TÜVRheinland®
DIN CERTCO
Precisely Right.

Certification Scheme

Products made of compostable materials (DIN-Geprüft)

according to

DIN EN 13432

if applicable, in connection with

DIN EN 14995
ISO 17088
ISO 18606
AS 4736

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Foreword

DIN CERTCO was founded in 1972 by DIN Deutsches Institut für Normung e. V., is now part of the TÜV Rheinland Group and is the certification body for issuing DIN marks and other certification marks for products, persons, services as well as companies based on DIN standards and similar specifications. Due to its independence, neutrality, competence and many years of experience, DIN CERTCO enjoys a high reputation both at home and abroad.

In order to prove the functionality of the system and our competence as a certification body, we have been accredited, certified or recognised by independent domestic and foreign bodies in both the voluntary and legally regulated areas. Our accreditations.

The "Products made of compostable materials (DIN-Geprüft)" certification scheme was created in collaboration with the DIN CERTCO "Biodegradable Materials" certification committee (ZA-BAW in its German abbreviation) and will be continuously refined. It makes a distinction between the certification of materials and intermediates and the certification of (end) products.

In addition to the general terms and conditions from TÜV Rheinland DIN CERTCO and the testing, registration and certification regulations of DIN CERTCO, this certification scheme provides a basis for parties who provide products made of compostable materials to label their products with the compostability mark, the ”DIN-Geprüft Industrial Compostable”-logo. This documents that their products fulfil all DIN EN 13432 requirements as well as, if applicable, the additional/simultaneous requirements in DIN EN 14995, ISO 17088, ISO 18606 and/or AS 4736.

The ”DIN-Geprüft”-mark creates trust among consumers that a neutral and competent entity carefully inspected and evaluated test criteria. DIN CERTCO's regular monitoring additionally ensures that product quality remains intact, even when production is running. Thus, customers receives added value that they can take into consideration when making purchase decisions.

Products made of compostable materials are given the right to use the compostability mark “DIN-Geprüft Industrial Compostable” upon fulfilling the requirements indicated under Section 4 according to the procedure described in this certification scheme. For materials or intermediates a certificate is issued if the requirements named under Section 4 are fulfilled.

All certificate holders can be viewed on the daily up-dated homepage of DIN CERTCO (www.dincertco.tuv.com).

Amendments

The following amendments have been made to the „Products made of compostable materials (DIN-Geprüft)“ (2021-07) certification scheme:

a) Restriction on intentionally added per- and polyfluoroalkylated substances (PFAS)
b) Removal of reference to “Produkthaftungsgesetz” (6.1.)
c) Addition of requirement c) for disintegration testing for non-woven products (6.2.10)
d) No disintegration test required for change of content in specific cases (6.2.12.4)
e) Disintegration testing of wet wipes (6.2.12.6)
f) Ecotoxicity testing of constituents present ≤0.1% (6.2.12.7)
g) Use of chemically recycled monomers to produce already certified compostable PLA (6.2.13)
h) Measurement of thickness / grammage for sublicences for production facilities (6.4.2)
i) Changes in the design requirements (7.5.2)
j)) Changes according to latest version of ISO 17088
k) Removal of the maximum usage for organic fillers under A 1.2
l)) Removal of “Testing in a composting plant under real conditions” under B 3.1
m) Align thresholds for biodegradability testing to above 1% and thresholds for ecotoxicity testing to above 0.1% across the scheme

n) Editorial changes

Earlier versions

Certification scheme „Products made of compostable materials (DIN-Geprüft)“ (2021-07)
Certification scheme „Products made of compostable materials (DIN-Geprüft)“ (2017-10)
Certification scheme „Products made of compostable materials (DIN-Geprüft)“ (2015-06)
Certification scheme „Products made of compostable materials (DIN-Geprüft)“ (2014-08)
Certification scheme „Products made of compostable materials (DIN-Geprüft)“ (2013-02)

Remark

The German version of this certification scheme shall be taken as authoritative. No guarantee can be given to the English translation.

