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UL ECV 1497

**Environmental Claim Validation Procedure (ECVP) for Biodegradability and
Compostability Correlated to Managed Waste Disposal Methods**

First Edition

February 23, 2023

Summary of Topics

This is the First Edition of the Environmental Claims Validation Procedure for Biodegradability and Compostability Correlated to Managed Waste Disposal Methods, UL ECV 1497, dated February 23, 2023.

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INTRODUCTION

1 General

1.1 This procedure describes the validation of an environmental claim for a product's biodegradability in a managed landfill or industrial composting facility. The product under consideration needs to fulfill certain criteria in its manufacturing process, material and product composition, as well as intended or probable disposing method to evaluate the substantial environmental benefit. Main requirements for the framework are as follows:

- Product mainly contains bio-based carbon greater than 50 % biobased carbon using test methods found in Section [6.3.1](#)
- Product does not contain hazardous chemicals → to be proven by respective test method (Section [6.3.2](#))
- Product contains enough organic carbon material → to be proven by respective test method for volatile solids (Section [6.3.3](#))
- Material is biodegradable in managed landfill or industrial compostable or suitable to be used in biogas generation → to be proven by respective test method (Section [6.4](#) to [6.6](#))
- Residual of product after biodegradation testing is not adverse effect on the environment → to be proven by respective test methods (Section [6.8](#))
- At the material's end-of-life, managed landfill (release to the environment), industrial composting or biogas generation will be an intended disposing method (Section [6.9](#))

1.2 The potential hazard of inadequately evaluated products with respect to degradability in the environment requires the use of certain criteria to be fulfilled to avoid creation of microplastics and other harmful substances that are released to the environment. Therefore, this ECVP determines product composition requirements including:

- Validation of the manufacturing process
- Material characterization
- Material's ability for biodegradability / compostability, disintegration and the compost quality
- Minimum content of volatile solids, limits for hazardous substance groups, biodegradation minimum and ecotoxicity testing.

1.3 The goal of using the content claim is to reduce amount of environmentally harmful waste as well as the consumption of fossil fuel resources, thus providing substantial environmental benefit and encouraging the circular use of materials.

1.4 This Environmental Claim Procedure does not address whole product lifecycle effects and environmental tradeoffs, health, and safety regulations, and is not intended to replace any applicable legal regulations.

2 Scope

2.1 This procedure provides a framework evaluating a materials suitability to biodegrade or compost in the following waste management methods:

- Managed landfill → aerobic / anaerobic biodegradation

- Industrial compostability → aerobic composting
- Biogas generation → anaerobic composting

It includes evaluating test results from biodegradability or compostability as well as for bio-based content testing and the probable or intended disposal method.

2.2 The conditions used in this document do not necessarily correspond to the optimum conditions allowing maximum biodegradation or composting under managed conditions to occur, but this document is designed to determine the potential suitability of materials (e. g. plastics, packaging, textiles) or give an indication.

3 Units of Measurement

3.1 For the purposes of this procedure, values shall be reported in accordance with the requirements of the individual criterion. If the manufacturer's choice of unit deviates, that change shall be documented and justified as to the reason and relevance for that change.

4 Undated References

4.1 Any undated reference to a code or standard appearing in the requirements of this procedure shall be interpreted as referring to the latest edition of that code or standard.

5 Glossary

5.1 For the purpose of this procedure, the following definitions apply.

5.2 BIO-BASED – Containing organic carbon of renewable origin like agricultural, plant, animal, fungi, microorganisms, marine, or forestry materials living in a natural environment in equilibrium with the atmosphere.

Reprinted, with permission, from ASTM D6886-2022, Standard Test Methods for Determining the Biobased Content of Solid, Liquid, and Gaseous Samples Using Radiocarbon Analysis, copyright ASTM International. A copy of the complete standard may be obtained from www.astm.org.

5.3 BIO-BASED CARBON CONTENT OR BIOBASED CONTENT – The amount of bio-based (organic) carbon in the material or product as a percent of the total organic carbon in the product.

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5.4 BIODEGRADABLE MATERIAL – A degradable material in which the degradation results from the action of naturally occurring microorganisms such as bacteria, fungi, and algae.

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5.5 COMPOSTABLE MATERIAL – A material that undergoes degradation by biological processes during composting to yield carbon dioxide (CO₂), water, inorganic compounds, and biomass at a rate consistent with other known compostable materials and leaves no visible, distinguishable, or toxic residue.

