INTERNATIONAL STANDARD

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Self-centring manually-operated chucks for machine tools — Acceptance test specifications (geometrical tests)

Mandrins pour machines-outils, à serrage concentrique et à commande manuelle — Conditions de réception (vérifications géométriques)

Reference number
ISO 3089:1991(E)

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 3089 was prepared by Technical Committee ISO/TC 39, *Machine tools*, Sub-Committee SC 8, *Chucks*.

This second edition cancels and replaces the first edition (ISO 3089:1974), which has been technically revised.

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Self-centring manually-operated chucks for machine tools — Acceptance test specifications (geometrical tests)

1 Scope

This International Standard describes, with reference to ISO 230-1, the geometrical tests and the corresponding permissible deviations of two classes of accuracy 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 inspection of rotational accuracy of the chuck, the straightening and the centring of workpieces. It does not apply to other dynamic qualities, such as measurement of counterbalancing, balancing or measurement of gripping powers.

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 230-1:1986, *Acceptance code for machine tools — Part 1: Geometric accuracy of machines operating under no-load or finishing conditions.*

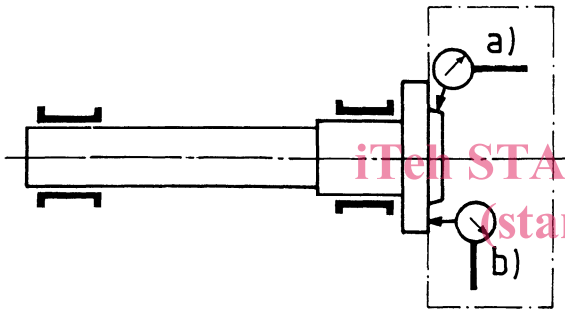
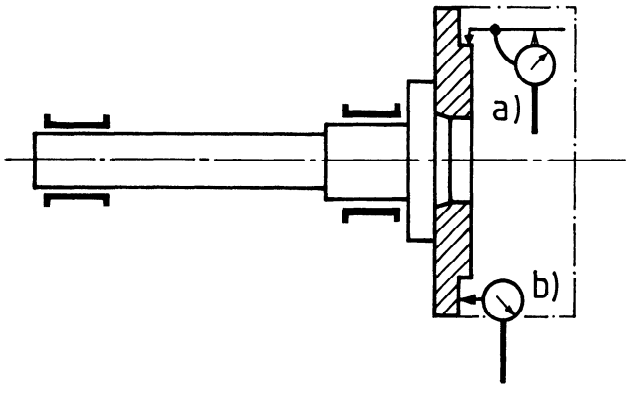
3 Preliminary remarks

Since all the geometrical tests to be carried out involve chuck rotation, the chuck should be mounted on a test spindle flange or adaptor. This flange or adaptor shall have been previously tested for the accuracy of size, centring, concentricity with the spindle axis and lack of camming of the flange or adaptor (see table 1).

The mounting of the chuck on the spindle nose shall be made either directly on the face plate or with an adaptor placed between the spindle nose and the chuck.

Where an adaptor is used, these tests shall be carried out directly on the face plate or adaptor which has previously been mounted on the spindle nose.

Table 1

Diagram	Object	Full indicator movement (FIM) max.		Observations and references to the ISO 230-1:1986 test code
		mm	in	
Chuck mounted directly on the nose of the test spindle 	a) Radial run-out of the outside diameter of flange or adaptor	a) 0,005	a) 0,000 2	Clauses 5.611.4 and 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.
Chuck mounted on a face plate or adaptor 	b) Axial run-out (camming) of face of flange or adaptor	b) 0,005	b) 0,000 2	Clause 5.63

