AS 1997—1977

Australian Standard®

Plain limit gauges (metric series)

The following scientific, industrial and governmental organizations were officially represented on the committee entrusted with the preparation of this standard:

Associated Chambers of Manufactures of Australia
Department of Defence
Department of Productivity
Federal Chamber of Automotive Industries
Institution of Production Engineers
Metal Trades Industry Association of Australia
National Measurement Laboratory
Queensland Institute of Technology
Railways of Australia Committee
Society of Manufacturing Engineers
The Institution of Engineers, Australia
University of New South Wales
Weapons Research Establishment

This standard, prepared by Committee ME/27, Metrology, was approved on behalf of the Council of the Standards Association of Australia on 7 December 1976, and was published on 1 August 1977.

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PREFACE

This standard was prepared by the Association's Committee on Metrology as part of its program of providing a rational range of specifications for measuring equipment in metric units.

Since the issue of AS 1654, Limits and Fits for Engineering (Metric Units), it became necessary to revise AS B195, Plain Limit Gauges (Inch Units), in order to take account of metric conversion, but more importantly to include the maximum material condition (MMC) and least material condition (LMC) limit concept introduced in AS 1654.

AS 1654 is based on ISO/R286, ISO System of Limits and Fits, which relates mainly to tolerances and deviations for workpieces, and does not include requirements for gauges. The ISO Technical Committee (TC 3), realizing this deficiency, subsequently prepared ISO/R1938/II, ISO System of Limits and Fits; Inspection of Plain Workpieces.

It was considered by the SAA committee that ISO/R1938/II formed a reasonable basis for an Australian standard for gauges for workpieces up to and including 500 mm only. For sizes over 500 mm, ISO/R1938/II includes experimental data which contain a serious anomaly that is considered to be quite unacceptable in an Australian standard. Briefly, for sizes over 180 mm, ISO/R1938/II introduces 'safety zones' (α and α_1) to take into account uncertainties in the measurement of these larger gauges and which encroach into the workpiece tolerance. The magnitude of this amount, and its disposition relative to the GO gauge member, in sizes over 500 mm is such that the 'new gauge' tolerance zone lies outside the theoretical wear limit as determined by the α and α_1 values.

With the exception of the foregoing, however, this standard embodies all other essential features of ISO/R1938/II as related to plain limit gauges, and gives tolerances to be applied to gauges intended to be used for the inspection of workpieces made to the metric limits given in AS 1654. With regard to gauge tolerances and deviations and their relationship to the workpiece limits, this standard is identical with ISO/R1938/II, although both the text and the numerical data have been differently presented to provide a clearer understanding of the subject. It should be noted that this standard does not contain reference to the inspection of workpieces by direct measurement, and it is anticipated that this will be the subject of a further Australian standard.

Attention is drawn to the fact that gauges may be tested for conformance to this standard by the National Measurement Laboratory, or by laboratories registered with the National Association of Testing Authorities for the appropriate class of test.

This standard may require reference to AS 1654 and AS B195 and to the following:

AS 1965	Measurement of Surface Roughness with Direct-reading Stylus Electronic Instruments
AS B129	Designs for Geometric Limit Gauges (Plain and Screwed in Inch Units).

In accordance with the practice adopted in AS 1100, Engineering Drawing Practice, the decimal comma has been used in this standard.

This standard supersedes the metric information given in AS B195, but that standard will remain in force for an interim period to satisfy the requirements of those using the imperial system of measurements.

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STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard Specification for PLAIN LIMIT GAUGES—METRIC SERIES

SECTION 1. SCOPE, TERMS AND SYMBOLS

1.1 SCOPE. This standard describes the types of gauges and gauging procedures used for the assessment of the conformance to dimensional specification of plain workpieces. The standard covers a size range up to and including 500 mm for gauges for holes, and up to and including 315 mm for gauges for shafts. The limitation of the size range for gauges for shafts is due to the fact that there is no international agreement on these types of gauges for sizes over 315 mm. The standard is presented as appropriate to plain cylindrical surfaces, but the principles may be used for other geometric forms.

The standard defines the types of gauges and their applications, specifies tolerances and wear limits for gauging surfaces, establishes minimum requirements for gauge materials and recommends gauging methods and procedures for resolving possible disputes. Interpretation of the limits of size, including geometric deviations and provisions for gauge identification are also included.

The design and material requirements are limited to those affecting gauging surfaces and performance of gauges.

The main section of the standard is limited to sizes up to 180 mm, with sizes over 180 mm given in Appendix D. Other appendices contain information on interpretation of workpiece limits of size and the Taylor principle; verification of gauges; derivation of gauge deviations; examples in the use of the tables; temperature effects.

1.2 TERMS AND DEFINITIONS. For terms and definitions used in this standard, see AS B129* and AS 1654†, Section 1.

1.3 SYMBOLS. For the purpose of this standard the following symbols are used (see Fig. 1):

T = tolerance on gauges for holes

T_1 = tolerance on gauges for shafts

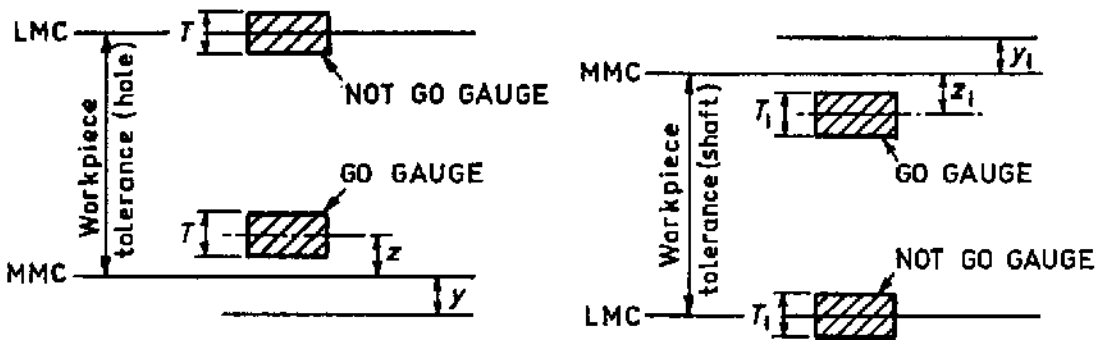
y = margin outside the MMC workpiece limit for the wear limit of gauges for holes

y_1 = margin outside the MCC workpiece limit for the wear limit of gauges for shafts

z = distance between centre of tolerance zone of new GO gauges for holes and the MMC workpiece limit

z_1 = distance between centre of tolerance zone of new GO gauges for shafts and the MMC workpiece limit.

* AS B129, Designs for Geometric Limit Gauges (Plain and Screwed in Inch Units).
† AS 1654, Limits and Fits for Engineering (Metric Units).



GAUGES FOR HOLES GAUGES FOR SHAFTS

NOTE: y and y_1 exist only for grades 6, 7 and 8. In all other cases $y = y_1 = 0$.

Fig. 1. TOLERANCE ZONES FOR LIMIT GAUGES, SIZES UP TO AND INCLUDING 180 mm

(See Appendix D for larger sizes)