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Determination of constituent content and void content of carbon fibre and glass fibre hybrid reinforced composites

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Table of Contents

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 is required. 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 is proposed and coordinated by the National Technical Committee on Carbon Fiber Standardization (SAC/TC 572). This document was drafted by: Nanjing National Materials Testing Co., Ltd. of China National Testing Holding Group, Anhui Jinsheng New Materials Co., Ltd., Jiangsu Hengshen Co., Ltd., Zhenshi Group Huazhi Research Institute (Zhejiang) Co., Ltd., Shanxi Gangke Carbon Materials Co., Ltd., Jushi Group Co., Ltd. Donghua University, Zhejiang Chengrudan New Energy Technology Co., Ltd., Mingyang Smart Energy Group Co., Ltd., Sichuan Dongshu New Materials Co., Ltd. Co., Ltd., Zhongfu Shenying Carbon Fiber Co., Ltd., AVIC Composite Materials Co., Ltd., Shanxi Coal Chemistry Research Institute of the Chinese Academy of Sciences Institute, Jilin Chongtong Chengfei New Materials Co., Ltd., Langfang Feize Composite Materials Co., Ltd., Harbin Fiberglass Research Institute Co., Ltd., Nanjing Chenguang Group Co.,

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1 Scope

China's national method for determining the constituent and void content of hybrid carbon and glass fibre reinforced composites. A hybrid laminate uses both fibres deliberately - carbon where stiffness and strength are needed, glass where cost, impact tolerance or electrical insulation matter, and the combination in wind turbine blades, sporting goods and automotive structures. Measuring what is in it is harder than for a single-fibre composite. The standard techniques burn or dissolve away the matrix and weigh the fibre, which works when there is one fibre of known density and fails when there are two, since the residue's composition is unknown. So the method has to separate the two fibre types or determine their ratio independently. The void content follows from comparing the measured density with the density calculated from the constituents, and voids matter because they reduce the compression and shear strength that the matrix carries.

This document specifies the determination of carbon fiber content, glass fiber content, resin content and porosity in carbon fiber and glass fiber reinforced plastics. The principle of content, samples, test instruments and reagents, test procedures, result calculation and test report, etc. This document is applicable to carbon fibers and glass fibers for which concentrated sulfuric acid can completely digest the resin matrix under certain conditions and only slightly corrode the fibers. Fiber composite reinforced plastics.

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. in this document.

GB/T 1033.1 Plastics - Determination of density of non-cellular plastics - Part

3 Terms and definitions

The terms and definitions defined in GB/T 40724 apply to this document.

4 Principle

The matrix of a sample of known mass is partially digested by hot sulfuric acid. After the matrix is digested by hot sulfuric acid, the residue containing the reinforcing material is passed through Filter, wash, dry, cool and weigh, then burn at a certain temperature, cool and weigh again. The part of the sample lost in digestion is the matrix resin. The part lost during burning is carbon fiber, and the remaining part after burning is glass fiber, from which the mass content of each component in the fiber reinforced plastic can be calculated. According to the density of fiber reinforced plastic, carbon fiber, glass fiber and resin casting, the volume of each component in fiber reinforced plastic is calculated respectively. content and pore content.

5.1.1 Analytical balance. with a precision of

0.1 mg.

5.1.2 Muffle furnace. can be controlled at (625±20)°C.

5.1.3 Air drying oven. can be controlled at (150±5)°C.

5.1.4 Heating table. The temperature is adjustable with a control accuracy of ±10 °C.

5.1.5 Beaker or flask. volume 250 mL.

5.1.6 Filter. Acid-resistant type, pore size 4.5 μm~9.0 μm.