
**Additive manufacturing — Feedstock
materials — Methods to characterize
metal powders**

*Fabrication additive — Matières premières — Méthodes pour
caractériser les poudres métalliques*



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Contents

	Page
Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Technical specifications	2
4.1 General.....	2
4.2 Documentation and traceability.....	2
4.3 Sampling.....	3
4.4 Particle size distribution.....	3
4.5 Chemical composition.....	5
4.6 Characteristic densities.....	6
4.7 Morphology.....	7
4.8 Flowability.....	7
4.9 Contamination.....	8
4.10 Packaging, handling and storage.....	8
4.10.1 General.....	8
4.10.2 Packaging and handling.....	8
4.10.3 Storage.....	9
Annex A (informative) Examples of morphology	10
Annex B (informative) Example of certificate	15
Bibliography	18

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by ISO/TC 261, *Additive manufacturing*, in cooperation with ASTM F 42, *Additive manufacturing technologies*, on the basis of a partnership agreement between ISO and ASTM International with the aim to create a common set of ISO/ASTM standards on additive manufacturing.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

The document aims to simplify the relation between the supplier and the customer for the supply of metallic powder for additive manufacturing purpose whatever the process involved.

The document does not aim to develop new standards but provides a list of existing standards dedicated to metallic powder that are suitable for additive manufacturing.

Additive manufacturing — Feedstock materials — Methods to characterize metal powders

1 Scope

This document provides technical specifications for metallic powders intended to be used in additive manufacturing and covers the following aspects:

- documentation and traceability;
- sampling;
- particle size distribution;
- chemical composition;
- characteristic densities;
- morphology;
- flowability;
- contamination;
- packaging and storage.

This document does not deal with safety aspects.

In addition, this document gives specific requirements for used metallic powders in additive manufacturing.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 2591-1, *Test sieving — Part 1: Methods using test sieves of woven wire cloth and perforated metal plate*

ISO 3252, *Powder metallurgy — Vocabulary*

ISO 3923-1, *Metallic powders — Determination of apparent density — Part 1: Funnel method*

ISO 3923-2, *Metallic powders — Determination of apparent density — Part 2: Scott volumeter method*

ISO 3953, *Metallic powders — Determination of tap density*

ISO 3954, *Powders for powder metallurgical purposes — Sampling*

ISO 4497, *Metallic powders — Determination of particle size by dry sieving*

ISO 13320, *Particle size analysis — Laser diffraction methods*

ISO 13322-1, *Particle size analysis — Image analysis methods — Part 1: Static image analysis methods*

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

ISO 22412, *Particle size analysis — Dynamic light scattering (DLS)*

ISO/ASTM 52900, *Additive manufacturing — General principles — Fundamentals and vocabulary*

ASTM B212, *Standard Test Method for Apparent Density of Free-Flowing Metal powders Using the Hall Flowmeter Funnel*

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 B329, *Standard Test Method for Apparent Density of Metal powders and Compounds Using the Scott Volumeter*

ASTM B417, *Standard Test Method for Apparent Density of Non-Free-Flowing Metal powders Using the Carney Funnel*

ASTM B527, *Standard Test Method for Tap Density of Metal powders and Compounds*

ASTM B822, *Standard Test Method for Particle Size Distribution of Metal powders and Related Compounds by Light Scattering*

EN 10204:2005, *Metallic products — Types of inspection documents*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 3252, ISO/ASTM 52900, ASTM B243 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1

EDX

X-ray spectrometry in which the energy of individual photons is measured by a parallel detector and used to build up a histogram representing the distribution of X-rays with energy

[SOURCE: ISO/TS 80004-13:2017, 3.3.2.4, modified — "EDX" has been kept as the only term and "are" has been changed to "is"]

4 Technical specifications

4.1 General

The supplier and customer shall choose the test methods appropriate to the customer's requirements.

4.2 Documentation and traceability

To ensure traceability, statements of conformity and inspection documents shall specify the following:

- a unique document reference,
- the name and the address of the supplier,
- the reference of powder lot,
- the product description, including chemical composition, standard and/or trade/common name,