ASME B89.1.5-1998

MEASUREMENT OF PLAIN EXTERNAL DIAMETERS FOR USE AS MASTER DISCS OR CYLINDRICAL PLUG GAGES

AN AMERICAN NATIONAL STANDARD

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This Standard will be revised when the Society approves the issuance of a new edition. There will be no addenda issued to this edition.

ASME will issue written replies to inquiries concerning interpretation of technical aspects of this Standard. The interpretations are not part of the Standard.

The American Society of Mechanical Engineers
Three Park Avenue, New York, NY 10016-5990

FOREWORD

(This Foreword is not part of ASME B89.1.5-1998.)

It was beyond our imagination that a standard was not yet in place when we, Working Group 1.5 of the ASME B89 Standards Committee, were formed. Today we are humbled by the complexity and work necessary to complete the task. We consider this a start to an ongoing need to improve our techniques in outside diameter measurement. With this Standard we hope to improve correlation in measurement across the country and the world. Revisions to come will only improve the state of the art.

This Standard is dedicated to Dr. Richard Zipin, Eli Whitney Laboratory, Dayton, Ohio. It was approved by the American National Standards Institute on March 4, 1998.

CORRESPONDENCE WITH THE B89 COMMITTEE

General. ASME standards are developed and maintained with the intent to represent the consensus of concerned interests. As such, users of this Standard may interact with the Committee by requesting interpretations, proposing revisions, and attending Committee meetings. Correspondence should be addressed to:

Secretary, B89 Standards Committee
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Proposing Revisions. Revisions are made periodically to the Standard to incorporate changes that appear necessary or desirable, as demonstrated by the experience gained from the application of the Standard. Approved revisions will be published periodically.

The Committee welcomes proposals for revisions to this Standard. Such proposals should be as specific as possible, citing the paragraph number(s), the proposed wording, and a detailed description of the reasons for the proposal, including any pertinent documentation.

Interpretations. Upon request, the B89 Committee will render an interpretation of any requirement of the Standard. Interpretations can only be rendered in response to a written request sent to the Secretary of the B89 Standards Committee.

The request for interpretation should be clear and unambiguous. It is further recommended that the inquirer submit his/her request in the following format:

Subject:	Cite the applicable paragraph number(s) and the topic of the inquiry.
Edition:	Cite the applicable edition of the Standard for which the interpretation is being requested.
Question:	Phrase the question as a request for an interpretation of a specific requirement suitable for general understanding and use, not as a request for approval of a proprietary design or situation. The inquirer may also include any plans or drawings which are necessary to explain the question; however, they should not contain proprietary names or information.

Requests that are not in this format will be rewritten in this format by the Committee prior to being answered, which may inadvertently change the intent of the original question.

ASME procedures provide for reconsideration of any interpretation when or if additional information that might affect an interpretation is available. Further, persons aggrieved by an interpretation may appeal to the cognizant ASME committee or subcommittee. ASME does not "approve," "certify," "rate," or "endorse" any item, construction, proprietary device, or activity.

Attending Committee Meetings. The B89 Standards Committee regularly holds meetings, which are open to the public. Persons wishing to attend any meeting should contact the Secretary of the B89 Standards Committee.

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CONTENTS

Foreword iii
Correspondence With the B89 Commitee iv
Standards Committee Roster v

1 Scope 1

2 Definitions 1

3 References 2

4 Requirements of Master Discs and Cylindrical Plug Gages 3
4.1 General 3
4.2 Design 3
4.3 Material 3
4.4 Surface Texture 3
4.5 Geometric Requirements 3
4.5.1 General 3
4.5.2 Roundness 3
4.5.3 Straightness and Taper 3
4.6 Face Perpendicularity of Master Discs 3
4.7 Face Perpendicularity of Plug Gages 3
4.8 Tolerance Classes 3

5 Requirements for Using Reference Gage Blocks 4
5.1 Length 4
5.2 Material 4

6 Calibration of an Identified Diameter 4
6.1 Measurements Using a Mechanical Comparator 4
6.1.1 Flat-to-Flat 5
6.1.2 Flat-to-Sphere 6
6.1.3 Sphere-to-Sphere 9
6.1.4 Flat-to-Cylinder 9
6.1.5 General Note 10
6.1.6 Analog Scale 10
6.1.7 Recalibration of 0.0025/0.005 mm (0.0001/0.0002 in.) Pins or Pin Sets 10
6.2 Laser Scanning Measurement 10
6.2.1 Range 11
6.2.2 Error Sources 11

