



Designation: ~~B212-99 (Reapproved 2006)~~ Designation: B212 - 09

Standard Test Method for Apparent Density of Free-Flowing Metal Powders Using the Hall Flowmeter Funnel¹

This standard is issued under the fixed designation B212; 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.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

~~1.1 This test method describes a procedure for determining the apparent density of free-flowing metal powders and is suitable for only those powders that will flow unaided through the specified Hall flowmeter funnel.~~

~~1.2~~

1.1 This test method describes a procedure for determining the apparent density of free-flowing metal powders, and mixed powders; and is suitable for only those powders that will flow unaided through the specified Hall Flowmeter funnel.

1.2 With the exception of density values, for which the g/cm^3 unit is the industry standard, the values stated in SI units are to be regarded as the standard. Values in inch-pound units are shown in parentheses and result from conversion in accordance with IEEE/ASTM Standard SI 10. They may be approximate and are only for information.

1.3 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](#)

B873 [Test Method for Measuring Volume of Apparent Density Cup Used in Test Methods B 212, B 329, and B 417](#)

2.2 *IEEE/ASTM Standard:*²

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

3. Terminology

~~3.1 Definitions—~~For definitions of terms used in this test method, see Terminology B243. Additional descriptive PM information is available in the Related Materials section of Vol 02.05 of the Annual Book of ASTM Standards.

4. Summary of Test Method

4.1 A volume of powder is permitted to flow into a container of definite volume under controlled conditions. The mass of powder per unit volume is determined and reported as apparent density, Hall (AD_H).

5. Significance and Use

~~5.1 This test method provides a guide for evaluation of the apparent density physical characteristic of powders. The density measured bears a relationship to the mass of powder that will fill a fixed volume press cavity when parts are being made. The degree of correlation between the results of this test and the quality of powders in use will vary with each particular application.~~

5.1 This test method provides a guide for evaluation of an important physical characteristic of a powder known as the apparent density. The measured apparent density bears a relationship to the mass of powder that will fill a fixed volume die cavity. The degree of correlation between the results of this test and the performance of powders during use may vary with each particular

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.

~~Current edition approved April 1, 2006. Published April 2006. Originally approved in 1946. Last previous edition approved in 1999 as B212-99. DOI: 10.1520/B0212-99R06.~~

Current edition approved Nov. 1, 2009. Published January 2010. Originally approved in 1946. Last previous edition approved in 2006 as B212-99(2006). DOI: 10.1520/B0212-09.

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.

application. Note, however, that the presence of moisture, oils, stearic acid, stearates, waxes, and the temperature of the powder mass may alter the physical characteristics of the powder.

6. Apparatus

- 6.1 *Powder Flowmeter Funnel*³—A Hall flowmeterFlowmeter funnel (Fig. 1) having a calibrated orifice.
- 6.2 *Density Cup*³—A cylindrical brass cup (Fig. 2) having a nominal capacity of 25 cm³. The actual cup volume shall be determined according to Test Method B873.
- 6.3 *Stand*³—A stand (Fig. 1) to support the Hall flowmeterFlowmeter funnel concentric with the density cup so that the bottom of the Hall flowmeterFlowmeter funnel orifice is approximately 25 mm (1 in.) above the top of the density cup when the apparatus is assembled as shown in Fig. 1.
- 6.4 *Base*—A level, vibration-free base to support the powder flowmeter.
- 6.5 *Balance*, having a capacity of at least 200 g and a sensitivity of 0.01 g.—A laboratory balance, having a capacity of at least 200 g and a sensitivity of 0.001 g.
- 6.6 *Spatula*—A non-magnetic spatula of suitable dimensions for leveling off the excess powder on top of the density cup.

7. Test Specimen

- 7.1 The test specimen shall consist of a volume of approximately 30 to 40 cm³ of metal powder obtained in accordance with Practices B215.
- 7.2 The test specimen shall be tested as sampled. Note, however, that temperature, moisture, oils, stearic acid, stearates, waxes, and so forth, may alter the characteristics of the powder.
- 7.2 The test specimen shall be tested as sampled.

8. Procedure

- 8.1 Weigh the empty density cup to the nearest 0.01 g or, alternatively, place the empty density cup on the balance and tare the balance to zero.

³ The sole source of supply of the apparatus known to the committee at this time is Accu Powder International, LLC, 901 Lehigh Ave., Union, NJ 07083-7632. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend.

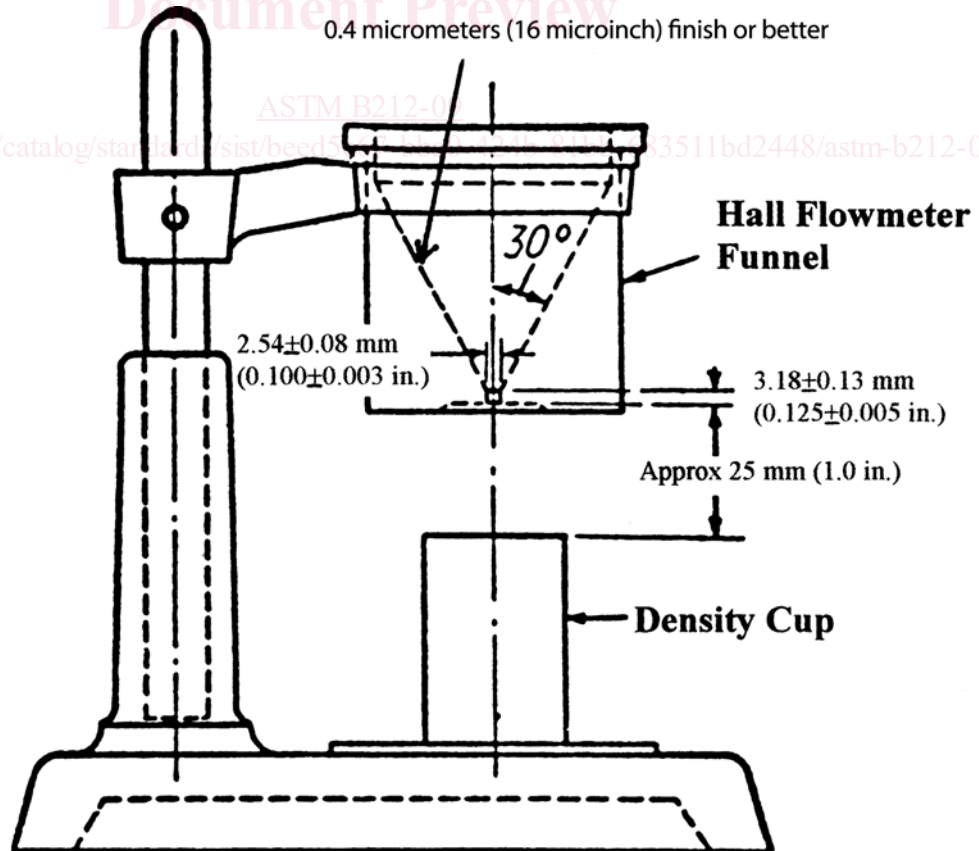


FIG. 1 Flowmeter Apparatus — Hall Funnel