

# Bioplastics – Industry Standards, Certifications & Labels

Bioplastics encompass a family of different materials that are biobased, biodegradable, or both. ‘Biobased’ means plastic wholly or partly derived from biomass. ‘Biodegradable’ refers to a biochemical metabolisation process during which micro-organisms available in the environment convert materials into natural substances such as water, carbon dioxide, and biomass.

The purpose of this document is to communicate relevant standards for the bioplastic industry.

## What are standards and why are they important?

Standardisation represents a powerful initiative led by a diverse group of stakeholders (e.g. industry, academia, public, etc.) to develop criteria, guidelines, procedures and/or requirements for the effective description of products, services, and processes. According to the European Standardisation body (CEN/CENELEC), “a standard is a technical document designed to be used as a rule, guideline or definition. It is a consensus-built, repeatable way of doing something. Standards are created by bringing together all interested parties such as manufacturers, consumers and regulators of a particular material, product, process or service.” Standards support clear and consistent communication, which the public can benefit from, providing confidence in the safety and quality of products, through which businesses can thrive, barriers diminish, and innovation flourishes. Standards set high benchmarks and can safeguard against fraudulent practices in the marketplace. While adherence to standards is generally voluntary<sup>1</sup>, embracing them can assist the market in many ways, including creating a competitive edge, and empowering market participants to lead in their industries.

There are various types of standards, the most common ones being Test methods and Specifications. Test methods describe the procedures and methodologies that need to be followed. Specifications, in contrast, define a set of criteria for pass/fail assessments that establish the requirements for compliance. While these two types of standards are often complementary, it is the Specifications that ultimately define the criteria for compliance. It is

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<sup>1</sup> Unless binding through a relevant regulation.

not possible to "comply" with Test methods, nor can Test methods be used to support claims of conformity.

Today, there is no comprehensive EU legislation specifically harmonising standards for environmental and product marketing claims. Independent standardisation institutes have issued a multitude of standards that serve as a basis for evaluating claims for bioplastics and at times the European Commission has requested harmonised standards to be developed by these institutes.

Key standardisation bodies creating standards are ISO (International Organization for Standardization), CEN (European Committee for Standardisation) and ASTM International (formerly known as American Society for Testing and Materials). In addition, there are many national standardisation organisations, often mirroring the activities of the international committees. The harmonisation of standards on a supranational level, for example on the EU-level through CEN, is valuable insofar as standards apply equally across participants in the same market.



Figure 1-3: Logos of standardisation ISO, CEN, and ASTM International, respectively.

This Fact Sheet focuses on EN standards (created by CEN) and on ISO standards and includes other standards (such as ASTM, AS, NF) which may also be of interest.

Certifications and labels based on standards are also a powerful tool for clearly communicating compliance with established criteria. They are intended to convey trustworthiness and highlight that the labelled product can be preferential to those without such endorsements. By utilising recognised and appropriate standards for certification, products achieve an indisputable label that facilitates easy identification. This paper summarises current relevant standards, certifications, and labels in relation to bioplastics.

## Standards related to biobased content

### *European*

**EN 16640** "Bio-based products – Determination of the bio-based carbon content of products using the radiocarbon method". This standard describes different test methods for measuring the carbon isotope C14 (radiocarbon method). EN 16640 is referenced in EN 16785-1.

**EN 16785-1** “Bio-based products – Bio-based content – Part 1: Determination of the bio-based content using the radiocarbon analysis and elemental analysis”. In addition to C14 (EN 16640), it accounts for other biobased elements in a biobased product through elemental analysis.

**EN 16785-2** “Bio-based products – Bio-based content – Part 2: Determination of the bio-based content using the material balance method”. It describes a material balance method to determine the renewable content of a biobased product.

**EN 17228** “Plastics – Bio-based polymers, plastics, and plastic products - Terminology, characteristics and communication”. This standard includes topics regarding terminology, biobased content reporting templates, life cycle assessment, sustainability, and communication.

### ***International***

**ISO 16620-2** “Determination of bio-based content – Part 2: Test methods for the determination of bio-based carbon content”. This test method determines the biobased carbon content based on C14 measurement and is the most commonly used standard test method of the **ISO 16620** series of standards related to biobased content.

**ASTM D6866** “Standard Test Methods for Determining the Bio-based Content of Solid, Liquid, and Gaseous Samples Using Radiocarbon Analysis”. This standard test method determines the biobased carbon content based on C14 measurement. It is equivalent to ISO 16620-2.