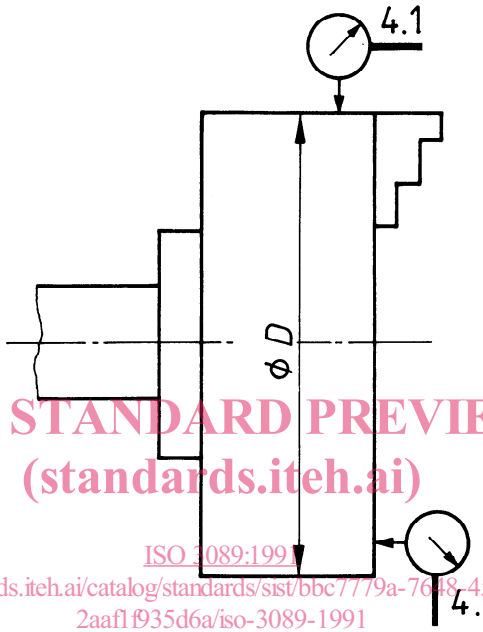
4 Geometrical tests

4.1 Measurement of concentricity of outside diameter of chuck

See figure 1 and table 2.

4.2 Measurement of axial run-out (camming) of face of chuck

See figure 1 and table 2.



NOTE — For measurement 4.2, the dial gauge shall be placed on the largest diameter possible.

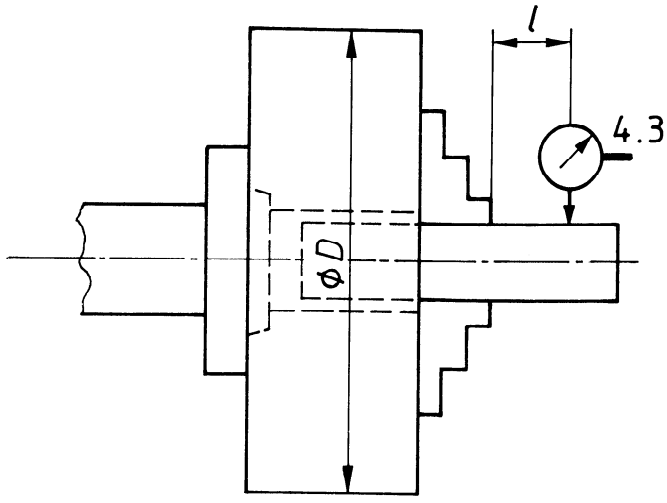
Figure 1

Table 2

Measurements 4.1 and 4.2			
Nominal diameter of chuck D_{nom}		Full indicator movement (FIM) max.	
mm	in	mm	in
$D_{nom} \leqslant 160$	$D_{nom} \leqslant 6{,}3$	0,03	0,001 2
$160 < D_{nom} \leqslant 250$	$6{,}3 < D_{nom} \leqslant 10$	0,04	0,001 6
$250 < D_{nom} \leqslant 400$	$10 < D_{nom} \leqslant 15$	0,06	0,002 4
$400 < D_{nom} \leqslant 630$	$15 < D_{nom} \leqslant 24$	0,08	0,003
$630 < D_{nom} \leqslant 1\,000$	$24 < D_{nom} \leqslant 36$	0,10	0,004

4.3 Checking of accuracy of grip on test bars

See figure 2 and table 3.



NOTES

1 The number of test bars to be used for class I chucks is four. The bars shall be of different diameters. For class II chucks, one test bar shall be specified.

2 When testing class I chucks the sizes of test bar diameters to be used shall be proportionate to the scroll pitch so that various angular scroll positions differ from one test bar to another through an arc subtending an angle of approximately 90°. The sizes of test bar diameters shall be different from the diameter at which the jaws are bored by a value approximately equal to 90° of scroll movement.

3 Test 4.3 shall be repeated three times for each test bar to check the repeatability of gripping; each measured deviation shall fall within the quoted full indicator movement figure.

4 In order to ensure the maximum stability of grip of the jaws on the test bars, the test bar diameter shall never be larger than the internal chuck diameter.

5 The contact of each jaw on the test bars 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.

6 Test bars shall be made of heat-treated steel to withstand the grip of the jaws without any permanent deformation, internal or superficial.

