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

GB/T 46075.5-2025

**Acceptance inspection of electron beam welding machines -
Part 5: Measurement of run-out accuracy**

电子束焊机验收检验 第5部分：跳动精度的测量

(English Translation)

Issued on: August 29, 2025

Implemented on: March 1, 2026

**Issued by: State Administration for Market Regulation, National
Standardization Administration**

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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 5 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 modifies ISO 14744-5:2000 "Acceptance testing of electron beam welders - Part 5: Measurement of runout accuracy".

This document has the following structural adjustments compared to ISO 14744-5:2008.

- Added the chapter "Terms and Definitions".

The technical differences between this document and ISO 14744-5:2000 and their reasons are as follows.

--- Replaced ISO 14744-1:2008 (see 4.2, 4.3 and Chapter 5) with the normative reference GB/T 46075.1-2025.

The degree of conformity of the document is modified 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 test Part 5: Measurement of runout accuracy";

--- Added "Note" content to the scope (see Chapter 1).

Introduction

As a high-precision welding equipment, electron beam welding machine is 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. Clarify the basic principles, general technical conditions and judgment criteria of acceptance inspection, and provide a basis for subsequent specialized inspection.

This trial provides a normative framework.

--- Part 2: Measurement of accelerating voltage characteristics. Specifies the test method for the stability, accuracy and fluctuation range of the accelerating voltage to ensure Controllability of electron beam energy output.

--- Part 3: Measurement of electron beam current characteristics. Establish a test process for beam intensity, dynamic response and ripple factor to ensure welding Consistency of heat input.

--- Part 4: Measurement of welding speed. Quantify the welding speed accuracy through a standardized motion platform and a synchronous signal acquisition system.

Influence on weld formation.

--- Part 5: Measurement of runout accuracy. A detection and evaluation method is proposed for the dynamic positioning error of the electron beam deflection system.

--- Part 6: Measurement of beam spot position stability. By monitoring the amount of beam spot drift, the stability of the equipment in long-term continuous operation is evaluated.

Qualitative.

Electron beam welding machine acceptance inspection Part 5: Measurement of runout accuracy

1 Scope

This document specifies the measurement requirements for the runout accuracy of electron beam welding machines.

This document applies to the measurement of runout accuracy of moving parts of electron beam welding machines.

Note: The runout accuracy defined in this document is a systematic error and can therefore be used as one of the parameters characterizing the performance of a machine tool. This document does not involve other influencing Energy factors (such as power, vacuum degree, positioning accuracy of CNC machine tools, etc.) and statistical evaluation methods.

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 46075.1-2025 Acceptance test of electron beam welding machines Part 1: Principles and acceptance conditions (ISO 14744-1:2008, MOD)

3 Terms and Definitions

The following terms and definitions apply to this document.

Run-out accuracy

The maximum deviation measured perpendicular to the feed direction of the X, Y and Z axes within the work space occupied during welding; or when the workpiece is rotated the maximum deviation measured in the axial and radial directions under the condition of Note. Runout accuracy is also the deviation between the actual weld point position of the electron

beam and the expected position, that is, the weld point on the workpiece surface. This deviation is caused by the positioning device.

It is done.

4.1 General requirements

The runout of each coordinate axis should be measured to provide comprehensive guidance on the accuracy of electron beam runout.

In cases where multiple axes are moved together during the welding process, special measurement procedures should be specified.

Unless otherwise specified, acceptance testing of runout accuracy is normally carried out in an atmospheric chamber.

4.2 Measurement range

The measurements shall be carried out in all important directions and axes under the load conditions specified in 7.4 of GB/T 46075.1-2025.

4.3 Instrument and its usage

The measurement should be carried out using instruments such as mechanical instruments, optical instruments (laser instruments) or inductive displacement sensors, etc., which allow the measurement accuracy to be