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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 41882-2022

Copper and copper alloy powders for additive manufacturing

增材制造用铜及铜合金粉

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1 Scope

China's national standard for the copper and copper alloy powders used in additive manufacturing. Printing copper is the hardest of the common metals to print, for two reasons that both come from what makes copper useful. It reflects infrared strongly, so the fibre lasers that power most powder bed machines are largely bounced off it rather than absorbed - which is why copper printing waited for green and blue laser sources, or for electron beam machines where reflection is irrelevant. And it conducts heat so well that the melt pool loses energy to the surrounding powder faster than in any other metal, so the process window is narrow. The reason to persist is that additive manufacturing makes internal channels no other process can produce, and copper's conductivity is exactly what a heat exchanger, an induction coil or a rocket engine chamber wants. The powder's requirements - sphericity, size distribution, oxygen content - are what determine whether any of it works.

This document specifies the designation and classification, technical requirements, test methods, inspection rules, marking, packaging, transportation, storage, accompanying documents, and order form content of copper and copper alloy powders for additive manufacturing. This document applies to copper and copper alloy powders for additive manufacturing prepared by processes such as plasma atomization, gas atomization, plasma spheroidization.

2 Normative references

The contents of the following documents, through normative references in this text, constitute indispensable provisions of this document. Among them, for dated references, only the edition corresponding to that date applies to this document. For undated references, the latest edition (including all amendments) applies to this document.

GB/T 1479.1 Metallic powders - Determination of apparent density - Part 1: Funnel method

GB/T 1480 Metallic powders - Determination of particle size by dry sieving

GB/T 1482 Metallic powders - Determination of flow rate - Calibrated funnel methods (Hall flowmeter)

GB/T 5121 (all parts) Methods for chemical analysis of copper and copper alloys

GB/T 5162 Metallic powders - Determination of tap density

GB/T 5314 Powders for powder metallurgical purposes - Sampling

GB/T 19077 Particle size analysis - Laser diffraction methods

GB/T 35351 Additive manufacturing - Terminology The chemical composition analysis of the product is carried out in accordance with the provisions of GB/T 5121 (all parts).

6.2 Particle size The determination of particle size composition of the product is carried out in accordance with the provisions of

GB/T 1480. The determination of particle size distribution of the product is carried out in accordance with the provisions of GB/T 19077.

6.3 Apparent density The apparent density of the product is determined in accordance with the provisions of GB/T 1479.1.

6.4 Tap density The tap density of the product is determined in accordance with the provisions of GB/T 5162.

6.5 Flow rate The determination of flow rate of the product is carried out in accordance with the provisions of GB/T 1482.

7.1 Inspection and acceptance

7.1.1 The product shall be inspected by the supplier or a third party, to ensure that the product quality complies with the provisions of this document and the order form. It shall fill in the accompanying documents.

7.1.2 The purchaser can inspect the received products according to the provisions of this document and the order form. If the inspection result is inconsistent with the provisions of this document or the order form, within 45 days from the date of receipt of the product, it shall be submitted to the supplier in writing. The supplier and the

8 Marking, packaging, transportation, storage, and accompanying documents

8.1 Marking Each minimum packaging unit of the product shall have a mark, which indicates:

- a) Supplier name;
- b) Product name;

- c) Designation or code;
- e) Powder specification (category);
- g) Number of this document;
- h) Marks such as "moisture-proof" and "prevent inhalation".

8.2 Packaging Products can be packaged in double-layer vacuum plastic bags; or packaged in clean plastic barrels or metal barrels as container units. The packaging container shall ensure its integrity during transportation. It is not easy to be damaged, damp or expose the product to foreign pollutants. During the packaging process, the environment shall be strictly controlled, to avoid pollution. It is recommended to use inert gas-filled protective packaging for Class I products; and that Class II products are packaged in an atmospheric environment. The product packaging mass is 5 kg. It can also be packaged according to the requirements of the purchaser.

8.3 Transportation The product shall be transported in a covered environment. During the transportation process, it shall be protected from rain and moisture. Severe collision and mechanical extrusion are strictly prohibited. During the handling process, it shall be loaded and unloaded lightly. Do not turn it upside down. It is strictly forbidden to approach fire and fire sources.

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