7 The accuracy of test bars to be used shall conform to the specifications given in ISO 230-1:1986, annex A, clause A.3, for test mandrels of similar dimensions.

8 For geometrical tests the input force shall be constant, approximately 67 % of maximum input force.

9 The master pinion is a pinion nominated as the reference pinion.

Figure 2

Table 3

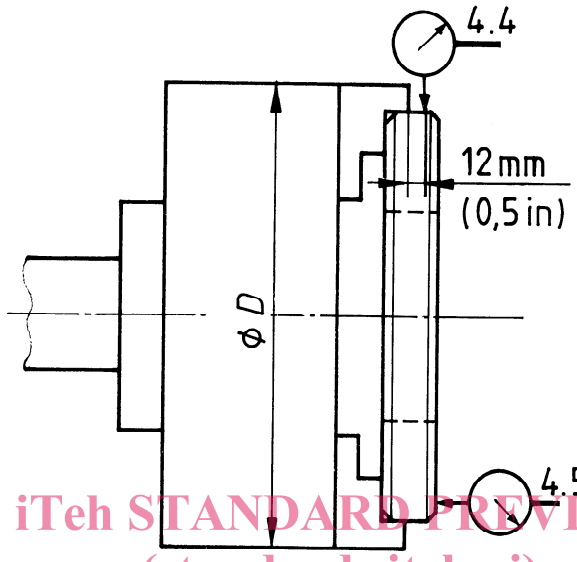
Nominal diameter of chuck D_{nom}		Distance of dial gauge from top of jaws l		Full indicator movement (FIM) max.			
				Class I, using master pinion		Class II, using any pinion	
mm	in	mm	in	mm	in	mm	in
$D_{nom} \leqslant 160$	$D_{nom} \leqslant 6{,}3$	50	2	0,04	0,001 6	0,10	0,003 9
$160 < D_{nom} \leqslant 250$	$6{,}3 < D_{nom} \leqslant 10$	50	2	0,06	0,002 4	0,15	0,005 9
$250 < D_{nom} \leqslant 400$	$10 < D_{nom} \leqslant 15$	75	3	0,075	0,002 9	0,20	0,007 8
$400 < D_{nom} \leqslant 630$	$15 < D_{nom} \leqslant 24$	100	4	0,10	0,003 9	0,25	0,009 8
$630 < D_{nom} \leqslant 1\,000$	$24 < D_{nom} \leqslant 36$	125	5	0,125	0,004 9	0,30	0,011 8

4.4 Reading on periphery

See figure 3 and table 4.

4.5 Reading on face

See figure 3 and table 4.



NOTES

1 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.

