

Specification for

The accuracy of machine tools and methods of test —

**Part 9: External cylindrical grinding
machines with reciprocating table**

UDC 621.9.01-187.001.4:621.924.56

Confirmed December 2011

NO COPYING WITHOUT BSI PERMISSION EXCEPT AS PERMITTED BY COPYRIGHT LAW

BSI
Documents

AVA

Document Sharing Hub

Co-operating organizations

The Mechanical Engineering Industry Standards Committee, under whose supervision this British Standard was prepared, consists of representatives from the following Government departments and scientific and industrial organizations:

Associated Offices Technical Committee	Department of Trade and Industry — National Engineering Laboratory*
Association of Consulting Engineers	Electricity Supply Industry in England and Wales
Association of Hydraulic Equipment Manufacturers Ltd.	Engineering Equipment Users' Association
Association of Mining Electrical and Mechanical Engineers	Federation of Manufacturers of Construction Equipment and Cranes
British Compressed Air Society	Institution of Gas Engineers
British Electrical and Allied Manufacturers' Association	Institution of Heating and Ventilating Engineers
British Gas Corporation	Institution of Mechanical Engineers*
British Gear Manufacturers' Association	Institution of Plant Engineers
British Internal Combustion Engine Manufacturers' Association	Institution of Production Engineers*
British Mechanical Engineering Confederation	London Transport Executive
British Pump Manufacturers' Association	Machine Tool Trades Association*
British Steel Corporation	Ministry of Defence
British Steel Industry	Ministry of Defence, Army Department*
Crown Agents for Oversea Governments and Administrations	National Coal Board
Department of Employment (HM Factory Inspectorate)	Process Plant Association
Department of the Environment*	Railway Industry Association of Great Britain
Department of Trade and Industry — ENT	Royal Institute of British Architects
Department of Trade and Industry (Marine Division)	Telecommunications Engineering Manufacturing Association

The Government departments and scientific and industrial organizations marked with an asterisk in the above list, together with the following, were directly represented on the committee entrusted with the preparation of this British Standard:

Association of Scientific Technical and Managerial Staffs	Society of Motor Manufacturers and Traders Ltd.
Department of Trade and Industry — Mechanical Engineering	Trades Union Congress
Gauge and Toolmakers' Association	University of Aston in Birmingham
Machine Tool Industry Research Association	University of Manchester Institute of Science and Technology
Ministry of Defence, Air Force Department	Five individual experts
National Federation of Engineers' Tool Manufacturers	

This British Standard, having been approved by the Mechanical Engineering Industry Standards Committee, was published under the authority of the Executive Board on 30 September 1974

© BSI 03-2000

The following BSI references relate to the work on this standard:
Committee reference MEE/6
Draft for approval 73/36143

ISBN 0 580 08376 4

Amendments issued since publication

Amd. No.	Date of issue	Comments
5372	March 1987	Indicated by a sideline in the margin

Contents

	Page
Co-operating organizations	Inside front cover
Foreword	ii
1 Scope	1
2 Application of test methods	1
3 Abbreviations	1
4 Diagrams	1
Table 1 — Geometrical tests	2
Table 2 — Practical tests	8
Publication referred to	Inside back cover

Foreword

This Part of this British Standard has been prepared under the authority of the Mechanical Engineering Industry Standards Committee and implements agreements of the International Organization for Standardization (ISO). This Part of the standard is generally in accordance with ISO 2433 “*Test conditions for external, cylindrical grinding machines with a movable table — testing of accuracy*” but varies from it in the following respects:

Test G2. An alternative test permitted by ISO has been deleted. This test was one where the straightness of the longitudinal movement of the table in the horizontal plane was checked by means of a microscope and taut wire. This test is not considered necessary for UK practice.

Test P1(a) and P2. The references to diameter in respect of the definition for circularity in ISO 2433 has been replaced by reference to radius. This is in accordance with Resolution 2 taken by ISO/TC 39/SC 2, Acceptance conditions, in Stockholm in June 1973 when it was agreed that this series of International Standards should be in conformity with ISO/R 1101 “*Tolerances of form and of position*” Part 1 “*Generalities, symbols, indications on drawings*”.

This reference to radius has made it necessary to correct the values for permissible deviations in tests P1(a) and P2 by dividing the values quoted in ISO 2433 by two.

A note applicable to tests P1 and P2 of ISO 2433 stating that any taper should be such that the major diameter is near the work head has not been included as this is considered inappropriate for cylindrical grinding machines.

Clauses 1 and 5 contain the same information as is given in ISO 2433 but have been expressed more in accordance with accepted English usage.

In accordance with the UK policy of metrication, inch dimensions given in ISO 2433 have not been included in this British Standard.

In Table 1 the reference to spindle has in many cases been clarified by the addition of the word “workhead”.

Throughout the text of the table there have been minor changes in wording to achieve greater compliance with English usage but no alteration in substance.

In addition examples of precise measuring instruments have been included in tests P1 and P2.

In certain tests superfluous headings denoting sub-units of the machine have been deleted from the object column. The headings concerned are “Bed” — Test G1; “Tailstock” — Test G7; “Grinding wheel head” — Test G9.

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 this British Standard specifies requirements for the accuracy of external cylindrical grinding machines with reciprocating table, by establishing permissible deviations from certain essential dimensional and geometrical characteristics, and by prescribing, by reference to BS 3800, the details of the tests to be carried out to verify compliance with these requirements. It applies to machines of which the swing diameter does not exceed 800 mm and the distance between centres does not exceed 4 000 mm.

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

The standard deals only with the verification of accuracy, and does not apply to the testing of the running of the machine (vibrations, abnormal noises, stick-slip motion of components etc.) nor to machine characteristics (speeds, feeds etc.) which should generally be checked before testing accuracy.

NOTE The title of the British Standard referred to in this standard is given on the inside back cover.

2 Application of test methods

2.1 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.

2.2 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 sub-assemblies of the machine, and it is not intended to impose the practical order in which the tests are to be made.

2.3 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, and these tests are to be clearly stated when the machine is ordered.

2.4 Practical tests shall be made with finishing cuts and not with roughing cuts which are liable to generate appreciable cutting forces.

2.5 When establishing the tolerance for a measuring range different from that given in this standard (see 2.311 in BS 3800:1964) it should be taken into consideration that the minimum value of tolerance is 0.001 mm for geometrical and practical tests.

3 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.

4 Diagrams

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