



BPI Commercial Compostability Certification Scheme - 2.4

Compostable products, resins, and intermediates according to ASTM D6400 and ASTM D6868

Foreword

The International Biodegradable Products Institute (BPI) was formed as a non-profit in 1999 with the goal of scalable diversion of organic waste to composting, by verifying that products and packaging will successfully break down in professionally managed composting facilities, without harming the quality of finished compost. BPI operates North America's leading certification program for compostable resins, products and packaging, and maintains a publicly available database that lists every certified item by SKU.

Version 2.4 - January 2023

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Earlier versions

Version 2.3 – Published on October 2021

Version 2.2 - Published on May 2021

Version 2.1 - Published on March 2021

Version 2 - Published November 2020

Version 1 - Published February 2019

Previous versions available upon request.

Remarks

The English version of this certification scheme shall be taken as authoritative. No translation allowed without permission, and no guarantee is given to translated versions. BPI's Certification Marks are fully registered trademarks that cannot be used without a license.

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1. Scope

This certification scheme applies to compostable resins, intermediates, components, and final products, in connection with the testing foundations named below, and contains all requirements on issuing of the BPI certification compostability mark.

This certification scheme establishes the requirements that need to be met by the final product, resins, component or intermediate directly, as well as requirements relating to the associated testing, monitoring and certification.

If a final product, resin, component or intermediate demonstrates conformity to the criteria specified in this certification scheme, then a certificate will be issued, and the final product, resin or intermediate will be listed in BPI's online database.

All products and packages must meet BPI's eligibility requirements detailed in Appendix B to be considered for certification. Products and packaging that do not meet these criteria are out of scope for this certification scheme.

2. Testing and Certification Specifications

The following referenced documents are the basis for testing and certification. For undated references, the latest edition of the referenced document (including any amendments) applies.

Final products, intermediates/components and resins can be certified according to the following standards (certification standards):

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

Final products, intermediates and materials are required to demonstrate compliance with the requirements of one of the two ASTM standard specifications, whichever is applicable as described below in Section 6. Testing Requirements.

Laboratory testing must be performed according to the stipulations in the standards named above according to the standardized test methods listed, unless otherwise noted in this certification scheme.

Test methods:

<i>ASTM D3776</i>	Standard Test Methods for Mass Per Unit Area (Weight) of Fabric
<i>ASTM D 5338</i>	Standard Test Method for Determining Aerobic Biodegradation of Plastics Materials Under Controlled Composting Conditions; Incorporating Thermophilic Temperatures
<i>ASTM D5729</i>	Standard Test Method for Thickness of Nonwoven Fabrics
<i>ASTM D6866</i>	Standard Test Methods for Determining the Biobased Content of Solid, Liquid, and Gaseous Samples Using Radiocarbon Analysis
<i>ASTM D6988</i>	Standard Guide for Determination of Thickness of Plastic Film Test Specimens
<i>ASTM F2251</i>	Standard Test Method for Thickness Measurement of Flexible Packaging Material
<i>ISO 534</i>	Paper and board — Determination of thickness, density and specific volume
<i>ISO 4591</i>	Plastics — Film and sheeting — Determination of average thickness of a sample, and average thickness and yield of a roll, by gravimetric techniques (gravimetric thickness)
<i>ISO 4593</i>	Plastics — Film and sheeting — Determination of thickness by mechanical scanning
<i>ISO 9073-2</i>	Test methods for nonwovens -- Part 2: Determination of thickness
<i>ISO 14851</i>	Determination of the ultimate aerobic biodegradability of plastic materials in an aqueous medium - Method by measuring the oxygen demand in a closed respirometer
<i>ISO 14852</i>	Determination of the ultimate aerobic biodegradability of plastic materials in an aqueous medium - Method by analysis of evolved carbon dioxide
<i>ISO 14855-1</i>	Determination of the ultimate aerobic biodegradability of plastic materials under controlled composting conditions -- Method by analysis of evolved carbon dioxide -- Part 1: General method
<i>ISO 14855-2</i>	Determination of the ultimate aerobic biodegradability of plastic materials under controlled composting conditions -- Method by analysis of evolved

	carbon dioxide -- Part 2: Gravimetric measurement of carbon dioxide evolved in a laboratory-scale test
<i>ISO 16929</i>	Plastics - Determination of the degree of disintegration of plastic materials under defined composting conditions in a pilot-scale test
<i>ISO 20200</i>	Plastics - Determination of the degree of disintegration of plastic materials under simulated composting conditions in a laboratory-scale test
<i>ISO 29073</i>	Test Method for Nonwoven Textile
<i>OECD 208</i>	Terrestrial Plant Test: 208: Seedling Emergence and Seedling Growth Test
<i>Standard Method 2540G</i>	Total, Fixed, and Volatile Solids in Solid and Semisolid Samples
<i>TAPPI T410</i>	Grammage of Paper and Paperboard
<i>TAPPI T411</i>	Thickness (caliper) of paper, paperboard, and combined board

The obligation to comply with relevant local laws and regulations governing the respective products is in no way affected by this certification scheme.

The obligation to comply with relevant local laws and regulations is the responsibility of the manufacturer and is not relevant nor taken into account in this certification scheme

3. Definitions

For the purposes of this certification scheme, the following definitions shall apply:

<i>Applicant</i>	Applicants can be either manufacturers or brand owners
<i>Blank compost</i>	Compost obtained from a parallel process without addition of sample material
<i>Certification</i>	Proof of conformity with the requirements of the named standards as well as with this certification scheme. A license to use the mark is granted
<i>Ingredient</i>	Substances or constituents, including a mixture of chemicals, added to a product, resin, or intermediate/component, e.g. adhesives, anti-blocking agents, plasticizers, inks. Does not include residuals, impurities or traces

<i>Intermediate/Component</i>	Semi-finished item that will require disintegration testing when converted into a finished product (e.g., coating, adhesive, packaging roll stock)
<i>Film</i>	A term for sheeting having a nominal thickness not greater than 250 μm (0.01 in). In food packaging, this can also be defined as a thin continuous polymeric material used to separate areas or volumes, to hold items, to act as barriers, or as printable surfaces
<i>Fluorinated Substance</i>	per- and poly-fluorinated substance (PFC) organic fluorine substance containing carbon-fluorine bonds and carbon-carbon bonds but also other heteroatoms
<i>Grammage</i>	The area density of a paper or paperboard product, that is, its mass per unit of area (expressed either in grams per square meter or in pounds (lb) per a ream of sheets of a given (raw, uncut) basis paper size, known as basis weight)
<i>Materials of natural origin</i>	Chemically unmodified ligno-cellulosic and other naturally occurring organic materials, such as wood, wood fiber, cotton fiber, starch, recycled fiber pulp, or jute, as defined in D6868.
<i>Maximum thickness</i>	The greatest distance from the lower surface to the upper surface allowed for a certified item
<i>Printing Systems</i>	Consists of Print Receptive Primers/Ink Adhesion Promoters, Inks, Overprint Varnishes
<i>Product</i>	Finished article as received at a composting facility
<i>Production facility</i>	Location at which production of manufactured items is carried out. This is not necessarily identical to the certificate holder's address
<i>Resin</i>	Polymeric material consisting of molecules characterized by the repetition (neglecting ends, branch junctions, other minor irregularities) of one or more types of monomeric units
<i>Volatile solids</i>	Amount of organic matter present determined as the ratio of the difference between the dry mass of test sample and the mass remaining after incineration at 550 °C by the dry mass of test sample.

