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स्वीकार्यता शर्ते — परिशुद्धता का
परीक्षण

**Conditions of Acceptance for
Horizontal Internal Broaching
Machines — Testing of the
Accuracy**

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भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS

मानक भवन, 9 बहादुरशाह ज़फर मार्ग, नई दिल्ली-110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI-110002

www.bis.org.in www.standardsbis.in

NATIONAL FOREWORD

This Indian Standard which is identical with ISO 6480 : 1983 'Conditions of acceptance for horizontal internal broaching machines — Testing of the accuracy' issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendation of the Machine Tools, Machine Tool Elements and Holding Devices Sectional Committee and approval of the Production and General Engineering Division Council.

The text of ISO Standard has been approved as suitable for publication as an Indian Standard without deviations. Certain conventions are however not identical to those used in Indian Standards. Attention is particularly drawn to the following:

- a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'.
- b) Comma (,) has been used as a decimal marker while in Indian Standards the current practice is to use a point (.) as the decimal marker.

In this adopted standard, reference appears to the following International Standard for which Indian Standard also exists. The corresponding Indian Standard, which is to be substituted in its place is listed below along with its degree of equivalence for the edition indicated:

| <i>International Standard</i> | <i>Corresponding Indian Standard</i> | <i>Degree of Equivalence</i> |
|--|--|---------------------------------|
| ISO/R 230 ¹⁾ Machine tool test code | IS 2063 (Part 1) : 2002 Test code for machine tools : Part 1 Geometric accuracy of machines operating under no-load or finishing conditions (<i>second revision</i>) | Identical with ISO 230-1 : 1996 |

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'.

¹⁾ Since revised as ISO 230-1 : 2012 'Test code for machine tools — Part 1: Geometric accuracy of machines operating under no-load or quasi-static conditions'.

Indian Standard

CONDITIONS OF ACCEPTANCE FOR HORIZONTAL INTERNAL BROACHING MACHINES — TESTING OF THE ACCURACY

1 Scope and field of application

This International Standard specifies, with reference to ISO/R 230, geometrical tests for general purpose and normal accuracy machines and gives the corresponding permissible deviations which apply. This International Standard also gives the terminology used for the main elements of the machine.

NOTE — In addition to terms used in the three official ISO languages (English, French and Russian), this International Standard gives, in the annex, the equivalent terms in German and Italian. These have been included at the request of ISO Technical Committee TC 39 and are published under the responsibility of the Member Bodies for Germany, F.R. (DIN) and Italy (UNI). However, only the terms given in the official languages can be considered as ISO terms.

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.), nor to its characteristics (speeds, feeds, etc.) which should generally be checked before testing accuracy.

2 Reference

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

3 Preliminary remarks

3.1 In this International Standard, all dimensions and permissible deviations 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 application of the methods of acceptance, warming up of moving parts, description of measuring methods, and recommended accuracy of testing equipment.

