

Certification of bioplastics

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It is difficult to imagine the modern world without plastics; however these versatile materials are often seen to be in conflict with an increasing focus on environmentally friendly lifestyles leading to a search for more acceptable alternative materials. One of the most visible and promising solutions are bioplastics (see definition below). As bioplastics are not readily distinguishable from regular plastics, it is necessary to provide a mechanism ensuring their quality and labeling. This is done through a standardization and certification system

Bioplastics: plastics that are biodegradable and/or biobased. In medicine the term can signify biocompatibility – the compatibility of plastics with human or animal tissues.

Certificate: an official document attesting a certain fact; certification, attestation (Oxford English Dictionary).

Certification: A procedure by which a third party gives written assurance that a product, process or service conforms to specified requirements. (EN 45020:2006 Standardization and related activities – General vocabulary and DIN EN ISO/IEC 17000)

Standards

Throughout the evolution of plastics, there have been different claims relating to their environmentally effects. Many of these claims, however, are not based on anything as credible as the results of certified laboratories. To provide generally applicable science based norms standardization organizations worked with experts from different fields of study to create standards for the field of bioplastics. Standards are a set of rules that a product must comply with before it can obtain a certain label. The most important standardization bodies in the world are:

- ASTM – American Society For Testing and Materials (USA)
- ISO – International Organization for Standardization (international)
- CEN – European Committee for Standardization (European Union)

CEN (European Committee for Standardization) is an officially recognized standardization body within the European Union. CEN standards are binding for EU countries, and the standards are transferred to individual national standardization structures. This facilitates manufacturers' entry to the European market once they comply with the standard requirements. The first standard in the field of composting and biodegradation of plastics was issued by DIN in 1997 (DIN V54900) and was later replaced by the European standard EN 13432.

Although each standardization organization has its own standards, they are mutually harmonized. European and American certification organizations both recognize each other's standards in the field of polymers, plastics and compostable products. When a certificate is issued (e.g. based on EN 13432), the manufacturer can easily obtain a certificate based on other standards. The above-mentioned standards are very similar to one another, only differing in certain additional analyses that have to be performed. This way it is possible to avoid duplication of analyses, which often entails additional costs and administrative burdens.



A number of standards issued by all main standardization organizations relate to bioplastics. The main focus is devoted to compostability and the content of renewables.

Certification

A certificate is an official document used to guarantee a specific characteristic. In the case of biodegradable polymer materials, a certificate is an attestation that a product is degradable under the conditions specified in the standard. In the case of materials made from renewable resources, the certificate proves that the product contains a specific percentage of renewable content.

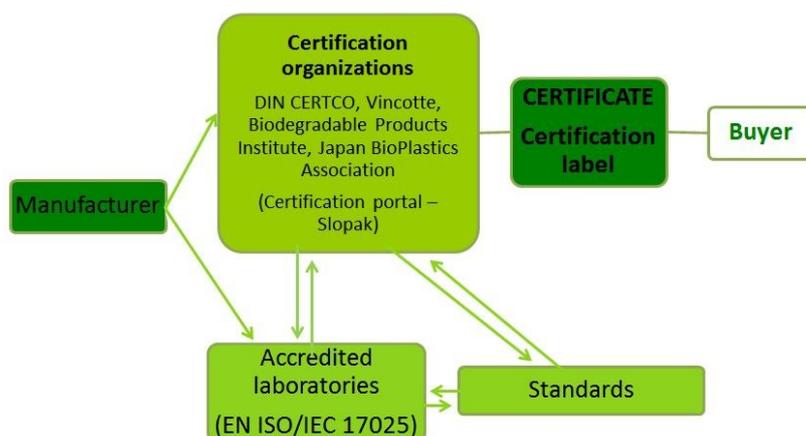
Certification is a process of obtaining a certificate; a process through which a third party issues a written recognition that a product, process or service complies with specific requirements (regulations and standards) under which a product, process or service is certified.

Certification organizations for bioplastics

The most important certification organizations in Europe are DIN CERTCO and Vinçotte. Both issue certificates relating to bioplastics. DIN CERTCO issues certificates for products made from compostable materials based on four standards that are very similar to one another. In addition to this certificate, Vinçotte also offers certificates for plastics suitable for home composting and for plastics that are biodegradable in soil and in water. Both organizations certify materials made of renewable resources based on the ASTM D6866 standard. Certificates for biodegradable products are also issued by the Biodegradable Products Institute (BPI) in the United States, the Japan BioPlastics Association in Japan as well as by other widely used certification organizations.

DIN CERTCO is currently developing a certification scheme for home- and garden compost based on the Australian standard as well as a combined logo to combine different characteristics (biobased, industrial compostable, home- and garden compostable,...).