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5.6 COMPOSTING – A managed process that controls the biological decomposition and transformation of biodegradable materials into a humus-like substance called compost: the aerobic mesophilic and thermophilic degradation of organic matter to make compost; the transformation of biologically decomposable material through a controlled process of bio-oxidation that proceed through mesophilic and thermophilic phases and results in the production of carbon dioxide (CO₂), water, minerals, and stabilized organic matter (compost or humus).

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5.7 DEGRADATION – This term refers to the breakdown of an organic compound.

5.8 DIGESTION – A process of treating a carbon-based product or substance by enzymes causing disintegration.

5.9 DISINTEGRATION – The breaking down of carbon-based material into very small fragments.

Note: Disintegration in this document is considered to be mainly caused by biological treatment process and not as in [5.6](#) by the influence of photochemical and thermal impacts.

5.10 OXO-DEGRADABILITY – Disintegration due to oxidative reaction induced photochemically or thermally.

5.11 ULTIMATE BIODEGRADATION – The decomposition of a carbon-based compound by microorganisms in the presence of oxygen to form carbon dioxide (CO₂), water, mineral salts of other elements present (mineralization) and new biomass, or in the absence of oxygen to form CO₂, methane, mineral salts and new biomass.

5.12 VOLATILE SOLID – Amount of material removed from the total dry matter content of the same sample by combustion at approximately 550 °C. This is obtained by subtracting the residual weight of the sample after combustion from the total amount of the sample before the measurement.

COMPLIANCE, EVALUATION AND ASSESSMENT CRITERIA

6 Documentation Requirements

6.1 General

Below are the documentation requirements for validating different properties of the material to support the claim.

- The formulation and design of the product
- The manufacturing site and manufacturing process
- Description of the manufacturer's supply chain
- Test reports to verify compliance with requirements in Section [6.3](#) – [6.8](#)
- Intended disposal methods in compliance with Section [6.9](#)

All test reports required to validate the claim have to be completed by a laboratory accredited to ISO 17025 for the listed tests and test reports shall be less than 3 years old.

Further details regarding the documentation requirements can be found in the following sections.

6.2 Production Details

6.2.1 The product manufacturer shall provide full product composition specifications for each product submitted. The facilities within the scope of the claim shall submit documentation necessary for verifying the proposed claim. That includes the following specific documentation to be submitted:

- Information on each manufacturing location(s)
- Manufacturing process flowchart and/or description for traceability during the production
- Bill of materials for the products being evaluated with bio-based content calculations
- Production records from bio-based material to final product.

Note: The bio-based content calculations shall be calculated and submitted by the manufacturer, based on the production, and receiving records, and will be reviewed during the validation of the project.

6.2.2 For the segregated handling of the bio-based materials each process, beginning with the origin of the material to the final product, a system for segregated management of material shall be in place. A certification of the location according to ISO 9001 and ISO 14000 is sufficient to fulfil the requirements but is not mandatory. Management processes and documentation (e. g. SOP, incoming material quality checks, supplier quality checks, etc.) dedicated to handle the bio-based material separate from all other materials shall be reviewed during the validation.

6.2.3 For supply chain traceability the following documentation shall be provided:

- Details on each supplier (address, contact person, etc.) of the bio-based material
- Origin of the bio-based material
- Each supplier for bio-based material shall provide a “Bio-Based Content Supplier Declaration”
- Receiving records of the manufacturing site

6.3 Product Composition

The product suitable to be validated for the claim shall be made from at least 50 % bio-based source and shall not contain any chemical hazards that are toxic to the environment.

6.3.1 Bio-based Materials

6.3.1.1 To verify that at least 50 % of the product's carbon content is from a bio-based source, it shall be tested according to Standard Test Methods for Determining the Biobased Content of Solid, Liquid, and Gaseous Samples Using Radiocarbon Analysis, ASTM D6866, Method B.

Note 1: Below standards are comparable to ASTM D6866 and can also be used to determine the bio-based carbon content, using accelerated mass spectroscopy (AMS):

- ISO 16620 Plastics – Biobased content; Part 2: Determination of biobased carbon content
- EN 16640 Bio-based products – Bio-based carbon content – Determination of the bio-based carbon content using the radiocarbon method
- EN 16785-1 Bio-based Products – Bio-based content – Determination of the bio-based content using the radiocarbon analysis and the elemental analysis (only the radiocarbon analysis is applicable to this ECV)