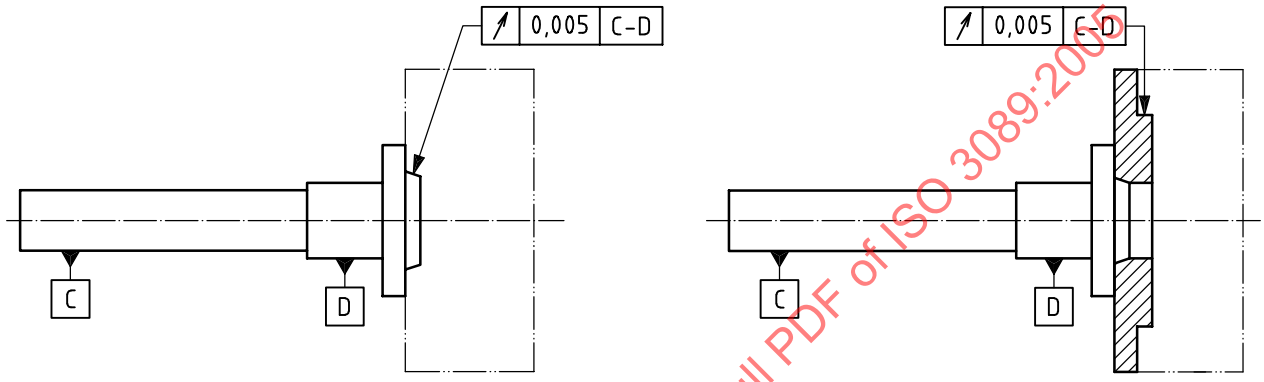
Since all the geometric tests to be carried out involve the chuck rotation, the chuck should be mounted on a test spindle either directly or by means of a face plate. The radial run-out on the outside diameter of the test spindle or face plate and the camming at any point on its face shall have been previously checked as described by G01 and G02.

Object

Checking of radial run-out of the spindle nose or face plate.

G01

Diagram



Tolerance

0,005

Measured deviation

Measuring instruments

Dial gauge.

References to ISO 230-1:1996 and observations 5.611.4 and 5.612.2

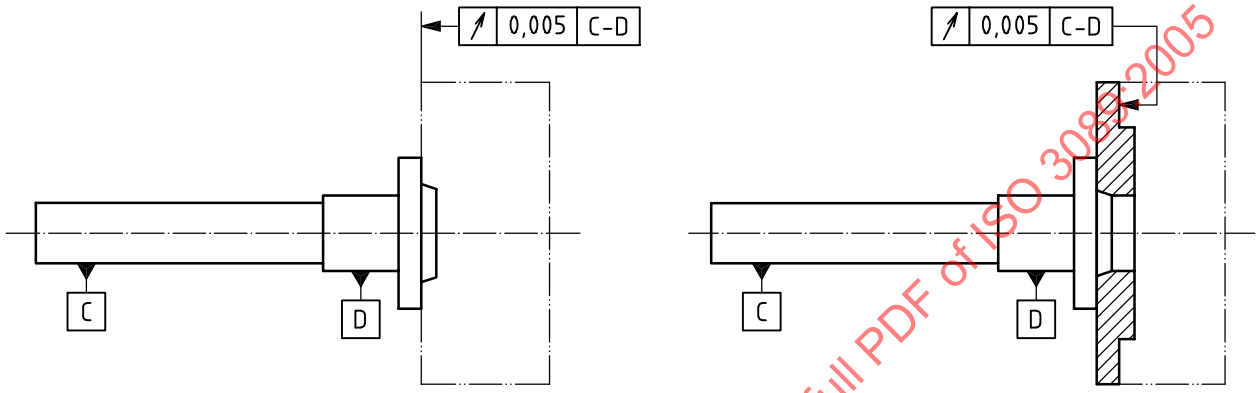
In the case of tapered spindle nose, the stylus of the dial gauge shall be set normal to the surface to be checked.

Object

Checking of camming of the spindle nose or face plate.

G02

Diagram



Tolerance

0,005

Measured deviation

Measuring instruments

Dial gauge.

References to ISO 230-1:1996 and observations 5.6.3

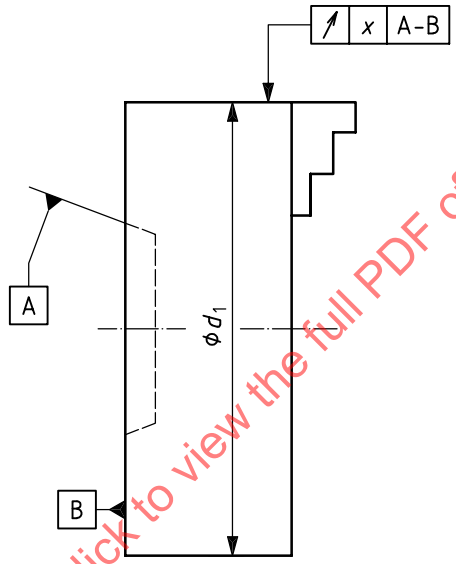
5.6 Chuck accuracy

Object

Checking of radial run-out of the outside diameter.