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1 Scope

This certification scheme applies for (end) products made of compostable materials or intermediates, and, in connection with the testing foundations named below, contains all requirements on issuing the compostability mark “DIN-Geprüft Industrial Compostable”.

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

If an (end) product, material or intermediate demonstrates conformity to the criteria specified in this certification scheme, then a certificate will be issued for that product. Furthermore, these certificates will be added to the corresponding lists of certificate holders (see Section 6.9).

There is no legal right to receiving a certificate or any other confirmation of conformity.

2 Test and certification specifications

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

Products, intermediates and materials can be certified and/or registered according to the following standards (certification standards):

DIN EN 13432	Requirements for packaging recoverable through composting and biodegradation
DIN EN 14995	Plastics - Evaluation of compostability - Test scheme and specifications
ISO 17088	Specifications for compostable plastics
ISO 18606	Packaging and environment - Organic recycling
AS 4736	Biodegradable Plastics – Biodegradable Plastics suitable for Composting and other microbial Treatment

Product, intermediates and materials are required to demonstrate compliance with the requirements of DIN EN 13432. One/several of the standards named may additionally be covered by the certification.

Laboratory testing must be performed according to the stipulations in the standards named above according to the following standards or test methods (testing standards):

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

DIN EN ISO 14855-1	Determination of the ultimate aerobic biodegradability of plastic materials under controlled composting conditions -- Method by analysis of evolved carbon dioxide -- Part 1: General procedure
DIN EN ISO 14855-2	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
DIN EN ISO 15985	Plastics - Determination of the ultimate anaerobic biodegradation and disintegration under high-solids anaerobic-digestion conditions - Method by analysis of released biogas
ASTM D 5338	Standard Test Method for Determining Aerobic Biodegradation of Plastics Materials Under Controlled Composting Conditions
DIN EN ISO 16929	Plastics - Determination of the degree of disintegration of plastic materials under defined composting conditions in a pilot-scale test
DIN EN 14045	Packaging - Evaluation of the disintegration of packaging materials in practical oriented tests under defined composting conditions; German version EN 14045:2003
DIN EN 14046	Packaging - Evaluation of the ultimate aerobic biodegradability of packaging materials under controlled composting conditions - Method by analysis of released carbon dioxide”; German version EN 14046:2003
DIN EN ISO 10634	Water quality – Guidance for the preparation and treatment of poorly water-soluble organic compounds for the subsequent evaluation of their biodegradability in an aqueous medium
ASTM E 1676	Standard Guide for conducting Laboratory Soil Toxicity or Bioaccumulation Tests with the Lumbricid Earthworm *Eisenia fetida* and the Enchytraeid Potworm *Enchytraeus albidus*
AS 4454	Composts, soil conditioners and mulches
OECD 208	Terrestrial Plant Test: 208: Seedling Emergence and Seedling Growth Test
OECD 301 (a-f)	Ready Biodegradability
Federal Quality Association Compost (ed.): (Bundesgütegemeinschaft Kompost e.V. (Hrsg.))	Manual of methods for analysing organic fertilisers, soil improver and substrates

- this certification scheme
- the general terms and conditions of TÜV Rheinland DIN CERTCO
- the testing, registration and certification regulations of DIN CERTCO
- the schedule of fees in its most current version