4. Certification Program for Compostability

Licensors will issue a Certificate to an Applicant, the Licensee or prospective Licensee, for a Product if it is determined, pursuant to the procedures set forth below, that all of the following criteria are met:

- A. The item (i.e., resin, component/intermediate or finished product) meets or exceeds the specifications set in ASTM D6400 or D6868, as demonstrated by tests performed by a BPI Approved Testing Laboratory according to the methodologies in these specifications and approved by BPI.
- B. The item meets the Application and Review Requirements set forth in this document and is in continuing compliance with the BPI License Agreement.

The obligation to comply with laws and regulations governing the respective products is in no way affected by this certification scheme.

5. Application Requirements and Review

A. Customer Documentation and Samples

- a. Customers must complete the following forms:
 - i. Application (see formulation details below and note that manufacturing facilities must be listed)
 - ii. Confidentiality Agreement (CDA) if there is not a current version on file.
 - iii. Statement of no intentionally added organic fluorinated chemicals, such as perfluorinated and polyfluorinated substances.

B. Formulation and Material Characteristics

- a. Full formulation disclosure of each ingredient, even if below 0.1%, including its associated dry weight percent and supplier information, CAS#'s and Safety Data Sheets (SDS), shall be submitted with the application for any ingredients that are not already BPI certified. The overall formulation percentage shall equal 100.
 - i. In general, Category 1A or 1B carcinogens, mutagens or reproductive toxins (CMR) (according to the most current version of the GHS¹¹) shall not be intentionally used as ingredients. Any traces, residuals or impurities classified as Category 1A or 1B carcinogens, mutagens, reproductive toxicants according to the most current version of the GHS,

¹ https://www.unece.org/trans/danger/publi/ghs/ghs_welcome_e.html

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- shall not exceed 0.1% by dry weight in the product being certified, as assessed by SDS or additional disclosures from suppliers.
 - ii. In general, substances identified as Persistent, Bio accumulative, and Toxic (PBT) under US EPA or EU REACH Annex XIII shall not be intentionally used as ingredients, and shall not exceed 0.1% per chemical by dry weight in the final product.
 - iii. Organic fluorinated chemicals, such as perfluorinated and polyfluorinated substances, cannot be present.
 - iv. NOTE: See section 6.C.e.iv for additional information and testing requirements.
 - b. Any external ingredient/additive such as inks, coatings, lacquers and adhesives must be included in the formulation information.
 - c. For multi-layer structures, each component must be separately listed, regardless of weight used, including adhesives.
 - d. Description of the Product(s) as well as intended end use(s) and manufacturing processes for resins (injection, extrusion, thermoform, foodservice, film bags, laminations, etc.) must be included in the application.
 - i. Note: Once certified, only the specific brand names and item numbers (also known as stock keeping units or SKU under which the product is identified to customers) listed on the certificate are considered covered by the certification.
 - e. Maximum thickness and/or Maximum density/grammage (required for bagasse, molded pulp and paper products)
 - i. The maximum thickness/density/grammage assigned to a certificate is determined by the thickness/density/grammage of the certified item sample that successfully passed disintegration testing. The documented maximum thickness/grammage is equal to the arithmetic mean of the ten specimen measurements at the same thickest measuring point by the BPI approved lab for the disintegration test and confirmed by the verification samples measured by the technical reviewer (see Appendix C for guidance). The maximum thickness of a certified item in the marketplace cannot exceed the documented maximum thickness plus the standard deviation.
 - ii. When the thickness of the verification sample submitted to BPI's technical reviewer exceeds the average thickness plus the standard deviation, as presented in the disintegration report from a BPI approved lab, the technical reviewer will confer with the lab to determine whether the same measuring points were used and to reconcile any identified discrepancies with measuring points. If it's determined that the same measuring locations were used, the applicant will be notified of the discrepancy and asked to confirm the samples tested and sent for verification were the same. In the case of an incorrect sample being sent

for verification, a new set of verification samples may be requested for measurement. No more than three sets of samples will be evaluated for thickness measurements before a new disintegration test is required or an application is denied.

- iii. The maximum thickness for a resin is determined by a successful disintegration test according to ASTM standards D6400 and D6868. A resin certificate may be issued based on a disintegration test conducted on a finished item, however the maximum thickness for the resin in that case will be equal to the thinnest measuring point on the finished item plus the standard deviation. Additional testing to determine the thinnest part of the disintegration test item, as determined by the technical drawings submitted to the BPI-approved lab, may be required in such cases.
- iv. BPI-approved labs will use the methods described in Appendix C when measuring the thickness/density/grammage of items undergoing disintegration testing, recertification, or validation testing (i.e., sublicenses) to determine the maximum thickness/grammage/density and/or ensure that a product's configuration remains unchanged
- f. Supplemental information (e.g., existing third party compostability certifications, test reports from BPI approved testing laboratories).

C. Test Data to Demonstrate Compliance with ASTM D6400 or ASTM D6868

To carry out the inspections and tests necessary for the evaluation and certifications, BPI uses test laboratories either accredited in the appropriate scope, or audited to show compliance, managed by DIN CERTCO and published on BPI's website as an approved list.

BPI may consider review of test data under AS 5810 if the resin or product is currently certified by a third party, within the time frame accepted by BPI. However, the final resin/product must still meet the requirements of either ASTM D6400 or ASTM D6868 in order to be considered for BPI Certification; the laboratory must then meet the requirements (retroactively based on raw data in an audit); and the tests must be released to BPI for their files.

All documents must be submitted in English.

D. Upon receipt of sample shipping forms, representative samples must be submitted to DIN CERTCO

Samples will be documented, with thickness/grammage measured, FTIR and photographs.

