



## Designation: ~~B214–07 (Reapproved 2011)~~ B214 – 15

# Standard Test Method for Sieve Analysis of Metal Powders<sup>1</sup>

This standard is issued under the fixed designation B214; 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 reappraisal. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reappraisal.

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

## 1. Scope

1.1 This test method covers the dry sieve analysis of metal ~~powders or mixed~~ powders, using sieves with openings ranging from 45 to 1000 ~~micrometers~~ micrometres.

1.2 This test method is based on a particular type of mechanical sieve shaker (see 5.2). Other types of sieve shakers are also available, but their precision and reproducibility have not been determined.

1.3 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

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:<sup>2</sup>

[B212 Test Method for Apparent Density of Free-Flowing Metal Powders Using the Hall Flowmeter Funnel](#)

[B215 Practices for Sampling Metal Powders](#)

[B243 Terminology of Powder Metallurgy](#)

[B329 Test Method for Apparent Density of Metal Powders and Compounds Using the Scott Volumeter](#)

[B417 Test Method for Apparent Density of Non-Free-Flowing Metal Powders Using the Carney Funnel](#)

[B703 Test Method for Apparent Density of Metal Powders and Related Compounds Using the Arnold Meter](#)

[E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves](#)

[E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method](#)

[E1638 Terminology Relating to Sieves, Sieving Methods, and Screening Media](#)

### 2.2 MPIF Standard:

[MPIF 05 Determination of Sieve Analysis of Metal Powders](#)<sup>3</sup>

## 3. Terminology

3.1 *Definitions*—Useful definitions of terms relating to powder metallurgy are found in [B243](#) and those relating to sieve analysis are found in [E1638](#).

## 4. Significance and Use

4.1 The particle size distribution of a metal powder affects its behavior in P/M processing and other applications of these materials. The test method may be part of the purchase agreement between powder supplier and user, or it may be an internal quality control test for either.

## 5. Apparatus

5.1 *Sieves*—Select a set of standard sieves from the table entitled, “~~Nominal Dimensions, Permissible Variations for Wire Cloth of Standard Test Sieves (U.S.A.) Standard Sieves,~~” of “U.S. Standard Series Test Sieves.” These shall conform to Specification [E11](#);

<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> 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.

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

or the equivalent Tyler standard sieves. The sieves shall be 200 mm (8 in.) in diameter and either 25 or 50 mm (1 or 2 in.) in depth, and fitted with bronze, brass, stainless steel, or other suitable wire cloth. The U.S. sieves given in the table entitled, "U.S. Standard Series Test Sieves and Equivalent Tyler Standard Sieves," of this test method shall conform to Specification and be 203 mm in diameter. In addition to E11. If Tyler standard sieves are substituted, they shall conform to the permissible variations given the sieves listed in Table 1 the table entitled, "Nominal Dimensions, Permissible Variations for Wire Cloth of Standard Test Sieves (U.S.A.) Standard Sieves" of Specification, a cover and collection pan are also required. E11.

NOTE 1—The new U.S. Series standard sieves, adopted in 1970, are the preferred sieves to use. The old U.S. Series standard sieves and equivalent sieves manufactured by other companies, such as Tyler, may also be used if the new U.S. Series is not available. Care should be taken to make sure that sieve opening sizes are correct when performing standardization work. 203 mm diameter sieve is most commonly referenced as an 8 in. diameter sieve. 8 in. diameter sieves do not nest with 200 mm diameter sieves.

5.2 *Sieve Shaker*—A mechanically operated, single eccentric sieve shaker shall be used that imparts to the set of sieves a rotary motion and a tapping action of uniform speed. The number of rotations per minute shall be between 270 and 300. The number of taps per minute shall be between 140 and 160. The hold down arm of the sieve shaker shall be fitted with a shock absorbing plug to receive the impact of the tapping device. The entire apparatus shall be rigidly mounted by bolting to a solid foundation, preferably of concrete.

NOTE 2—Use of a sound proof enclosure is recommended.

5.3 *Balance*—A balance having a capacity of at least 150 g and a sensitivity of 0.01 readable to 0.01 g, with a minimum capacity of 150 g, to be used for determining the mass of the test portion and retained portions to the nearest 0.1 g.

**6. Test Specimen Portion**

6.1 The size of the test specimen portion shall be 90 to 110 g for any metal powder having an apparent density greater than or equal to 1.50 g/cm<sup>3</sup> when determined in accordance with Test Method B212, B329, B417, or B703. A specimen portion of 40 to 60 g shall be used when the apparent density of the powder is less than 1.50 g/cm<sup>3</sup>. The test specimen portion should be obtained in accordance with Practices B215.

**7. Procedure**

7.1 Examine the sieves to make sure that they are not damaged and are clean.

7.2 Assemble the group of sieves selected in consecutive order by the size of their openings, with the coarsest sieve at the top, the assembly being completed by a solid collecting pan below the bottom sieve. Place the test specimen portion on the top sieve and close this sieve with a solid cover. Then fasten the sieve assembly securely in the sieve shaker and operate the machine for a period of 15 minutes.

**TABLE 1 U.S. Standard Series Test Sieves and Equivalent Tyler Standard Sieves**

Sieve Number	Sieve Opening (µm)		
	New U.S. Series	Old U.S. Series	Tyler Series
20	850	841	800
35	—	—	417
40	425	420	—
60	250	250	250
80	180	177	175
100	150	149	147
140	106	105	—
150	—	—	104
200	75	74	74
230	63	63	—
250	—	—	63
325	45	44	45

**TABLE 1 U.S. Standard Series Test Sieves**

Sieve Number	Sieve Opening (µm)
20	850
40	425
60	250
80	180
100	150
140	106
200	75
230	63
325	45