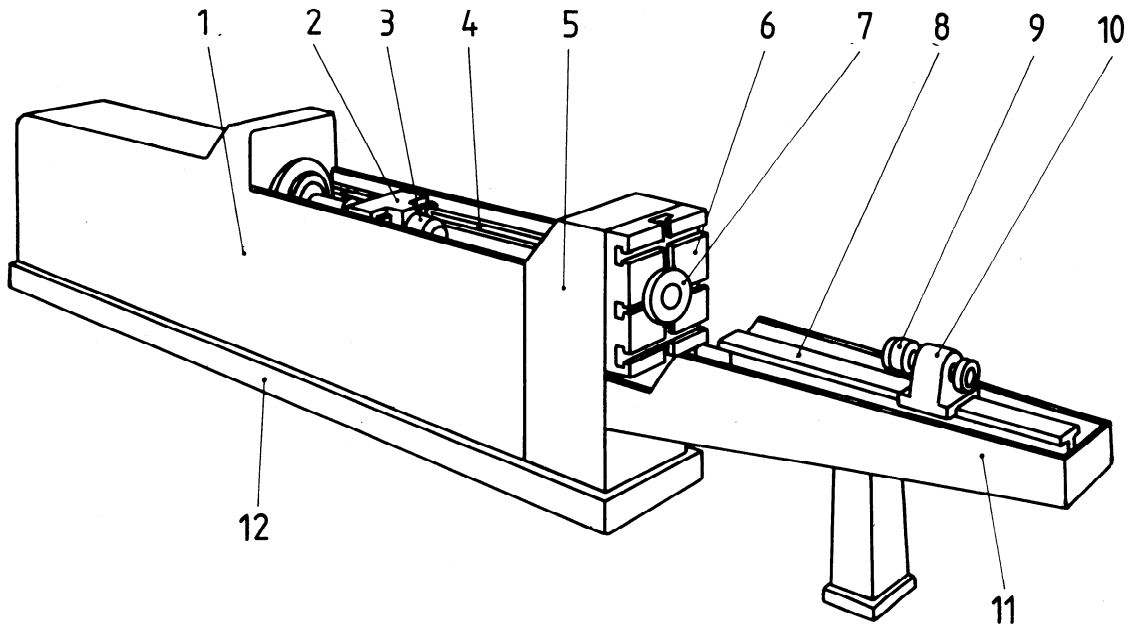
3.3 The sequence in which the geometrical tests are given is related to the sub-assemblies of the machine and this in no way defines the practical order of testing. In order to make the mounting of instruments or gauging easier, tests may be applied in any order.

3.4 When inspecting a machine, it is not always necessary to carry out all the tests given in this International Standard. The user may choose, in agreement with the manufacturer, those tests relating to the properties which are of interest to him, but these tests shall be clearly stated when ordering a machine.

3.5 Because of the diversity of shape of the pieces, practical tests have not been included. If the user wishes to carry out a practical test, this test shall be stated in agreement with the manufacturer.

3.6 When establishing the tolerance for a measuring range different from that given in this International Standard (see clause 2.311 in ISO/R 230), it should be taken into consideration that the minimum value of tolerance, for geometrical tests as well as for practical tests, is 0,01 mm (0.000 4 in).

4 Terminology

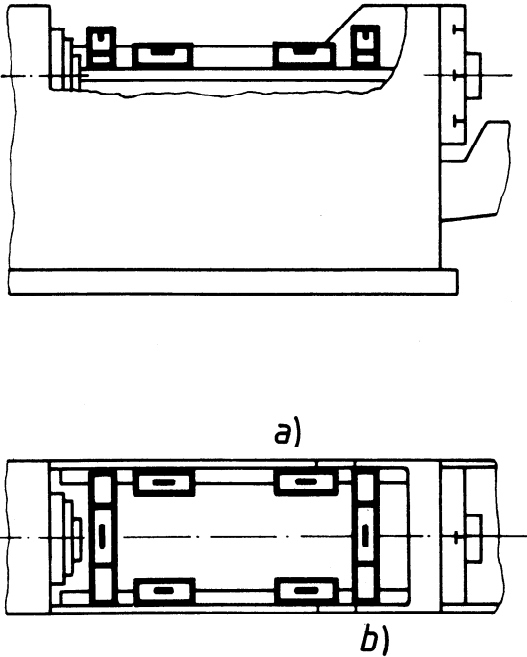
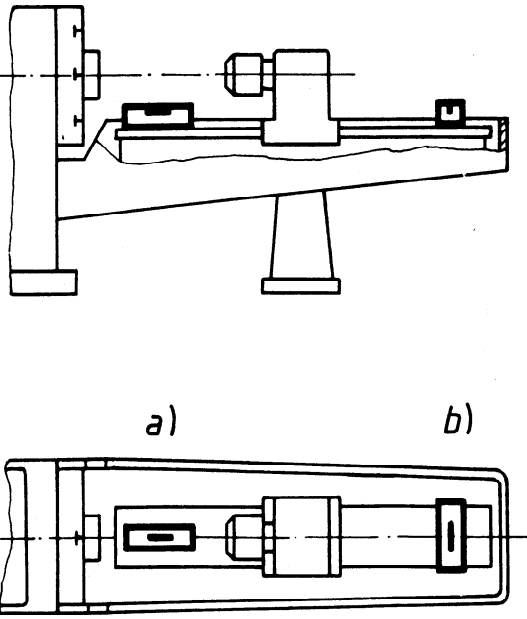


