
**Machine tools — Test conditions for
universal spindle heads —**

Part 1:
**Accessory heads for machines with
horizontal spindle (horizontal Z-axis)**

*Machines-outils — Conditions d'essai pour poupées porte-broche
universelles —*

*Partie 1: Têtes accessoires pour machines à broche horizontale (axe Z
horizontale)*



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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Accessory spindle heads are used on machine tools such as milling and boring machines, machining centres, portal and gantry type machines, turning centres, with only one built-in spindle in the head or ram, providing fixed or indexing or tilting spindles which can be oriented in directions different from the built-in spindle axis.

In the same way as the built-in spindle, they can perform multiple machining operations including milling, boring, drilling, grinding and tapping, and, in some cases, automatic tool changing as well from a magazine or similar storage unit in accordance with a machining program.

Some types of heads allow to check only the resulting position of the spindle (as the fixed or indexing ones considered in [3.3](#), [3.4](#) and [3.5](#) and in tests G1 to G15), whereas for some others, i.e. those with continuous movement of the two rotary axes (as those considered in [3.6](#) and [3.7](#)). [Annexes A](#) and [B](#) allow to make additional analysis of the relative positions between axes and to check the accuracy of their offset compensation as well.

Machine tools — Test conditions for universal spindle heads —

Part 1:

Accessory heads for machines with horizontal spindle (horizontal Z-axis)

1 Scope

This document specifies, with reference to the ISO 230 series, some families of tests for accessory spindle heads used on machining centres or numerically controlled milling machines, etc., where applicable, with horizontal spindle (i.e. horizontal Z-axis). The tests considered in this document are also applicable to manual indexing heads.

This document establishes the tolerances or maximum acceptable values for the test results corresponding to general purpose and normal accuracy spindle heads used on different types of machines.

This document specifies several sets of procedures for geometric tests which can be carried out on different types of spindle heads for comparison, acceptance, maintenance, adjustments or any other purpose.

Grinding heads and facing heads are not included in the scope of this document.

This document deals only with the verification of geometric and positioning accuracy of the accessory spindle heads and does not apply to:

- the testing of the machine's head(s) operation (e.g. vibration, abnormal sound noise level, stick slip motion of components);
- the machine's spindle head(s) characteristics (e.g. speeds, feeds and accelerations) which are generally checked separately; or
- the verification of the machining capability under power.

Tests concerning the accuracy of finished test pieces are dealt with in other ISO standards.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 230-1:2012, *Test code for machine tools — Part 1: Geometric accuracy of machines operating under no-load or quasi-static conditions*

ISO 230-2:2014, *Test code for machine tools — Part 2: Determination of accuracy and repeatability of positioning of numerically controlled axes*

ISO 230-7:2015, *Test code for machine tools — Part 7: Geometric accuracy of axes of rotation*