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

GB/T 9452-2023

Test method for qualified work zone of heat treatment furnace

热处理炉有效加热区测定方法

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Table of Contents

Foreword	3
1 Scope	5
2 Normative references	5
3 Terms and definitions	6
4 Classification of heat treatment furnaces according to temperature uniformity	7
5 Initial test and periodic test of qualified work zone	9
6 Test system	11
7 Test methods	15
8 Evaluation of qualified work zone test	22
9 Records and reports	22
10 Management	23
Annex A (informative) Test record sheet for qualified work zone	25
Annex B (informative) Test certificate of qualified work zone	26

Foreword

This document was issued on 23 May 2023 by the State Administration for Market Regulation; Standardization Administration of the PRC and takes effect on 1 December 2023.

It is a GB/T standard: recommended rather than compulsory, but it is the text a Chinese reviewer applies when assessing a submission.

1 Scope

GB/T 9452-2023 covers how the usable volume of a heat treatment furnace is measured and proved - the qualified work zone, meaning the part of the chamber where temperature stays inside the band a process allows. Furnaces are sorted into seven categories according to the temperature uniformity of that zone, and the document fixes when the zone is measured for the first time and how often it is measured again afterwards. It then describes the test system, the measuring instruments and sensors and their verification or calibration, and the test methods themselves, including whether the furnace is run empty or under load, how the test is prepared and how the measuring points are taken. The remaining clauses cover how the result is judged, what the original record must contain, and the management of those records and documents; two informative annexes supply a record sheet and a test certificate. The periodic part matters because a furnace gives no

sign when its uniform zone shrinks: elements age, sensors drift and linings degrade, and parts loaded outside the zone leave with hardness or structure that inspection of the finished part does not reliably catch. Written for heat treatment shops, furnace builders, calibration bodies and the quality auditors who ask for the evidence.

This document specifies the requirements for classification of heat treatment furnaces according to temperature uniformity, initial test and periodic test of qualified work zones, test systems, test methods, result evaluation, records and reports, and management.

This document is suitable for determining the qualified work zone of a heat treatment furnace that meets temperature uniformity requirements within the operating temperature range. This document does not apply to work zones in continuous heating furnaces where there is no fixed process-specified heating temperature or where temperature uniformity is not required. This document can be used as a reference for other heating equipment.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 1598, Platinum-10% Rhodium/Platinum thermocouple wires -- Platinum-13% Rhodium/Platinum thermocouple wires -- Platinum-30% Rhodium/Platinum-6% Rhodium thermocouple wires

GB/T 2614, Nickel-Chromium/Nickel-Silicon thermocouple wires

GB/T 2903, Copper/Copper-Nickel (Constantan) thermocouple wires

GB/T 4989, Extension and compensating cables for thermocouples

GB/T 4990, Alloy wires of extension and compensating cables for thermocouples

GB/T 4993, Nickel-Chromium/Copper-Nickel (Constantan) thermocouple wires

GB/T 4994, Iron/Copper-Nickel (Constantan) thermocouple wires

GB/T 5977, Platinum wires for resistance thermometers

GB/T 7232, Metal heat treatment - Terminology

GB/T 13324, Terminology of heat treatment equipment

GB/T 16839.1, Thermocouples -- Part 1: EMF specifications and tolerances

GB/T 17615, Nickel-Chromium-Silicon/Nickel-Silicon-Magnesium thermocouple wires

GB/T 18404, Mineral insulated metal-sheathed thermocouple cables and thermocouples

GB/T 30825, Pyrometry for heat treatment

JB/T 8901, Sheathed noble metal thermocouple cables

3 Terms and definitions

For the purposes of this document, the terms and definitions defined in GB/T 7232, GB/T 13324 and GB/T 30825 as well as the followings apply.

3.1 process temperature

The heating temperature specified by the heat treatment process is based on the purpose of heat treatment of the workpiece and the type of material.

3.2 temperature uniformity

The degree of temperature uniformity in the qualified work zone of the heat treatment furnace refers to the maximum deviation of the temperature of each test point in the qualified work zone relative to the set temperature.

NOTE: Usually it is expressed as "+/- degrees C".

3.3 qualified work zone

In the heating furnace, the working space that meets the process temperature and temperature uniformity specified by the heat treatment is determined through temperature detection.

3.4 previewed qualified work zone

In order to judge the qualified work zone of the heat treatment furnace, before testing, it is a pre-assumed temperature measurement space based on the structure, control method and other conditions of the heat treatment furnace. It is generally a work space stipulated by the heat treatment furnace manufacturer or relevant standards.

3.5 no load test

A test to determine the qualified work zone without loading workpieces or substitutes into the heat treatment furnace.

3.6 load test

A test to determine the qualified work zone when the workpiece or substitute is loaded into the heat treatment furnace.

3.7 initial test

It is a qualified work zone test that is performed to determine the qualified operating area, operating temperature range and furnace category for heat treatment furnaces that are newly put into production or have undergone overhaul, technical transformation, and repairs, changes, and adjustments during use.

3.8 periodic test

A qualified work zone test that is carried out regularly at a certain frequency during the use of the heat treatment furnace.

3.9 stabilization

All control and recording sensor temperatures are within the allowable uniformity deviation range, and the temperature control of each zone is maintained at the set temperature to achieve equipment stability. All qualified work zones determine that the sensor temperature reaches the required uniformity range. And it can be determined that the temperature of all sensors does not show a continuous trend of upward or downward deviation from the set point, and the temperature uniformity measurement is stable.

4 Classification of heat treatment furnaces according to

temperature uniformity

4.1 Heat treatment furnaces are divided into seven categories according to the temperature uniformity of the qualified work zone. The corresponding temperature control instrument accuracy level and digital recording instrument accuracy level are shown in Table 1.

be moved on wheels or other portable means);