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# International Standard



# 6480

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

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## Conditions of acceptance for horizontal internal broaching machines — Testing of the accuracy

*Conditions de réception des machines horizontales à brocher les intérieurs — Contrôle de la précision*

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# 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.<sup>1)</sup>

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 and permissible deviations are expressed in millimetres and in inches.

2.2 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.

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 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 are to be clearly stated when ordering a machine.

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

2.6 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).

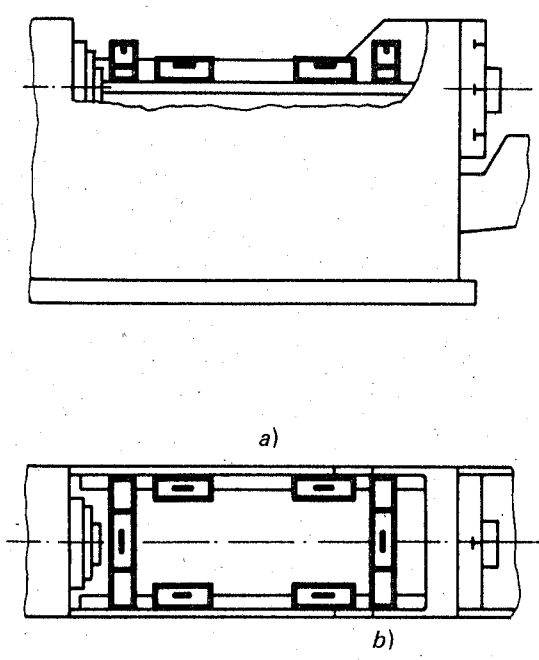
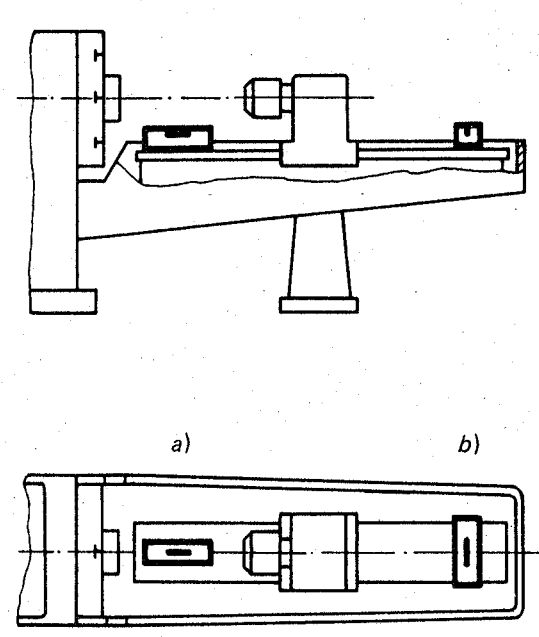
## 3 REFERENCE

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

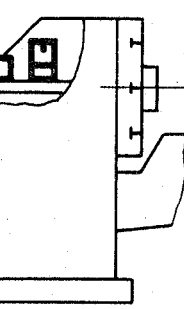
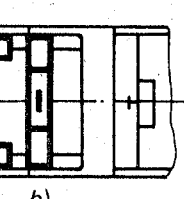
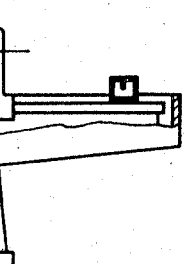
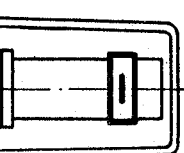
1) In addition to terms used in the three official ISO languages (English, French and Russian), this International Standard gives the equivalent terms in German and Italian, these have been included at the request of ISO Technical Committee TC 39 and are published under the responsibility of the Member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

