



Designation: B 212 – 99

## Standard Test Method for Apparent Density of Free-Flowing Metal Powders Using the Hall Flowmeter Funnel<sup>1</sup>

This standard is issued under the fixed designation B 212; 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 ( $\epsilon$ ) 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 *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:

- B 215 Practices for Sampling Finished Lots of Metal Powders<sup>2</sup>
- B 243 Terminology of Powder Metallurgy<sup>2</sup>
- B 873 Test Method for Measuring the Volume of Apparent Density Cup Used in Test Methods B 212, B 329, B 417<sup>2</sup>

### 3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method, see Terminology B 243.

### 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.

### 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.

### 6. Apparatus

6.1 *Powder Flowmeter Funnel*<sup>3</sup>—A Hall flowmeter funnel (Fig. 1) having a calibrated orifice.

6.2 *Density Cup*<sup>3</sup>—A cylindrical brass cup (Fig. 2) having a capacity of 25 cm<sup>3</sup>. The actual cup volume shall be determined according to Test Method B 873.

6.3 *Stand*<sup>3</sup>—A stand (Fig. 1) to support the Hall flowmeter funnel concentric with the density cup so that the bottom of the Hall flowmeter 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.

### 7. Test Specimen

7.1 The test specimen shall consist of a volume of approximately 30 to 40 cm<sup>3</sup> of metal powder obtained in accordance with Practices B 215.

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.

### 8. Procedure

8.1 Weigh the empty density cup to the nearest 0.1 g or, alternatively, place the empty density cup on the balance and tare the balance to zero.

<sup>1</sup> 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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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 02.05.

<sup>3</sup> 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 alternate suppliers, please provide this information to ASTM Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committees, which you may attend.