### ***Comparison of the ISO, EN and ASTM standards for the determination of biobased carbon content.***

**ASTM D6866**, **ISO 16620-2** and **EN 16640** are very similar in content and in fact share the same scope. However, they show some differences in the expression of the analytical results.

Biobased carbon content is usually expressed as a percentage of the total carbon content (TC) or of the total organic carbon (TOC).

According to **ASTM D6866** standard, biobased carbon content testing is reported as a percentage of TOC while **EN 16640** standard reports the biobased carbon content as a percentage of the TC. **ISO 16620-2** standard allows for reporting the biobased carbon content either as a percentage of the TOC or of the TC.

## Certification and labels related to biobased content

Certification and the accompanying labels for biobased content of plastics are for example DIN-Geprüft biobased from DIN CERTCO, OK biobased from TÜV AUSTRIA Belgium, and Nederlandse Norm (NEN), based on **EN 16785-1**.



Figure 5-7: DIN-Geprüft biobased from DIN CERTCO, OK biobased from TÜV AUSTRIA Belgium, and Nederlandse Norm (NEN), respectively.

Certification and the accompanying label for biobased content of plastics based on **ASTM D6866** is available from USDA's BioPreferred Program.

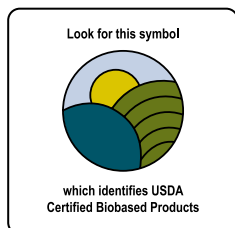


Figure 4: USDA's BioPreferred label

## Standards on Sustainability and Life Cycle Assessment (LCA)

### European

**EN 16751** "Bio-based products – Sustainability criteria." This standard is intended to standardise sustainability criteria of biobased products. (The standard does not include any thresholds or limits and is not suitable for making claims on the sustainability of products or operations<sup>2</sup>.)

**EN 16760** "Bio-based products– Life Cycle Assessment". This standard provides specific LCA requirements and guidance for biobased products based on the **ISO 14040** series.

<sup>2</sup> Note: EUBP does not recommend its use in business-to-business (B2B) communication.

**EN 18027** “Bio-based products. Life cycle assessment.” This standard contains the requirements and guidelines for comparing the life cycles of bio-based products with fossil-based equivalents.

### **International**

**ISO 14040** “Environmental management– Life cycle assessment - Principles and framework”. This standard includes definition and scope, analysis phase, impact assessment phase, interpretation phase, reporting and review, limitations, and other related information relating to LCAs.

**ISO 14044** “Environmental management — Life cycle assessment — Requirements and guidelines”. This standard provides general information regarding Life Cycle Assessment but does not provide provisions for specific product categories such as **EN 16760** which is focused on biobased products.

**ISO 14067** “Greenhouse gases — Carbon footprint of products — Requirements and guidelines for quantification”. This standard provides detailed information on how to measure and report the carbon footprint of products.

**ISO 22526** “Carbon and environmental footprint of biobased plastics”. This standard provides life cycle assessment requirements and guidance to assess impacts over the life cycle of biobased plastic products, materials and polymer resins, which are partly or wholly based on biobased constituents.

## **Certifications and Labels on Sustainability and Life Cycle Assessment (LCA)**

Certification and the accompanying labels are available from a number of certification schemes to prove the sustainability of biomass used in a product, for example ISCC, RSB (Roundtable on Sustainable Biomaterials), or REDcert. It should be known that these schemes are not based on a standardised framework, instead, they are derived from the provisions of a version of the Renewable Energy Directive.<sup>3</sup> Certification on the content of biomass is also available.



Figure 8-10: Labels from ISCC, RSB, and REDcert, respectively.

<sup>3</sup> EU Directive 2009/28/EC, as amended through EU Directive 2018/2001 and EU Directive 2023/2413.

## Standards for Industrial Composting and Anaerobic Digestion

### *European*

**EN 13432**<sup>4</sup> “Requirements for packaging recoverable through composting and biodegradation”. This standard mandates pass/fail criteria for compostable packaging that biodegrades in industrially controlled conditions. These criteria include biodegradation, disintegration, ecotoxicity and chemical analysis.

**EN 14995** “Plastics – Evaluation of compostability – Test scheme and specifications”. This standard is equivalent to **EN 13432**; however, it applies to all plastics, not just packaging.

### *International*

**ISO 17088** “Plastics – Organic recycling – Specifications for compostable plastics”. This standard specifies the procedures and requirements for plastics, and products made from plastics, that are suitable for recovery through organic recycling.

