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

GB/T 46075.1-2025

**Acceptance inspection of electron beam welding machines -
Part 1: Principles and acceptance conditions**

电子束焊机验收检验 第1部分:原则与验收条件

(English Translation)

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Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part 1: Structure and drafting rules for standardization documents" Drafting.

This document is Part 1 of GB/T 46075 Acceptance test of electron beam welding machines. GB/T 46075 has been published in the following parts.

- Part 1: Principles and acceptance conditions;
- Part 2: Measurement of accelerating voltage characteristics;
- Part 3: Measurement of electron beam current characteristics;
- Part 4: Measurement of welding speed;
- Part 5: Measurement of runout;
- Part 6: Measurement of beam spot position stability.

This document is modified to adopt ISO 14744-1:2008. Acceptance testing of electron beam welding machines Part 1: Criteria and acceptance conditions.

This document has the following structural adjustments compared to ISO 14744-1:2008.

- Added a chapter on "Terms and Definitions";
- Deleted Chapter 7 of ISO 14744-1:2008;
- Changed the position of Table 1 from 6.2 to 5.6.

The technical differences between this document and ISO 14744-1:2008 and their reasons are as follows.

- Changed the scope of content (see Chapter 1) and supplemented the scope of application to suit the Chinese standard writing specifications;
- Changed the symbols of focal length and focusing current (see Chapter 4) to conform to domestic usage habits;
- Changed the unit of pressure rise rate (see Chapter 4) to conform to domestic usage habits;
- Changed the content of the safety warning requirements and added the allowable dose requirements of X-rays to comply with domestic usage habits (see 5.4);
- The normative reference GB/T 46075.2-2025 replaces ISO 14744-2:2000. The consistency of the two documents is Modify and replace ISO 14744-3:2000 with the normative reference GB/T 46075.3-2025. The consistency of the two documents is the degree of modification (see 7.2.1) is to facilitate the application of the standard;
- Change the clauses on the selection of ripple coefficient measurement condition parameters to notes (see 7.2.2);
- Replaced ISO 14744-4:2000 (see 7.3.1) with the normative reference GB/T 46075.4-2025. The two documents are consistent the degree of modification is to facilitate

the application of the standard;

--- Replaced ISO 14744-5:2000 (see 7.4) with the normative reference GB/T 46075.5-2025. The consistency of the two documents the degree of modification is to facilitate the application of the standard;

--- Replaced ISO 14744-6:2000 (see 7.5) with the normative reference GB/T 46075.6-2025. The consistency of the two documents the degree of modification is to facilitate the application of the standard.

The following editorial changes have been made to this document.

--- Change the name of the standard to "Electron beam welding machine acceptance inspection Part 1: Principles and acceptance conditions";

--- Deleted Chapter 7 of ISO 14744-1:2008, as it is a supplement to Appendix A and has no actual technical content.

Introduction

As high-precision welding equipment, electron beam welding machines are widely used in high-end manufacturing fields such as aerospace, precision instruments, and nuclear energy equipment.

Core performance parameters (such as acceleration voltage, beam characteristics, welding speed and beam spot stability) directly determine welding quality and process reliability.

GB/T 46075 "Acceptance Test of Electron Beam Welding Machines" aims to standardize the performance evaluation methods and key parameter measurements of electron beam welding machines in my country.

GB/T 46075 has realized the basic principle through hierarchical structure design.

The implementation of this system will standardize the acceptance process of electron beam welding machines and improve the quality of equipment.

GB/T 46075 is intended to consist of the following six parts.

--- Part 1: Principles and acceptance conditions. Aims to clarify the basic principles, general technical conditions and judgment criteria for acceptance inspection, and to provide guidance for future Provide a normative framework for continued special experiments.

--- Part 2: Measurement of accelerating voltage characteristics. Test method to specify the stability, accuracy and fluctuation range of accelerating voltage Method to ensure the controllability of electron beam energy output.

--- Part 3: Measurement of electron beam current characteristics. Aims to establish a test process for beam intensity, dynamic response and ripple factor, ensuring this prevents the consistency of welding heat input.

--- Part 4: Measurement of welding speed. Aims to quantify welding speed through a standardized motion platform and a synchronized signal acquisition system.

The influence of precision on weld formation.

--- Part 5: Measurement of runout accuracy. This part aims to propose a method for detecting and evaluating the dynamic positioning error of the electron beam deflection system.

method.

--- Part 6: Measurement of beam spot position stability. Aims to evaluate the stability of the equipment during long-term continuous operation by monitoring the amount of beam spot drift.

stability.

Electron beam welding machine acceptance inspection Part 1: Principles and acceptance conditions

1 Scope

This document specifies the acceptance criteria and acceptance conditions for electron beam welding machines, including relevant terms and definitions, acceptance items, acceptance criteria and acceptance methods.

This document applies to factory acceptance, on-site acceptance, relocation acceptance, and maintenance and repair acceptance of electron beam welding machines.

2 Normative references

The contents of the following documents constitute the essential clauses of this document through normative references in this document.

For referenced documents without a date, only the version corresponding to that date applies to this document; for referenced documents without a date, the latest version (including all amendments) applies to this document.

GB/T 46075.2-2025 Acceptance test of electron beam welding machines Part 2: Measurement of accelerating voltage characteristics (ISO 14744-2.

2000, MOD)

GB/T 46075.3-2025 Acceptance test of electron beam welding machines Part 3: Measurement of electron beam current characteristics (ISO 14744-3.

2000, MOD)

GB/T 46075.4-2025 Acceptance test of electron beam welding machines Part 4: