

Specification for

Limits and tolerances on plain limit gauges

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- Department of Industry (British Calibration Service)
- Department of Industry (National Physical Laboratory)
- Gauge and Tool Makers' Association
- Coopted member

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Foreword

This British Standard has been prepared under the direction of the Mechanical Engineering Standards Committee. BS 969:1941, BS 969:1953, ISO/R 1938 and BS 4500-2 have each in turn prescribed tolerances for plain limit gauges. The standards differed in their way of specifying the placing of the gauge limits, i.e. within, outside or straddling the workpiece limits.

BS 4500-2 was aligned with ISO/R 1938 in which the amount of gauge tolerance was coupled with the various tolerances for fits of interchangeable workpieces and also according to ranges of workpiece size, resulting in the gauge tolerance impinging on the workpiece tolerance.

In this standard the workpiece limits are considered to be boundaries in that gauge tolerances will be such that the size of any workpiece accepted by a gauge has to lie within the workpiece limits. Furthermore, the magnitude of the gauge tolerances is consequent upon the amount of the workpiece tolerance only. A wear allowance is provided on all "GO" gauges, i.e. those that control the maximum material condition of the workpiece.

This standard covers gauge tolerances for workpiece tolerances in ranges between 0.009 mm and 3.2 mm. When the workpiece tolerance is outside the range 0.009 mm to 3.2 mm, or if it is not possible to comply with Table 2 regarding type of gauge, gauge tolerance and workpiece size, direct measurement should be used.

This standard supersedes the 1953 edition and BS 4500-2 which are withdrawn. At the time of preparation, the tolerances shown in the standard were aligned with those under discussion within ISO/TC 3. However, because of the urgent need in the United Kingdom for a simple, consistent reference source for arriving at gauge limits, given the workpiece limits, the finalization of the work undertaken by the International Organization for Standardization was not awaited.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 10, 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 standard specifies the tolerances and limits for simple forms of limit gauges, such as cylindrical plain plug, ring and gap gauges, and is intended for reference by component producers and gauge makers when gauge limits have not been stipulated.

It specifies gauge tolerances for workpiece tolerances in ranges between 0.009 mm and 3.200 mm and how gauge limits are related to the workpiece limits. It also specifies types of gauge according to size and minimum workpiece tolerance.

Examples of the use of the tables are given in appendix A and the principles of the gauging system are outlined in appendix B.

Dimensions are expressed in millimetres but appropriate values in imperial units are given in appendix C for those who continue to need the information.

2 References

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

3 Definitions

For the purposes of this British Standard the following definitions apply.

3.1

maximum material limit of size

the dimension defining the maximum material condition of a feature, and is at the maximum limit of size for an external feature, e.g. a shaft, and at the minimum limit of size for an internal feature, e.g. a hole

3.2

least material limit of size

the dimension defining the minimum limit of local size for an external feature, e.g. a shaft, or the maximum limit of local size for an internal feature, e.g. a hole

3.3

GO gauge

a gauge that controls the maximum material limit of size of the workpiece

3.4

NOT GO gauge

a gauge that controls the least material limit of size of the workpiece

3.5

workpiece tolerance

the difference between the high and low limits of size of the workpiece

4 Gauge limits and tolerances

4.1 Gauge limits. Gauge purchasers should state the gauge limits they require. However, when workpiece limits only (i.e. without instructions) are supplied to the gauge maker, gauge limits for workpiece tolerances in ranges between 0.009 mm and 3.2 mm shall be as given in Table 1. (See appendix A for examples of application of the table.)

NOTE It will be seen that gauge tolerance increases with workpiece tolerance only. To appreciate this apparent disregard of workpiece size, it should be remembered that the size factor plays its proper part when the workpiece tolerance is fixed initially.

4.2 Tolerances on gauge types. The minimum tolerance on various types and sizes of gauge shall be as given in Table 2.

NOTE 1 In most cases it is uneconomical to manufacture, and impractical to use, limit gauges with tolerances on sizes smaller than those given in Table 2.

NOTE 2 The GO gauges should be of full form; the NOT GO gauges should be designed to make contact at only the two ends of a diameter. (The principle and reservations are described in appendix B.)

NOTE 3 Recommended gauge designs are given in BS 1044-1.

5 Hardness

The hardness of the gauging surface shall be not less than 700 HV (600 HRC).

NOTE It is recommended that plain plug gauges of less than 6 mm nominal diameter should be suitably tempered on the relieved section to avoid breakage in use.

6 Marking

Gauges shall be marked with:

- a) the limiting size of the workpiece which the gauge controls;
- b) GO or NOT GO, as appropriate.

NOTE Gauges may also be marked with:

- a) the manufacturer's name or trade mark;
- b) a serial number.

7 Gauges in disagreement

It is possible that similar, satisfactory gauges, using a different region of the permitted gauge tolerance, may respectively accept and reject a workpiece. Such cases are likely to be rare and a dispute may be resolved by measuring the workpiece directly.