

CONFIRMED
DECEMBER 2007

Accuracy of machine tools and methods of test —

Part 2: Specification for copying lathes and copying attachments

UDC 621.9.01 – 187.001.4:621.941.244:620.1

NO COPYING WITHOUT BSI PERMISSION EXCEPT AS PERMITTED BY COPYRIGHT LAW

BSI
Documents

AVA

Document Sharing Hub

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Machine, Engineers and Hand Tools Standards Committee (MTE/-) to Technical Committee MTE/1 upon which the following bodies were represented:

- Advanced Manufacturing Technology Research Institute
- Cranfield Institute of Technology
- Department of Trade and Industry [Mechanical Engineering and Manufacturing Technology Division (MMT)]
- Health and Safety Executive
- Institution of Production Engineers
- Ministry of Defence
- University of Aston in Birmingham

This British Standard, having been prepared under the direction of the Machine, Engineers and Hand Tools Standards Committee, was published under the authority of the Board of BSI and comes into effect on 30 December 1988

© BSI 08-1999

First published December 1982
First revision December 1988

The following BSI references relate to the work on this standard:
Committee reference MTE/1
Draft for comment 83/76970 DC

ISBN 0 580 16997 9

Amendments issued since publication

Amd. No.	Date of issue	Comments

Contents

	Page
Committees responsible	Inside front cover
Foreword	ii
1 Scope	1
2 Definitions	1
3 Application of test methods	1
4 Abbreviations	2
5 Diagrams	2
Table 1 — Geometrical tests for copying lathes with single-axis copying systems	3
Table 2 — Geometrical tests for copying lathes with two-axis copying systems	4
Table 3 — Practical tests for copying lathes	5
Publications referred to	Inside back cover

Foreword

This Part of BS 4656 has been prepared under the direction of the Machine, Engineers and Hand Tools Standards Committee and implements agreements of the International Organization for Standardization (ISO). This Part of BS 4656 supersedes BS 4656-2:1982, which is withdrawn.

This Part of BS 4656 is generally in accordance with ISO 8956 “*Acceptance conditions for copying attachments, integral or otherwise, for lathes — Testing of the accuracy*”, ISO 8956 was based on a UK proposal. This Part of BS 4656 differs from ISO 8956 in the following respects.

Clauses. Clauses 1 and 3 contain the same information as is given in ISO 8956 but they are presented in accordance with an accepted format that has been adopted for the BS 4656 series of standards. Clauses 4 and 5 have been added.

A provision is included in clause 1, where reference is made to the exclusion of precision category, because neither ISO 8956 nor this standard includes such a category.

In 2.2 “motion” has been qualified by the term “resultant”.

Inch dimensions. In accordance with the UK policy of metrication, inch dimensions given in ISO 8956 have not been included in this Part of BS 4656.

Tables. In column 5 of Table 1 reference is made to “thimble micrometer” in place of “micrometer”.

In Table 3 test P2, a statement has been included in column 8 indicating that check c) can be performed using a steel test piece from test P2 of BS 4656-1:1981.

In column 3 of Table 3, test P3 the following text has been retained from BS 4656-2:1982.

“Machining diameters, shoulders and tapers on cylindrical shaft-type test piece.

Only one size of test piece is required to be machined. Dependent on the size of the machine, test piece a) or b) is used.”

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 8, 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 BS 4656 specifies, with reference to BS 3800, both geometrical and practical tests for copying lathes and centre lathes of general purpose type with copying attachments.

The tests in this standard are supplementary to those (except precision category) in BS 4656-1.

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

It applies to hydraulic and electric servo-controlled copying attachments but not to mechanically-controlled ones.

It applies to lathes with single-axis copying systems and to lathes where two axes are used in conjunction to produce a profile of up to 180° included angle. It also applies to capstan and combination turret lathes and vertical boring machines equipped with copying attachments.

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.

This standard does not apply to turning machines equipped with two-axis systems of more than 180° capability which are considered as special-purpose machines, nor does it apply to single- or multi-spindle automatic lathes fitted with a copying attachment.

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

2 Definitions

For the purposes of this Part of BS 4656 the following definitions apply.

2.1

single-axis copying system

a copying system in which a component shape is produced by the resultant motion of two slides, one of which is under servo-control from the contact of a stylus against a template whilst the other has a pre-set constant feed motion. In this case the axis of the stylus is always parallel to the axis of the copying slide

2.2

two-axis copying system

a copying system in which a component shape is produced by the resultant motion of two slides, both of which are under servo-control from the contact of a stylus against a template

3 Application of test methods

3.1 In applying the tests detailed in Table 1 and Table 2, 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 1 is related to the subassemblies 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.

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 0.005 mm for geometrical and practical tests.

3.5 Tests carried out on copying lathes which purport to comply with BS 4656-1 shall be performed with the copying unit in position.

3.6 Unless otherwise stated, geometrical tests shall be performed at each end of, and also at the mid-point of, the copying slide stroke.