**ISO 18606** “Packaging and the environment – Organic Recycling”. This standard specifies procedures and requirements for packaging that are suitable for organic recycling.

**ASTM D6400** “Standard Specification for Labelling of Plastics Designed to be Aerobically Composted in Municipal or Industrial Facilities”. This standard describes the requirements for plastics and products made from plastics that are designed to be composted in municipal and industrial aerobic composting facilities.

**ASTM D6868** “Standard Specification for Labeling of End Items that Incorporate Plastics and Polymers as Coatings or Additives with Paper and Other Substrates Designed to be Aerobically Composted in Municipal or Industrial Facilities”. This standard describes the requirements for labelling of materials and products (including packaging), wherein a biodegradable plastic film or coating is attached (either through lamination or extrusion directly onto the paper) to compostable substrates and the entire product or package is designed to be composted in municipal and industrial aerobic composting facilities.

**ASTM D8410** “Standard Specification for Evaluation of Cellulosic-Fiber-Based Packaging Materials and Products for Compostability in Municipal or Industrial Aerobic Composting Facilities”. This standard describes the requirements for cellulosic-fiber-based packaging materials and products associated with food, landscape waste, and other compost feedstocks, which are intended to be composted under aerobic conditions in municipal and industrial composting facilities.

**AS 4736** “Biodegradable plastics – Biodegradable plastics suitable for composting and other microbial treatment”. This standard provides the criteria against which plastics

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<sup>4</sup> NOTE: The Regulation (EU) 2025/40 (“PPWR”) will prompt CEN to develop and/or update standard(s) for compostable packaging, including considerations for anaerobic digestion.

materials that are to be biodegraded in industrial anaerobic composting facilities, are assessed.

## Certification and Labels for Industrial Composting and Anaerobic Digestion

Certifications and labels for industrially compostable products include the Seedling, OK Compost Industrial, and DIN-Geprüft Industrial Compostable. Other national-level labels exist as well, such as the CIC in Italy. BPI (Biodegradable Products Institute) also provides certification and a label for industrially compostable products.



Figure 11-14: Labels for industrial compostability: Seedling (EUBP), OK Compost Industrial (TÜV AUSTRIA Belgium), DIN-Geprüft Industrial Compostable (DIN CERTCO), and BPI's label for industrial compostability, respectively.

## Standards for Home Composting<sup>5</sup>,

### European

**EN 17427** “Packaging – Requirements and test scheme for carrier bags suitable for treatment in well-managed home composting installations”. This standard describes the testing scheme and requirements for carrier bags of any materials that are considered to be suitable for incorporation into well-managed home composting installations for non-commercial purposes.

**EN 17428<sup>6</sup>** “Packaging – Determination of the degree of disintegration under simulated home composting conditions”. This standard describes a laboratory scale test method for determining the degree of disintegration of test items when exposed to well-managed home composting conditions by the weight evaluation method.

<sup>5</sup> Home composting should only be considered as a supplementary approach to industrial composting, which represents a circular type of composting that generates secondary products and raw materials, like organic fertiliser or bio-waste, used as feedstock for industrial products. The EUBP Position paper “Home composting of compostable bioplastics” can be found at [www.european-bioplastics.org](http://www.european-bioplastics.org).

<sup>6</sup> A new standard for home composting of specific types of packaging will be created as outlined in Article 9, paragraph 6 of the PPWR.

**NF T51-800** “Plastics — Specifications for plastics suitable for home composting”. This standard describes the testing scheme and requirements for plastic and plastic products that are considered to be suitable for incorporation into home composting installations.

### *International*

**AS 5810** “Biodegradable plastics – Biodegradable plastics suitable for home composting”. This standard describes the testing scheme and requirements for plastic and plastic products that are considered to be suitable for incorporation into home composting installations.

## Certification and Labels for Home Composting

Certification and labels for home compostability include OK Compost HOME, DIN-Geprüft Home Compostable, DINplus Home Compostable Carrier Bags, and BPI Compostable Commercial & Home<sup>7</sup>.