6. Testing Requirements

- A. **Biodegradation:** If the test report is older than two years, at the time of application, the testing laboratory will be asked to confirm the validity of the results in writing and the manufacturer must confirm that the product/resin/intermediate/component has not been changed since testing.
- a. For individual components, compounds, and substrates, biodegradation by at least one of the following:
 - i. Provide evidence of biodegradation through the use of a Licensor Certified Product.
 - ii. Provide evidence of biodegradation through testing performed by a BPI Approved Testing Laboratory
 1. 90% absolute biodegradation or 90% relative to a suitable positive reference substrate, within 6 months. Evidence must be proven via a test according to the standards named under Section 2.
 - a. The cellulosic-fiber-based substrate or components are permitted to fulfill the requirements of biodegradation without testing if they are “materials of natural origin” demonstrated by showing that over 95 % of their carbon comes from biobased resources, using Test Methods D6866. Materials of natural origin are assumed to be biodegradable.
 2. Individual organic ingredients present in concentrations between 1%-10% by dry weight, including, pigments, inks, colorants, scents, secondary polymers, and glues, etc., must be tested separately.
 - a. By June 30, 2026, individual organic ingredients present in concentrations between 1%-15% by dry weight must be tested separately.
 3. Ingredients at or below 1% by dry weight are exempt from biodegradation testing, so long as the total of these does not exceed 5% by dry weight.
 - a. By June 30, 2026, the total must not exceed 3% by dry weight.
 - b. This includes all waxes, including natural waxes.
 4. Ingredients used with proportions of more than 10% by dry weight of the item being certified may be tested separately or as part of the end item.
 - a. If a copolymer or homopolymer is used above 10%, BPI reserves the right to request separate biodegradability testing of that component, with

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- sufficient justification (e.g., for a traditionally non-biodegradable polymer such as polyethylene).
- b. By June 30, 2026, ingredients used with proportions of more than 15% by dry weight of the item being certified may be tested separately or as part of the end item.
5. Ingredients on the Positive List in Appendix A may be permitted without biodegradation testing.
- iii. End items which include Ligno-cellulosic substrates are permitted to fulfill the biodegradation requirements above (and certify to D6400) or by certifying to ASTM D6868 with the requirements below, by demonstrating that the substrate is a “material of natural origin” and therefore assumed to be biodegradable by showing that over 95% of their carbon comes from biobased resources, using ASTM D6866
 1. Ingredients added during the ligno-cellulosic substrate manufacturing process must be disclosed, and if above 1% are subject to biodegradation requirements. The total of these may not exceed 5% by dry weight.
 - a. By June 30, 2026, the total must not exceed 3% by dry weight.
 2. External/surface modifiers, coatings and adhesives must be evaluated separately for biodegradation regardless of the dry weight percentage within the formulation.
 3. Ingredients on the Positive List in Appendix A may be permitted without biodegradation testing.
- B. Disintegration of the Final Product: If the test report is older than two years, at the time of application, the testing laboratory will be asked to confirm the validity of the results in writing, and the manufacturer must confirm that the resin/product/component/intermediate has not been changed since testing.
- NOTE: Disintegration tests for components may be omitted, however the other requirements need to be met.
- a. Quantitative disintegration of the final product at its maximum thickness, grammage, basis weight, and/or density, according to methods accepted in the most recent versions of ASTM D6400 or ASTM D6868 standard specifications.
 - i. After composting for no more than 12 weeks, no more than 10% of the tested material's original dry weight may be found in a > 2 mm screen fraction. The test shall be carried out in accordance with the pilot-scale test in ISO 16929, or in the case of smaller, two-dimensional materials like films, the lab-scale test ISO 20200.

Note that test method ISO 20200 may not be suitable for all products, especially those with lower surface area to volume ratios, such as coffee pods or injection molded parts.) For ASTM D6868 the test according to ASTM D5338 (without the carbon dioxide-trapping component, and not in the form of granules or powder) is applicable as well. The particles or pieces which do not differ from the compost (i.e., color, structure, dimension, moisture feeling, brightness/gloss) are considered to be compost.

- ii. Special attention should be given to the visual aspects of compost. Visual contamination of compost as evidenced by reduction of aesthetic acceptability should not be significantly increased by any post-composting residues of the introduced packaging material.
- iii. Residues remaining in packaging or substances that may be dispatched along with the compost product must be suitable for composting.
- iv. Manufactured items where the contents for the most part remain present in the product during and after use (e.g., beverage extraction from a bag or capsule), and would be received by composting facilities in this condition, shall be tested according to the Special Rule prescribed in Section 11, item VI.
- v. Deviating from ASTM D6868, the following shall apply additionally for uncoated paper and natural fiber products during sieving process, for those that have passed at least 80% of the quantitative disintegration but have not reached 90% quantitative disintegration:
 1. The particles or pieces which do not differ from the compost in color, structure, dimension, moisture feeling, and brightness/gloss are considered to be compost if the other requirements are met as well (biodegradation, ecotoxicity, heavy metals). Specifically, the following must be recorded at a minimum at the beginning and the end of the disintegration test, and intermittently if possible:
 - a. Evaluation of size distribution of the remaining particles of the product, their visual relevance for compost quality
 - b. Description of the microbial population on the product (fungi, bacteria, etc.)
 - c. Texture and material thickness
 - d. Changes in color (e.g., decolorization) to match that of the compost
 - e. Consistency and compactness of the material
 - f. Signs of local disintegration (e.g., the presence of holes)

- g. How easy (or difficult) it was to pick out the test material
- h. Documentation (e.g., photography) of all of the above

C. Compost Quality: If the test report is older than two years at the time of application, the testing laboratory will be asked to confirm the validity of the results in writing, and the manufacturer must confirm that the product/resin/intermediate/additive has not been changed since testing.

- a. Effects of compost on two higher plants shall be determined by comparing compost produced with and without addition of test material, according to OECD 208 with the modifications mentioned in EN 13432 (using compost instead of water or soil).
- b. Compost to be used for plant toxicity tests shall be prepared according to ISO 16929 using a 10% sample input concentration, or ISO 20200 (so long as the concentration of the test items at the start of testing is in accordance with the requirements of ISO 16929, i.e., 10% dry weight test item). It is acceptable to use up to 9% of this input quantity in reduced-size form (e.g., as a powder).
- c. Testing shall be run in line with OECD 208 with the modifications mentioned in EN 13432 (using compost instead of water or soil) and must include the germination rate and biomass results.
 - i. Deviating from the standard, the use of a minimum of 50 seeds per replicate is allowed, if the test is performed using barley.
 - ii. It is possible to test samples designed to establish a maximum loading rate, rather than testing the actual finished item to be certified.
- d. Ingredients above 0.1% by dry weight must be determined to be harmless for the composting process by one or more of the following:
 - i. Safety Data Sheet
 - ii. Pass testing of the finished product containing that ingredient
 - iii. Pass testing of the individual ingredient, either tested on its own or in combination with other ingredients
- e. Ingredients below 0.1% by dry weight are not required to be tested separately. However, if these ingredients sum up to more than 0.5 % dry mass the following plant toxicity testing applies:
 - i. Pass testing of the finished product containing these ingredients with their maximum intended usage or
 - ii. Pass testing of individual ingredients, either tested on their own or in combination with all the other ingredients summing up to 0.5% or more.
- f. Regulated Metals, Total Fluorine and Ash Contents (volatile solids)
 - i. Test data must not be older than one (1) year.

