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

GB/T 46075.2-2025

**Acceptance inspection of electron beam welding machines -
Part 2: Measurement of accelerating voltage characteristics**

电子束焊机验收检验 第2部分：加速电压特性的测量

(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 2 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 14744-2:2000 "Acceptance test of electron beam welding machines Part 2: Test method for accelerating voltage characteristics" quantity".

The technical differences between this document and ISO 14744-2:2000 and their reasons

are as follows.

--- Replaced ISO 14744-1:2008 (see 4.2 and 5.1) with the normative reference GB/T 46075.1-2025.

The degree of conformity is modification to facilitate the application of the standard;

--- Replaced ISO 14744-3:2000 (see 5.1) with the normative reference GB/T 46075.3-2025. 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 test Part 2: Measurement of accelerating voltage characteristics".

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 2: Measurement of accelerating voltage characteristics

1 Scope

This document specifies the procedure and instrumentation requirements for measuring the accelerating voltage characteristics of electron beam welders.

This document is applicable to the measurement of the accelerating voltage characteristics of electron beam welding machines for acceptance and the acceleration voltage of electron beam welding machines for long-term use.

Measurement check.

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) 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)

3 Terms and Definitions

The following terms and definitions apply to this document.

accelerating voltage when the electron gun is working, the voltage applied between the

cathode and the anode is used to generate a high voltage electric field between the cathode and the anode to accelerate the electrons.

4.1 General requirements

Special measuring equipment is required to ensure safe measurement of the accelerating voltage during electron beam welding.

NOTE: Manufacturers of electron beam welding machines or high voltage power supplies generally have equipment for measuring the accelerating voltage and have convenient conditions for measuring the accelerating voltage.

When measuring the accelerating voltage, the electrical safety of the test environment should be ensured, and the test personnel should be qualified and trained personnel.

The measuring equipment should measure the acceleration voltage within the entire electron beam current setting range of the electron beam welder.

Note: This document is only intended to unify the measurement method of the accelerating voltage of electron beam welding machines and does not provide a complete measurement circuit diagram.

4.2 Test Equipment

Acceleration voltage measurement requires a voltage divider. The voltage divider resistor is a non-inductive resistor. The voltage divider is connected between the acceleration power supply device and the electron gun.

As shown in Figures 1 and 2.

The accuracy of the test operation shall comply with the requirements specified in GB/T 46075.1-2025.