Certification process



The process of obtaining a certificate is completely voluntary. The manufacturer contacts a certification organization with an application containing information about the material and the product that they wish to certify. The certification organization then provides a list of laboratories that have valid accreditation to perform the testing methods required by the standard. The laboratories are attested by the certification organization and an independent inspector, and receive accreditation in accordance with the EN ISO/IEC 17025 standard. In general, this means that the laboratory is



qualified to perform the analyses for which it is accredited. Once the analyses are completed the laboratory sends the testing report to the certification organization, where experts review the results. Based on positive results, the certification organization issues the manufacturer with compliance certificate for products and licenses them to use the certification labels.

Other statements, even if they are called certificates (statement by the manufacturer about the product), which are not based on results of a certified biodegradability analysis that was performed by an accredited laboratory, are not valid.

A valid certificate shall contain a label of the certification authority, it should state the standards on which the certificate is based, and a registration number. The validity of the certificate can normally be verified on the certification organization website.

Certification of compostable products

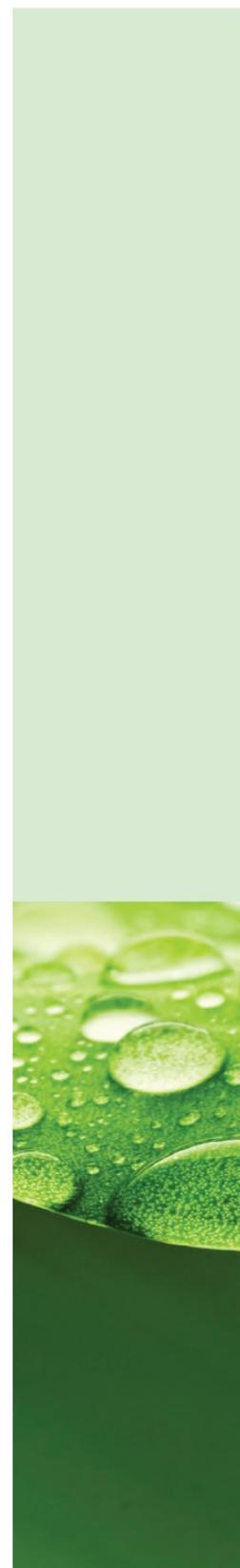
Compostability is a characteristic of packaging or plastics that enable them to decompose during the composting process.

The EN 13432 standard requires: a) testing on ultimate biodegradability; b) testing on compostability; c) testing on plant ecotoxicity; d) and chemical characterization. These conditions are based on pass-fail values that uniquely distinguish between compostable and non-compostable packaging.

Biodegradability, eco toxicity, compostability and the content of heavy metals are the parameters that apply to materials. Materials, intermediates and additives can obtain a registration—an attestation that they are compliant with a standard. They are not entitled to the use of a certification label but advertisement is now possible according to Trademark rules and Trademark usage guidelines. The certificate, certification number and certification label can only be applied to a finished product, as an important factor for obtaining the certificate is **degradability**, which is linked to the finished product and dependent on its physical form (e.g. thickness). A certificate is assigned for a period of three years, during which verification testing is performed on the product once per year. For material, intermediates and additives notification of registration is valid for six years and undergoes a verification testing every second year.

Only final products shall be certified. Only final products are allowed to be labeled with the certification label proving that a product is compostable but advertising is now possible also for materials, intermediates and additives according to Trademark rules and Trademark usage guidelines.

Each product decompose during the biological waste decomposition process in accordance with specifically defined criteria, and should not have a negative effect on the composting process and the quality of the resulting compost.



Main certification organizations and their certificate labels for biodegradable plastics

COUNTRY	ORGANIZATION	STANDARDS	CERTIF. LABEL
CERTIFICATES ATTESTING COMPOSTABILITY			
Germany	DIN CERTCO	EN 13432, ASTM D6400, ISO 17088, EN 14995	
Germany	DIN CERTCO	EN 13432, ASTM D6400, ISO 17088, EN 14995 + if applicable AS 4736	
Germany	DIN CERTCO	AS 5810	
Belgium	Vinçotte	EN 13432, EN 14995	
Belgium	Vinçotte	Special Vinçotte process based on EN 13432 at low temperatures	
USA	Biodegradable products Institute	ASTM D6400	
CERTIFIKATES ATTESTING OTHER BIODEGRADABILITY CHARACTERISTICS			
Belgium	Vinçotte	Special Vinçotte process based on ISO 14851 or ISO 14852	
Belgium	Vinçotte	Special Vinçotte process based on ISO 17556 or ASTM D 5988 or ISO 11266	

Since April 2012, the Belgian certification organization, Vinçotte, has the right to award the Seedling logo that is also used by DIN CERTCO. This is an important step towards clarifying the situation in the area of marking compostable products within Europe. The Seedling logo is owned by European Bioplastics.



