SULAPAC

SULAPAC COMPOSTABILITY

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Compostability

One way to recycle biodegradable materials is through organic recycling, which includes industrial composting and anaerobic digestion. Industrial composting is one of the potential end-of-life options for Sulapac.

Organic recycling is rapidly increasing in volume, but the regulation is not keeping up with the change. Although the infrastructure exists worldwide, processes related to organic recycling are not standardized. In order to provide some clarity on the topic and support our clients with the communication of the compostability claim, we have gathered this brief guide on compostability.

According to EU legislation (Directive 94/62/EC) industrial composting and anaerobic digestion are considered a specific form of material recycling. Requirements for the compostability of packaging and packaging materials are specified in The European Standard EN 13432. The Seedling certificate is an example of an international certificate that complies with the standard and can be used as an independent proof of the industrial compostability of a product. However, Seedling or similar certificate is not obliged by any legislative authority in Europe.

Compared to many other recycling methods, the technology for industrial composting is widely available in many countries. By 2023 separate biowaste collection is set to be mandatory in the EU. Biodegradation under controlled conditions fits into a circular economy through the idea of closing the biological cycle. The organic component is recycled in a way that mimics nature. A major part of the material is turned into CO2 or CH4, and water, and the remaining mineral component, including nutrients, is recycled back to compost or digest.

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Industrial composting process and its benefits

The outcomes of industrial composting process are CO2, water and compost, which can be used for enhancing the quality of soil.

Industrial composting is an aerobic (oxygen present) process which takes place in controlled conditions. The composting period is governed by a number of factors including temperature (typically 50–60°C), moisture, amount of oxygen, particle size, the carbon-to-nitrogen ratio and the degree of turning involved. Generally, effective management of these factors will accelerate the composting process. The conditions in industrial composting differ from those of home composting, in which the temperature, for example, tends to be lower. The outcomes of industrial composting process are CO2, water and compost. The compost includes nutrients, and can be used, for example, in agriculture to enhance the quality of soil.

The benefits of industrial composting are many. For example, no chemicals are needed in the process. Organic recycling also contributes to greenhouse gas savings, for example, via replacement of mineral fertilizers and carbon sequestration in soil.

From biowaste bin into the field. A Finnish example of the industrial composting system:

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The European standard

The European standard EN 13432 defines the requirements for industrially compostable packaging and includes both the criteria and a test scheme.

The European standard EN 13432 defines the requirements packaging has to meet in order to be processable by industrial composting. It includes the test scheme and evaluation criteria for the compostability and anaerobic treatability of packaging and packaging materials in controlled waste treatment plants. EN 13432 can be applied to all packaging materials. For other than packaging applications the standard EN 14995 is applied. The technical contents of EN13432 and EN14995 are identical.

EN 13432 is not applicable to home composting in which the conditions, such as the temperature, differ from those of industrial composting. As a result, packaging recognized as compostable according to EN 13432 cannot automatically be considered to be suitable for home composting. EN 13432 does not take into account packaging waste which may end up in the environment, through uncontrolled means, i.e. as litter.

According to the EN 13432 standard, a packaging claimed to be compostable must fulfill the following criteria:

- **Contains a minimum of 50% volatile solids**

Volatile solids mean ‘the amount of solids obtained by subtracting the residues of a known amount of test material or compost after incineration at about 550 °C from the total dry solids content of the same sample. The volatile solids content is an indication of the amount of organic matter.

- **Is inherently and ultimately biodegradable as demonstrated in laboratory tests**

Aerobic biodegradation has been defined as ‘breakdown of an organic chemical compound by naturally occurring micro-organisms in the presence of oxygen to CO2, water and mineral salts of any other elements present

(mineralization) and new biomass. In aerobic biodegradation tests the sample's CO2 production level must reach 90% of that of the reference material in 6 months.

- **Has no negative effect on the biological treatment process**

Any negative effects of the test material on the composting process can be detected by direct comparison of process parameters in reactors with and without test material.

- **The packaging or packaging component which is intended for entering the biowaste stream must be recognizable as compostable or biodegradable by the end user by appropriate means**

To ensure correct disposal, packaging intended for the biowaste stream must be clearly recognizable as compostable or biodegradable by the end user. This can be achieved through standardized labels, symbols, or clear textual guidance directly on the packaging. Without such identification, even compostable materials risk being discarded improperly, undermining their environmental benefits.

- **Does not contain hazardous substances, e.g. heavy metals**

The concentration of the following substances needs to be measured and shall not exceed the maximum values defined: zinc, copper, nickel, cadmium, lead, mercury, chromium, molybdenum, selenium, arsenic, fluorine.

