

CONFIRMED
DECEMBER 2007

Specification for

The accuracy of machine tools and methods of test —

Part 26: Gear shaping machines

UDC 621.9.01 – 187.001.4:621.833.002.2:621.912.3

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Ball and Roller Bearing Manufacturers' Association	University of Aston in Birmingham
Department of the Environment (PSA)	University of Manchester (Institute of Science and Technology)
Federation of British Engineers' Tool Manufacturers	Individual experts

This British Standard, having been prepared under the direction of the Mechanical Engineering Standards Committee, was published under the authority of the Executive Board and comes into effect on 30 June 1980

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The following BSI references relate to the work on this standard:
Committee reference MEE/6
Draft for comment 78/80897 DC

ISBN 0 580 11438 4

Amendments issued since publication

Amd. No.	Date of issue	Comments

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Foreword

This Part of this British Standard has been prepared under the direction of the Mechanical Engineering Standards Committee. It has been developed following consideration of an initial proposal prepared by the Machine Tool Trades Association for the revision of BS 3329:1961 “*Specification for gear planing and shaping machines*”. For convenience it was decided to produce the revision of BS 3329 in two Parts, one dealing with gear planing machines and one dealing with gear shaping machines.

BS 3329:1961 is now withdrawn.

The format of this standard has been revised to accord with that now used for the general series of standards dealing with machine tool tests known as the BS 4656 series.

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.

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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, with reference to BS 3800, both geometrical and practical tests for gear shaping machines, horizontal and vertical spindle types, having a workpiece diameter capacity of up to 1 600 mm, used for the production of external and internal spur and helical gears, and gives the corresponding permissible deviations which apply. It applies only to machines which use pinion type cutters. These cutters have a rotary motion.

This standard is applicable to machines of high accuracy and 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, 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.

Levelling of the machine should be carried out in accordance with the manufacturer's instructions before testing accuracy.

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 When inspecting a gear shaping machine, it is necessary to carry out all the tests specified in this standard where applicable.

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 0.001 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 Practical test

6.1 General

6.1.1 Object of test. The object of this test is to verify the geometry of the machine by cutting a test piece under lightly loaded conditions.

6.1.2 Spur gears. A test spur gear shall be cut for one specified direction of rotation of the table or work spindle and measured for pitch and tooth alignment errors.

If cutting in both directions is required, this is subject to special arrangement between purchaser and manufacturer.

6.1.3 Helical gears. If the machine is required for cutting helical gears, an additional test gear with helical teeth shall be cut for one specified direction of rotation and measured for helix angle, lead, or axial pitch.

If cutting in both directions is required, this is subject to special arrangements between purchaser and manufacturer.

6.1.4 Diameter of test gear. The diameter of the test gear shall be equivalent to at least 60 %, unless otherwise agreed, of the capacity of the machine and the face width of the test gear blank shall be equivalent to at least 20 % of the capacity of the machine for width or 20 mm whichever is the greater.