The procedure for certifying biobased materials, additives and products from renewable materials

Traditional plastics are made from fossil resources, which is not a sustainable solution. This is why the development of plastics is turning towards using renewable resources. Using plastics made from renewable resources reduces the negative environmental impact of the polymer industry as it reduces the consumption of fossil-based resources. There are currently no regulations that would require plastics manufacturers to disclose the presence of renewable resources within a product, however there is increased interest in the industry and among consumer to create and buy environmentally friendly products.

Determination of biobased content is based on the principle of measuring the activity of the ¹⁴C isotope. Materials - both those based on fossil resources as well as those based on renewable resources - are mainly composed of carbon that can be found in three isotopes in nature: ¹²C, ¹³C, and ¹⁴C. The ¹⁴C isotope is unstable, decays slowly and is naturally present in all living organisms. The activity of ¹⁴C in living organisms is very stable since it is related to the concentration of ¹⁴C in the environment which is close to constant. When the organism is deceased, it stops absorbing the ¹⁴C isotope from the environment. From that moment onward the ¹⁴C concentration starts to decrease due to natural decay of the isotope. The half-life of ¹⁴C is known to be 5 700 years. This is not noticeable in the range of a human life, but within 50,000 years the content of ¹⁴C decreases to a level that cannot be measured. This means that the concentration of ¹⁴C in fossil resources is negligible.

ASTM D6866 standard using the above principle is the basis for certifying materials, intermediate products, additives and products based on renewable resources.

Main certification organizations and their certificate labels for plastics based on renewable resources

COUNTRY	ORGANIZATION	BIOBASED CONTENT	CERTIF. LABEL
Germany	DIN CERTCO: Additional requirement: volatile solids > 50 % (mass)	20 – 50 %	
		50 – 85 %	
		> 85 %	
Belgium	Vinçotte	20 – 40 %	
		40 – 60 %	
		60 – 80 %	
		> 80 %	



Benefits of certification

There are various benefits to certification of products and materials. A certificate distinguishes bioplastics from traditional plastics and proves that a material conforms to standard requirements. This is a clear advantage over other products that do not have the certificate.

Products that bear certification logos give consumers a beyond-doubt proof of product/material properties. The certification logo for compostable plastics enables simpler sorting of waste and correct handling and it provides a guarantee about the product's quality.

Distributors of materials, additives, intermediates and final products need to submit their information about certificates, certification numbers and registration documents. If a material is registered as compostable, it is much easier to receive a certificate for the finished product. A valid certificate includes information about the manufacturer and the product, certification number and the logo of the certification organization that issued the certificate.

A certified final product should be marked with a certification logo which shall include the registration number. Depending on the Usage Guidelines of these logos B2B and B2C marketing is possible. Customers will get those information from the certification bodies.

Conclusion

Certification of bioplastics is important as it gives choice to the consumer as well as provides information about the correct handling of the product after it is used.

To prevent misleading statements and false information found in this area ("Green-washing"), expert groups have developed standards to govern this field. Standards are sets of requirements that a product shall conform to. They also prescribe methods for analysis and threshold values for individual parameters. Analyses are performed by laboratories nominated by certification organizations and their test results are used by the certification bodies for assessment and to award certification labels that can be used on final products. The certification logo is proof that a product conforms to specific requirements and is an undeniable advantage compared to products without the logo.

Certification in the PLASTiCE project

Within WorkPackage 4, Task 4.5. the introduction of a certification system for compostable plastics is planned for Slovenia (Slovak) and Slovakia. The introduction is modeled on the cooperation between COBRO, Poland and DIN CERTCO, Germany. The process, once implemented, will be made available to other countries.



LINKS

DIN CERTCO (Europe, Germany)

http://www.dincertco.de/en/products_made_of_compostable_materials.html

http://www.dincertco.de/en/din_geprueft_biobased_for_more_sustainability.html

Vinçotte (Europe, Belgium)

<http://www.okcompost.be/en/home/>

Biodegradable Products Institute (USA)

<http://www.bpiworld.org/>

Polish Packaging Research and Development Center

[http://www.cobro.org.pl/index.php?option=com_content&view=article&id=154%](http://www.cobro.org.pl/index.php?option=com_content&view=article&id=154%3Acertyfikacja-wyrobow-przydatnych-do-kompostowania&catid=34&Itemid=75&lang=en)

[3Acertyfikacja-wyrobow-przydatnych-do-kompostowania&catid=34&Itemid=75&lang=en](http://www.cobro.org.pl/index.php?option=com_content&view=article&id=154%3Acertyfikacja-wyrobow-przydatnych-do-kompostowania&catid=34&Itemid=75&lang=en)

European Bioplastics –Industrial Composting Factsheet (pages 6-8)

<http://en.european-bioplastics.org/wp-content/uploads/2011/04/fs/>

[FactSheet_Industrial_Composting.pdf](http://en.european-bioplastics.org/wp-content/uploads/2011/04/fs/FactSheet_Industrial_Composting.pdf)

Additional information on sustainability aspects of plastics is available at
www.plastice.org.

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