G1

Diagram



Nominal diameter of chuck $d_{1\ nom}$	Tolerance x (full indicator movement)
$d_{1\ nom} \leqslant 125$	0,02
$125 < d_{1\ nom} \leqslant 200$	0,03
$200 < d_{1\ nom} \leqslant 315$	0,04
$315 < d_{1\ nom} \leqslant 500$	0,05
$500 < d_{1\ nom} \leqslant 800$	0,06

Measured deviation

For $d_{1\ nom}$ = …:

Measuring instruments

Dial gauge.

NOTE Two measurements are possible:

a) the chuck is mounted on a spindle, or

b) with a measuring machine.

The results of both measurements may differ depending on the tolerances of spindle noses and chucks

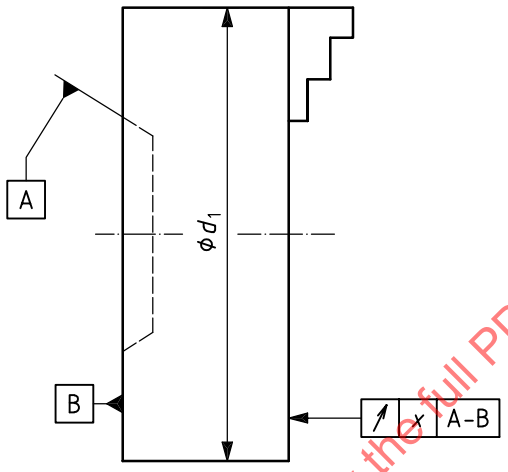
References to ISO 230-1 and observations

Object

Checking of camming of the chuck face.

G2

Diagram



Nominal diameter of chuck $d_{1\ nom}$	Tolerance x (full indicator movement)
$d_{1\ nom} \leqslant 125$	0,02
$125 < d_{1\ nom} \leqslant 200$	0,03
$200 < d_{1\ nom} \leqslant 315$	0,04
$315 < d_{1\ nom} \leqslant 500$	0,05
$500 < d_{1\ nom} \leqslant 800$	0,06

Measured deviation

For $d_{1\ nom}$ = …:

Measuring instruments

Dial gauge.

NOTE Two measurements are possible:

a) the chuck is mounted on a spindle, or

b) with a measuring machine.

The results of both measurements may differ depending on the tolerances of spindle noses and chucks

References to ISO 230-1 and observations

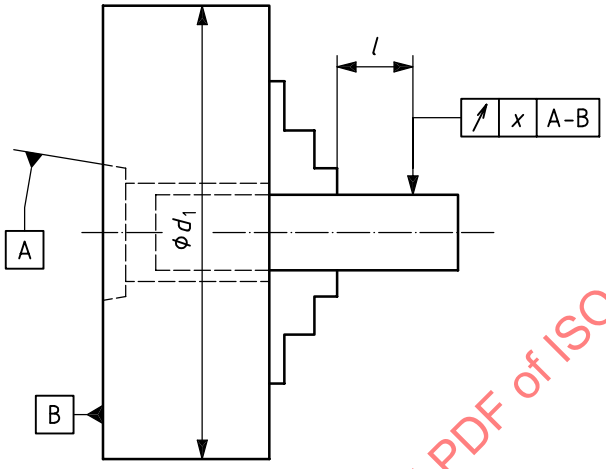
For the purpose of this test the dial gauge shall be placed on the largest possible diameter.

Object

Checking of accuracy of grip on test mandrels.

G3

Diagram



Nominal diameter of chuck $d_{1\ nom}$	Distance of dial gauge from top of jaws l	Tolerance x (full indicator movement)
$d_{1\ nom} \leqslant 125$	50	0,04
$125 < d_{1\ nom} \leqslant 200$	50	0,06
$200 < d_{1\ nom} \leqslant 315$	75	0,08
$315 < d_{1\ nom} \leqslant 500$	100	0,10
$500 < d_{1\ nom} \leqslant 800$	125	0,12

Measured deviation

For $d_{1\ nom}$ = …:

Measuring instruments

Dial gauge.

References to ISO 230-1 and observations

The number of test mandrels to be used is four. The mandrels shall be of different diameters.

The sizes of test mandrel diameters to be used shall be proportionate to the scroll pitch so that various angular scroll positions differ from one test mandrel to another through an arc subtending an angle of approximately 90°. The sizes of test mandrel diameters shall be smaller than the diameter at which the jaws are bored. The contact of each jaw on the test mandrels shall be made gripping along the centre line of each jaw, it being understood that any increase in the number of contact points or in their width would upset the centring and make the test difficult to carry out.

Test G3 shall be repeated not less than three times for each test mandrel to check the repeatability of gripping; each measured deviation shall fall within the quoted full indicator movement figure.

