



Designation: B939 – 09

Standard Test Method for Radial Crushing Strength, K , of Powder Metallurgy (PM) Bearings and Structural Materials¹

This standard is issued under the fixed designation B939; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope*

1.1 This test method covers the equipment and laboratory procedure for the determination of the radial crushing strength of materials using either a plain powder metallurgy (PM) bearing or a thin-walled hollow cylindrical test specimen. This is a destructive test that produces quantitative results.

1.2 Limitations:

1.2.1 The principle of this procedure is based on the material being tested having minimal ductility. The permanent deflection of the cylinder during the test should not exceed 10 % of the outside diameter.

1.2.2 The radial crushing strength test results should be used only as a guide if the test specimen has a wall thickness that is greater than one-third of the outside diameter. These test results should then only be used for comparison with data from the test specimens of like materials and similar dimensions.

1.3 With the exception of density values, for which the g/cm^3 unit is the industry standard, the values stated in inch-pound units are to be considered the standard. The values in SI units, shown in parenthesis have been converted in accordance with IEEE/ASTM Standard SI 10, may be approximate and are only included for information.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

B243 Terminology of Powder Metallurgy

B438 Specification for Bronze-Base Powder Metallurgy (PM) Bearings (Oil-Impregnated)

B439 Specification for Iron-Base Powder Metallurgy (PM) Bearings (Oil-Impregnated)

B925 Practices for Production and Preparation of Powder Metallurgy (PM) Test Specimens

E456 Terminology Relating to Quality and Statistics

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

2.2 IEEE/ASTM Standard:

SI 10 American National Standard for Use of the International System of Units (SI): The Modern Metric System

2.3 MPIF Standard:³

MPIF Standard 55 Determination of Radial Crush Strength (K) of Powder Metallurgy (PM) Test Specimens

3. Terminology

3.1 *Definitions*—Definitions of powder metallurgy (PM) terms can be found in Terminology **B243**. Additional descriptive information is available in the related material section of Vol 02.05 of the *Annual Book of ASTM Standards*.

4. Summary of Test Method

4.1 Radial crushing strength is determined by subjecting a plain sleeve bearing or a thin-walled cylindrical test specimen to a controlled compressive force applied perpendicular to its central axis under uniformly increasing load until fracture occurs.

4.2 The term radial crushing strength as used in this test method is the stress at fracture calculated from the breaking load and the dimensions of the test specimen.

5. Significance and Use

5.1 The radial crushing strength test is a destructive procedure used to determine a material strength characteristic of PM bearings and hollow cylindrical test specimens. These data can be used to grade, classify, and evaluate the materials.

³ Available from Metal Powder Industries Federation (MPIF), 105 College Rd. East, Princeton, NJ 08540, <http://www.mpif.org>.

¹ This test method is under the jurisdiction of ASTM Committee B09 on Metal Powders and Metal Powder Products and is the direct responsibility of Subcommittee B09.04 on Bearings.

Current edition approved Nov. 1, 2009. Published January 2010. Originally approved in 2005. Last previous edition approved in 2005 as B939 – 05. DOI: 10.1520/B0939-09.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

*A Summary of Changes section appears at the end of this standard