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

3 Definitions

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

Additive	Substances and product constituents added to a product, material or intermediate in order to, for example, generate certain properties (e.g. adhesives, antiblocking agents, printing inks).
Blank compost	Compost obtained from a parallel process according to B 3 without addition of sample material
Blend	Physical mixture of 2 or more materials without reactive process.
Certification	Proof of conformity with the requirements of the named standards as well as with this certification scheme for final products. A licence to use the mark is granted. In the case of materials or intermediates, the right to use the mark is granted for branding and advertising purposes only.
Compostable material	Material meeting the requirements of this certification scheme. The classification of types shall be made according to Section 6.3.
Continuous phase	The background phase (polymer 1) of a multiphase system with at least one further phase (polymer 2) (e.g. blend). A blend always has two phases: a continuous phase and the dispersed phase.
Intermediate	Semi-finished item. Optional state between material and product, e.g. laminates consisting of several layers of material. The classification of types shall be made according to Section 6.3.
Manufactured item	Material, intermediate or product according to this certification scheme. The classification of types shall be made according to Section 6.3.
Material	Material that is (in case of polymers) primarily based on organic chain molecules and used, for example, to manufacture intermediates or products. Materials generally contain further inorganic or low molecular weight organic materials used to influence processing or application properties. Materials can also consist of materials other than plastics.
PFAS	PFAS are defined as fluorinated substances that contain at least one fully fluorinated methyl or methylene carbon atom (without any H/Cl/Br/I) atom attached to it), i.e. with a few noted exceptions, any chemical with at least a perfluorinated methyl group (-CF3) or a perfluorinated methylene group (-CF2-) is a PFAS.[1]
Product	Article that is disposed of as waste (for composting) after use, is manufactured from polymeric materials or intermediates and frequently also contains additives. Products are not necessari-

[1] For this Certification Scheme, the OECD definition of PFAS is used (OECD 2021b) to align with the definitions used in EU institutions and CEN.

	ly packaging. The classification of types shall be made according to Section 6.3.
Production facility	Location at which production of manufactured items is carried out according to this certification scheme. This is not necessarily identical to the certificate holder's address.
Pulp	Cellulose pulp, regardless of manufacturing process – mechanical or chemical, as long as it has not been chemically modified.

4 Product requirements

According to the requirements of the underlying standards, the requirements named in the following must be fulfilled. Section 6 describes the details on providing the associated evidence.

- Compliance with the threshold values named in Table A.1 in DIN EN 13432.

- Ultimate biodegradability (90 % absolute biodegradation, or 90 % with a suitable reference substrate within not more than 6 months). Evidence must be proven via a test according to the standards named under Section 2.

- 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 > 2mm screen fraction. Evidence must be demonstrated via a test according to the standards named under Section B 3 (disintegration testing).

- The germination rate and plant biomass of both plant types grown on the compost using test substance must be higher than 90 % of the corresponding blank compost. Evidence must be demonstrated via a test according to the standards named under Section B 3.

- For organic additives present in a manufactured item at concentrations of more than 1 % of mass referred to the manufactured item, fulfilment of the requirements according to Section 6.3 Registration of biodegradable additives must be proven.

- Ingredients above 0.1% by dry weight must be determined to be harmless for the composting process by one or more of the following proves: Safety Data sheet, Pass testing of the finished product containing that ingredient, or pass testing of the individual ingredient, either tested on its own or in combination with other ingredients up to the maximum usage in the finished product in question.

- Ingredients at or below 0.1% by dry weight are not required to be tested on ecotoxicity. However, if these ingredients at or below 0.1 % dry mass sum up to more than 0.5 % dry mass the following plant toxicity testing applies: Pass testing of the finished product containing these ingredients with their maximum intended usage, or pass testing of each of these individual ingredients, either tested on their own or in combination with all the other ingredients summing up to more than 0.5% in their maximum usage. This interpretation does not apply for Earthworm toxicity against AS 4736.

- Additives present in a manufactured item at concentrations of 1 % of mass item or less must be harmless for the composting process.

- The total sum of the organic compounds for which biodegradability needs not be determined shall not exceed 5 % of mass.

- Residues remaining in packaging or substances that may be dispatched along with the product must be suitable for composting.

- The product or materials must not contain any intentionally added per- and polyfluoroalkylated substances (PFAS) and other organic, fluorinated chemicals, and no PFAS and organic fluorinated chemicals must be used intentionally during the production process, i.e. in or on equipment coming into use with the products or materials.

- For the application of ISO 18606, ISO 17088: For organic additives present in a manufactured item at concentrations of 1 % to 10 % for ISO 18606 and of 1% to 15% for ISO 17088 of mass referred to the manufactured item, the ultimate biodegradability must be evidenced separately. This evidence can be proven via a certification/notification of registration according to the certification scheme “Additives according to EN 13432” or “Products made of compostable materials”. For the application of AS 4736 the testing of the manufactured item on ultimate biodegradability is required additionally.

