Designation: D6868 – 17

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[1]

This standard is issued under the fixed designation D6868; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope*

1.1 This specification covers end items that include plastics or polymers where plastic film/ sheet or polymers are incorporated (either through lamination, extrusion or mixing) to substrates and the entire end item is designed to be composted under aerobic conditions in municipal and industrial composting facilities, where thermophilic temperatures are achieved.

1.2 This specification is intended to establish the requirements for labeling of end items which use plastics or polymers as coatings or binders, as "compostable in aerobic municipal and industrial composting facilities."

1.3 The properties in this specification are those required to determine if end items (including packaging) which use plastics and polymers as coatings or binders will compost satisfactorily, in large scale aerobic municipal or industrial composting where maximum throughput is a high priority and where intermediate stages of plastic biodegradation should not be visible to the end user for aesthetic reasons.

1.4 *The following safety hazards caveat pertains to the test methods portion of this standard: This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate health and safety practices and to determine the applicability of regulatory limitations prior to use.*

NOTE 1—There is no known ISO equivalent for this standard.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D883 Terminology Relating to Plastics

D3715/D3715M Practice for Quality Assurance of Pressure-Sensitive Tapes

D5338 Test Method for Determining Aerobic Biodegradation of Plastic Materials Under Controlled Composting Conditions, Incorporating Thermophilic Temperatures

D6002 Guide for Assessing the Compostability of Environmentally Degradable Plastics (Withdrawn 2011)[3]

D6400 Specification for Labeling of Plastics Designed to be Aerobically Composted in Municipal or Industrial Facilities

D6866 Test Methods for Determining the Biobased Content of Solid, Liquid, and Gaseous Samples Using Radiocarbon Analysis

2.2 *Organization for Economic Development (OECD) Standard:*

OECD Guideline 208 Terrestrial Plants, Growth Test[4]

2.3 *Comite Europeen de Normalisation (CEN):*

EN 13432 Packaging-Requirements for Packaging Recoverable through Composting and Biodegradation-Test Scheme and Evaluation Criteria for the Final Acceptance of Packaging[5]

2.4 *ISO Standards:*[5]

ISO 14851 Determination of the ultimate aerobic biodegradability of plastic materials in an aqueous medium—Method by measuring the oxygen demand in a closed respirometer

ISO 14852 Determination of the ultimate aerobic biodegradability of plastic materials in an aqueous medium—Method by analysis of evolved carbon dioxide

ISO 14855 Evaluation of the Ultimate Aerobic Biodegradability and Disintegration of Plastics under Controlled Composting Conditions-Method by Analysis of Evolved Carbon Dioxide

[1] This specification is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.96 on Environmentally Degradable Plastics and Biobased Products.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] The last approved version of this historical standard is referenced on www.astm.org.

[4] Available from Organisation for Economic Cooperation and Development (OECD), 2 rue André Pascal, F-75775, Paris Cedex 16, France, http://www.oecd.org.

[5] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

***A Summary of Changes section appears at the end of this standard**

ISO 16929 Determination of the degree of disintegration of plastic materials under defined composting conditions in a pilot-scale test

2.5 *Government Standard:*

40 CFR Part 503.13 Standards for the Use or Disposal of Sewage Sludge[6]

3. Terminology

3.1 *Definitions*—Definitions appearing in this specification are found in Terminology D883, unless otherwise noted.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *materials of natural origin, n*—Chemically unmodified ligno-cellulosic packaging materials and constituents of natural origin, such as wood, wood fibre, cotton fibre, starch, paper pulp or jute.

3.3 *Definition found in Terminology Practice D3715/D3715M:*

3.3.1 *end item*—the actual product or commodity being sold under the material specification.

3.3.1.1 *Discussion*—In its most complete form, either packed for shipping or at a production stage just preceding packing.

4. Classification

4.1 The purpose of this specification is to establish requirements for identifying end items, where plastics or polymers are used as a coating or incorporated into a substrate so that they do not interfere with their satisfactorily composting in commercial and municipal aerobic composting facilities. Products meeting the requirements outlined below should be labeled as "compostable in municipal or industrial aerobic composting facilities" in accordance with the guidelines issued by the Federal Trade Commission[7] as long as proper qualifications as to the availability of such facilities are included on the label."

5. Basic Requirements

5.1 In order to compost satisfactorily, an end item must demonstrate each of the characteristics found in 5.1.1 – 5.1.3, and which are quantified in Section 6.

5.1.1 *Disintegration During Composting*—An end item will disintegrate during composting such that any remaining residuals (plastic, polymer, or substrate) are not readily distinguishable from the other organic materials in the finished product. Additionally, the material or product must not be found in significant quantities during screening prior to final distribution of the compost.

5.1.2 *Biodegradation*—A level of biodegradation for the plastic coatings and additives shall be established by tests under controlled conditions.