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- ii. Tests to be performed on the final product. Alternatively, in the case of printed or colored products, the unprinted product and the inks (or a blend of the inks) can be analyzed separately.
 - iii. Metals must be no greater than 50% of thresholds listed for both the US (40 CFR Part 503.13) and Canada (Compost Category A in Guidelines for Compost Quality published by the Canadian Council of Ministers of the Environment (CCME), and Category AA of the Ontario Compost Quality Standard, without exception.
 - 1. By June 30, 2026, all certified items must be compliant with the above-mentioned thresholds. Until then, certified items shall have concentrations of regulated metals less than 50 % of those listed for both the US (40 CFR Part 503.13) and Canada (Trade Memorandum T-4-93).
 - iv. Total fluorine must not exceed a maximum of 100 ppm, to restrict organic fluorinated chemicals
 - 1. Naturally occurring fluorine resulting in greater than 100 ppm in the finished product may be accepted if ingredients are isolated to demonstrate the source is not from an organic fluorinated chemical (e.g., naturally occurring from inorganic fillers like talc).
 - 2. The total fluorine concentration shall be analyzed using EN 14582, ISO 10304, DIN 51723, EN 15408, or ASTM D1179-04 test methods, where samples are prepared by digestion, not extraction.
 - v. Ash requirements: packaging products shall contain at least 50% volatile solids which exclude largely inert materials, as determined by Standard Method 2540G or equivalent method provided that all performance requirements are met.
- g. FTIR and/or ATR
- i. Test data must not be older than one (1) year.
 - ii. To be performed on the final product / product layers.
 - iii. To be performed on all sample formats submitted (e.g., resins, films, coated side, and uncoated side).
 - iv. In case of multi-component structures, all components need to be analyzed separately:
 - 1. Outer layers (in reflectance mode/ATR);
 - 2. Full laminate (in transmission mode);
 - 3. Inner layer material(s) separately (physically separated by the lab or provided separately);

4. If all layers cannot be separated for analysis, this would not prevent the article from being certified. However, if the component identity is not clear through FTIR in transmission and/or reflectance mode, then supplemental information and/or testing may be necessary.

7. Certification Validity

BPI Reviews for an application will be valid for three (3) years, providing that the Product formulation is unchanged and the Product thickness or density is not increased. Recertification testing is performed on products, materials and intermediates every three years, to ensure that the formulation and configuration remain unchanged. This must be evidenced on schedule via confirmation of the current formulation, test reports from the last 12 months (Metals, Total Fluorine, Ash, FTIR, thickness, grammage), and samples sent in for assessment. If the formulation has changed significantly, additional testing may be required.

Applicant must follow instructions in Section 5 “Application Requirements and Review.”

8. Modification of an Existing Certification

The type and scope of supplementary testing will be determined by BPI in individual cases in coordination with DIN CERTCO. This is typically for small changes, such as adding printing inks to a previously unprinted item.

Alterations/Amendments

The certificate holder is required to notify BPI of all alterations to the manufactured item without delay. BPI will decide the extent to which testing must be performed and whether the change is significant. The respective test report(s) shall be sent to BPI by the approved testing laboratory.

Should BPI and DIN CERTCO determine that a substantial alteration has occurred, the certificate with the corresponding registration number shall expire. For the modified manufactured item, a new application for initial certification authorizing the use of the compostability mark may be submitted.

The certificate holder remains responsible to notify of any changes in the formal details (e.g., name of certificate holder or his address). For this purpose an application for amendment must be sent to BPI. The certificate will be changed respectively.

The certificate holder may apply to BPI for an extension of the existing certificate for further design-types (sub-types) of the same type. It is for BPI to decide whether these amendments require a complementary examination. The design-types shall be entered in the certificate for

the already certified product and, provided that the conditions are fulfilled, shall be regarded as an integral part of the same certificate.

9. Sampling

The samples used for initial certification and recertification testing must be delivered by the manufacturer to the testing laboratory which has been commissioned to perform the tests, and similar samples must be sent to DIN CERTCO as BPI's appointed technical reviewer (or a lab designated by DIN CERTCO). The manufacturer bears the associated costs.

10. Certification

Certification in the sense of this scheme relates to the assessment of conformity of an end item, intermediate or a resin by BPI and DIN CERTCO on the basis of test reports submitted by testing laboratories recognized by BPI and DIN CERTCO. In doing so, the end products, intermediate or resin being certified with the requirements of this scheme and the respective standards are examined and subsequently monitored.

11. Special Rules

1. Manufactured items composed of materials already certified (Blends)

If certification is being requested for an item consisting solely of materials already certified by BPI, and no further ingredients/additives are used, the following documents and information must be submitted along with the application form:

- a. List of the ingredients used, including percentages by dry weight.
- b. Quantitative disintegration test as specified in Section 6B.
- c. An infrared transmission spectrum and metals and Ash test, a photo and a measurement of thickness or grammage as described in Section 5.B.e.

The maximum layer thickness will be defined depending on the layer thicknesses tested.

2. Ranges in blends made from 2 different resins/materials:

It is possible to register composition ranges of two different resins/materials (A and B) that have already been registered. Doing so requires disintegration tests of the various compositions and continuous phases (e.g., ratio A/B of 20/80 and 80/20).

Provided that the range within the blend remains inside a certain threshold, some of the tests may be omitted. This must be determined in coordination with BPI, DIN CERTCO and, if applicable, the approved testing laboratory. This requires proof that the material forming the continuous phase does not change within the range (resin/material B instead of resin/material A is the continuous phase instead). A disintegration test is required for each continuous phase that

occurs. If the quantitative disintegration tests for each continuous phase are performed with materials of different thicknesses, then the range of blends will only be certified up to the lowest thickness tested (see Section 5.B.e. for guidance).

Example:

Tests required for a range of a blend of registered resin/materials A and B under the assumption that the resin/material with a share of 80 % forms the continuous phase (this shall be evidenced in the certification procedure):

Determination of degradation properties with resin/material A as continuous phase:

A/B = 80/20

Determination of degradation properties with resin/material B as continuous phase:

A/B = 20/80

If A/B 80/20 and A/B 20/80 are tested at different thicknesses, the range will be certified up to the lowest thickness only.

3. Variations in the manufacturing process.

To cover for variations in composition which are inherent to the manufacturing process, the BPI certificate, is valid for a variant of this same material under the condition that this variant contains the same and no more constituents as the certified basic material and the ratio between the different constituents does not vary more than 20 % relatively speaking (e.g., the certification of a basic material with a composition of 70% - 20% - 9% - 1% is also valid for a variant with a composition of 70 +- 14% - 20 +- 4% - 9 +- 1.8% - 1 +- 0.2 % for the same components, taking into account that the total is still 100%). Subsequent variations must be compared to the tested material used in the original certification. BPI certification of a variant of a tested material having a composition falling within these levels of tolerance is not automatically granted and needs to be checked by BPI for compliance.

4. Manufactured items consisting of recycled paper

If BPI certification is sought for a final product or intermediate/component consisting of recycled paper, then the following information must be submitted along with the application form, in addition to the standard requirements.