- For the application of AS 4736, ISO 17088 additionally: The survival rate and the mean weight of the applied worm species exposed with the compost using test substance must be higher than 90 % of the corresponding blank compost. Evidence must be demonstrated via a test according to the standard named under Section B 3.4 Determining compost quality (earthworm toxicity test).

5 Testing

5.1 General information

To carry out the inspections and tests necessary for the evaluation and certifications, DIN CERTCO uses test laboratories it has recognised.

If applicable test reports according to the certification scheme “Products made of compostable materials” (Seedling), “Products made of compostable materials for home and garden composting”, “Additives which are harmless for the composting process”, “Biodegradable in soil” and “Bio-Waste bags made of compostable materials” can be accepted.

All documents must be submitted in German or English.

5.2 Types of tests

5.2.1 Initial test (Type testing)

The initial test is a type test intended to establish whether the (end) product, intermediate, or material meets the requirements according to Section 4 of this certification scheme.

Section 6.2 shows which tests are necessary for individual cases.

5.2.2 Verification test (Control test)

Verification testing is performed on products, materials and intermediates.

Verification testing is performed in recurring, predefined intervals and establishes whether the certified (end) product, a registered material, a registered intermediate and/or a registered additive in production phase corresponds to the product tested during initial certification.

This must be evidenced on schedule via a test report with positive results from a testing laboratory recognised by DIN CERTCO.

Test reports are assessed by DIN CERTCO.

For this purpose, 5 samples of the certified manufactured item are obtained from manufacturers' production facilities and provided to DIN CERTCO on their own expense.

In the case of multiple certifications of the same manufactured item in the field of compostable materials at DIN CERTCO one evidence of a verification test per manufactured item is sufficient.

5.2.3 Supplementary testing

Supplement testing is performed when supplements, expansions or additions (see Section 6.13) are intended for a certified/registered manufactured item that may have an influence on conformity with the underlying requirements.

The type and scope of supplementary testing will be determined by DIN CERTCO in individual cases.

5.2.4 Special test

A special test is conducted when

- defects are detected
- the production has been suspended for a period of more than 6 months
- required by DIN CERTCO - reasons to be specified
- requested in writing by a third party if a particular interest in the maintenance of proper conduct of market procedures in relation to competition or quality is involved.

The type and scope of special test will be determined by DIN CERTCO in each individual case.

If defects are detected in a special test, or if a special test is performed due to a prolonged break in production, then the certificate holder shall bear the costs of the examination procedure.

Should the special test at the request of a third party reveal no defects, the costs shall be borne by said third party.

5.3 Sampling

The samples used for initial verification and amendment testing are usually delivered by the manufacturer to the testing laboratory which has been commissioned to perform the tests. The manufacturer bears the associated costs.

The number of samples required for product testing is agreed between DIN CERTCO and the testing laboratory unless it is already specified in the applicable test standards.

5.4 Test procedure

Testing universally must be performed according to one or more of the standards named above.

According to standards DIN EN 13432, DIN EN 14995, ISO 17088, ISO 18606 and AS 4736 the following tests are required:

- Chemical characterisation according to Section B 1.
- Testing of complete biodegradability according to Section B 2.
- Testing of compostability under practice-relevant conditions (disintegration) and of the quality of the composts (ecotoxicity). Certification is made with the maximum layer thickness determined in testing according to Section B 3.
- Testing of soil toxicity under practice-relevant conditions (earthworm toxicity test) according to Section B 3.5 (only required if AS 4736, ISO 17088 shall be applied).
- Additionally, for identifying the material it is necessary to perform an IR spectrum in accordance to Section C.

5.5 Test report

The testing laboratory informs the client of the test results by means of a test report. An original copy of it shall be submitted to DIN CERTCO; or a digital copy sent by the testing laboratory.

