

Specification for

Gauge blocks and accessories —

Part 3: Gauge blocks in use

Committees responsible for this British Standard

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- City of Birmingham Polytechnic
- Department of Trade and Industry (National Physical Laboratory)
- Department of Trade and Industry (National Engineering Laboratory)
- Gauge and Toolmakers' Association
- Ministry of Defence

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Foreword

This British Standard has been prepared under the direction of the Machine, Engineer and Hand Tools Standards Policy Committee.

All standards previously published for gauge blocks, by the British Standards Institution or by any other national or international body, have provided specifications to which gauge blocks are required to conform only when new.

As BS 4311-1:1968 has recently been revised and reissued bringing the verification practice for new gauge blocks up to date, it is opportune to provide a specification for used gauge blocks. Hence after new gauge blocks have been provided in conformity with BS 4311-1:1993, this Part provides a specification to which they should be controlled throughout their useful life.

NOTE The revision to BS 4311-2:1977 *Accessories*, which is currently in progress will supersede BS 888:1950 section 3 – *Accessories*, enabling BS 888 to be withdrawn.

Gauge blocks wear during use. The amount of wear inevitably results in a gauge block wearing beyond its original specification when new. This standard provides requirements and recommendations which cover the initial service of a gauge block in its original grade followed by a controlled programme of downgrading, when the gauge block has worn, to provide further periods of service in lower grades.

This standard also specifies methods to be used during recalibration to ensure traceability to national standards and to provide the necessary control over uncertainty of measurement.

This Part of BS 4311 also contains recommendations on the care and maintenance of gauge blocks in use and the reconditioning of measuring faces.

Furthermore, guidance is provided on the suitability of use of the various grades in relation to the work-piece tolerance in a specific measuring application. This is necessary to ensure that the grade of gauge blocks being used is of sufficient accuracy to achieve the required measuring result, but, from an economic view point, not of an unnecessarily higher grade which should be retained for appropriately higher grade measuring purposes.

Clauses 4 to 7 of this standard apply specifically to metric gauge blocks with clause 8 defining its application to inch gauge blocks.

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 4311 specifies the requirements for continued service of used gauge blocks, originally manufactured to BS 4311-1:1993 and should be used in conjunction with BS 4311-1:1993.

The tolerances given in this standard for grades 0, 1 and 2 are identical to those in Part 1, but the tolerances for each grade may be applied to any used gauge block which when new was accepted either to the same grade or to a higher grade.

Two lower grades, 3 and 4, have been added for gauge blocks which have worn beyond the limit of grade 2, but which nevertheless have sufficiently flat, wringing surfaces for further service at a lower grade.

This standard also specifies the requirements for the continued service of used gauge blocks originally manufactured to earlier standards, providing a consistent system for grading all used gauge blocks.

Guidance is given in annexes on essential care of the measuring faces in use, regular servicing and calibration to ensure that a gauge block continues within the requirements for its grade.

Selection of the grade of gauge blocks for a particular work-measuring purpose is outlined so that higher grade gauge blocks may be avoided where a lower grade will suffice.

NOTE 1 Grades 3 and 4 are the result of downgrading only and are not available "as new".

NOTE 2 Grade K gauge blocks, as specified in Part 1 of this standard, have to be re-calibrated in accordance with the specification of accuracy for grade K given in Tables 4 and 6 and annex A.2 of Part 1 of this standard, which for the sake of brevity have not been reproduced in this Part.

NOTE 3 Gauge blocks made to earlier standards (e.g. BS 888:1950 and BS 4311:1968 which are now superseded by BS 4311:1993) have at their next scheduled calibration to be re-calibrated and graded to the requirements of this standard.

2 References

2.1 Normative references

This Part of BS 4311 incorporates, by reference, provisions from specific editions of other publications. These normative references are cited at the appropriate points in the text and the publications are listed on the inside back cover. Subsequent amendments to, or revisions of, any of these publications apply to this Part of BS 4311 only when incorporated in it by updating or revision.

2.2 Informative references

This Part of BS 4311 refers to other publications that provide information or guidance. Editions of these publications current at the time of issue of this standard are listed on the inside back cover, but reference should be made to the latest editions.

3 Definitions and nomenclature

For the purposes of this standard the definitions and nomenclature of BS 4311-1:1993 apply together with the following.

minimal lapping

the lightest possible flat lapping operation consistent with the restoration of wringing (see B.2)

4 Verification

NOTE 1 Confidence in the measurement of gauge blocks is so important that it should be entrusted only to specialists accredited or recognized by the National Measurement Accreditation Service (NAMAS).

NOTE 2 Organizations accredited by NAMAS provide calibration satisfying the dual requirements of authentic certification and traceability.

4.1 Frequency of recalibration

Provided the use of a particular set does not change, then it shall normally be recalibrated at intervals appropriate to the rate of wear as determined initially by the results of two calibrations separated by a time interval not greater than one year.

If there is a change of use and/or the frequency of use or application of the gauge block, then the recalibration interval shall be reviewed.

4.2 Measuring faces

The measuring faces shall wring readily and they shall be free from surface defects likely to have an adverse effect on the use of the gauge block. Gauge blocks which do not wring readily shall be minimal lapped before calibration.

4.3 Calibration

4.3.1 Central length

The measurement of central length of grades 0, 1, 2, 3, and 4 shall be by comparison with grade K gauge blocks (see 3.6, 3.7, 7.4 and A.3 of BS 4311-1:1993) within an uncertainty of measurement no greater than the maximum given in Table 1 and Table 2 of this Part.

4.3.2 Variation of measured length

For the practical measurement of variation of measured length the gauge block to be measured may be contacted in the centre and in the four corners of the measuring face at points approximately 1.5 mm from the adjoining side faces. The measured lengths at these selected points may be regarded as representative for determining the variation of measured length of the gauge block.

The variation of length of each gauge block shall be measured, and the gauge blocks graded accordingly.