- a. Test report on the quality of the compost (plant toxicity) per ASTM D6868. If available, use samples from three (3) production runs to capture variation (lot to lot) as a composite sample.
- b. Signed self-declaration from Supplier of Quality Management Procedures (QMPs) for recycled paper sourcing, such as FDA requirements guaranteeing a

program is in place.² Self-declaration document should address, but not be limited to, the following elements to document an appropriate program is in place:

1. Control of fiber source
 2. Safe for intended use
 3. Contains no and was not used to hold a poisonous or deleterious substance
 4. Processes to prevent contamination (e.g., biological, chemical and/or physical).
- c. Recertification of finished products must additionally have:
- i. Self-declaration document should address, but not be limited to, the following elements to document an appropriate program, remains in place:
 1. Control of fiber source
 2. Safe for intended use
 3. Contains no and was not used to hold a poisonous or deleterious substance
 4. Process to prevent contamination (e.g., biological, chemical and/or physical).

5. Manufactured items composed of certified materials and materials indicated in Appendix A

If certification is being requested for a manufactured item that is intended to contain the fillers and processing auxiliaries indicated in Appendix A, it is possible to certify individual compositions within a predefined composition range, without a new disintegration test (section 3 above).

Within the separate subgroups or sections (as per Appendix A), other mixtures may, under the following conditions, be certified up to the upper limit documented in the test report:

- a. For a certified material, a supplier change for a specific constituent(s) on the Positive List in Appendix A may be approved without a new disintegration test

² 21 CFR 176.260 Pulp from reclaimed fiber is referenced as basis for self-declaration

“(1) Industrial waste from the manufacture of paper and paperboard products excluding that which bears or contains any poisonous or deleterious substance which is retained in the recovered pulp and that migrates to the food, except as provided in regulations promulgated under sections 406 and 409 of the Federal Food, Drug, and Cosmetic Act. (2) Salvage from used paper and paperboard excluding that which (i) bears or contains any poisonous or deleterious substance which is retained in the recovered pulp and that migrates to the food, except as provided in regulations promulgated under sections 406 and 409 of the act or (ii) has been used for shipping or handling any such substance.”)

under the condition that the constituent formulation from the new supplier is identical to the original constituent(s) under consideration. As proof that the constituent from the new supplier does not introduce unacceptable levels of regulated metals into the environment, metals and FTIR tests must be submitted along with the application form.

6. Products/packages where the contents remain in the item as received by compost facilities (e.g., coffee pods)

For the purpose of assessment, these products are defined to be composed of an outer envelope or enclosure and internal contents, where the purpose is water extraction of the contents. The contents remain within the envelope or enclosure during product use and, for the most part, after use (e.g., after water extraction through a capsule), and the item would be received by a compost facility in this condition. The products allowed under this Special Rule are coffee, tea, and solubles (specifically food or beverage substances-, i.e., soup, hot chocolate).

The outer envelope or enclosure represents the part of the product containing the contents and includes capsules, pads and bags.

Assessment of products under this Special rule shall consist of the following:

- a. The biodegradation, ecotoxicity and material characterization on the product shall be performed only on the outer envelope or enclosure without the contents (i.e., without the coffee, tea or other solubles).
- b. The quantitative disintegration shall be performed on the whole product, that is, outer envelope or enclosure with contents. The quantitative disintegration test can be performed on a wet product, corresponding to an actually used coffee pod/capsule or tea bag. The 1% sample loading specified by ISO 16929 and in Section 6, Disintegration of the Final Product, would in this case refer to the dry weight of the outer envelope or enclosure without contents. Because the envelope or enclosure will still contain its contents when it is tested for disintegration, the amount of sample material compared to the compost might become too high and possibly hinder the composting process. Therefore, only for items assessed under this Special Rule, it is allowed to reduce the percentage of the dry weight of the outer envelope or enclosure down to 0.5% relative to the wet weight of the compost.
- c. No additional quantitative disintegration test is required for a change of content category of a previously tested outer envelope or enclosure when the change of content is:
 - i. From coffee to tea;
 - ii. From coffee to solubles;
 - iii. From tea to solubles.

No additional quantitative disintegration test is required for changes within a content category (e.g., changing types of coffee, changing types of tea, changing types of solubles). For other changes of content, an additional quantitative disintegration test of an already tested outer envelope or enclosure may be required.

- d. No additional quantitative disintegration test is required for a change in filter or lid, if that filter or lid is certified separately or if test reports on the new item demonstrate compliance with the ASTM standards. A change to the main structure (e.g., the rigid ring or cup) would require a new quantitative disintegration test.
 - i. If the new filter/lid in use contains a new adhesive for the ring/filter/lid/capsule substructure, then a new quantitative disintegration test is required.

7. Special cases for products/intermediates

a. Hollow body

In the case of hollow bodies with small diameter apertures (e.g., drinking straw), the maximum permissible wall thickness d_{max} is limited to 50 % of the certified material thickness. This applies to all hollow bodies for which the ratio of volume to aperture area yields a value for x greater than 10 cm.

Calculation is based on the following formula:

$$x = \frac{\text{container volume}}{\text{aperture area}}$$

b. Packaging units

Packaging units are distinguished in easily manually separable units and not easily manually separable units.

- i. Easily separable units (e.g., yoghurt containers with lids).

These products will be processed as a packaging unit. All parts must independently show conformity with this certification scheme. Therefore, the calculation of potential ingredients will be referred to each single unit. Nevertheless, the complete and un-separated packaging unit needs to meet the requirements as well.

- ii. Not manually separable units

This refers to products like labels on packaging. These products will be processed as one unit. Any ingredients contained are being related to the whole unit.

If only part of the item is compostable, and would need to be disassembled, consideration is needed for appropriate labeling, and likelihood that a consumer will actually do the sorting. These must be reviewed on a case-by-case basis.

8. Self-adhesive labels

- a. The certification mark shall only be used on self-adhesive labels in the following cases:
 - i. When directly applied to fruits or vegetables;
 - ii. If sold exclusively with a certified product or package and fulfilling the following requirements.
- b. A certified self-adhesive label and a certified product (film, takeout container, packaging) can be combined into a finished package or product, provided the following conditions are fulfilled:
 - i. The maximum surface area of the label does not exceed 10 % of the total surface area of the package/film.
 - ii. The maximum thickness of both the label and the package/film does not exceed 50 % of the certified thickness/grammage.

If above 10% of the total surface area then a quantitative disintegration test would be required. Additionally, the backing paper must be clearly identified to consumers as non-compostable, unless it has also been certified.

9. Substituting a BPI certified polymer (such as PLA, PBAT, PBS or PHA) with the same polymer that is also BPI certified by another supplier or another grade of the same BPI certified polymer from the same supplier, in a BPI certified final product.

For a certified final product, a supplier and/or grade change for the certified polymer may be approved without a new quantitative disintegration test under the conditions that:

- a. The alternate BPI certified polymer has an equal or higher certified thickness than the certified final product;
- b. Thickness, density and/or grammage of each final product must be equal to or lower than the currently certified final product (see Section 5.B.e. for guidance);
- c. Metals + Total Fluorine, Ash analysis, FT-IR and thickness/grammage are submitted for each final product with constituent(s) from new supplier(s) and/or grade(s), as specified in Section 6.C. and according to the timeframe as determined by BPI; and
- d. There are no other formulation change(s) that would affect disintegration behavior according to other sections of this scheme.