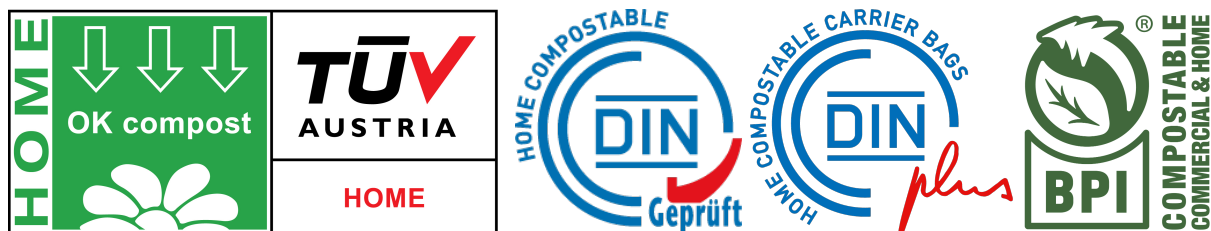


Figure 15-18: Labels for home compostability: OK Compost HOME, DIN-Geprüft Home Compostable, DINplus Home Compostable Carrier Bags, and BPI Compostable Commercial & Home, respectively.

## Standards for Biodegradability in Soil

### *European*

**EN 17033** “Biodegradable mulch films for use in agriculture and horticulture — Requirements and test methods”. This standard specifies the requirements for biodegradable mulch films used in agriculture and horticulture, which are designed to biodegrade in soil without causing harm to the environment.

### *International*

**ISO 17556** “Determination of the ultimate aerobic biodegradability of plastic materials in soil by measuring the oxygen demand in a respirometer or the amount of carbon dioxide evolved”. This standard describes the test method for assessing the ultimate aerobic biodegradability of plastic materials in soil.

<sup>7</sup> BPI Compostable Commercial & Home is expected to be launched in December 2025.

**ISO 23517** “Plastics – Soil biodegradable materials for mulch films for use in agriculture and horticulture – Requirements and test methods regarding biodegradation, ecotoxicity and control of constituents”. This standard specifies test methods and evaluation criteria to assess biodegradable plastic materials used to produce mulch films but is written to be applicable also to other potentially soil biodegradable plastic products (for example drip tape, twine, clips, and plant pots).

## Certification and Labels for Soil Biodegradability

Certification and labels for soil biodegradability include OK biodegradable SOIL from TÜV AUSTRIA Belgium. DIN CERTCO offers the DIN-Geprüft Biodegradable in Soil certification in accordance with **EN 17033** and/or **ISO 23517**.



Figure 19-20: Labels for soil biodegradability OK biodegradable and DIN-Geprüft Biodegradable in Soil, respectively.

Soil-biodegradable mulch films<sup>8</sup> may carry the CE marking, which means that they have been additionally assessed to meet the high safety, health, and environmental protection requirements of the European Union and can be traded on the extended Single Market in the European Economic Area (EEA) without restrictions.<sup>9</sup>



Figure 21: CE marking

<sup>8</sup> This is also the case for soil-biodegradable coating agents and water retention polymers, as from 17 October 2028 only.

<sup>9</sup> For more information refer to EUBP's Q&A on soil-biodegradable mulch films: [https://docs.european-bioplastics.org/publications/EUBP\\_Q\\_A\\_Certified\\_soil\\_biodegradable\\_mulch\\_films.pdf](https://docs.european-bioplastics.org/publications/EUBP_Q_A_Certified_soil_biodegradable_mulch_films.pdf)

## Standards for Biodegradability in Marine Environments

### *European*

No European standards currently exist for marine biodegradability. However, the European standardisation bodies have adopted most of the ISO standards below.

### *International*

**ISO 16221** “Water quality – Guidance for determination of biodegradability in the marine environment”. This standard specifies five methods for determining the ultimate aerobic biodegradability of organic compounds in the marine environment by aerobic microorganisms in static aqueous test systems.

**ISO 18830** “Plastics – Determination of aerobic biodegradation of non-floating plastic materials in a seawater/sandy sediment interface – Method by measuring the oxygen demand in closed respirometer”. This is a standard test method for determining the aerobic biodegradation of non-floating plastic materials in a seawater/sediment interface.

**ISO 19679** “Plastics – Determination of aerobic biodegradation of non-floating plastic materials in a seawater/sediment interface – Method by analysis of evolved carbon dioxide”. This standard determines the degree and rate of aerobic biodegradation of plastic materials by measuring the evolved carbon dioxide (CO<sub>2</sub>).

**ISO 22403** “Plastics – Assessment of the intrinsic biodegradability of materials exposed to marine inocula under mesophilic aerobic laboratory conditions – Test methods and requirements”. This standard provides pass/fail criteria for biodegradability in seawater and includes test methods and requirements of the inherent aerobic biodegradability; however, it is clearly stated that this document is not suitable for 'marine biodegradable' claims.

