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

GB/T 14999.2-2025

Replacing GB/T 14999.4-2012

Test methods for superalloys - Part 2: Microstructure

高温合金检验方法 第2部分：高倍组织

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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 14999 "Test methods for high temperature alloys". GB/T 14999 has been published in the following parts.

1. Macroscopic tissue;

2. High-magnification tissue. This document replaces GB/T 14999.4-2012 "Test methods for high temperature alloys - Part

4. Grain structure and primary analysis of rolled high temperature alloy strips". Carbide Distribution Determination" and GB/T 14999.6-2010 "Determination of Dual Grain Structure and Primary Carbide Distribution in Wrought High-Temperature Alloys". The document is based on GB/T 14999.4-2012 and integrates the contents of GB/T 14999.6-2010.

Compared with GB/T 14999.6-2010, in addition to structural adjustments and editorial changes, the main technical changes are as follows:

a) Added the term and definition of "homogeneous grain structure" (see 3.1);

b) The terms and definitions of "wide-grade grains" and "double-peak grains" have been changed (see 3.5, 3.7, and

3.1.2 of GB/T 14999.6-2010). and 3.1.4);

c) Added requirements for inspection surfaces of forged products (see 4.1.2);

d) Added the provisions on the determination and expression methods of uniform structure (see Chapter 5);

e) The relevant content on the classification of primary carbides has been modified (see 5.2.2,

5.3.1 of GB/T 14999.4-2012). Please note that some of the contents of this document may involve patents. The issuing organization of this document does not assume the

responsibility for identifying patents. This document was proposed by the China Iron and Steel Association. This document is under the jurisdiction of the National Technical Committee on Steel Standardization (SAC/TC183). This document was drafted by: Beijing Steel Research Institute Gaona Technology Co., Ltd., Fushun Special Steel Co., Ltd., Metallurgical Industry Information Standards Research Institute, Western Superconducting Materials Technology Co., Ltd., Daye Special Steel Co., Ltd., Panzhihua Iron and Steel Group Jiangyou Great Wall Special Steel Co., Ltd., Zhonggang Stainless Steel Pipe Industry Technology Shanxi Co., Ltd. The main drafters of this document are: Chen Huixia, Xie Jinli, Gu Qiang, Luan Yan, Yan Chengming, Liu Wei, Wang Lin, Zhang Hong, Zhu Hua, Wang Ruisen, Qiao Qiao, Wang Aizhu, Zhao Xiaohua, Di Youni, Feng Chengcheng, and Cao Yuxin. The previous versions of the documents replaced by this document are as follows:

---GB/T 14999.4, first issued in.1994, first revised in.2012;

---GB/T 14999.6, first issued in.2010.

1 Scope

GB/T 14999.2-2025 is the Chinese national standard on test methods for superalloys - part 2: microstructure, in the field of metallurgy. The /T suffix marks it as a recommended standard: it is not compulsory by itself, but it becomes binding as soon as a contract, a tender or a customer specification calls it up - which in practice is how most foreign buyers meet it. It was issued on 29 August 2025 by the State Administration for Market Regulation; Standardization Administration of China, and has been in force since 1 March 2026.

Classification: ICS 77.140.99, CCS H57. This page is published from the official record of the standard held by the Chinese standards administration: the identification, the dates, the classification and the issuing body are taken from there. The clause text, the tables and the numeric limits are in the document itself, which is delivered complete in English translation.

This document describes the sampling and preparation, determination and result presentation, and inspection report of high-magnification microstructure inspection methods for deformed high-temperature alloys. This document is applicable to the inspection and evaluation of grain structure and primary carbides in rolled and forged high-temperature alloy products. Gold reference used.

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 6394 Determination of average grain size of metals

GB/T 24177 Characterization and determination method of double grain size

GB/T 30067 Metallographic Terminology YB/T 4290 Determination of the maximum grain size grade (ALA grain size) on the metallographic examination surface

3 Terms and Definitions

The terms and definitions defined in GB/T 6394 and GB/T 30067 and the following apply to this document.

3.1 A structure in which the grain area, diameter or intercept length presents a unimodal distribution, which is approximately log-normal.

3.2 Duplexgrain There are at least two grains with obviously different sizes and distribution forms, and the grain size difference between fine grains and coarse grains is not less than 3 levels.

3.3 banding grain Grains in alternating areas with a grain size difference of not less than 3 levels along the metal flow direction or along the processing direction.

3.4 Individual coarse grain ALA (aslargeas) grain The largest grain observed in the randomly dispersed isolated coarse grains has a size difference of not less than 3 levels from the matrix grains. The percentage of the area occupied by the coarse grains is no more than 5% of the total area of the observation range. NOTE. If the area percentage of coarse grains is greater than 5%, the corresponding provisions for bimodal grains (3.7) shall apply in this document.

3.5 wide-range grain Grains with a wide range of sizes are randomly distributed in the field of view, and there is a grain size difference of no less than 5 levels between the largest grain and the smallest grain.

3.6 necklace grain necklacegrain There are two types of grains with a grain size difference of not less than 3 levels in the field of view, and the small grains surround the large grains. The small grains account for the total size of the observation range.