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

GB/T 47929.4-2026

**Additive manufacturing of metals - Qualification principles of
operators - Part 4: Operators for directed energy
deposition-laser beam (DED-LB)**

金属增材制造 操作员资格鉴定原则 第4部分：激光定向能量沉积（DED-LB）操
作员

(English Translation)

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Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part 1: Structure and Drafting Rules of Standardization Documents".

Drafting.

This document is Part 4 of GB/T 47929, "Principles for the Qualification Assessment of Operators in Metal Additive Manufacturing". GB/T 47929 has been issued.

The following parts were laid out.

- Part 1: General Rules;
- Part 2: Laser Powder Bed Melting (PBF-LB) Operator;
- Part 3: Electron Beam Powder Bed Melting (PBF-EB) Operator;
- Part 4: Laser Directed Energy Deposition (DED-LB) Operator;
- Part 5: Directed Energy Deposition by Arc (DED-Arc) Operator.

This document is modified to adopt ISO/ASTM 52926-4:2023 "Qualification principles for metal additive manufacturing - Part 4: DED-LB operation".

"Member Qualification Assessment".

The technical differences between this document and ISO/ASTM 52926-4:2023, and the reasons therefor, are as follows.

---ISO/ASTM 52900 has been replaced with the normatively referenced GB/T 35351 (see Chapter 3).

GB/T 47929.1 replaces ISO/ASTM 52926-1 (see Chapter 3) to maintain the terminology

commonly used in my country's additive manufacturing field.

The definition method is easy to use;

---ISO/ASTM 52926-1 (see 4.2.1) has been replaced with the normatively referenced GB/T 47929.1 to comply with my country's additive manufacturing standards.

Current status of operator qualification assessment in the industry.

The following editorial changes have been made to this document.

LB) Operator;

---The section concerning the purpose and significance of this document in Chapter 1 of ISO/ASTM 52926-4:2023 has been deleted;

---The introductory information regarding the URLs to the ISO and IEC terminology databases in Chapter 3 of ISO/ASTM 52926-4:2023 has been removed.

content;

---The references cited in the training and assessment sections of operator qualification have been changed (see note 4.1);

---The section on the types of theoretical exam questions and the recommendation for 60% of the total score in section 4.2.1 of ISO/ASTM 52926-4:2023 has been deleted.

Avoid repetition;

---Added introductory text to the columns (see 4.2.2~4.2.7);

---The order of the 5th and 6th columns in the Manufacturing/Shaping section has been adjusted (see 4.2.5);

---Added a note for 4.2.3.

Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents.

This document was proposed by the China Machinery Industry Federation.

This document is under the jurisdiction of the National Technical Committee on Standardization of Additive Manufacturing (SAC/TC562).

Introduction

Additive manufacturing, as an emerging manufacturing process, is developing towards greater complexity, customization, and integration, and features decentralized production.

This places higher demands on efficiency and consistency. This is especially true in fields such as aerospace, automotive, rail transportation, and biomedicine, where there are

stringent requirements for component quality and safety.

Strict requirements.

As with traditional manufacturing processes, when additive manufacturing is used to produce industrial parts, it must meet relevant quality and safety requirements.

Therefore, when designing the production process and planning the production environment, it is essential to ensure the consistency and repeatability of the process and the quality of the final product. Thus, it is necessary to ensure...

All personnel involved in the entire production process possess the corresponding capabilities.

GB/T 47929, "Principles for the Qualification Assessment of Metal Additive Manufacturing Operators," describes the capabilities of operators in the field of additive manufacturing technology and the responsibilities aim to provide guidance and standards for the qualification of operators in metal additive manufacturing applications in general industrial settings. For specific industries and application areas...

For domains (such as aerospace, automotive, rail transportation, biomedicine) or to meet regulatory requirements, industry-specific standards may be used in place of this document.

Metal additive manufacturing involves various manufacturing processes, and qualification depends on the process category. Therefore, additive manufacturing operators need to be qualified according to the process.

The qualification is based on the category and is only valid for that specific process category. GB/T 47929 consists of five parts.

---Part 1: General Rules. The purpose is to provide general requirements for the qualification of metal additive manufacturing operators.

---Part 2: Laser Powder Bed Fusion (PBF-LB) Operators. The aim is to provide qualification guidelines for PBF-LB operators.

Require.

---Part 3: Electron Beam Powder Bed Fusion (PBF-EB) Operators. The aim is to provide qualification guidelines for PBF-EB operators.

Require.

---Part 4: Laser Directed Energy Deposition (DED-LB) Operators. The purpose is to provide qualification guidelines for DED-LB operators.

Require.

---Part 5: Directed Electric Arc Deposition (DED-Arc) Operators. The purpose is to provide

qualification guidelines for DED-Arc operators.

Require.

Part 4: Laser-Directed Energy Deposition (DED-LB) Operator

1 Scope

This document specifies the competencies and responsibilities required for the qualification of operators in metal laser-directed energy deposition additive manufacturing.

This document applies to the qualification of laser-directed energy deposition operators responsible for the production of metal parts in the additive manufacturing field.

2 Normative references

The contents of the following documents, through normative references within the text, constitute essential provisions of this document. Dated citations are not included.

For references to documents, only the version corresponding to that date applies to this document; for undated references, the latest version (including all amendments) applies.

This document.

GB/T 35351 Additive Manufacturing Terminology GB/T 47929.1 Principles for the Qualification Assessment of Metal Additive Manufacturing Operators Part 1: General Rules (GB/T 47929.1-2026) ISO/ASTM 52926-1:2023, MOD)

3 Terms and Definitions

The terms and definitions defined in GB/T 35351 and GB/T 47929.1 apply to this document.

4.1 General Provisions

The qualification examination for operators (hereinafter referred to as "operators") should follow appropriate and systematic procedures or manufacturing plans.

Before conducting the assessment, the operator should have received the necessary theoretical and practical training (e.g., 24-hour training), or have prior experience with the equipment.

Experience in similar work in an operational position.

Note: For recommendations on minimum requirements for training, education and assessment, see reference [4].