7 Environment 11
7.1 General 11

7.2 Cleanliness 11
7.3 Vibration 12
7.4 Temperature 12
7.5 Humidity 12
7.6 Electrical Interference 12
7.7 Illumination 12

8 Written Procedures 13

9 Packaging, Shipping, and Storage 13

Figures

1 Four Common Methods of Measurement 7
2 Possible Error Conditions of Flat-to-Flat Contacts 8
3 Various Error Conditions With Imperfect Geometry 10
4 Laser Standard Measurement 11

Tables

1 Surface Roughness Limits for Master Discs and Plug Gages 4
2 Limits for Roundness, Taper, or Straightness for Master Discs and Plug Gages 5
3 Diameter Tolerances for Classes and Sizes for Master Discs and Plug Gages 6
4 Deformation of a Steel Cylinder Between Flat Carbide Contacts 7
5 Difference in Deformation of 2 mm Diameter Diamond Ball to Steel Cylinder and 2 mm Diameter Diamond Ball to Chrome Carbide Flat 8

Appendices

A The Effects of Form and Form Errors on Size 15
B Measurement Uncertainty 25
C Depth Steps, Air Grooves, and Flatted NOGO Members for Plug Gages 29

MEASUREMENT OF PLAIN EXTERNAL DIAMETERS FOR USE AS MASTER DISCS OR CYLINDRICAL PLUG GAGES

1 SCOPE

This Standard is intended to establish uniform practices for the measurement of master discs or cylindrical plug gages to a given tolerance using vertical or horizontal comparators and laser instruments. The Standard includes requirements for geometric qualities of master discs or cylindrical plugs, the important characteristics of the comparison equipment, environmental conditions, and the means to assure that measurements are made with an acceptable level of accuracy. This Standard does not address thread or gear measuring wires.

2 DEFINITIONS

circularity (roundness): a condition of a surface of revolution where:

(a) for a cylinder or cone, all points of the surface intersected by any plane perpendicular to a common axis are equidistant from that axis;

(b) for a sphere, all points of the surface intersected by any plane passing through a common center are equidistant from that center.

cosine error: the measurement error in the measurement direction caused by angular misalignment between a measuring system and the gage or part being measured.

cylindricity: a condition of a surface of revolution in which all points of the surface are equidistant from a common axis.

diameter: the length of a straight line through the center of a circular cross section of an object. In the case of a cylinder, the line is considered to be perpendicular to the axis.

dimensional stability: ability of an object (e.g., measuring instrument or workpiece) to maintain its metrological characteristics with time.

NOTES:

(1) Where stability with respect to a quantity other than time is considered, this should be stated explicitly.

(2) Stability may be quantified in several ways, for example:

(a) in terms of the time in which a metrological characteristic changes by a stated amount; or

(b) in terms of the change in a characteristic over a stated time.

discrimination (threshold): largest change in a stimulus that produces no detectable change in the response of a measuring instrument, the change in the stimulus taking place slowly and monotonically.

elastic deformation: the nonpermanent (reversible) change in the size or geometry of a part due to an applied force.

gage block: a length standard with rectangular, round, or square cross section, having flat, parallel opposing gaging faces.

NOTE: The surface finish of the gaging faces should be such as to allow gages to be wrung together.

index of refraction: for a given wavelength, the ratio of the velocity of light in a vacuum to the velocity of light in a refractive material.

NOTE: As used in this Standard, the material is air.

line contact: the zone of contact between a flat surface and a cylinder.

lobing: systematic variations in the radius around a part (measured in the cross section perpendicular to the axis).

master cylinder: a known-size cylinder used for setup for comparison to the gage being measured.

master disc: a cylinder of known size, with insulating grips, used to set or verify another gage. The tolerance is typically bilateral.

measurand: particular quantity subjected to measurement.

EXAMPLE: Diameter of a cylindrical gage at 20°C.

measurement force: the amount of force exerted upon the object being measured by a measuring instrument