2 Tightening of the chuck shall be carried out using one pinion only. For class I chucks use the master pinion.

3 The accuracy of the test rings to be used shall conform to the specifications given in ISO 230-1:1986, annex A.

4 The reading on the face (test 4.5) shall be as near to the periphery as practicable.

Figure 3

Table 4

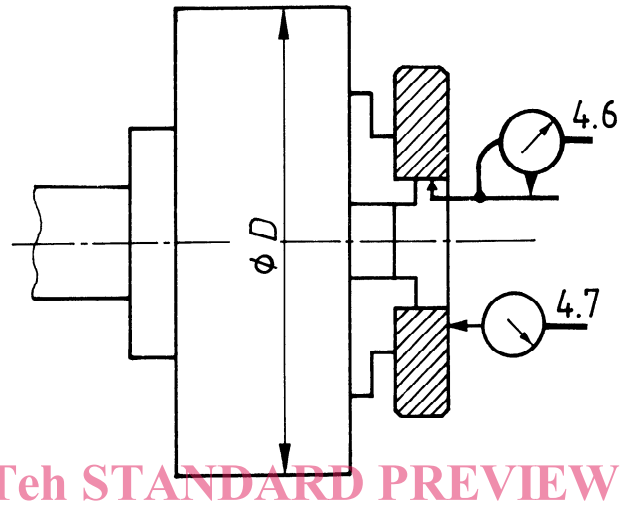
Test	Nominal diameter of chuck D_{nom}		Full indicator movement (FIM) max.			
			Class I		Class II	
	mm	in	mm	in	mm	in
4.4	$D_{nom} \leqslant 160$	$D_{nom} \leqslant 6,3$	0,03	0,001 2	0,075	0,002 9
	$160 < D_{nom} \leqslant 250$	$6,3 < D_{nom} \leqslant 10$	0,04	0,001 6	0,075	0,002 9
	$250 < D_{nom} \leqslant 400$	$10 < D_{nom} \leqslant 15$	0,06	0,002 4	0,10	0,003 9
	$400 < D_{nom} \leqslant 630$	$15 < D_{nom} \leqslant 24$	0,075	0,002 9	0,125	0,004 9
	$630 < D_{nom} \leqslant 1\,000$	$24 < D_{nom} \leqslant 36$	0,10	0,003 9	0,16	0,006 3
4.5	$D_{nom} \leqslant 160$	$D_{nom} \leqslant 6,3$	0,025	0,001 0	0,05	0,002 0
	$160 < D_{nom} \leqslant 250$	$6,3 < D_{nom} \leqslant 10$	0,03	0,001 2	0,05	0,002 0
	$250 < D_{nom} \leqslant 400$	$10 < D_{nom} \leqslant 15$	0,04	0,001 6	0,075	0,002 9
	$400 < D_{nom} \leqslant 630$	$15 < D_{nom} \leqslant 24$	0,05	0,002 0	0,10	0,003 9
	$630 < D_{nom} \leqslant 1\,000$	$24 < D_{nom} \leqslant 36$	0,06	0,002 4	0,125	0,004 9

4.6 Reading on bore

See figure 4 and table 5.

4.7 Reading on face

See figure 4 and table 5.



NOTES

1 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.

2 Tightening of the chuck shall be carried out using one pinion only. For class I chucks use the master pinion.

3 The accuracy of the test rings to be used shall conform to the specifications given in ISO 230-1:1986, annex A.

4 The reading on the face (test 4.7) shall be as near to the internal diameter as practicable.

Figure 4

Table 5

Test	Nominal diameter of chuck D_{nom}		Full indicator movement (FIM) max.			
			Class I		Class II	
	mm	in	mm	in	mm	in
4.6	$D_{nom} \leqslant 160$ $160 < D_{nom} \leqslant 250$ $250 < D_{nom} \leqslant 400$ $400 < D_{nom} \leqslant 630$ $630 < D_{nom} \leqslant 1\,000$	$D_{nom} \leqslant 6{,}3$ $6{,}3 < D_{nom} \leqslant 10$ $10 < D_{nom} \leqslant 15$ $15 < D_{nom} \leqslant 24$ $24 < D_{nom} \leqslant 36$	0,03 0,04 0,06 0,075 0,10	0,001 2 0,001 6 0,002 4 0,002 9 0,003 9	0,075 0,075 0,10 0,125 0,16	0,002 9 0,002 9 0,003 9 0,004 9 0,006 3
4.7	$D_{nom} \leqslant 160$ $160 < D_{nom} \leqslant 250$ $250 < D_{nom} \leqslant 400$ $400 < D_{nom} \leqslant 630$ $630 < D_{nom} \leqslant 1\,000$	$D_{nom} \leqslant 6{,}3$ $6{,}3 < D_{nom} \leqslant 10$ $10 < D_{nom} \leqslant 15$ $15 < D_{nom} \leqslant 24$ $24 < D_{nom} \leqslant 36$	0,025 0,03 0,04 0,05 0,06	0,001 0 0,001 2 0,001 6 0,002 0 0,002 4	0,05 0,05 0,075 0,10 0,125	0,002 0 0,002 0 0,002 9 0,003 9 0,004 9