**ISO 22404** “Plastics – Determination of the aerobic biodegradation of non-floating materials exposed to marine sediment – Method by analysis of evolved carbon dioxide”. This standard describes a laboratory test method to determine the degree and rate of aerobic biodegradation level of plastic materials.

**ISO 22766** “Plastics – Determination of the degree of disintegration of plastic materials in marine habitats under real field conditions”.

**ISO 23977-1** “Plastics – Determination of the aerobic biodegradation of plastic materials exposed to seawater – Part 1: Method by analysis of evolved carbon dioxide”.

**ISO 23977 – 2** “Plastics — Determination of the aerobic biodegradation of plastic materials exposed to seawater — Part 2: Method by measuring the oxygen demand in closed respirometer”.

**ASTM D6691** “Standard Test Method for Determining Aerobic Biodegradation of Plastic Materials in the Marine Environment by a Defined Microbial Consortium or Natural Sea Water Inoculum”. This standard determines the degree and rate of aerobic biodegradation of plastic materials exposed to pre-grown population of at least ten aerobic marine microorganisms of known genera or the indigenous population existing in natural seawater.

**ASTM D7473** “Standard Test Method for Weight Attrition of Plastic Materials in the Marine Environment by Open System Aquarium Incubations”. This standard determines the weight loss as a function of time of non-floating plastic materials when incubated under changing, open, marine aquarium conditions, representative of aquatic environments near the coasts and near the bottom of a body of water in the absence of sunlight.

## Certification and Labels for Biodegradability in Marine Environments

Certification and labels for marine biodegradability include OK biodegradable MARINE from TÜV AUSTRIA Belgium. DIN CERTCO offers the DIN-Geprüft Biodegradable in Marine Environment and DINplus Biodegradable in Marine Environment according to ISO 22403. However, the certification schemes make a clear distinction between the certification of the claim and the authorisation to communicate about it.

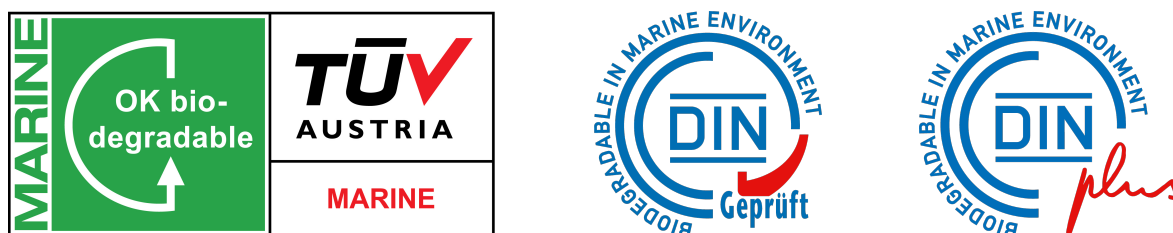


Figure 22-24: Labels for marine biodegradability OK biodegradable MARINE, DIN-Geprüft Biodegradable in Marine Environment, and DINplus Biodegradable in Marine Environment, respectively.

## Standards for Bioplastics Communication

### European

**EN 16848** “Bio-based products - Requirements for Business-to-Business communication of characteristics using a Data Sheet”.

**EN 16935** “Bio-based products - Requirements for Business-to-Consumer communication and claims”.

### ***International***

**ISO 14020** “Environmental statements and programmes for products — Principles and general requirements”.

**ISO 14021** “Environmental labels and declarations — Self-declared environmental claims (Type II environmental labelling)”.

**ISO 14024** “Environmental labels and declarations — Type I environmental labelling — Principles and procedures”.

**ISO 14025** “Environmental labels and declarations — Type III environmental declarations — Principles and procedures”.

**ISO 14063** on “Environmental management – Environmental communication — Guidelines and examples”.

## **Closing remarks**

Bioplastics are a large family of plastic materials. Many of them are new innovative materials with different properties and functionality profiles. With the large variety of available plastics, including bioplastics, and the complexity due to the various applications and use cases, clear and precise communication is crucial.

In terms of the circular economy, standards like the ones listed in this document offer a first basis for assessing bioplastics and providing sound clear communication on corresponding claims - a prerequisite for successful market performance.

Certifications support the practical implementation of the reference standards, and labels (when based on standards) provide visibility and a clear communication tool.

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### **About European Bioplastics**

European Bioplastics (EUBP) is the European association representing the interests of the bioplastics industry along the entire value chain. Its members produce, refine, and distribute bioplastics i.e. plastics that are biobased, biodegradable, or both. More information is available at [www.european-bioplastics.org](http://www.european-bioplastics.org)