- **Disintegrates in a biological waste treatment process**

With the term disintegration the standard refers to 'the physical falling apart into very small fragments of packaging and packaging materials. After 12 weeks no more that 10% of the original dry weight of test material fails to pass a 2 mm fraction sieve.

- **Has no negative effect on the quality of the resulting compost**

The compost quality shall not be negatively affected by the addition of the packaging defined by the following physical-chemical parameters: volumetric weight (density), total dry solids, volatile solids, salt content, pH, the presence of total nitrogen, ammonium nitrogen, phosphorus, magnesium and potassium.

Possible environmental risks attached to the end compost must be evaluated for example, by determination of the ecotoxicological effects of the biodegradation products or by performing ecotoxicological tests with compost produced with and without packaging material and comparison of the test results. Following the OECD Guideline for testing of chemicals 208 "Terrestrial Plants, Growth Test" the sample compost and the blank compost are being compared on the basis of germination numbers (number of grown plants) and the plant biomass. The growth rate in the test compost must be higher than 90% of that of blank compost.

Frequently Asked Questions About Compostable Packaging

- **What applies to a partly compostable package?**

The standard outlines that in case of a packaging formed by different components, some of which are compostable and some other not, the packaging itself, as a whole is not compostable. However, if the components can be easily

separated by hand before disposal, the compostable components can be considered and treated as such, once separated from the non-compostable components.

- **What about the contents of the packaging?**

If in any case the product filled into a compostable packaging could remain in parts or as a whole in the packaging after the normal use, the products should by themselves be compostable and neither toxic nor hazardous.

Seedling and BPI – certificates for compostability

An example of a third-party certification that verifies that a product is industrially compostable and helps to communicate about it.

Seedling

Seedling is an independent third-party certification that verifies the compostability of a product in an industrial composting plant in accordance with the European standard EN 13432. The Seedling certificate does not cover home composting.

The certification process is conducted by independent certifiers DIN CERTCO (Germany) and Vinçotte TÛV Austria (Belgium). In order to be certified compostable, the product must undergo a stringent test regime carried out by recognised independent accredited laboratories. The certification process includes the following procedures: 1. chemical characterization of the product, 2. testing of ultimate biodegradability, 3. disintegration under practice-relevant composting conditions, 4. definition of the quality of the compost (ecotoxicity test on two plant species), and 5. infrared spectrum recording to enable the identification of the material. The evaluation criteria as well as test circumstances and methods comply with the EN 13432. To ensure continuous compliance with the certification requirements regular inspections take place.

Products that have successfully passed the strictly defined and documented tests and been formally certified by one of the certification bodies may feature the Seedling logo, a registered trademark owned by European Bioplastics. A product marked with the Seedling logo is ideally disposed of in the organic waste collection. However, if no separate collection of organic waste is available, the product may be disposed of in the residual waste bin. More detailed information on regional specifications can be obtained from the respective municipalities or waste management authorities. Since the establishment of the Seedling certificate approximately 780 products, 110 intermediates and 330 materials have been certified, including the Sulapac Universal Flex 30 Low Flow (registration No 7W0496), Sulapac Flow 1.7 / 1.8 (registration No 7W0591) and Universal Flex 30 High Flow materials (registration No 7W0981). We are in the process of obtaining the certificate also for our other materials.

BPI

BPI is an independent third-party certification in the USA that verifies the compostability of a product in an industrial composting plant in accordance with the ASTM standards. Similar to the European counterpart EN 13432, the

standard ASTM D6400 consist of five parts, as described above. More details on the BPI Certification process, including testing and the certification scheme, can be found in the Get Certified section of BPI website. BPI is the only third-party verification of ASTM standards for compostable products in North America.

The BPI Certification process is rigorous and ensures that items can be cycled back into the soil safely at a commercial composting facility. This is done through testing to ASTM standards and applying additional restrictions on carcinogens and fluorinated chemicals. Use of the BPI Certification Mark is highly restricted and earning the right to display it is the culmination of the BPI Certification program. It provides assurance that compostability claims have been verified by a trusted third party, and it is the foundation of clear and consistent direction for end-users and consumers who are responsible for making decisions at the point of disposal. You can find the listing of all BPI certified Sulapac materials from the Biodegradable Products Institute website. Read more about BPI's Value of Certification.

Contact our experts to get certificates and further information.

Figure 1: Biodegradation of Sulapac Jar.

Compostability testing of Sulapac® materials

Sulapac material is industrially compostable in accordance with the EN 13432, as shown in the test results of an accredited testing laboratory OWS.

