



AEROSPACE MATERIAL SPECIFICATION

AMS7025™

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Metal Powder Feedstock Size Classifications

RATIONALE

To provide a technical specification for harmonizing metal powder feedstock sizing across AMS additive manufacturing specifications.

AMS7025 has been reaffirmed to comply with the SAE Five-Year Review policy.

1. SCOPE

1.1 Form

This specification covers particle size classifications and corresponding particle size distribution requirements for metal powder feedstock conforming to a classification.

1.2 Application

Various size classes for use in purchasing of metal powder, but usage is not limited to metal powders.

1.3 Classifications

Classes are most commonly designated by two number combinations, separated by a hyphen, where the first number indicates the undersize limit or tolerance and the second number the oversize limit or tolerance, per Table 1 in Section 3.

1.4 Safety - Hazardous Materials

While the materials, methods, applications, and processes described or referenced in this specification may involve the use of hazardous materials, this specification does not address the hazards that may be involved in such use. It is the sole responsibility of the user to ensure familiarity with the safe and proper use of any hazardous materials and to take necessary precautionary measures to ensure the health and safety of all personnel involved.

2. APPLICABLE DOCUMENTS

The issue of the following document in effect on the date of the purchase order forms a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been cancelled and no superseding document has been specified, the last published issue of that document shall apply.

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2.1 SAE Publications

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

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

ARP1917 Clarification of Terms Used in Aerospace Metals Specifications

2.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM B214 Standard Test Method for Sieve Analysis of Metal Powders

ASTM B215 Standard Practices for Sampling Metal Powders

ASTM B243 Standard Terminology of Powder Metallurgy

ASTM B822 Particle Size Determination of Metal Powders by Light Scattering

ASTM E11 Standard Specification for Woven Wire Test Sieve Cloth and Test Sieves

ISO/ASTM 52900 Additive Manufacturing - General Principles - Terminology

3. TECHNICAL REQUIREMENTS

3.1 Particle Size Distribution (PSD)

A size class defines the major oversize (coarse) and undersize (fine) powder limits or tolerances using a combination designation from Table 1 as follows: Size class <Undersize descriptor> - <Oversize descriptor> (e.g., size class 45-106 µm; see 8.4, 8.5, and 8.6). When tested in accordance with ASTM B214 or ASTM B822, the particle size distribution shall meet both:

1. The undersize limit of the powder, per Table 1, indicated by the first “undersize” descriptor in the size class designation.
2. The oversize limits or tolerance of the powder, also per Table 1, indicated by the second “oversize” descriptor in the size class designation.

ASTM B214 shall be used to measure powder particle sizes 45 µm (325 mesh) and greater. ASTM B822 shall be used for powder particle sizes less than 45 µm (325 mesh). For 0.0 wt% oversize limits tested per ASTM B214, results of either 0.0 wt% or “trace” (e.g., 0.049 wt% that rounds down to 0.0 wt%) are acceptable.

3.1.1 Due to the variety in laser diffraction instruments, the bins or channels output from the instrument may not align exactly with the listed sizes. For evaluating the undersize values of classes ending in class descriptors 0 through 32, it is acceptable to use the next larger threshold reported by the instrument (see 8.7.1).

3.1.2 Powder shall be of a natural distribution (see 8.7.2).

3.1.3 Powder shall be designated by the narrowest size class that it conforms to (see 8.4).

3.1.3.1 If the “0” designation is used, a narrower designation need not be applied to the fine end of the distribution (e.g., for $d_{90} < 22 \mu\text{m}$).

3.1.3.2 If a powder is sieved (e.g., at $45 \mu\text{m}$) to remove coarser particles, a class designation ending with the value corresponding to that sieve (e.g., 45) shall be used even if it would meet a broader (e.g., size class $_{-53} \mu\text{m}$) designation.

3.1.4 The following shall be agreed upon between purchaser and producer (see 8.7.3):

- Any powder particle size distributions or requirements that differ from the requirements of 3.1 (including the tolerances or limits defined in Table 1) through 3.1.3, and
- Any measurement methods that do not comply with ASTM B214 and B822.

Table 1 - Oversize and undersize requirements for size classes

Undersize Class Descriptor ↓	Oversize Class Descriptor →	∞	425	355	300	250
	Oversize Limits or Tolerance →	No oversize limit	0.0 wt% >600 µm; 1.0 wt% >500 µm; 5.0 wt% >425 µm	0.0 wt% >500 µm; 1.0 wt% >425 µm; 5.0 wt% >355 µm	0.0 wt% >425 µm; 1.0 wt% >355 µm; 5.0 wt% >300 µm	0.0 wt% >355 µm; 1.0 wt% >300 µm; 5.0 wt% >250 µm
	Undersize Limit ↓					
425	5 wt% <425 µm	>425 µm	---	---	---	---
355	5 wt% <355 µm	>355 µm	355-425 µm	---	---	---
300	5 wt% <300 µm	>300 µm	300-425 µm	300-355 µm	---	---
250	5 wt% <250 µm	>250 µm	250-425 µm	250-355 µm	250-300 µm	---
212	5 wt% <212 µm	>212 µm	212-425 µm	212-355 µm	212-300 µm	212-250 µm
180	5 wt% <180 µm	>180 µm	180-425 µm	180-355 µm	180-300 µm	180-250 µm
150	5 wt% <150 µm	>150 µm	150-425 µm	150-355 µm	150-300 µm	150-250 µm
125	5 wt% <125 µm	>125 µm	125-425 µm	125-355 µm	125-300 µm	125-250 µm
106	5 wt% <106 µm	>106 µm	106-425 µm	106-355 µm	106-300 µm	106-250 µm
90	5 wt% <90 µm	>90 µm	90-425 µm	90-355 µm	90-300 µm	90-250 µm
75	5 wt% <75 µm	>75 µm	75-425 µm	75-355 µm	75-300 µm	75-250 µm
63	5 wt% <63 µm	>63 µm	63-425 µm	63-355 µm	63-300 µm	63-250 µm
53	5 wt% <53 µm	>53 µm	53-425 µm	53-355 µm	53-300 µm	53-250 µm
45	5 wt% <45 µm	>45 µm	45-425 µm	45-355 µm	45-300 µm	45-250 µm
38	5 vol% <38 µm	>38 µm	38-425 µm	38-355 µm	38-300 µm	38-250 µm
32	5 vol% <32 µm	>32 µm	32-425 µm	32-355 µm	32-300 µm	32-250 µm
25	5 vol% <25 µm	>25 µm	25-425 µm	25-355 µm	25-300 µm	25-250 µm
20	5 vol% <20 µm	>20 µm	20-425 µm	20-355 µm	20-300 µm	20-250 µm
15	5 vol% <15 µm	>15 µm	15-425 µm	15-355 µm	15-300 µm	15-250 µm
10	5 vol% <10 µm	>10 µm	10-425 µm	10-355 µm	10-300 µm	10-250 µm
5*	0 vol% <5 µm	>5* µm	5*-425 µm	5*-355 µm	5*-300 µm	5*-250 µm
5	5 vol% <5 µm	>5 µm	5-425 µm	5-355 µm	5-300 µm	5-250 µm
0	No undersize limit	---	0-425 µm	0-355 µm	0-300 µm	0-250 µm