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GB/T 46444-2025

Test method for tension-tension fatigue properties of carbon fibre reinforced ceramic matrix composites at elevated temperature

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Table of Contents

Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part

1.Structure and Drafting Rules of Standardization Documents". Drafting. Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents. This document was proposed and is under the jurisdiction of the National Technical Committee on Carbon Fiber Standardization (SAC/TC572). This document was drafted by: Nanjing University of Aeronautics and Astronautics, Shanghai Institute of Ceramics, Chinese Academy of Sciences, and Beijing Aeronautical Materials Research Institute, China Aero Engine Corporation. Institute, China Aviation Manufacturing Technology Research Institute, Institute of Metal Research, Chinese Academy of Sciences, Sichuan Gas Turbine Research Institute of AECC, Shenyang Engine Plant of AECC The Institute of Motion Technology, Hunan Power Machinery Research Institute of China Aero Engine Corporation, Shanghai Ruihuasheng New Materials Co., Ltd., and Nanjing Glass Fiber Research and Design Institute have... Limited Liability Company, Aero Engine Corporation of China Commercial Aircraft Engine Co., Ltd., Nanjing University of Aeronautics and Astronautics Wuxi Research Institute, Changzhou Institute of Technology. The main drafters of this document are. Song Yingdong, Gao Xiguang, Yu Guoqiang, Fang Guangwu, Li Long, Hu Jianbao, Jiao Jian, Qiu Haipeng, Tang Sufang, and Shi Jundong. You Chao, Zhang Sheng, Wang Yana, Wu Tao, Ma Dan, Mi Dong, Cao Yuan, Shen Qingyang, Shao Hongyan, Zheng Yuanyi, Gao Jianhui, Wang Wenjun, Zeng Yuqi, Zhou Haijun Xue Yudong, Li Tianshan, Cui Heng, Chen Mingwei, Pang Shengyang, Hu Chenglong, Hong Hui, Zhang Yishang, Kong Xianghao, Sun Jie, Wang Tao, Yang Bin. High-temperature tensile fatigue of carbon fiber reinforced ceramic matrix composites Performance test methods

1 Scope

GB/T 46444-2025 is the Chinese national standard covering fatigue testing a C/SiC composite hot - the specimen and the gripping outside the furnace, the heating and its uniformity, the atmosphere, the load ratio and frequency, and the stiffness loss that signals

damage accumulating rather than a clean fracture. First edition, in force from 1 May 2026. Issued on 31 October 2025, it has been in force since 1 May 2026.

This document specifies the tensile-tensile fatigue life curves and conditional fatigue limit tests for carbon fiber reinforced ceramic matrix composites under high-temperature conditions. The principle of the test method, instruments and materials, test specimens, test conditions, test procedures, result calculation and test report. This document applies to the determination of tensile fatigue strength of ceramic matrix composites reinforced with continuous carbon fibers in a high-temperature environment of 600°C to 1650°C. The SN curves and fatigue limits under fatigue loads are used as a reference for continuous silicon carbide fiber reinforced ceramic matrix composites.

2 Normative references

The contents of the following documents, through normative references within the text, constitute essential provisions of this document. Dated citations are not included. For references to documents, only the version corresponding to that date applies to this document; for undated references, the latest version (including all amendments) applies. This document.

GB/T 1446 General Rules for Test Methods of Properties of Fiber Reinforced Plastics

GB/T 2611 General Technical Requirements for Testing Machines

GB/T 12160 Calibration of extensometer systems for uniaxial testing of metallic materials

GB/T 16825.1 Inspection and calibration of static uniaxial testing machines for metallic materials - Part

1.Tensile and/or compressive testing machines Inspection and calibration of force measurement system

GB/T 16839.1 Thermocouples - Part

3 Terms and Definitions

The terms and definitions defined in GB/T 40724, as well as the following terms and definitions, apply to this document.

3.1 stress ratio The ratio of the minimum to the maximum value of the internal stress in a cycle.

3.2 strain ratio The ratio of the minimum to the maximum strain within a cycle.

4.Principles Under high-temperature conditions, at different tensile stress or strain levels, the specimen is subjected to constant stress or strain amplitude, stress ratio, and frequency. Apply alternating stress or strain until the specimen fails or reaches the specified

number of cycles. Analyze the test results and plot the stress life. (SN) curves or strain-life (epsilon-N) curves are used to obtain the conditional fatigue limit.