



Designation: B 761 – 98

Standard Test Method for Particle Size Distribution of Metal Powders and Related Compounds by X-Ray Monitoring of Gravity Sedimentation¹

This standard is issued under the fixed designation B 761; 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 particle size distributions of metal powders. Experience has shown that this test method is satisfactory for the analysis of elemental tungsten, tungsten carbide, molybdenum, and tantalum powders, all with an as-supplied Fisher number of 6 μm or less, as determined by Test Method B 330. Other metal powders (for example, elemental metals, carbides, and nitrides) may be analyzed using this test method with caution as to significance until actual satisfactory experience is developed (see 7.2). The procedure covers the determination of particle size distribution of the powder in the following two conditions:

1.1.1 As the powder is supplied (as-supplied), and

1.1.2 After the powder has been deagglomerated by rod milling as described in Practice B 859.

1.2 This test method is applicable to particles of uniform density and composition having a particle size distribution range of 0.1 to 100 μm. However, with tungsten, molybdenum, tantalum, and tungsten carbide powders, analyses are limited to a particle size distribution range of 0.1 to 30 μm.

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. Specific hazard information is given in Section 7.*

2. Referenced Documents

2.1 ASTM Standards:

B 330 Test Method for Average Particle Size of Powders of Refractory Metals and Their Compounds by the Fisher Sub-Sieve Sizer²

B 821 Guide for Liquid Dispersion of Metal Powders and Related Compounds for Particle Size Analysis²

B 859 Practice for De-agglomeration of Refractory Metal

Powders and Their Compounds Prior to Particle Size Analysis²

3. Summary of Test Method

3.1 A carefully dispersed homogeneous suspension of the powder is permitted to settle in a cell scanned by a collimated X-ray beam of constant intensity. The net X-ray signal is inversely proportional to the sample concentration in the dispersing medium, and the particle diameter is related to the position of the X-ray beam relative to the top of the cell. Cumulative mass percent versus equivalent spherical diameter are recorded to yield a particle size distribution curve.

4. Significance and Use

4.1 This test method is useful to both suppliers and users of powders, as outlined in 1.1 and 1.2, in determining particle size distribution for product specifications, manufacturing control, development, and research.

4.2 Users should be aware that sample concentrations used in this test method may not be what is considered ideal by some authorities, and that the range of this test method extends into the region where Brownian movement could be a factor in conventional sedimentation. Within the range of this test method, neither the sample concentration nor Brownian movement are believed to be significant.

4.3 Reported particle size measurement is a function of both the actual particle dimension and shape factor as well as the particular physical or chemical properties being measured. Caution is required when comparing data from instruments operating on different physical or chemical parameters or with different particle size measurement ranges. Sample acquisition, handling, and preparation can also affect reported particle size results.

5. Apparatus

5.1 Gravitational sedimentation particle size analyzer utilizing X-ray extinction to determine particle concentration.

6. Reagents and Materials

6.1 *Purity of Reagents*—Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents conform to the specifications of the Committee on

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 Subcommittee B09.03 on Refractory Metal Powders.

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