As a rule, the test report may not be older than 6 months at the time of application. In individual cases, older test reports can be recognised if the testing laboratory confirms the validity of the results by means of a test report in writing and the manufacturer confirms that the product/material/intermediate has not been changed since testing. Test reports that are more than 5 years old can generally no longer be recognised.

The test report must correspond to DIN EN ISO/IEC17025, Section 7.8.2 and must at least contain the following information:

- Name and address of the manufacturer
- Name and address of the applicant (if different than manufacturer)
- Test basis (standards and certification scheme) with date of issue
- Type of test (e.g. type test, additional test, etc.)
- Test date
- Results and evaluation of test
- If testing is being performed in parallel with multiple replicates, then the individual results must also be shown.
- Name and signature of the individual responsible for the test

6 Certification

Certification in the sense of this certification scheme relates to the assessment of conformity of a (end) product, intermediate or material by DIN CERTCO on the basis of test reports submitted by testing laboratories recognized by DIN CERTCO. In doing so, the (end) products being certified and/or intermediates or materials being registered for conformity with the requirements named in Section 2 are examined and subsequently monitored. Since this cer-

tification scheme is a modular system, the individual testing requirements are indicated accordingly in Section 6.2.

For certified materials and intermediates the right to use the logo is only granted to the certificate holder for **marketing and advertisement reasons**, not for labelling the product itself. A registration number is issued upon granting the certificate.

References to manufactured items that have already been certified can minimise testing expenditures. The points named in the following shall apply:

Should a reference be made to an (end)product that has already been certified, then an additional agreement will be required from the certificate holder. References to certified products will only be possible if concerning an identical product. Thus, for the certification of e.g. trays a reference can be made to certified trays but not to certified carrier bags.

6.1 Application for certification

Applicants can be both manufacturers or retailers who market the products independently with the written consent of the certificate holder.

The following documents must be submitted by the applicant to DIN CERTCO:

- The original application for certification, with a legally binding signature and company stamp.
- Completed datasheet (part of the application form).
- List of production facilities, including complete address. If production is being carried out by companies other than the certificate holder, then the company's complete name and address must be submitted. Production can be carried out at various locations alternatively or simultaneously. In this case, all alternative production facilities must be reported to DIN CERTCO upon application.
- Safety Data Sheets according to REACH for all substances being used to determine additives' suitability for composting (e.g. processing auxiliaries, printing inks, etc).

If substances' harmlessness cannot be determined using the Safety Data Sheet, then it may be necessary to perform additional tests (e.g. ecotoxicity testing and earthworm toxicity test). This is coordinated with DIN CERTCO and, if applicable, with the testing laboratories.

- If required, an up-to-date test report according to Section 5.5 (see Section 5.2.1 and Section 6.2), when the test has not been contracted by DIN CERTCO within the scope of an ongoing certification process.
- Details on construction and layer thickness, if applicable.
- Density or grammage or base-weight, if applicable, e.g. for paper, non-wovens, and expanded items
- Drawings, with data on all wall and layer thicknesses (d_{max}), if applicable.
- Test report on an infrared transmission spectrum according to Section C.
- Self-declaration that no PFAS or other organic, fluorinated chemicals are intentionally added or are intentionally used during the production process.

Additionally for products:

- Information on intended use.
- Submitting of product samples.
- List of substances which in the course of intended use may be disposed of as waste along with the product (e.g. residual packaging contents).
  For each substance: Proof of suitability for biological waste processing, e.g. reference to published data, according to internationally recognised standards and/or guidelines (e.g. OECD) dealing with biodegradability and toxicological effects of the substance.
- Food contents will be accepted in any case.

After receipt of the application, the applicant will receive a confirmation of order from DIN CERTCO with a procedure number and information on further processing.

6.2 Required tests/documents

Depending on the composition of the (end) products being certified and/or the intermediates or materials being registered, the tests named in the following will be required.

If assessment is finished with positive results and a positive decision is made regarding the application, the certification will be issued for the maximum layer thickness determined via testing according to Section B 3 and published according to Section 6.9.