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10. Surface Printing Systems: Surface Printing Systems must meet all plant toxicity, heavy metals and total fluorine and ash requirements. For biodegradation, an individual organic ingredient must meet the biodegradation limits in section 6.A., with the following provisions:
- a. All final structures with Surface Printing Systems with cross-linked inks must be tested for disintegration, unless otherwise addressed by a separate rule.
 - b. All final structures where an ingredient in the Surface Printing System is 100% coverage or greater, such as flood coat inks, overprint varnishes, etc., must be tested for disintegration with the maximum amount of polymeric ingredient applied, unless otherwise addressed by a separate rule.
11. Adding color or filler/processing auxiliary (from Appendix A) masterbatch: When adding a color or filler/processing auxiliary (from Appendix A) masterbatch to a certified product, additional quantitative disintegration testing might not be required if the carrier polymer used in the masterbatch is certified and is the same type of polymer as one of the polymer(s) used in the BPI certified product.

If the carrier polymer is not the same type as one of the polymer(s) used in the certified product or it is not certified, a new quantitative disintegration test would be required for the final product.

Other tests might still be required to cover the active ingredient in the masterbatch, for example plant toxicity and heavy metals, and other biodegradation rules will apply. Appendix A similarly requires disintegration when fillers, colors and processing auxiliaries are used in excess of 3% in the final product (see Appendix A).

12. Sublicenses

According to BPI's License Agreement, the rules governing BPI Certification Mark use and logo usage guidelines, sublicenses are necessary if certified manufactured items are intended to be brought onto the market on behalf of companies other than the main certificate holder.

In all cases, a sublicense is only possible if the BPI License Member (in good standing) requests the sublicense be given to the applicant and the product to be sublicensed is not different in any way from what was BPI certified. This includes but is not limited to any changes in source or suppliers, printing, coatings, thickness (see Section 5.B.e. for guidance), or if the product will be packaged with other products that are not BPI certified, etc. A sublicense is only valid as long as the original certificate is valid. All use of the BPI Certification Mark or claims on any sublicensed product, packaging or promotional materials must be approved by BPI.

Films, resins, and components are not typically sublicensed, due to the potential for false certification claims from companies converting these items into finished products.

A. Types of Sublicenses

- a. Sublicense 1: A sublicense agreement is required between BPI, the certificate holder and the sublicense applicant and the sublicense applicant must have its own unique logo/ID.
 - i. A company (sublicense applicant) who does not hold the certificate wants to sell a BPI certified product as a product to be resold.
 - ii. The product is not visibly co-branded with the original certificate holder (only the sublicense applicant will have their brand on the product).
- b. Sublicense 2: A sublicense agreement is required between BPI, the certificate holder, and the sublicense applicant. The sublicense applicant may choose to use either its own unique logo/ID or the certificate holder's, but it must be uniform across all products.
 - i. A company (sublicense applicant) who does not hold the certificate wants to sell a BPI certified product as a product to be resold.
 - ii. The product is visibly co-branded with both the sublicense applicant's brand and the original certificate holder's brand.
- c. Hybrid Sublicense: A hybrid sublicense agreement between BPI, the certificate holder and the sublicense applicant allows a sublicense to cover:
 - i. Assembly of the sublicensed item by the reseller when the full item has already been certified by the licensee (e.g., a coffee pod is certified, and a reseller is doing the assembly at their own facility).
 1. Reseller must send verification samples to BPI's technical reviewer for thickness (see Section 5.B.e. for guidance), FTIR, and photographing.
 - ii. A reseller adding either a time/date stamp or the BPI Mark ONLY to a sublicensed item. Ink use must be below the dry weight percentage threshold for compost quality testing as stipulated in Section 6.C. Compost Quality, Paragraphs d. and e. in the BPI Commercial Compostability Certification Scheme.
 1. Reseller must send a printed sample to DIN CERTCO for photographing and submit a heavy metals test report and safety data sheets for the ink.

BPI reserves the right to determine eligibility of products for a hybrid sublicense.

B. Certifying an identical product

If a company (not owned by the certificate holder) wants to make the same exact product certified by BPI, with the original certificate holder's permission, a sublicense is not sufficient; they must certify the product.

C. Adding a manufacturing site

If a company wants to add an additional production site or change the production site (owned or hired by the certificate holder) to make the same exact product certified by BPI for their use, then a sublicense is not necessary; they must demonstrate that it is the same exact product (e.g., sending samples produced at that site and FTIR testing, and thickness/grammage/density). For thickness/grammage/density measurements, refer Section 5.B.e. for guidance).

13. Conformity Assessment

On the basis of the documents submitted to BPI, DIN CERTCO will conduct the conformity examination. The assessment is made with the aid of the test reports as to whether the product meets the requirements of the certification scheme and of the underlying standards. The applicant will receive written notification from BPI in the event of any possible deviations.

14. Publication

All certificate holders can be viewed on BPI's database (www.products.bpiworld.org). Manufacturers, users and consumers use this research possibility for obtaining information on certified products.

Besides the contact details of the certificate holders (telephone, telefax, e-mail, homepage), it is also possible to view the technical data regarding dimensions and maximum layer thicknesses for the certified product and registered intermediate or material. Individual SKUs are listed for each certified item, and the published list is considered definitive.

15. Cancellation of Certificates

In the event that the new certification assessment according to Section 5 has not been completed before expiration of the validity period, the certificates and the registration number expires without the necessity for explicit notification from BPI.

Furthermore, certificates can be cancelled if, for example:

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- a. the BPI mark is misused by the certificate holder.
 - b. the requirements laid down in the certification scheme or its accompanying documents are not fulfilled.
 - c. if invoices are outstanding beyond 60 days.
 - d. the prerequisites for the issuing of the certificate are no longer fulfilled.

16. Alterations to ASTM Standards, Tests used in ASTM Standards or BPI Certification Scheme

If the test specifications/requirements are modified, an application for the alteration of the certification shall be generally submitted within 6 months of receiving notification from BPI, and, as a rule, after 12 months, proof of conformity with the modified specifications shall be submitted (e.g., in the form of a positive test report), where applicable. The exact time limit will be defined by BPI based on the alterations that were made.

17. Compliance Checks for Products, Intermediates, Materials

In the event that a certified product on the market is found to be defective, the certificate holder shall be contacted in writing by BPI to rectify the defects.

In conjunction with BPI, DIN CERTCO shall decide whether it is a serious or a minor defect.

In the case of serious defects having a direct or indirect effect on the degradation properties, the manufacturer must ensure that, until the defects have been rectified, the products are no longer marked with the mark of conformity.

The defects must also be rectified without delay in installed products or products in storage. The manufacturer must submit proof to BPI within 3 months, in the form of a test report on the product, that the defects have been rectified and that the product in question again fulfils the stipulated requirements.