5 CONDITIONS OF ACCEPTANCE AND PERMISSIBLE DEVIATIONS

5.1 Preliminary tests

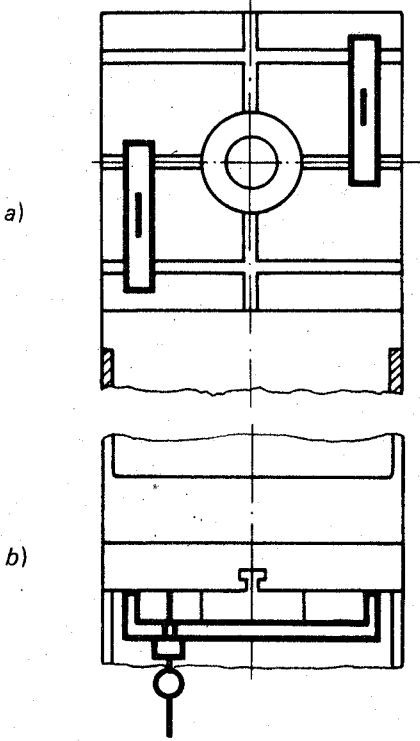
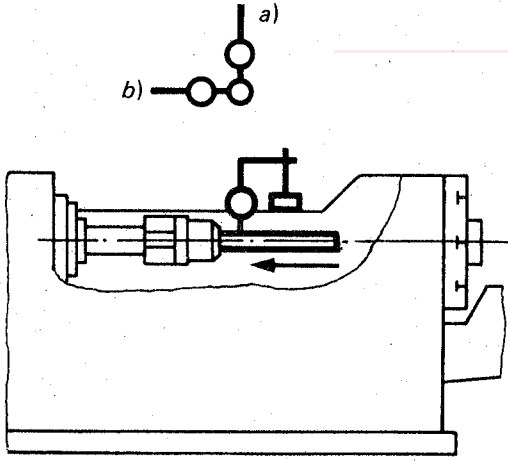
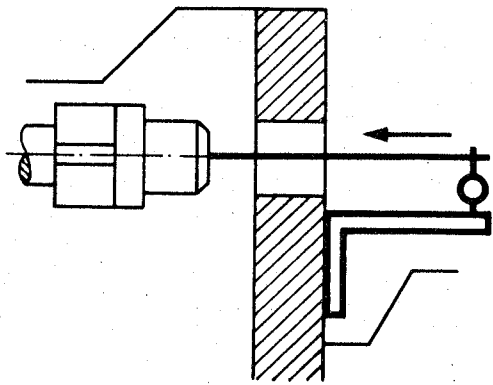
| N°   | Diagram                                                                                                 | Object                                                                                                                              |  |
|------|---------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|--|
|      |  <p>a)</p> <p>b)</p>  | <p>Verification of levelling of the pull block ways :</p> <p>a) longitudinal verification;</p> <p>b) tranverse verification.</p>    |  |
| G 01 |  <p>a)</p> <p>b)</p> | <p>Verification of levelling of the outer support ways :</p> <p>a) longitudinal verification;</p> <p>b) tranverse verification.</p> |  |

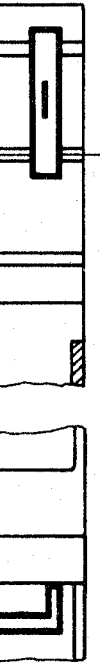
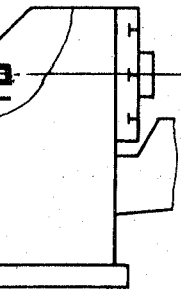
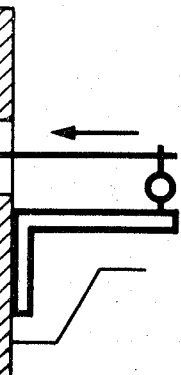
# PERMISSIBLE DEVIATIONS

|                                                                                                                                                                                     | Object                                                                                                                                            | Permissible deviation                           |                                                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|-------------------------------------------------|
|                                                                                                                                                                                     |                                                                                                                                                   | mm                                              | in                                              |
| <br><br><i>b)</i>    | <p>Verification of levelling of the pull block ways :</p> <p><i>a)</i> longitudinal verification;</p> <p><i>b)</i> tranverse verification.</p>    | <p><i>a)</i> and <i>b)</i></p> <p>0,1/1000</p>  | <p><i>a)</i> and <i>b)</i></p> <p>0.004/40</p>  |
| <br><br><i>b)</i> | <p>Verification of levelling of the outer support ways :</p> <p><i>a)</i> longitudinal verification;</p> <p><i>b)</i> tranverse verification.</p> | <p><i>a)</i> and <i>b)</i></p> <p>0,05/1000</p> | <p><i>a)</i> and <i>b)</i></p> <p>0.0002/40</p> |

