



Standard Test Method for Flow Rate of Metal Powders¹

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1. Scope

1.1 This test method covers the determination of the flow rate of metal powders and is suitable only for those powders that will flow unaided through the specified apparatus.

1.2 The values stated in SI units are to be regarded as the standard (except for the flowmeter funnel, which is fabricated in inch-pound units). The values given in parentheses are for information only.

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:

B 215 Practices for Sampling Finished Lots of Metal Powders²

B 243 Terminology of Powder Metallurgy²

3. Terminology

3.1 *Definitions*—Definitions of powder metallurgy terms can be found in Terminology B 243.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *flow rate, n*—the time required for a powder sample of standard mass to flow through an orifice in a standard instrument according to a specified procedure.

4. Summary of Test Method

4.1 A weighed mass (50.0 g) of metal powder is timed as it flows through the calibrated orifice of a 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. Fine powders may not flow.

5.3 Humidity and moisture content influence flow rate. Wet or moist powders may not flow.

5.4 This test method may be part of the purchase agreement between powder manufacturers and powder metallurgy (P/M) part producers, or it can be an internal quality control test by either the producer or the end user.

6. Apparatus

6.1 *Powder Flowmeter Funnel*³—A flowmeter funnel (Fig. 1) having a calibrated orifice of 0.10 in. (2.54 mm) in diameter.

NOTE 1—The dimensions shown for the flowmeter funnel, including the orifice, are not to be considered controlling factors. Calibration with emery, as specified in Section 9, determines the working flow rate of the funnel.

6.2 *Stand*³—A stand (Fig. 2) to support the powder flowmeter funnel.

6.3 *Base*—A level, vibration free base to support the powder flowmeter stand.

6.4 *Timing Device*—A stopwatch or other suitable device capable of measuring to the nearest 0.1 s.

6.5 *Chinese Emery*³—An emery powder used to calibrate the flowmeter funnel.

6.6 *Balance*—A balance suitable for weighing at least 50.0 g to the nearest 0.1 g.

7. Sampling

7.1 A quantity of powder sufficient to run the desired number of flow tests shall be obtained in accordance with Practice B 215.

8. Preparation of Apparatus

8.1 Clean the funnel with clean dry toweling paper.

8.2 Clean the funnel orifice with a clean dry pipe cleaner.

9. Calibration of Apparatus

9.1 The manufacturer supplies the powder flowmeter funnel calibrated as follows:

9.1.1 Heat an open glass jar of Chinese emery in a drying oven at a temperature of 102° to 107°C (215° to 225°F) for 1 h.

9.1.2 Cool the emery to room temperature in a desiccator.

9.1.3 Follow the procedure outlined in steps 10.1.1-10.1.8 .

¹ This test method is under the jurisdiction of ASTM Committee B-9 on Metal Powders and Metal Powder Products and is the direct responsibility of B09.02 on Base Metal Products.

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² *Annual Book of ASTM Standards*, Vol 02.05.

³ The flowmeter funnel, stand, and Chinese emery are available from AcuPowder International, LLC.