In the case of defects that have no influence on the degradation properties of the product (minor defects), the manufacturer must submit suitable proof to BPI within 3 months that the defects in the product in question have been rectified.

Should the manufacturer fail to observe these deadlines, the product certification will be canceled.

Should grounds for complaint continue to exist, BPI shall initially suspend the certificate and at the same time issue a final deadline for the rectification of the defects. Should the certificate holder fail to meet this demand, or fail to meet it within the grace period, or if it is not possible to prove that the defects have been rectified, the certificate shall be canceled.

Appendix A

Fillers, colors and processing auxiliaries

If a certification is being requested for a manufactured item that is intended to contain fillers and processing auxiliaries indicated below, it is possible to register individual compositions within a predefined composition range.

Materials may be used in varying proportions up to the given upper limits as ingredients in manufacturing or processing of compostable materials, so long as metals requirements for the finished product are still met. Filler or fiber in excess of 3% by dry weight present in a product, regardless of whether it is listed below, requires the product + filler/fiber to be tested quantitatively for disintegration.

For a certified material, a supplier change for a specific constituent(s) on the list below may be approved without a new disintegration test under the condition that the constituent formulation from the new supplier is identical to the original constituent(s) under consideration. As proof that the constituent from the new supplier does not introduce unacceptable levels of regulated metals into the environment, metals and FTIR tests must be submitted along with the application form.

Main Group 1: Fillers

Subgroup 1.1: Inorganic constituents (fillers and pigments) - admixture up to a maximum of 49 % (by weight)

- a. Aluminium silicates
- b. Ammonium carbonate
- c. Calcium carbonate (treatments and/or coatings must be disclosed)
- d. Chalk (treatments and/or coatings must be disclosed)
- e. Calcium chloride
- f. Carbon black (pigment)
- g. Dolomite
- h. Iron oxides (pigment)
- i. Graphite (pigment)
- j. Gypsum
- k. Kaolin clay
- l. Mica
- m. Natural silicates
- n. Silicon dioxide; quartz
- o. Sodium carbonate
- p. Talc (treatments and/or coatings must be disclosed)
- q. Titanium dioxide (pigment)
- r. Wollastonite

Subgroup 1.2: Organic fillers - admixture up to a maximum of 49 % (by weight)

Subgroups 1.2.1 and 1.2.2 refer to filler materials, not to substrates.

Section 1.2.1: Non-modified native cellulose

- a. Vegetable fibers

Section 1.2.2: Non-modified native ligno-cellulose

These chemically unmodified materials are used as filler materials or reinforcing materials for biopolymers according to ASTM D6400. They are excluded from biodegradation testing; however, disintegration, ecotoxicity and metal and fluorine requirements must be met. For their use as substrates, biobased testing rules in ASTM D6868 apply.

- a. Wood flour/wood fibers
- b. Vegetable fibers
- c. Cork
- d. Bark

Section 1.2.3: Chemically non-modified natural starch

- a. Starch
- b. Rye flour and other flours

Examples for chemically unmodified starch are physical reduction of molecular weight (e.g., by means of mineral acids) or similar. They are excluded from biodegradation testing; however, disintegration, ecotoxicity and metal and fluorine requirements must be met, if applicable, e.g., depending on the information in the Safety Data Sheet (purity, CAS#, etc.).

Main Group 2: Processing auxiliaries

Subgroup 2.1: Processing auxiliaries - admixture up to a maximum of 10 %

- a. Benzoic acid/sodium benzoate
- b. Erucic acid amide/erucic amide
- c. Glycerol monostearate
- d. Glycerol monooleate
- e. Stearates
- f. Urea

Subgroup 2.2: Processing auxiliaries - admixture up to a maximum of 49 %

- a. Glycerin/glycerol
- b. Sorbite
- c. Citric acid ester (with linear, aliphatic chains up to a chain length of C22)
- d. Glycerol acetates
- e. Xylite

Appendix B

BPI Eligibility Requirements

In addition to meeting the technical requirements in this certification scheme, and the BPI Certification Mark requirements in the License Agreement, all finished products and packages must be in scope and on the eligible list that appears at the end of this Appendix. The eligibility criteria are based on the following principles:

- The item must be associated with desirable organic wastes (e.g., food scraps and yard trimmings) that are collected for composting.
- The item cannot be a redesign of something that is a better fit for recycling based on existing demand, infrastructure, and consumer awareness (e.g., water bottles).
- The item cannot require disassembly in order to be composted.

Items That Do Not Meet Eligibility Requirements

For items that do not meet BPI's eligibility requirements, conditional certification may be granted for regional pilot projects, closed-loop venues, take-back programs, or other scenarios that demonstrate how leakage of materials into mainstream recycling will be prevented. Approval for these projects is decided by the Executive Director and BPI Board of Directors, after consultation with the Composter and Municipality Advisory Panel.

BPI Composter and Municipality Advisory Panel

BPI's Composter and Municipality Advisory Panel evaluates BPI's eligibility requirements and the list of eligible and ineligible finished products that appears at the end of this Appendix.

The Composter and Municipality Advisory Panel is overseen by the Executive Director and is comprised of a minimum of two Composters that accept compostable products and packaging, two Municipalities managing organics diversion programs that accept compostable products and packaging. This panel will meet monthly (or as needed) to review any changes to the list of eligible and ineligible products. A majority vote is required for any proposed changes, which will then go to the BPI Board of Directors, which similarly must be approved by a majority vote.

Companies who wish to submit a product or packaging concept to the panel can do so by sending an email to certification@bpiworld.org.

List of Common Eligible and Ineligible Finished Products

In Scope (Eligible)

- Foodservice Products and Packaging
 - Hot Cups, Cold Cups, Lids, Straws, Sleeves

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- Cutlery (loose and with compostable wrapper), Plates, Bowls, Take-Out Containers, Trays
 - Napkins, Paper Towels, Wraps, Wipes (for food-contact use)
 - Pizza Boxes, Cup Carriers, Platters
 - Bags
 - Food scraps bags, can liners for food waste, drawstring food waste bags
 - Yard trimmings bags
 - Produce bags
 - Sandwich and resealable food storage bags
 - Retail/Takeout bags for “food use” (e.g. restaurants, supermarkets, farmers markets)
 - Pet waste bags for “Canada only” (US curbside composting doesn’t accept pet waste)
 - Pet food bags
 - Coffee pods/capsules/tea bags, including solubles (specifically food or beverage substances, i.e., soup) pods/capsules, bags.
 - Produce stickers, self-adhesive labels
 - Flexible food packaging
 - Coffee beans/ground coffee, coffee pod mother bag
 - Snack packaging (chip bags, bar wrappers)
 - Stand-up pouches for food (including resealable)
 - Flour bags (stand-up pouch and paper-based)
 - Foam shipping packaging for food use (currently packing peanuts, foam panels)
 - Foam food-trays (meat, produce, etc.)
 - Cling wrap and shrink films for food use
 - Parchment and wax paper
 - Agricultural mulch film, growing mediums, plant pots

Out of Scope (Ineligible without approval -- see above)

- ALL Non-Food Packaging
 - e.g., Apparel packaging, E-commerce packaging, electronics packaging, mixed retail packaging
- ALL Non-Food / Non-Yard Waste Bags
 - e.g., general use shopping bags, portable toilet bags, “trash” bags, pet waste bags (US), cat litter bags (US)
- Bottles
- Shipping mailers
- 3D printing filament
- Dental hygiene products (e.g. toothbrushes, floss)
- Apparel including shoes
- Building materials

- Non-food cleaning wipes and sponges
- Diapers
- Foam packaging for pharmaceuticals or general shipping

Appendix C

Guide for determination of maximum thickness, density, and grammage of specimens for disintegration testing requirements.