Sulapac products have been tested by independent, accredited testing laboratory OWS following the test regime applied in the Seedling certification process, in accordance with the EN 13432. OWS is a Belgium based laboratory recognized by all certification bureaus worldwide working in the field of biodegradability and compostability.

According to the EN 13432 a controlled pilot-scale test shall be used as the reference test method. A test in a full-scale treatment facility, may, however, be accepted as equivalent. The OWS tests for Sulapac products have been carried out in a pilot-scale setting. The test results show that Sulapac® conforms with the criteria set for compostable packaging as defined in EN 13432 and thus are suitable for composting in industrial compost. Sulapac®'s test results are as follows:

- **Volatile solids**

With a volatile solids content of 98.9% Sulapac easily fulfills this requirement. A minimum of 50% of volatile solids is being required by EN 13432.

- **Hazardous substances**

The heavy metal and fluorine levels of Sulapac® colours Natural, First Snow, Warm Granite, Wild Cloudberry and Summer Strawberry lay well below the maximum levels set in EN 13432.

- **Biodegradability**

Sulapac® fulfills the biodegradability requirements of EN 13432. EN 13432 requires that in 6 months the sample's CO2 production level has to reach 90% of that of the reference material.

- **Disintegration**

Not a single piece of Sulapac material was found after sieving with 2mm sieve after 12 weeks of composting. EN 13432 requires that no more that 10% of the original dry weight of test material fail to pass the sieve.

- **Quality of end compost**

No negative effect on emerge or growth of the plants grown in the test composts (25% and 50% concentrations) was observed. According to EN 13432 the growth rate in the test compost must be higher than 90% of that of blank compost.

Figure 2: The ecotoxicity tests to ensure the quality of the end compost of Sulapac® were performed using 2 plant species: barley and cress. No negative effect on the germination numbers or the plant biomass for either barley plants or cress plants was observed.

In addition to the pilot-scale compostability simulations by OWS, tests in full-scale treatment facility have been carried out by Kekkilä. The thermophilic phase of the composting process takes place inside concrete tunnels (6m x 21m) under controlled conditions. Temperature and the amount of oxygen is measured continuously, and the mass is rotated weekly. To enable the visual examination of biodegradation of the Sulapac® jars they were placed into perforated steel tubes (12cm x 40cm) together with compost mass. Steel tubes were placed inside composting

tunnel together the normal waste mass. Steel tubes were collected in approximately one-month intervals and the biodegradation of the jars evaluated. The industrial-scale testing confirmed that Sulapac® comply with EN 13432 and is suitable for industrial composting

According to EN 13432 a packaging material demonstrated to be compostable in a particular form, shall be accepted as being compostable in any other form having the same or a smaller mass to surface ratio or wall thickness. The compostability tests have been conducted with Sulapac products with a wall thickness of 4,5mm. To validate the compostability of an item with a larger maximum thickness, a disintegration test must be rerun.

Communicating about the compostability

A product can be claimed ‘compostable’, if it meets the criteria in the EN 13432. However, there are a few things to bear in mind.

According to EU legislation a product can be claimed ‘compostable’, if it has been properly tested in accordance with the EN 13432 standard and all the criteria set in that standard have been met. No third-party certification is required.

Communication of the compostability claim is currently not regulated or standardized, which on the other hand gives freedom for creativity but also adds the risk of misinterpretations and confusion. Therefore, clarity and transparency should be at core when using the compostability claim in communications and marketing.

Although ‘compostability’ is a term used for products which can be processed in an industrial composting plant, it is sometimes used to refer to home composting and even to biodegradation in natural environment. Hence, to avoid misunderstandings it is recommended to use the more specific term ‘industrially compostable’. To add even more clarity ‘industrially compostable in accordance with EN 13432’ can be used.

Certifying your product

A third-party certificate such as the Seedling may be seen as advantageous in communicating the compostability claim and adding credibility. However, practice has shown that even though the Seedling certificate is appreciated in many contexts, not all stakeholders recognize it. In some context the EN 13432, in fact, is more commonly known.

Seedling certificate is product-specific, meaning that any application of the product, e.g. filling of a jar with cosmetics substance, requires separate testing of the jar. However, references to items that already have been certified may significantly lower the testing expenditure, and the process for certifying a product manufactured solely of materials already registered with no further additives is more straightforward.

For products, e.g. shopping bags, cutlery and clothing hangers, the certification is valid for three years and includes the right to use the “Seedling” mark. The certification process itself may take up to 12 months.

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