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

GB/T 32246-2015

GH141 alloy forgings - General specification

GH141合金锻件 通用技术条件

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Table of Contents

1 Scope	1
2 Normative references	1
3 Requirements	1
3 Prepare	4
6 Ordering Document	5

Foreword

This standard was drafted in accordance with GB/T 1.1-2009 given rules. This standard by the National Standardization Technical Committee Forging (SAC/TC74) and focal points. This standard was drafted. Guizhou Anda Aviation Forging limited liability company, Beijing Institute of Electrical and Jiang Su Baojie Forging Limited. The main drafters of this standard. Chenzu Xiang, Wei Zhijian, gold red, Gan Yuan, Chen Wenjing, land in spring. GH141 alloy forgings - General technical requirements

1 Scope

China's national general specification for GH141 alloy forgings. It specifies the requirements, the quality assurance provisions and the delivery preparation for these forgings, and it applies to forgings of GH141 alloy. GH141 is a nickel-based precipitation-hardening superalloy, the Chinese designation for the composition known internationally as Rene 41: nominally 19 per cent chromium, 10 per cent molybdenum, 11 per cent cobalt, with about 1.5 per cent aluminium and 3.1 per cent titanium in a nickel matrix, hardened by the gamma prime phase those last two form. It is a high strength alloy for service at temperature - turbine discs, shafts, casings, fasteners and structural parts in aero engines and in gas turbines - and its properties come from a combination of composition, forging history and heat treatment that a specification has to control together. The first requirement in the document is about melting, and it is the one that matters most: the material must be produced by vacuum induction melting followed either by vacuum arc remelting or by electroslag remelting, and the route used must be stated in the contract and on the quality certificate. That double-melt requirement exists because superalloy properties are limited by inclusions and by segregation rather than by composition, and a single melt cannot deliver the cleanness these applications need. The composition limits then include boron between 0.003 and 0.010 per cent - a range of seven parts per million wide - because boron at the grain boundaries governs the creep and stress rupture behaviour that the alloy is bought for. Issued on 10 December 2015 and in force since 1 July 2016.

This standard specifies the GH141 alloy forgings requirements, quality assurance provisions and delivery preparation. This standard applies to GH141 alloy forgings (hereinafter referred to as "forging").

2 Normative references

The following documents for the application of this document is essential. For dated references, only the dated version suitable for use herein Member. For undated references, the latest edition (including any amendments) applies to this document.

GB/T 222 chemical composition of finished steel tolerance

GB/T 223 (all parts), steel and alloy chemical analysis method

GB/T 230.1 metallic materials - Rockwell hardness test - Part 1. Test methods (A, B, C, D, E, F, G, H, K, N, T standard ruler) Creep Test Methods

GB/T 2039 metal material uniaxial stretching

GB/T 4338 high-temperature metallic materials - Tensile testing

GB/T 6394 Determination of average grain size of metal

GB/T 6402 Steel Forgings Ultrasonic Testing Method

GB/T 14999.2 superalloys Test methods - Part 2. Horizontal macrostructure and defect acid leaching test

3 Requirements

3.1 raw materials Forging raw materials by vacuum induction melting plus vacuum arc remelting or vacuum induction melting plus ESR smelting method of production, Smelting methods used should be specified in the contract and the quality certificate.

3.2 Chemical composition

3.2.1 The chemical composition of the alloy should meet the requirements in Table 1. Table

1 Alloy Chemical Composition% (mass fraction) Elements Cr Mo Al Ti Co B Ni Content
 $\geq 18.00 \sim 20.00$ $\geq 9.00 \sim 10.50$ $\geq 1.40 \sim 1.70$ $\geq 3.00 \sim 3.30$ $\geq 10.00 \sim 12.00$ $\geq 0.003 \sim$

0.010 margin Element C Cu Fe Si Mn PS Zr Content ≤ 0.12 ≤ 0.50 ≤ 5.00 ≤ 0.50 ≤ 0.10
 ≤ 0.015 ≤ 0.015 ≤ 0.07