This guide is intended to provide common practices among labs to determine the maximum thickness of plastic, paper, and other samples where their maximum thickness, grammage and/or density will be used directly in defining the final product's compostability according to disintegration tests requirements in support of BPI certification.

The maximum thickness/grammage/density for certification purposes is determined by the mean value of the maximum measurements obtained as described in the following sections. This guide should be used except as otherwise required by DIN CERTCO. If the lab or applicant has a question, DIN CERTCO can review the item and provide guidance as part of the test scheme.

c.1 Thickness Measurement and Documentation Standards for 2-D products (such as film):

- i. The maximum thickness is measured. For this purpose, at least 10 specimens (preferably from the same lot) are measured at the same measuring point.
- ii. Document the mean value of the maximum and minimum measurements with their corresponding standard deviation for each sample type.
- iii. For bagasse, non-woven, woven and fabrics, molded pulp, and paper products, a maximum grammage measurement on at least 10 specimens is also required. Document the mean value of the maximum and minimum measurements with their corresponding standard deviation for each sample type.
- iv. The test report must state the type (including the foot size and foot pressure, if applicable) and measurement inaccuracy of the equipment used to take the measurements and a photograph or a precise description/drawing of the object showing exactly where the thickness measurements were taken shall be included in the report.
- v. Table C.1. provides further guidance on sampling, calibration, conditioning, and procedures.

Table C.1. Thickness and grammage determination methods

	Thickness determination method*	Grammage determination method*	Sample conditioning*
Plastic	ASTM D6988, ISO 4591, ISO 4593	NO	NO
Paper, bagasse, molded pulp	TAPPI T411, ISO 534	TAPPI T410, ASTM D646, ISO 536	YES (23 ± 1°C; 50 ± 2% RH)
Non-woven	ASTM D5729, ISO 9073-2	ASTM D3776, ISO 29073	YES (20 ± 1°C; 65 ± 2% RH)

* It may be possible to use other methods to obtain equivalent results. Conditioning of the samples will depend on the material under evaluation. If conditioning before testing is appropriate, normal, and desirable, refer to this table or to DIN CERTCO for guidance.

c.2 Thickness Measurement and Documentation Standards for 3-D Structures

- i. Take thickness measurements from each unique part of the structure, ensuring measurements are taken at the thickest part of each unique part. For example:
 - a. For cups, measure the wall, the side seam, the bottom seam, and bottom
 - b. For cutlery, measure handles, rims, and all other significant parts of each type of cutlery (spoon, fork, etc.)
 - c. For bags, measure the wall, the seam at the bottom and/or handle, and at the drawstring, if present
 - d. For drawstring bags, measure the wall, the draw string, overlap drawstring and bag (middle), seam overlap drawstring and bag
 - e. For straws, measure the wall
 - f. For coffee pods/capsules, the measurements shall be done in each single part according to their specific structure (see below Figure C.1 some examples for guidance):
 - For lid: follow instructions for 2-D products (films) – section c.1
 - For internal filter: follow instructions for 2-D products (films) – section c.1
 - For upper/bottom sieve: measure the wall, edge, and bottom.
 - For casing: measure the wall, edge, and bottom.

- For whole pod/capsule: measure the overlap lid and casing



Figure C.1. Examples of typical coffee pod structures

- g. For flexible packaging, measure a single sheet (the sum of all external and internal layers) and measure the seam excluding the overlap flap. If the seam is ridged or rippled, measure the seam at the ridge. In the case of compressible products, adopt the appropriate procedures as described in ASTM F2251, ISO 4593, or other methods to obtain equivalent results.
 - h. For products with a complex geometry (e.g., complex plastic containers, complex hollow items, any structure where access is limited to one side) it is recommended to use ultrasonic thickness gauges or similar method/instrument that offers a wide measurement range, unless otherwise arranged with DIN CERTCO.
- ii. Take measurements from the exact same locations on at least 10 identical samples (preferably from the same lot).
 - iii. Document the mean value of the maximum and minimum measurements with their corresponding standard deviation for each sample type.
 - iv. For bagasse, non-woven, molded pulp, and paper products, a maximum density/grammage measurement is also required. Document the mean value of the maximum and minimum measurements with their corresponding standard deviation for each sample type.
 - v. In the test report, state the type (including the foot size and foot pressure, if applicable) and measurement accuracy of the equipment used to take the measurements and include a photograph or a precise description/drawing of the object showing exactly where the thickness measurements were taken.
 - vi. For guidance on calibration and sample conditioning please refer to Table C.1.

c.3. Thickness Measurement and Documentation Standards for Non-Standard Products (To Be Used with DIN CERTCO's Approval Only)

- i. For natural and chemically unmodified lignocellulosic fiber-only items (including leaf, bamboo, wood) with natural variability in thickness/grammage that does not allow consistent product dimension tolerances during the manufacturing process, then:
 - a. Measure thickness of each part of the structure, ensuring measurements are taken at the thickest part of each unique part. In case of a significantly high standard deviation, DIN CERTCO will confer with the lab to determine the specific measuring points.
 - b. Take measurements from the exact same locations on at least 10 identical samples (preferably from the same lot).
 - c. Document the mean value of the maximum and minimum measurements with their corresponding standard deviation for each sample type.
 - d. An average weight-per-item-measurement is also required. Document the weight of each item. Take weight measurements on at least 10 identical samples. Document the mean value of the maximum and minimum measurements with their corresponding standard deviation for each sample type.
 - e. In the test report, state the type of equipment and measurement accuracy used and include a photograph or a precise description/drawing of the object showing exactly where the thickness measurements were taken.
- ii. For expanded polymer products with non-uniform distribution of porosity, determination of thickness and weight-per-item is necessary, as described in section c.3.1. No grammage measurement is required.
- iii. Due to the increasing complexity of current packaging products in the market, all other products that present extraordinary features that are not described here, the methodology to follow needs to be consulted in advance with DIN CERTCO.

In the case of a recertification, if changes in the measurement location on the product have caused a difference in the documented maximum thickness, density and/or grammage, the lab may provide a set of measurements using this updated guidance and an affirmation that the product appears to be unchanged, but the location of measurements has changed, causing the discrepancy.