| No. | English language | French language | Russian language |
|-----|---------------------|--|--------------------------------|
| 1 | Bed | Bâti avant | Станина |
| 2 | Pull block | Chariot de traction | Рабочая каретка |
| 3 | Pulling chuck | Tête d'accrochage avant | Зажимной патрон |
| 4 | Pull block ways | Guidage du chariot de traction | Направляющие рабочей каретки |
| 5 | Table | Montant du plateau de fixation | Стол |
| 6 | Face plate | Plateau de fixation | Опорная плита |
| 7 | Work support bush | Support de pièce | Рабочая скользящая втулка |
| 8 | Outer support ways | Guidage du chariot d'amenage et d'accompagnement | Направляющая скользящего блока |
| 9 | Retrieving chuck | Tête d'accrochage arrière | Вспомогательный патрон |
| 10 | Outer support block | Chariot d'amenage et d'accompagnement | Скользкий блок |
| 11 | Outer support table | Support du chariot d'amenage | Приставная станина |
| 12 | Base box | Socle | Основание |

| Permissible deviation | | Measuring instruments | Observations and references to test code ISO/R 230 |
|------------------------|-----------------------|------------------------------|---|
| mm | in | | |
| a) and b) 0,05/1000 | a) and b) 0.002/40 | Level and special support | <p>Clause 3.11</p> <p>The level shall be placed in positions <i>a)</i> and <i>b)</i>, and the deviation observed; for the two tests of G01, the deviations shall be in the same direction.</p> <p>NOTE — These tests shall be carried out in accordance with the manufacturer's instructions.</p> |
| a) and b) 0,1/1000 | a) and b) 0.004/40 | | |

5 Conditions of acceptance and permissible deviations

5.1 Preliminary tests

| No. | Diagram | Object |
|-----|---|--|
| G01 |  | <p>Verification of levelling of the pull block ways :</p> <p>a) longitudinal verification;</p> <p>b) transverse verification.</p> |
| G01 |  | <p>Verification of levelling of the outer support ways :</p> <p>a) longitudinal verification;</p> <p>b) transverse verification.</p> |

| Permissible deviation | | Measuring instruments | Observations and references to test code ISO/R 230 |
|--|--|---|---|
| mm | in | | |
| <p>a) and b)</p> <p>0,025 up to 300</p> <p>0,025</p> <p>for each additional</p> <p>300</p> <p>up to a maximum of</p> <p>0,05</p> | <p>a) and b)</p> <p>0.001 up to 12</p> <p>0.001</p> <p>12</p> <p>0.002</p> | <p>a)</p> <p>Box spirit level or straightedge and gauge blocks</p> <p>b)</p> <p>Dial gauge and special support or straightedge and gauge blocks</p> | <p>Clauses 5.322 and 5.323</p> <p>a)</p> <p>The box spirit level shall be placed successively at a number of positions equally spaced along the face plate, and the deviation observed.</p> <p>b)</p> <p>The special support shall be placed in the upper, mid and lower positions on the face plate. The dial gauge shall be moved on the special support in a horizontal plane, and the deviation observed.</p> |
| <p>a) and b)</p> <p>0,05/300</p> | <p>a) and b)</p> <p>0.002/12</p> | <p>Test mandrel and dial gauge</p> | <p>Clause 5.422.21</p> <p>Pulling chuck extended.</p> <p>The dial gauge shall be fixed to a fixed part of the machine. The pulling chuck shall be moved and any horizontal or vertical deviation noted.</p> |
| <p>a) and b)</p> <p>0,035/300</p> | <p>a) and b)</p> <p>0.0014/12</p> | <p>Square and dial gauge</p> | <p>Clause 5.522. 2</p> <p>The dial gauge shall be fixed to the pulling chuck and the square to the face plate; the pulling chuck shall be moved with the dial gauge along the square and any horizontal or vertical deviation noted.</p> |

