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Accuracy of machine tools and methods of test —

Part 29: Specification for automatic lathes, multi-spindle (indexing drum) type

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Contents

	Page
Cooperating organizations	Inside front cover
Foreword	ii
1 Scope	1
2 References	1
3 Application of test methods	1
4 Abbreviations	1
5 Diagrams	1
6 Machine size ranges	1
Table 1 — Machine size ranges	1
Table 2 — Geometrical tests for automatic lathes multi-spindle (indexing drum) type	2
Table 3 — Practical tests for automatic lathes multi-spindle (indexing drum) type	9
Publications referred to	Inside back cover

Foreword

This Part of this British Standard has been prepared under the direction of the Mechanical Engineering Standards Committee and is based upon a draft prepared by the Machine Tool Industry Research Association. It is one of a series dealing with accuracy tests for various types of machine tools.

Multi-spindle automatic lathes are manufactured usually with 4, 6 or 8 spindles for both bar and chuck work. There are variations in the layout of the machines but the series of tests in this standard are intended, however, to cover all machine configurations and layouts whether for bar or chuck work unless otherwise stated under the particular test.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 14, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This Part of this British Standard specifies, with reference to BS 3800, geometrical tests for automatic lathes of multi-spindle indexing drum type and gives corresponding permissible deviations which apply.

This standard is applicable to machines of general purpose use and normal accuracy.

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 References

The titles of the publications referred to in this standard are listed on the inside back cover.

3 Application of test methods

3.1 In applying the tests detailed in Table 2 and Table 3, reference should be made to BS 3800, especially concerning the installation of the machine before testing, warming up of spindles and other moving parts, the description of measuring methods and the recommended accuracy of testing equipment.

3.2 The tests may be applied in any order that is practicable and that makes for ease of mounting of instruments or gauging. The sequence in which the geometrical tests are listed in Table 2 is related to the sub-assemblies of the machine and it is not intended to impose the practical order in which the tests are to be done.

3.3 It is not always necessary for all the tests specified in this standard to be carried out. The purchaser shall be at liberty to select, in agreement with the manufacturer, those tests relating to the properties that are of interest to him. The appropriate tests are to be clearly stated when the machine is ordered.

If the results of practical tests differ from those of geometric tests having the same object, the results of the practical tests shall be accepted as the only valid ones (see 4.3 of BS 3800:1964).

3.4 When establishing the tolerance for a measuring range different from that given in this standard (see 2.311 of BS 3800:1964), it should be taken into consideration that the minimum value of tolerance is 0.01 mm for geometrical and practical tests.

4 Abbreviations

For the purposes of this standard, various methods of expressing permissible deviations are employed, each having a particular type of application. The methods employed are as follows.

---/---	This type of expression applies to deviations of perpendicularity that are ratios.
---for any length of---	This type of expression applies to deviations of straightness and parallelism, and is used in fact for local permissible deviations, the measurement length being obligatory.
---per---	This type of expression applies to deviations of straightness and parallelism and is used to recommend a measurement length, but in this case the proportionality rule comes into operation if the measurement length differs from that indicated.

5 Diagrams

For reasons of simplicity the diagrams in this standard illustrate only one type of machine.

6 Machine size ranges

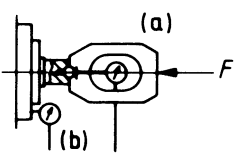
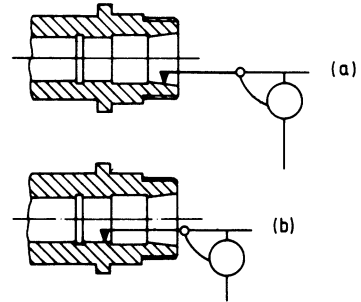
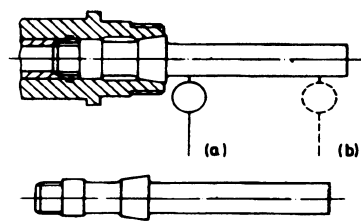
For the purposes of this standard machines are divided into size ranges. In general, tolerances are applied according to the machine size, particular note is taken of the fact that machines of a given capacity having more than 6 spindles are generally constructed using a larger machine frame than those of the same capacity having 6 or fewer spindles. Three machine size ranges based on maximum bar capacity and three corresponding machine size ranges based on nominal chuck capacity are included (see Table 1).

Table 1 — Machine size ranges

Range	Machines with 6 or fewer spindles		Machines with more than 6 spindles	
	Bar machines	Chucking machines	Bar machines	Chucking machines
	mm	mm	mm	mm
1	0 up to 25	0 up to 129	0 up to 19.9	0 up to 99.9
2	25.1 up to 62.9	130 up to 179	20 up to 40.9	100 up to 149
3	63 and over	180 and over	41 and over	150 and over

Table 2 — Geometrical tests for automatic lathes, multi-spindle (indexing drum) type

All dimensions are in millimetres.

1 No.	2 Diagram	3 Object	4 Permissible deviation			5 Measuring instruments	6 Observations and references to the test code BS 3800:1964
			Range 1	Range 2	Range 3		
G1		This test applies to both bar and chucking machines Measurement of periodic axial slip	0.012	0.015	0.020	Dial gauge and special device	5.622.1 and 5.622.2 The value of force F to be applied for the test shall be specified by the manufacturer Dial gauge mounted on the spindle carrier front face or other relevant fixed part of the machine The test shall be repeated for each spindle
G2.1		This test applies to bar machines with work spindles for drawback collets Measurement of radial run-out of the collet internal seating diameter(s)	0.012	0.016	0.025	Dial gauge	5.612.3 Dial gauge is mounted on the spindle carrier front face or other relevant part of the machine The stylus at right angles to the surface being checked The test shall be repeated for each spindle
G2.2	 Special test mandrel	<i>Alternative</i> Using a special test mandrel: (a) at the spindle nose (b) at a distance of 100 from the spindle nose	(a) 0.016 (b) 0.030	0.020 0.030	0.030 0.030	Special test mandrel and dial gauge	