Designation: B964 – 16

Standard Test Methods for Flow Rate of Metal Powders Using the Carney Funnel[1]

This standard is issued under the fixed designation B964; 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 These test methods cover the determination of a flow rate, by use of the Carney funnel, of metal powders and powder mixtures that do not readily flow through the Hall funnel of Test Method B213.

1.2 This is a non-destructive quantitative test performed in the laboratory.

1.3 With the exception of the values for density and the mass used to determine density, for which the use of gram per cubic centimetre (g/cm^3) and gram (g) units is the longstanding 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.

1.4 *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]

B213 Test Methods for Flow Rate of Metal Powders Using the Hall Flowmeter Funnel

B215 Practices for Sampling Metal Powders

B243 Terminology of Powder Metallurgy

B855 Test Method for Volumetric Flow Rate of Metal Powders Using the Arnold Meter and Hall Flowmeter Funnel

3. Terminology

3.1 Definitions of powder metallurgy (PM) terms can be found in Terminology B243.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *Carney flow rate (FR_C), n*—the time required for a metal powder sample of specified mass to flow through the orifice in a Carney funnel according to a specified procedure.

3.3 3 Additional descriptive information is available in the Related Materials section of Vol 02.05 of the Annual Book of ASTM Standards.

4. Summary of Test Methods

4.1 A weighed mass of metal powder is timed as it flows through the orifice of a Carney funnel.

5. Significance and Use

5.1 The rate and uniformity of die cavity filling are related to flow properties, which thus influence production rates and uniformity of compacted parts.

5.2 The ability of a powder to flow is a function of interparticle friction. As interparticle friction increases, flow is slowed. Some powders, often fine powders and lubricated powder mixtures, may not flow through the Hall funnel of Test Method B213.. Nevertheless, if a larger orifice is provided, such as in the Carney funnel, a meaningful flow rate may be determined, providing specific information for certain applications.

5.3 Test Method B213., using the Hall funnel, is the preferred method for determining the flowability of metal powders. The Carney funnel of these test methods should only be used when a powder will not flow through the Hall funnel. These test methods may also be used for comparison of several powders when some flow through the Hall funnel and some do not.

5.4 Humidity and moisture content influence flow rate. Wet or moist powders may not flow through either the Hall or the Carney funnel.

5.5 These test methods are based on flow of a specific mass of powder. If flow of a specific volume of powder is preferred, Test Method B855 may be used for powders that flow readily through the Hall funnel.

5.6 These test methods may be part of the purchase agreement between powder suppliers and powder metallurgy (PM) part producers, or it can be an internal quality control test by either the supplier or the end user.

[1] These test methods are under the jurisdiction of ASTM Committee B09 on Metal Powders and Metal Powder Products and are the direct responsibility of Subcommittee B09.02 on Base Metal Powders.

Current edition approved June 1, 2016. Published June 2016. Originally approved in 2009. Last previous edition approved in 2009 as B964-09. DOI: 10.1520/B0964-16.

[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**