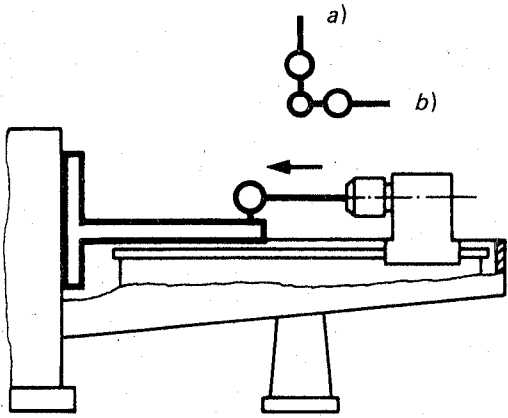
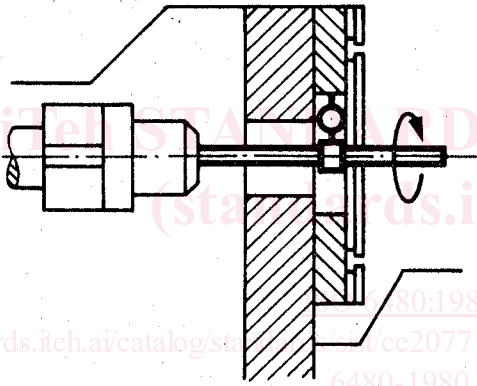
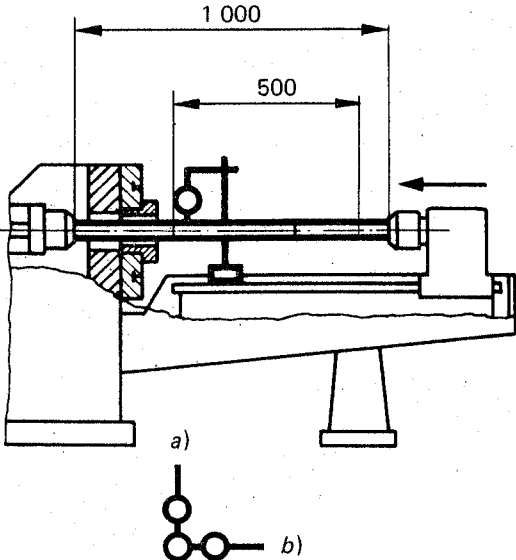
| Permissible deviation                           |                                                 | Measuring instruments            | Observations<br>and references to test code ISO/R 230                                                                                                                                                                                                                                            |
|-------------------------------------------------|-------------------------------------------------|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| mm                                              | in                                              |                                  |                                                                                                                                                                                                                                                                                                  |
| <p><i>a)</i> and <i>b)</i></p> <p>0,1/1000</p>  | <p><i>a)</i> and <i>b)</i></p> <p>0.004/40</p>  | <p>Level and special support</p> | <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 G 01, the deviations must be in the same direction.</p> <p>NOTE — These tests must be carried out in accordance with the manufacturer's instructions.</p> |
| <p><i>a)</i> and <i>b)</i></p> <p>0,05/1000</p> | <p><i>a)</i> and <i>b)</i></p> <p>0.0002/40</p> |                                  |                                                                                                                                                                                                                                                                                                  |

