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Carbon fibres — Determination of polyacrylonitrile-based (PAN-based) carbon fibre tow characteristics — Heat transfer parameter

National foreword

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 13, *Composites and reinforcement fibres*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

Currently, contact-type (1) and noncontact-type thermal conductivity method (2) are used to measure the thermal conductivity. The contact-type method exhibits measurement non-uniformity in the carbon fibre thickness direction to unable uniform sampling, and the error occurrence rate is known to be high. Also, the noncontact-type method, fibre porosity and tow gap can create lower accuracy, and the error occurrence rate is similarly high. Therefore, this document is made to provide a quantitative method for the measurement of carbon fibre thermal conductivity, using a thermal imaging camera, that will alleviate problems observed in prior described methods.

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1 Scope

This document specifies a method using a thermal imaging camera for measuring the heat transfer parameter of PAN-based 12 K carbon fibre tow with a filament diameter of 7 µm. This document is applicable to both sized and unsized carbon fibres.

NOTE At the time of publication, the experience is on 12 K tow. Other tows will be included when the experience becomes available.

2 Normative references

There are normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions are apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
carbon fibre
fibrous carbon materials having a mass content of carbon element of 90 % or more, obtained by pyrolysis of organic materials

3.2
carbon fibre tow
untwisted bundle of continuous carbon fibre filaments

Note 1 to entry: The tow is provided in a wide variety of sizes from 1 K, 3 K, 6 K, 12 K, 24 K, etc. 12 K indicates 12 000 filaments. The 12 K carbon fibre tow used in this experiment has filaments with about 7 µm in diameter.

3.3
polyacrylonitrile
PAN
polymer of acrylonitrile

Note 1 to entry: PAN is a raw material used for the carbon fibre production.

[SOURCE: ISO 472:2013, 2.721, modified — A note to entry has been added.]

4 Principle

A thermal imaging camera is used to measure the temperature difference of the carbon fibre tow from one side of electrode A to the other side of electrode B (distance of 15^{+5}_{-0} mm) between which the heating is measured (see Figure 2.). According to the heating power and the cross-sectional area of the tow, the

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