



Technical Specification

ISO/TS 24858

Plastics — Conducting materials — Eddy current measurement on spread carbon fibre tow

*Plastiques — Matériaux conducteurs — Mesure par courants de
Foucault sur un câble en fibres de carbone étiré*

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Foreword

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This document was prepared by Technical Committee ISO/TC 61, *Plastics*.

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.

Introduction

As technologies for the commercialization of textile materials have advanced, the development of various functional materials based on fibres has increased. Conductive fibres are flexible and highly elastic materials with significant potential for application in next-generation electronic devices, and carbon fibres are also one of the conductive materials that exhibit electrical conductivity. The homogeneity of a conductive material is an important factor in determining the performance of the final product, and from a quality control perspective, it is necessary to have a method to analyse the distribution status of the raw material before it is processed. In the case of carbon fibres, a conductive material in the form of fibres, it is important to manage the arrangement of the fibres because the degree to which the filament strands are arranged can cause performance degradation in localized areas. Optical image analysis is a common method for checking the homogeneity of filaments in carbon fibres and can be used to analyse the arrangement of filaments on the surface, but it has limitations in analysing the presence and density of filaments arranged in the thickness direction. A method for continuously measuring the homogeneity of carbon fibres with large surface areas is eddy current measurement, which utilizes electrical conductivity properties. An eddy current measurement is used to detect discontinuities in materials that conduct electricity. This method is a reliable measurement that can identify materials with low electrical conductivity, such as spread carbon fibre tow, making it applicable to a wide range of industries. This document specifies a standard method for evaluating the homogeneity of a spread carbon fibre tow, a conductive fibre, using eddy current measurement.

[Annex A](#) gives the eddy current measurement data for impedance analysis based on the presence of defects.

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Plastics — Conducting materials — Eddy current measurement on spread carbon fibre tow

1 Scope

This test method defines test terms and specifies a standard method for evaluating the homogeneity of electrically conductive spread carbon fibre tow using eddy current measurement. The impedance in the width direction of the fibre is measured continuously, and the standard deviation of the measured impedance determines the homogeneity of the conductive material in fibre form.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

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

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1 spread carbon fibre tow

large bundle of continuous carbon fibre spread thinly and widely in the width direction

3.2 eddy current

electrical currents induced within conductors by a time-varying magnetic field in the conductor

[SOURCE: IEC 62899-202-3:2019, 3.2]

3.3 impedance

value represented by the combined effect of a circuit's resistance, inductance, and capacitance, which interferes when a voltage is applied to the circuit

3.4 homogeneity

degree of a state of being of a similar kind or of having a uniform structure or composition throughout

4 Background — Impedance

Eddy current instruments work on the principle that an electrically conductive sample is placed in an electromagnetic field generated by a probe system, which causes an eddy current to flow. Impedance is the total opposition a circuit presents to the flow of alternating current and is calculated as shown in [Formulae \(1\)](#) and [\(2\)](#), including resistance, inductive reactance, and capacitive reactance. For eddy current testing, capacitive reactance is usually not present, so impedance is calculated with [Formula \(3\)](#). As shown