



AEROSPACE INFORMATION REPORT

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Additional Guidance for Metal Powder Feedstock for Additive Manufacturing

RATIONALE

Instead of repeating the same notes or wording in every powder feedstock specification, this standard collects them in a separate, independent document. This method enables the relevant powder feedstock documents to refer to the unified language, making updates and standardization more straightforward.

1. SCOPE

This document is a collection of comments on topics relevant to AMS powder feedstock production and procurement. In some instances, it provides explanation of characteristics not controlled in AMS-AM powder feedstock specifications and the rationale for exclusion (e.g., limitation of applicability or maturity of standardized inspection techniques). In other cases, it provides additional context on the reason for structuring requirements in AMS documents one way instead of other available options.

2. APPLICABLE DOCUMENTS

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (U.S. and Canada only) or +1 724-776-4970 (outside U.S. and Canada), www.sae.org.

AMS7002 Process Requirements for Production of Metal Powder Feedstock for Use in Additive Manufacturing of Aerospace Parts

AMS7025 Metal Powder Feedstock Size Classifications

AS7766 Terms Used in Aerospace Metals Specifications

2.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9500, www.astm.org.

ASTM B213 Flow Rate of Metal Powders Using the Hall Flowmeter

ASTM B214 Standard Test Method for Sieve Analysis of Metal Powders

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Documents

Standard, visit Sharing Hub

ASTM B243	Standard Terminology of Powder Metallurgy
ASTM B822	Standard Test Method for Particle Size Distribution of Metal Powders and Related Compounds by Light Scattering
ASTM B923	Standard Test Method for Metal Powder Skeletal Density by He or Nitrogen Pycnometry
ASTM B964	Flow Rate of Metal Powder Using the Carney Funnel
ASTM E11	Standard Specification for Woven Wire Test Sieve Cloth and Test Sieves

2.3 ISO Publications

Available from International Organization for Standardization, ISO Central Secretariat, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland, Tel: +41 22 749 01 11, www.iso.org/store.

ISO 9276-6 Representation of results of particle size analysis - Part 6: Descriptive and quantitative representation of particle shape and morphology

ISO 13322-2 Particle size analysis - Image analysis methods - Part 2: Dynamic image analysis methods

Other Publications

Islam, S.F., Hawkins, S.M., Meyer, J.L., and Sharman, A.R. (2022). Evaluation of different particle size distribution and morphology characterization techniques. *Additive Manufacturing Letters*, 3. <https://doi.org/10.1016/j.addlet.2022.100077>.

3. ADDITIONAL GUIDANCE

3.1 Flow Characteristics

Powder flow is important in the production of acceptable parts in additive manufacturing (AM) processes. Different machine-supplier combinations may require different flow characteristics. Powder may be tested via ASTM B213 (Hall flow), ASTM B964 (Carney flow), or other methods. While these methods are commonly used, they are not currently able to definitively distinguish between powder that is or is not suitable in AM applications but can be used as guidance in some situations.

3.2 Spreadability

Spreadability is recognized as another important characteristic. As there is currently no standardized test available to use for AMS powder specifications, the combination of the fixed practice with process control documentation (PCD) and machine-specific particle size distribution (PSD) requirements serve to ensure proper spreadability.

3.3 Skeletal Density

Skeletal or true density can be measured by ASTM B923. Currently, there is no industry-accepted value for acceptability, and the relation between powder true density and AM part density is not well established.

3.4 Morphology

Powder morphology is an important consideration for many AM applications. The morphology influences attributes such as rheological performance (e.g., spreadability, flowability, tendency to clog powder feeder), powder bed density (e.g., apparent density, tap density, minimum layer thickness), and spray behavior and adhesion for powder directed energy deposition (DED) or cold-spray applications.