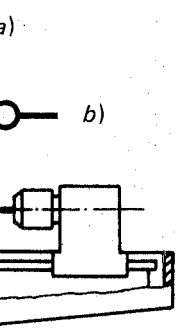
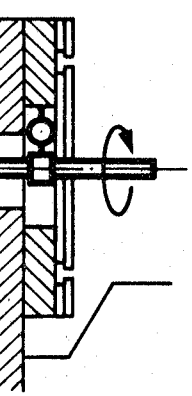
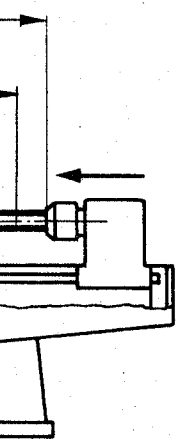
## 5.2 Geometrical tests

| N°  | Diagram                                                                                                 | Object                                                                                                                                                 |
|-----|---------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| G 1 |  <p>a)</p> <p>b)</p>  | <p>Checking of flatness of the face plate :</p> <p>a) in a vertical plane;</p> <p>b) in a horizontal plane.</p>                                        |
| G 2 |  <p>a)</p> <p>b)</p> | <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>    |
| G 3 |  <p>a)</p> <p>b)</p> | <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> |

|                                                                                   | Object                                                                                                                                                               | Permissible deviation                                                                                                                                 |                                                                                                 |
|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
|                                                                                   |                                                                                                                                                                      | mm                                                                                                                                                    | in                                                                                              |
|   | <p>Checking of flatness of the face plate :</p> <p><i>a)</i> in a vertical plane;</p> <p><i>b)</i> in a horizontal plane.</p>                                        | <p><i>a)</i> and <i>b)</i></p> <p>0,025</p> <p>up to 300</p> <p>0,025</p> <p>300</p> <p>0,05</p> <p>for each additional</p> <p>up to a maximum of</p> | <p><i>a)</i> and <i>b)</i></p> <p>0.001</p> <p>up to 12</p> <p>0.001</p> <p>12</p> <p>0.002</p> |
|  | <p>Verification of parallelism of the pulling chuck hole axis to its movement :</p> <p><i>a)</i> in a vertical plane;</p> <p><i>b)</i> in a horizontal plane.</p>    | <p><i>a)</i> and <i>b)</i></p> <p>0,05/300</p>                                                                                                        | <p><i>a)</i> and <i>b)</i></p> <p>0.002/12</p>                                                  |
|  | <p>Checking of squareness of the movement of the pulling chuck to the face plate :</p> <p><i>a)</i> in a vertical plane;</p> <p><i>b)</i> in a horizontal plane.</p> | <p><i>a)</i> and <i>b)</i></p> <p>0,035/300</p>                                                                                                       | <p><i>a)</i> and <i>b)</i></p> <p>0.0014/12</p>                                                 |

| Permissible deviation                                                                                                                   |                                                                                   | Measuring instruments                                                                                                                 | Observations<br>and references to test code ISO/R 230                                                                                                                                                                                                                                                                                                                                               |
|-----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| mm                                                                                                                                      | in                                                                                |                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                     |
| <p>a) and b)</p> <p>0,025</p> <p>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</p> <p>up to 12</p> <p>0.001</p> <p>12</p> <p>0.002</p> | <p>a) Box spirit level or straightedge and gauge blocks</p> <p>b) Dial gauge and special support or straightedge and gauge blocks</p> | <p>Clauses 5.322 and 5.323</p> <p>a) 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) 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>                                                                                                                                                             |

| N°  | Diagram                                                                             | Object                                                                                                                                                            |
|-----|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| G 4 |    | <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>         |
| G 5 |   | <p>Checking of coincidence of the pulling chuck hole axis with the central hole axis of the face plate.</p>                                                       |
| G 6 |  | <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> |

|                                                                                   | Object                                                                                                                                                            | Permissible deviation             |                                   |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|-----------------------------------|
|                                                                                   |                                                                                                                                                                   | mm                                | in                                |
|    | <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>         | <p>a) and b)</p> <p>0,075/300</p> | <p>a) and b)</p> <p>0.003/12</p>  |
|   | <p>Checking of coincidence of the pulling chuck hole axis with the central hole axis of the face plate.</p>                                                       | <p>0,05</p>                       | <p>0.002</p>                      |
|  | <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> | <p>a) and b)</p> <p>0,06/500</p>  | <p>a) and b)</p> <p>0.0024/20</p> |