
Polimerni materiali - Ogljični in okoljski odtis polimernih materialov na biološki osnovi - 1. del: Splošna načela (ISO 22526-1:2020)

Plastics - Carbon and environmental footprint of biobased plastics - Part 1: General principles (ISO 22526-1:2020)

Kunststoffe - CO₂- und ökologischer Fußabdruck von biobasierten Kunststoffen - Teil 1: Allgemeine Grundlagen (ISO 22526-1:2020)

Plastiques - Empreinte carbone et environnementale des plastiques biosourcés - Partie 1: Principes généraux (ISO 22526-1:2020)

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**Plastics — Carbon and environmental
footprint of biobased plastics —**

**Part 1:
General principles**

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ISO 22526-1:2020(E)

Foreword

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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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A list of all parts in the ISO 22526 series can be found on the ISO website.
86575747e4/iso/22526-1:2020

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

Increased use of biomass resources for manufacturing plastic products can be effective in reducing global warming and the depletion of fossil resources.

Current plastic products are composed of biobased synthetic polymers, fossil-based synthetic polymers, natural polymers and additives that can include biobased materials.

Biobased plastics refer to plastics that contain materials wholly or partly of biogenic origin.

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Plastics — Carbon and environmental footprint of biobased plastics —

Part 1: General principles

1 Scope

This document specifies the general principles and the system boundaries for the carbon and environmental footprint of biobased plastic products. It is an introduction and a guidance document to the other parts of the ISO 22526 series.

This document is applicable to plastic products and plastic materials, polymer resins, which are based from biobased or fossil-based constituents.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 472, *Plastics — Vocabulary*

ISO 14020, *Environmental labels and declarations — General principles*

ISO 14040, *Environmental management — Life cycle assessment — Principles and framework*

ISO 14044, *Environmental management — Life cycle assessment — Requirements and guidelines*

ISO 14067, *Greenhouse gases — Carbon footprint of products — Requirements and guidelines for quantification*

ISO 16620-1, *Plastics — Biobased content — Part 1: General principles*

ISO 16620-2, *Plastics — Biobased content — Part 2: Determination of biobased carbon content*

ISO 16620-3, *Plastics — Biobased content — Part 3: Determination of biobased synthetic polymer content*

ISO 16620-4, *Plastics — Biobased content — Part 4: Determination of biobased mass content*

ISO 16620-5, *Plastics — Biobased content — Part 5: Declaration of biobased carbon content, biobased synthetic polymer content and biobased mass content*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 472, ISO 14067, ISO 16620-1, ISO 16620-2, ISO 16620-3, ISO 16620-4, ISO 16620-5 and the following 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/>

ISO 22526-1:2020(E)

3.1 carbon and environmental footprint
life cycle assessment of biobased plastics products with considerations on the specific situations for biobased materials and products on the removal of CO₂ from the air in comparison with fossil-based plastics products

Note 1 to entry: The definition of the term “environmental footprint” used here is different from that of the one used in European Union, which is composed of “Product environmental footprint” and “Organization environmental footprint”.

3.2 material carbon footprint
amount (mass) of CO₂ removed from the air and incorporated into 1 kg of polymer molecule

3.3 process carbon footprint
carbon footprint for the process of converting the starting feedstock/resource to product at factory gate

4 General principles

4.1 The general principles for the development and use of environmental labels and declarations established in ISO 14020 shall be followed for modifications that will fit the special assessment linked to the origin of the material.

4.2 The general principles for guidance for decisions relating to both the planning and the conducting of an LCA in ISO 14040 shall also be followed.

5 Carbon and environmental footprint of biobased plastics

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5.1 Principle

Carbon is the major basic element that is the building block of all plastics, fuels, and even life itself. Therefore, discussions on sustainability and environmental responsibility centre on the carbon footprint of bioplastics using biocarbon content analysis and life-cycle assessment of biobased plastics, in which the fossil carbon is replaced by bio-based carbon, offer the intrinsic value of a reduced carbon footprint and are in complete harmony with the rates and time scale of the biological carbon cycle. Identification and quantification of bio-based content is based on the radioactive C-14 signature associated with (new) biocarbon. Using experimentally determined biocarbon content values, one can calculate the intrinsic CO₂ emissions reduction achieved by substituting petrocarbon with biocarbon — the material carbon footprint. The process carbon footprint arising from the conversion of feedstock to final product is computed using life-cycle assessment methodology. The issue is of managing carbon (carbon-based materials) in a sustainable and environmentally responsible manner. Indeed, the burning issue of today is concern over increasing human-made CO₂ emissions with no offsetting sequestration and removal of the released CO₂. Reducing our carbon footprint is a major challenge. Reduced CO₂ emissions translate to minimizing global warming-climate change problems.

5.2 Material carbon footprint

Switching the manufacturing base (the origins of the carbon) from fossil carbon feedstock to bio-based carbon feedstock offers an intrinsic zero material (i.e. referred to the feedstock of the product) carbon footprint potentiality. This can be seen by reviewing biological carbon cycle. Nature cycles carbon through various environmental compartments with specific rates and time scales, as shown in [Figure 1](#). Carbon is present in the atmosphere as inorganic carbon in the form of CO₂. The current level of CO₂ in the atmosphere is around 380 ppm (parts per million) and is increasing. CO₂ and other greenhouse gases in the atmosphere trap the sun’s heat from radiating back to space, thereby providing a life-sustaining average planet temperature of 7,2 °C (45 °F).