The testing requirements for products, materials or intermediates are basically identical. Therefore, the requirements named in the following apply for all manufactured items equally. Depending on composition and structure of the manufactured item, a combination of the requirements named may be necessary.

6.2.1 Manufactured items consisting of items not yet certified

If certification is being requested for a manufactured item consisting of a material that is not yet certified, the following documents and information must be submitted along with the application form:

a) Disclosure of chemical composition (including substances at concentrations below 1 % of mass).

b) Safety Data Sheets according to REACH for all substances being used to determine substances' suitability for composting.

   If substances' harmlessness cannot be determined using the Safety Data Sheet, then it may be necessary to perform additional tests (e.g. ecotoxicity testing and earthworm toxicity test).This is coordinated with DIN CERTCO and, if applicable, with the testing laboratories.

c) Test report on the chemical characterisation as specified in Section B 1.

d) Test report on testing of ultimate biodegradability as specified in Section B 2.

   For ISO 18606 individual testing of each of the organic constituents present at levels between 1 to 10 % is required.

For ISO 17088 individual testing of each organic constituents present at concentrations of 1% to 15% is required.

If the constituents used are different from those used for the certified basic material, an extension/amendment of the certified basic material is not possible without additional assessment.

e) Test reports on quantitative testing of disintegration under practice-relevant conditions and of the quality of the compost as specified in Section B 3 (quantitative disintegration and ecotoxicity or rather earthworm toxicity test).
An infrared transmission spectrum in accordance with Section C.

g) Self declaration that no PFAS or other organic, fluorinated chemicals are intentionally added or are intentionally used during the production process.

6.2.2 Manufactured items composed of materials already certified (Blends)

If certification is being requested for a manufactured item consisting solely of materials already on the list according to Section 6.9 and no further additives are used, the following documents and information must be submitted along with the application form:

a) List of the materials used, including information on mass portions.

b) Test reports on quantitative testing of disintegration under practice-relevant conditions (quantitative disintegration) as specified in Section B 3.

c) An infrared transmission spectrum in accordance with Section C.

d) Self declaration that no PFAS or other organic, fluorinated chemicals are intentionally added or are intentionally used during the production process.

The test for disintegration according b) can be omitted if the applied thickness of the blend made of two registered materials does not exceed the applied thickness of the respective registered material with the lower applied thickness.

If a polymer different from the main polymer is used in an amount of 1% or less (biodegradable or non-biodegradable polymer), a qualitative and not quantitative disintegration test will be needed. This includes masterbatches, colour batches, and similar.

Use of colouring masterbatch or filler masterbatch with a certified carrier:

If the carrier is already a constituent within the material it is used with, the maximum allowed concentration of masterbatch without the need for a new disintegration test is determined by the percentage of pigment/filler which should be limited to 3% on the final product.

If the carrier is different than the material it is used with, the maximum allowed concentration of masterbatch without the need for a new disintegration test is determined by the percentage of pigment/filler which should be limited to 3% on the final product and on the condition that the certified thickness of the product is the lowest certified thickness of the materials used (finished product and carrier). In case the thickness is higher than the lowest certified thickness, but lower than the highest certified thickness, a qualitative disintegration test will be needed.

In case the concentration of the pigment/filler is higher than 3% or the thickness is higher than the lowest certified thickness but lower that the highest certified thickness of the two materials used, a qualitative disintegration test will be needed.

Note 1: valid for certified or tested carrier
Note 2: valid for other masterbatches that do not affect the mechanical properties (e.g. lubricant)

6.2.2.1 Special rules

The following special rules apply on the precondition that the compostable properties (disintegration) of blends are determined by the properties of the continuous phase. They only refer to the certification of blends. The mixtures used for the testing needs to be defined in cooperation with DIN CERTCO and the testing laboratory. It needs to be representative for the continuous phase. As long as the continuous phase remains identical, different mixture proportions have no influence on compostability. The applicant must provide evidence and data on the respective continuous phase.

