



Designation: B822 – 25

Standard Test Method for Particle Size Distribution of Metal Powders and Related Compounds by Light Scattering¹

This standard is issued under the fixed designation B822; 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 This test method covers the determination of the particle size distribution by light scattering, reported as volume percent, of particulate materials including metals and compounds.

1.2 This test method applies to analyses with both aqueous and nonaqueous dispersions. In addition, analysis can be performed with a gaseous dispersion for materials that are hygroscopic or react with a liquid carrier.

1.3 This test method is applicable to the measurement of particulate materials in the range of 0.4 to 2000 μm , or a subset of that range, as applicable to the particle size distribution being measured.

1.4 *Units*—The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.5 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

B215 Practices for Sampling Metal Powders

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 May 1, 2025. Published June 2025. Originally approved in 1992. Last previous edition approved in 2020 as B822 – 20. DOI: 10.1520/B0822-25.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at www.astm.org/contact. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

B243 Terminology of Powder Metallurgy

B821 Guide for Liquid Dispersion of Metal Powders and Related Compounds for Particle Size Analysis

E177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

E1617 Practice for Reporting Particle Size Characterization Data

2.2 *ISO Standard:*³

ISO13320 Particle Size Analysis—Laser Diffraction Methods

3. Terminology

3.1 *Definitions*—Definitions of powder metallurgy terms can be found in Terminology **B243**.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *background, n*—extraneous scattering of light by elements other than the particles to be measured; includes scattering by contamination in the measurement path.

3.2.2 *Fraunhofer Diffraction, n*—the optical theory that describes the low-angle scattering of light by particles that are large compared to the wavelength of the incident light.⁴

3.2.3 *Mie Scattering, n*—the complex electromagnetic theory that describes the scattering of light by spherical particles.

3.2.3.1 *Discussion*—It is usually applied to particles with diameters that are close to the wavelength of the incident light. The real and imaginary indices of light refraction of the particles are needed.⁴

3.2.4 *multiple scattering, n*—the rescattering of light by a particle in the path of light scattered by another particle.

3.2.4.1 *Discussion*—This usually occurs in heavy concentrations of a particle dispersion.

4. Summary of Test Method

4.1 A prepared test portion of particulate material is dispersed in water, or a compatible organic liquid, and circulated

³ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

⁴ Muly, E. C., Frock, H. N., "Industrial Particle Size Measurement Using Light Scattering," *Optical Engineering*, Vol 19, No. 6, 1980, pp. 861–869.

*A Summary of Changes section appears at the end of this standard