5.2 Geometrical tests

| No. | Diagram | Object |
|-----|---------|--|
| G1 | | <p>Checking of flatness of the face plate :</p> <p>a) in a vertical plane;</p> <p>b) in a horizontal plane.</p> |
| G2 | | <p>Verification of parallelism of the pulling chuck hole axis to its movement :</p> <p>a) in a vertical plane;</p> <p>b) in a horizontal plane.</p> |
| G3 | | <p>Checking of squareness of the movement of the pulling chuck to the face plate :</p> <p>a) in a vertical plane;</p> <p>b) in a horizontal plane.</p> |

| Permissible deviation | | Measuring instruments | Observations and references to test code ISO/R 230 |
|------------------------|------------------------|---|---|
| mm | in | | |
| a) and b) 0,075/300 | a) and b) 0.003/12 | Dial gauge and special square | <p>Clause 5.522.2</p> <p>The dial gauge shall be fixed on the retrieving chuck. The special square shall be placed against the face plate.</p> <p>The retrieving chuck shall be moved, and any horizontal or vertical deviation noted.</p> |
| 0,05 | 0.002 | Test mandrel and dial gauge | <p>Clause 5.44</p> <p>Pulling chuck in starting position.</p> <p>The dial gauge shall be set to swivel on the test mandrel, and the test mandrel shall be fixed to the pulling chuck.</p> <p>The dial gauge shall be turned 360° around the central hole, and any deviation observed (half value).</p> |
| a) and b) 0,06/500 | a) and b) 0.0024/20 | Test mandrel of length $L = 1000$ and dial gauge | <p>Clauses 5.43 and 5.44</p> <p>The test mandrel shall be fixed in the retrieving chuck hole and in the pulling chuck hole.</p> <p>The plunger of the dial gauge shall touch the test mandrel. The retrieving chuck hole and pulling chuck hole shall be moved, and any horizontal or vertical deviation noted.</p> |

| No. | Diagram | Object |
|-----|---------|---|
| G4 | | <p>Checking of squareness of the movement of the retrieving chuck to the face plate :</p> <p>a) in a vertical plane;</p> <p>b) in a horizontal plane.</p> |
| G5 | | <p>Checking of coincidence of the pulling chuck hole axis with the central hole axis of the face plate.</p> |
| G6 | | <p>Checking of alignment of the retrieving chuck hole axis with the pulling chuck hole axis :</p> <p>a) in a vertical plane;</p> <p>b) in a horizontal plane.</p> |

Annex

| No. | German language | Italian language |
|-----|-------------------------------|----------------------------------|
| 1 | Bett | Bancale |
| 2 | Schafhalteraufnahme | Testa di trazione |
| 3 | Schafhalter | Pinza di trazione |
| 4 | Werkzeugschlitten- führung | Guide della testa di trazione |
| 5 | Ständer für Aufspannplatte | Bancale per la tavola |
| 6 | Aufspannplatte | Tavola portapezzi |
| 7 | Werkstückvorlage | Supporto pezzo |
| 8 | Endstückhalterführung | Guide della testa posteriore |
| 9 | Endstückhalter | Pinza posteriore |
| 10 | Endstückhalteraufnahme | Testa posteriore |
| 11 | Tisch | Bancale posteriore |
| 12 | Unterkasten (Sockel) | Zoccolo |

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BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones : 2323 0131, 2323 3375, 2323 9402 Website: www.bis.org.in

Regional Offices:

| | Telephones |
|--|--|
| Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110002 | { 2323 7617 2323 3841 |
| Eastern : 1/14 C.I.T. Scheme VII M, V. I. P. Road, Kankurgachi KOLKATA 700054 | { 2337 8499, 2337 8561 2337 8626, 2337 9120 |
| Northern : Plot No. 4-A, Sector 27-B, Madhya Marg, CHANDIGARH 160019 | { 26 50206 265 0290 |
| Southern : C.I.T. Campus, IV Cross Road, CHENNAI 600113 | { 2254 1216, 2254 1442 2254 2519, 2254 2315 |
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