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

Blend of materials from identical material groups:

For blends of registered materials that are only distinguished by molecular weight, the disintegration test according to Section B 3 can be omitted. The requisite for this is that the manufacturing process for the materials is identical and there is certification with the same manufacturer. The maximum layer thickness is that of the material with the lowest determined layer thickness. The condition for this is that any additives used in producing the manufactured item do not cause any chemical or structural changes.

Ranges in blends made from 2 different materials:

It is possible to register composition ranges of two different 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 DIN CERTCO and, if applicable, the testing laboratory. This requires proof that the material forming the continuous phase does not change within the range (material B instead of material A is the continuous phase). A disintegration test is required for each continuous phase that occurs. It must be demonstrated using electron microscopy that there is no phase change within the requested range.

Ranges in blends made from 3 different materials:

It is possible to register composition ranges of three different materials that have already been registered. For determining maximum layer thickness, testing of the quantitative disintegration of a blend for each continuous phase is needed. Maximum layer thickness can be differentiated depending on the layer thickness tested for the continuous phase.

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 DIN CERTCO and the testing laboratory. This requires proof that the continuous phase does not change within the range. A disintegration test is required for each continuous phase that occurs. It must be demonstrated using electron microscopy that there is no phase change within the requested range.

Example:

Tests required for a range of a blend of registered materials A, B and C under the assumption that the material with a share of 60 % forms the continuous phase (this shall be evidenced in the certification procedure):

Determination of degradation properties with material A as continuous phase:

A/B/C = 60/20/20

Determination of degradation properties with material B as continuous phase:

A/B/C = 20/60/20

Determination of degradation properties with material C as continuous phase:

A/B/C = 20/20/60

Ranges in blends with fillers:

In case the composition of a blend with fillers which already has been tested positively on quantitative disintegration shall be amended by increasing the amount of the filler, a qualitative disintegration testing of compostability according to section B 3 may be used to proof compostability under the condition that the continuous phase remains unchanged.

Example:

	Blend 1	Blend 2
Material A (polymer)	50 %	50 %
Material B (polymer)	20 %	10 %
Material C (filler)	30 %	40 %

If Blend 1 was tested positively by quantitative testing of compostability, a qualitative testing of compostability for Blend 2 may be accepted.

6.2.3 Manufactured items consisting of natural organic substances

If exclusively chemically unmodified constituents of natural origin (e.g. wood, wood fibre, cotton fibre, starch, paper pulp or jute) and admissible for composting according to the applicable legal stipulations are used for the manufactured item, such item are accepted by DIN CERTCO as being biodegradable without testing. The following documents and information must be submitted along with the application form:

a) Disclosure of chemical composition (including additives at concentrations below 1 % of mass).

b) Safety Data Sheets according to REACH for all substances being used to determine substances' suitability for composting.

   If substances' harmlessness cannot be determined using the Safety Data Sheet, then it may be necessary to perform additional tests (e.g. ecotoxicity testing and earthworm toxicity test). This is coordinated with DIN CERTCO and, if applicable, with the testing laboratories.

c) Test report on the chemical characterisation as specified in Section B 1.

d) Test reports on quantitative testing of disintegration under practice-relevant conditions and of the quality of the compost as specified in Section B 3 (quantitative disintegration and ecotoxicity or rather earthworm toxicity test). Ecotoxicity testing is not needed if the natural substance is listed in Annex A.

e) An infrared transmission spectrum in accordance with Section C.

If additives are being used, then the requirements according to 6.2.9 apply accordingly.

6.2.4 Manufactured items consisting of paper/recycled paper

Remark: In paper industry, fillers are called pigments.

If certification is being requested for a manufactured item consisting of paper/recycled paper, then the following documents and information must be submitted along with the application form:

a) Disclosure of the paper's chemical composition and structure (including additives at concentrations below 1 % of mass).

b) Disclosure of the manufactured item's chemical composition (including additives at concentrations below 1 % of mass).

c) Safety Data Sheets according to REACH for all substances being used to determine substances' suitability for composting.