5.1.3 *No Adverse Impacts on Ability of Compost to Support Plant Growth*—After incorporation with soils, the end items shall not adversely impact on the ability of composts to support plant growth, when compared to composts derived from biowaste without any addition of tested end items or reference materials. Additionally, the polymeric products or other materials must not introduce unacceptable levels of heavy metals or other toxic substances into the environment, upon sample decomposition.

NOTE 2—For a better understanding of why these criteria are important, the reader should consult Guide D6002, Compost Facility Operating Guide,[8] and EN 13432.

6. Detailed Requirements

6.1 In order to be identified as compostable in municipal or industrial aerobic facilities, end items must pass the requirements of 6.2, 6.3, and 6.4 using the appropriate laboratory tests, representative of the conditions found in aerobic composting facilities, which reach thermophilic temperatures. End items (products and finished articles) shall be tested in the same form as they are intended to be used. For end items that are made in multiple thicknesses or densities, such as films, containers and foams, only the thickest or most dense products need to be tested as long as the chemical composition and structure remains otherwise the same. It is assumed that thinner gauges and lower densities will also compost satisfactorily. Similarly, if additives are present in test samples that pass testing, lower levels of the same additives are similarly passed.

6.2 *Disintegration During Composting*—An end item is considered to have demonstrated satisfactory disintegration if after twelve weeks in a controlled composting test, no more than 10 % of its original dry weight remains after sieving on a 2.0-mm sieve. The use of Test Method D5338, without the carbon dioxide-trapping component, or ISO 16929 are suitable methods of generating laboratory thermophilic composting conditions.

6.3 *Biodegradation*—An end item, having a plastic coating(s) or additives are considered to have achieved a satisfactory level of biodegradation if the criteria in 6.3.1 and 6.3.2 are met or exceeded.

6.3.1 The plastic coating or polymeric additives must meet the requirements of subsection 6.3 of Specification D6400.

6.3.2 Substrates used in the end item must individually satisfy the requirements of 6.3.2.1 or 6.3.2.2, and 6.3.3.

6.3.2.1 The substrates of the end item are to individually demonstrate that 90 % of the organic carbon is converted to carbon dioxide using Test Method D5338 within a 180 days at 58°C (±2°C), when compared to the positive control. The testing method shall be Test Method D5338 unless it is inappropriate for the type and properties of the material. As an alternative, only internationally recognized standardized tests, which conclusively demonstrate biodegradability by means of microbial assimilation of the test materials shall be used, in particular ISO 14851:1999, ISO 14852:1999, and ISO 14855:1999.

6.3.2.2 End items made of ligno-cellulosic substrates are permitted to fulfill the requirements of 6.3.2 by demonstrating

[6] Available from U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401, http://www.access.gpo.gov.

[7] *Guidelines for the Use of Environmental Marketing Claims*, Federal Trade Commission, Washington, DC, 1992.

[8] *Compost Facility Operating Guide*, Composting Council, Alexandria, VA, 1995.

that they are "materials of natural origin" and therefore assumed to be biodegradable by showing that over 95 % of their carbon comes from biobased resources, using D6866. Any polymers or additives derived from biobased sources that are blended with ligno-cellulosic substrates shall separately demonstrate that they meet the requirements of subsection 6.3 of Specification D6400, if they are more than 1 % of the dry weight of the end item.

6.3.3 Any organic constituent present in more than 1 % of the dry weight of the end item shall fulfill the biodegradation requirements of subsection 6.3 of Specification D6400.

6.3.3.1 The total portion of organic constitutents or additives that do not fulfill the requirements of 6.3.1 shall not exceed 5 % of the end item by weight.

6.4 *No Adverse Impacts on Ability of Compost to Support Plant Growth*—If an end item which incorporates a plastic or polymer fulfills the requirements in 6.4.1 and in 6.4.2 it will have demonstrated satisfactory terrestrial and aquatic safety.

6.4.1 The end item shall have concentrations of heavy metals less than 50 % of those prescribed in 40 CFR Part 503.13, and

6.4.2 The germination rate and the plant biomass of the sample composts shall be no less than 90 % that of the corresponding blank composts for two different plant species following OECD Guideline 208 with the modifications found in Annex E of EN 13432.

7. Sampling

7.1 Sampling shall be conducted as indicated in the specified test method.

8. Specimen Preparation

8.1 Specimen preparation shall be in accordance with the specified test method.

9. Marking and Labeling

9.1 Marking and labeling shall conform to national and local regulations.

10. Keywords

10.1 biodegradable; compostable packaging; compostable plastic; composting; degradable plastics; labeling

SUMMARY OF CHANGES

Committee D20 has identified the location of selected changes to this standard since the last issue (D6868 - 11) that may impact the use of this standard. (March 15, 2017)

(1) Revised 3.3.1.