



Standard Test Method for Green Strength of Specimens Compacted from Metal Powders¹

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1. Scope*

1.1 This standard covers a test method that may be used to measure the transverse rupture strength of a compacted but unsintered (green) test specimen produced from lubricated or unlubricated metal powders or powder mixtures.

1.2 Green strength is measured by a quantitative laboratory procedure in which the fracture strength is calculated from the force required to break an unsintered test specimen supported as a simple beam while subjected to a uniformly increasing three-point transverse load under controlled conditions.

1.3 This test method is a companion standard to Test Method B528 that covers the measurement of the transverse rupture strength of sintered PM test specimens.

1.4 With the exception of the values for density and the mass used to determine density, for which the use of the gram per cubic centimeter (g/cm^3) and gram (g) units is the long-standing industry practice, the values in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.5 *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

B215 Practices for Sampling Metal Powders

B243 Terminology of Powder Metallurgy

B528 Test Method for Transverse Rupture Strength of Pow-

der Metallurgy (PM) Specimens

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

B962 Test Methods for Density of Compacted or Sintered Powder Metallurgy (PM) Products Using Archimedes' Principle

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

3. Terminology

3.1 *Definitions*—the definitions of powder metallurgy (PM) terms used in this test method can be found in Terminology B243. Additional descriptive PM 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 Three rectangular test specimens are compacted to a predetermined green density or at a specified compacting pressure from test portions of the metal powder or powder mixture that is to be tested.

4.2 Each unsintered bar is placed, in turn, in a test fixture and subjected to a uniformly increasing transverse load under controlled conditions until fracture occurs.

4.3 The green strength or maximum flexural stress of each specimen is determined by calculation using the stress equation for a simply supported beam with a concentrated mid-point load.

4.4 The green strength of the material being tested is reported as the arithmetic mean of the results of three individual tests at the measured green density or at the specified compacting pressure rounded to the nearest 100 psi (0.5 MPa).

5. Significance and Use

5.1 The green strength value determined under the conditions specified by this test method is influenced by the characteristics of the powder, how it compacts under the specified conditions (i.e., the particle to particle bonding that exists following compacting), and the lubrication system used.

5.2 Knowledge of the green strength value is useful to the production, characterization and utilization of metal powders in the manufacture of PM structural parts and bearings.

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 B09.02 on Base Metal Powders.

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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.