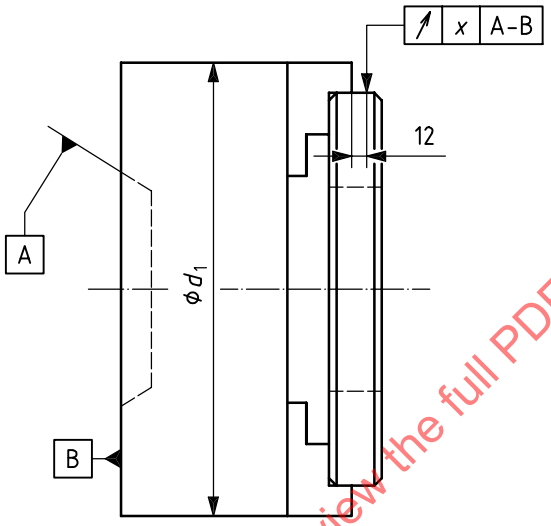
In order to ensure the maximum stability of grip of the jaws on the test mandrels, the test mandrel diameter shall never be larger than the bore diameter of the chuck.

Object

Checking of accuracy of external grip on test rings: radial run-out.

G4

Diagram



Nominal diameter of chuck $d_{1\ nom}$	Tolerance x (full indicator movement)
$d_{1\ nom} \leqslant 125$	0,03
$125 < d_{1\ nom} \leqslant 200$	0,05
$200 < d_{1\ nom} \leqslant 315$	0,07
$315 < d_{1\ nom} \leqslant 500$	0,09
$500 < d_{1\ nom} \leqslant 800$	0,11

Measured deviation

For $d_{1\ nom}$ = …:

Measuring instruments

Dial gauge.

References to ISO 230-1 and observations

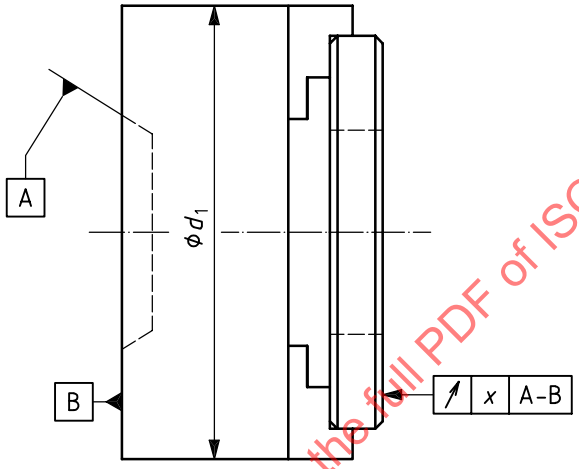
Each jaw step shall be tested. A single test ring should be used for each step. The external diameter of the test ring shall be larger than the diameter at which the steps of the jaws have been ground.

Object

Checking of accuracy of external grip on test rings: camming.

G5

Diagram



Nominal diameter of chuck $d_{1\ nom}$	Tolerance x (full indicator movement)
$d_{1\ nom} \leqslant 125$	0,03
$125 < d_{1\ nom} \leqslant 200$	0,04
$200 < d_{1\ nom} \leqslant 315$	0,05
$315 < d_{1\ nom} \leqslant 500$	0,06
$500 < d_{1\ nom} \leqslant 800$	0,07

Measured deviation

For $d_{1\ nom}$ = …:

Measuring instruments

Dial gauge.

References to ISO 230-1 and observations

Each jaw step shall be tested. A single test ring should be used for each step. The external diameter of the test ring shall be smaller than the diameter at which the steps of the jaws have been ground.

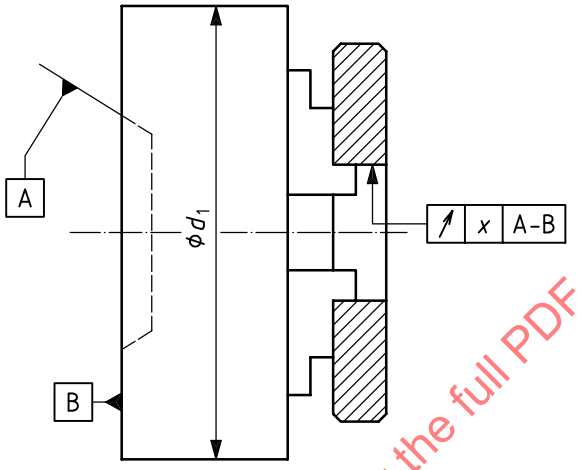
For the purpose of this test the dial gauge shall be placed on the largest possible diameter.

Object

Checking of accuracy of internal grip on test rings: radial run-out.

G6

Diagram



Nominal diameter of chuck $d_{1\ nom}$	Tolerance x (full indicator movement)
$d_{1\ nom} \leqslant 125$	0,03
$125 < d_{1\ nom} \leqslant 200$	0,05
$200 < d_{1\ nom} \leqslant 315$	0,07
$315 < d_{1\ nom} \leqslant 500$	0,09
$500 < d_{1\ nom} \leqslant 800$	0,11

Measured deviation

For $d_{1\ nom}$ = …:

Measuring instruments

Dial gauge.

References to IOS 230-1 and observations

Each jaw step shall be tested. A single test ring should be used for each step. The internal diameter of the test ring shall be larger than the diameter at which the steps of the jaws have been ground.