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

GB/T 47929.5-2026

**Additive manufacturing of metals - Qualification principles of
operators - Part 5: Operators for direct energy deposition-arc
(DED-Arc)**

金属增材制造 操作员资格鉴定原则 第5部分：电弧定向能量沉积（DED-Arc）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 5 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 52926-5:2023 "Qualification principles for metal additive manufacturing - Part 5: DED-Arc operations".

"Member Qualification Assessment".

The technical differences between this document and ISO/ASTM 52926-5:2023, and the reasons therefor, are as follows.

---ISO/ASTM 52900 (see Chapter 3) has been replaced with the normatively referenced GB/T 35351 to align with my country's additive manufacturing standards.

The conventional definition of domain terms is easy to use;

---ISO/ASTM 52926-1 (see Chapter 3, 4.2.1) has been replaced with the normatively referenced GB/T 47929.1 to comply with my country's new national standards.

Basic principles for operator qualification assessment in the material manufacturing industry;

---The theoretical exam question types and the requirement for 60% of the total score in ISO/ASTM 52926-5:2023 have been removed, and it is no longer limited to multiple choice questions.

To avoid duplication with the content referenced in GB/T 47929.1 (see 4.2.1);

The value requirements (see 4.2.5) are consistent with other series of documents, and no specific requirements are specified for the type of process parameter;

---The section 4.2.7 on operator requirements for equipment maintenance and operation in ISO/ASTM 52926-5:2023 has been removed. Maintenance and upkeep have...

It is the responsibility of a dedicated person, not an operator.

The following editorial changes have been made to this document.

---The standard title has been changed to "Principles for Operator Qualification in Metal Additive Manufacturing Part 5: Directed Energy Deposition by Arc (DED)".

Arc Operator;

---The references for operator qualification assessment in training, education, and evaluation have been revised (see note 4.1);

---Added informative references on environment, health and safety, and raw material lifecycle management (see notes to 4.2.2 and 4.2.3);

---Added key points of DED-Arc/M basics, raw materials, system setup, manufacturing/forming, post-processing, and quality to the evaluation procedures.

The introductory remarks for each section (see 4.2.2~4.2.7).

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

With advantages such as reduced production costs and shorter delivery cycles, additive manufacturing technology has broad application prospects. As the technology is widely

applied, its processing efficiency will continue to improve.

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.

Principles for the Qualification Assessment of Metal Additive Manufacturing Operators Part 5: Directional Energy Deposition of Electric Arc (DED-Arc) operator

1 Scope

This document specifies the competencies and responsibilities required for the qualification of operators in metal arc directional energy deposition additive manufacturing.

This document applies to the qualification of arc-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, operators should receive the necessary theoretical and practical training (e.g., 24-hour training), or have prior experience operating the equipment.

Operator qualification examinations should be conducted in accordance with the assessment procedures specified in section 4.2 for this technology.