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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 41638.4-2026

**Plastics - Carbon and environmental footprint of biobased
plastics - Part 4: Environmental (total) footprint (Lifecycle
assessment)**

塑料 生物基塑料的碳足迹和环境足迹 第4部分：环境（总）足迹（生命周期评价）

(English Translation)

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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.

This document is Part 4 of GB/T 41638, "Carbon and environmental footprint of bio-based

plastics". GB/T 41638 has been...

The following sections were published.

---Part 1: General Rules;

---Part 2: Material carbon footprint is the amount (mass) of CO₂ from the air incorporated into polymer molecules;

---Part 3: Requirements and Criteria for Quantifying Process Carbon Footprint;

---Part 4: Environmental (Total) Footprint (Life Cycle Assessment).

This document is equivalent to ISO 22526-4:2023 "Plastics - Carbon and environmental footprint of bio-based plastics - Part 4: Environment (general)".

Footprint (Life Cycle Assessment) 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 proposed by the National Technical Committee on Standardization of Bio-based Materials and Degradable Products (SAC/TC380).

This document was prepared by the National Technical Committee on Standardization of Bio-based Materials and Degradable Products (SAC/TC380) and the National Carbon Emission Management Standardization Committee.

Introduction

Increasing the use of biomass resources in the production of plastic products can reduce global warming and slow down the depletion of fossil resources.

Currently, plastic products are mainly composed of bio-based synthetic polymers, fossil-based synthetic polymers, natural polymers, and materials that may contain bio-based components.

It is made with additives.

Bio-based plastics refer to plastics that are wholly or partially derived from biomass.

GB/T 41638, "Carbon and Environmental Footprint of Bio-based Plastics," is proposed to consist of five parts.

---Part 2: Material Carbon Footprint - The amount (mass) of CO₂ from the air incorporated into polymer molecules. The purpose is to determine the amount of CO₂ incorporated into polymer molecules based on experimental data.

The results determined the bio-based carbon content, which was then used to calculate the carbon dioxide emissions that could be achieved by replacing petroleum carbon with bio-based carbon (material carbon footprint).

Emission reduction.

---Part 3: Requirements and Criteria for Quantifying Process Carbon Footprint. The aim is to define the requirements for quantifying and reporting the carbon footprint of bio-based plastic processes.

Requirements.

---Part 4: Environmental (Total) Footprint (Life Cycle Assessment). The aim is to assess the environmental (total) footprint of bio-based plastics using a life cycle assessment approach.

The impact of products, materials, and polymer resins throughout their lifecycle.

---Part 5: Reporting and Assessment. The purpose is to specify the requirements for reporting the carbon and environmental footprint assessment results of bio-based plastics.

The carbon footprint of bio-based plastics and Environmental Footprint Part 4: Environment (General) Footprint (Life Cycle Assessment)

1 Scope

This document specifies the requirements and guidelines for Life Cycle Assessment (LCA) for evaluating bio-based plastic products, materials, and polymers.

The impact of synthetic resins throughout their entire life cycle. These products, materials, and polymer resins are composed, in whole or in part, of bio-based components.

The application of Life Cycle Assessment (LCA) is not within the scope of this document. Clarifications, considerations, and practical methods for different applications are provided below.

Simplified processing and selection of solutions are not within the scope of this document.

Furthermore, this document can be applied to studies that do not cover the entire lifecycle, provided there are appropriate justifications, such as inter-firm information exchange.

Below, such as cradle-to-gate research, gate-to-gate research, and specific parts of the lifecycle (such as waste management, product groups) (Completed). Most of the requirements in this document apply to these studies (e.g., data quality, collection and computation, as well as distribution and critical review).

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 24040-2008 Principles and framework for life cycle assessment in environmental management (ISO 14040:2006, IDT) GB/T 24044-2008 Environmental Management - Life Cycle Assessment Requirements and Guidelines (ISO 14044:2006, IDT) ISO 472 Plastics Vocabulary Note. GB/T 2035-2024 Plastics Terminology (ISO 472:2013, NEQ) Note. GB/T 24025-2009 Environmental Labelling and Declarations Type III Environmental Declaration Principles and Procedures (ISO 14025:2006, IDT) EN16575 Vocabulary for Bio-based Products EN16760 Lifecycle assessment of bio-based products the definitions provided in GB/T 24040-2008, GB/T 24044-2008, ISO 472, EN16575, EN16760 and ISO/T R21960 are as follows.

Terms and definitions apply to this document.

The URLs for the terminology databases maintained by ISO and IEC for standardization are as follows.