IEC TS 62607-6-35

Edition 1.0 2025-08

TECHNICAL SPECIFICATION

Nanomanufacturing - Key control characteristics -
Part 6-35: Graphene-related products - Density: free-pouring, tapping and compressing method

ICS 07.120

ISBN 978-2-8327-0655-8

IEC TS 62607-6-35:2025-08(en)

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Nanomanufacturing - Key control characteristics - Part 6-35: Graphene-related products – Density: free-pouring, tapping and compressing method

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IEC TS 62607-6-35 has been prepared by IEC technical committee 113: Nanotechnology for electrotechnical products and systems. It is a Technical Specification.

The text of this Technical Specification is based on the following documents:

Draft	Report on voting
113/900/DTS	113/910/RVDTS

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this Technical Specification is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

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The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

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– revised.

INTRODUCTION

Graphene materials in powder form such as reduced graphene oxide and exfoliated graphite have high expectations for industrial applications including energy storage, composites, conductive ink, filtration membranes, etc. Graphenes available from commercial sources have a variety of shapes with various volumes per unit mass. The density of graphene materials affects both the surface area and the dispersion properties within a solvent matrix to fabricate their composites. Therefore, it is important that graphene manufacturers identify and provide information on the density of graphene materials to enable users to select a material suitable for their application.

Powder-type graphene sample has a very low density. Given its low mass per unit volume and its high fluffiness, it is difficult to directly apply the existing standard methods for evaluating the density of graphene samples, which have been used for the determination of powders containing heavy elements such as metals or ceramics. Therefore, it is essential to develop a new measurement method to evaluate the density of graphenes.

On the other hand, graphene has a very large volume per unit mass because of its low density, making its storage and distribution less efficient compared to other powder materials. This issue can be overcome by compressing graphene powder within a range that preserves its physical properties.

This document provides the method for evaluating the bulk densities of graphene, such as apparent density and tap density, and the compressed density of a sample compressed to a specific volume by applying a pressure. Furthermore, the evaluation method for the pressure required to reduce to a specific volume will be included. By measuring compressed density, it is possible to determine the pressure required to compress the graphene to a reducing volume for easy distribution and storage.

1 Scope

This part of IEC TS 62607 establishes standardized methods to determine the structural key control characteristics

– apparent density (d_a),

– tap density (d_t), and

– compressed density (d_c)

for graphene in powder form by

– free-pouring, tapping and compressing method.

2 Normative references

There are no normative references in this document.