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**Test method for the thermal expansion rate of thin-walled
carbon fibre reinforced composite tubes**

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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 prepared by the National Technical Committee on Carbon Fiber Standardization (SAC/TC572) and the National Technical Committee on Standardization of Aerospace Technology and its Applications. It was jointly proposed and is under the jurisdiction of the SAC/TC425. This document was drafted by: Beijing Satellite Manufacturing Plant Co., Ltd., Anhui Mengkes Aviation Technology Co., Ltd., and Lanzhou Space Technology Physics Research Institute. Research Institute, China Aerospace Standardization Institute, Dalian University of Technology, Aerospace Materials and Processes Research Institute, Xi'an Aerospace Composite Materials Research Institute, Shanghai Composite Materials Technology Co., Ltd., Shaanxi Tianyi Technology Co., Ltd., Beijing Electronic Engineering General Research Institute, Guangdong Seagull Flying Car Group Co., Ltd., Zhejiang Sci-Tech University. The main drafters of this document are: Tang Xiaojun, Xin Liang, Liu Yunyan, Hui Tianli, Tian Kuo, Liu Lixia, He Nan, Wang Bo1), Yang Fenglong, and Jiang Mingxia. Sun Zijie, Chen Dongkang, Li Xiujie, Li Yi, Liu Yang, Luo Jintao, Liu Qiang, Wang Tiantian, Gu Xuhan, Wang Bo2), Yang Yang, Huo Lixia, Zeng Jinfang, Sheng Tao, Huo Shulin, Hou Lei, Jin Wugang, Wang Feng, Dong Wenyue, Pan Yunfeng. 1) Beijing Satellite Manufacturing Plant Co., Ltd. 2) Dalian University of Technology Thermal expansion coefficient of carbon fiber reinforced composite thin-walled pipe fittings Test methods

1 Scope

GB/T 47083-2026 is the Chinese national standard covering the thermal expansion of a composite tube - near zero along the fibres and large across them, which is exactly why these tubes are used for optical benches and satellite structures and exactly what has to be measured to trust them there. First edition, the companion of GB/T 43938.3-2026. It was issued on 28 January 2026 and has been in force since 1 August 2026, as a first edition.

The document is under the responsibility of the Standardization Administration of China. This page is published from the official record of the 2026 edition; the clause text of a standard this recent is not yet in circulation, and the figures, limits and tables it contains are those of the document itself, delivered in full with the English translation.

This document specifies the test principle, specimen, and measurement method for testing the thermal expansion coefficient of carbon fiber reinforced composite thin-walled tubular fittings (hereinafter referred to as "fittings"). Test conditions, instruments and equipment, test procedures, data processing, and test reports. This document applies to the determination of the shaft diameter of carbon fiber reinforced composite thin-walled tubular fittings with a wall thickness not exceeding 1 mm and a nominal outer diameter less than 50 mm. Thermal expansion coefficient.

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 4339-2008 Determination of characteristic parameters of thermal expansion of metallic materials

3 Terms and Definitions

The following terms and definitions apply to this document.

3.1 thermal expansion rate The relative rate of change of the axial length of the specimen with temperature within a certain temperature range.

3.2 Within a certain temperature range, the ratio of the average change in the axial length of the specimen as the temperature increases to the initial length and the temperature difference.

3.3 The instantaneous rate of change of the axial length of a specimen caused by a unit temperature change at a specific temperature.

4. Testing Principle The pipe fitting specimens were placed in a temperature-controlled device for temperature rise and fall. After reaching the specified conditions, the pipe fittings were measured using an optical expansion testing device. The variation in the spacing of optical feature markers on different generatrices of the specimen under different temperature environments was calculated by examining the change in specimen length with temperature. The relative change rate is used to obtain the axial thermal expansion rate of

the pipe fitting specimen. The schematic diagram of the test system is shown in Figure 1.

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