   If substances' harmlessness cannot be determined using the Safety Data Sheet, then it may be necessary to perform additional tests (e.g. ecotoxicity testing and earthworm toxicity test). This is coordinated with DIN CERTCO and, if applicable, with the testing laboratories.

d) Test report on the chemical characterisation as specified in Section B 1.

e) Test reports on quantitative testing of disintegration under practice-relevant conditions and of the quality of the compost as specified in Section B 3 (disintegration and ecotoxicity or rather earthworm toxicity test).

f) An infrared transmission spectrum in accordance with Section C.

g) Self declaration that no PFAS or other organic, fluorinated chemicals are intentionally-added or are intentionally used during the production process.

The requirements according to 6.2.9 apply accordingly for the additives being used.

If using recycled paper, the following additional evidence is required:

– Evidence of continuous compliance with the threshold values according to Table A.1 of DIN EN 13432 via a suitable quality assurance system.

– An additional chemical analysis performed annually according to Section B 1 within the scope of annual control testing according to 5.2.2.

Certification of manufactured items requires information on the maximum layer thickness and grammage. Both additional conditions must be fulfilled. A higher thickness of paper products, non-wovens or leaf products can be accepted during surveillance if the grammage/base-weight is still the same.

If composition ranges in paper/recycled paper shall be certified, a quantitative disintegration test is required of the manufactured item with the highest content of lignin/the hardest wood and/or applied additives in its highest concentrations. The variety of alternative compositions can be proven by quantitative disintegration based on the “theoretical” sample covering the worst case.

In case of varying parameters (e.g. lignin content, several alternative fillers, etc), several cornerstones can be considered but must be proven by means of comparative qualitative disintegration testing.

6.2.4.1 Special rules

The following special rules have been developed to minimise testing expenditures.

Chemical pulp with 1 % additives or less, **without** pigmentation and without use of wet strengtheners:

– For single-sided coating, up to 50 % of the tested layer thickness of the registered polymer and up to 100 % of the tested layer thickness of the paper can be certified/registered without additional tests.

– For double-sided coating, up to 25 % of the tested layer thickness of the registered polymer and up to 100 % of the tested layer thickness of the paper can be certified/registered without additional tests.

– For single-sided coating with 2 different polymers, up to 25 % of the tested layer thickness of each polymer and up to 100 % of the tested layer thickness of the paper can be certified/registered without additional tests.

– For double-sided coating with 2 different polymers, up to 12.5 % of the tested layer thickness of the polymer and up to 100 % of the tested layer thickness of the paper can be certified/registered without additional tests.

Mechanical pulp with 1 % additives or less, **without** pigmentation and without use of wet strengtheners:

– For single-sided coating, up to 50 % of the tested layer thickness of the polymer and up to 50 % of the tested layer thickness of the paper can be certified/registered without additional tests.

– For double-sided coating, up to 25 % of the tested layer thickness of the polymer and up to 50 % of the tested layer thickness of the paper can be certified/registered without additional tests.

– For single-sided coating with 2 different polymers, up to 25 % of the tested layer thickness of each polymer and up to 50 % of the tested layer thickness of the paper can be certified/registered without additional tests.

– For double-sided coating with 2 different polymers, up to 12.5 % of the tested layer thickness of the polymer and up to 50 % of the tested layer thickness of the paper can be certified/registered without additional tests.

Chemical pulp with 1 % additives or less, **with** pigmentation and without use of wet strengtheners:

– For single-sided coating, up to 50 % of the tested layer thickness of the polymer and up to 50 % of the tested layer thickness of the paper can be certified/registered without additional tests.

– For double-sided coating, up to 25 % of the tested layer thickness of the polymer and up to 50 % of the tested layer thickness of the paper can be certified/registered without additional tests.

– For single-sided coating with 2 different polymers, up to 25 % of the tested layer thickness of each polymer and up to 50 % of the tested layer thickness of the paper can be certified/registered without additional tests.

– For double-sided coating with 2 different polymers, up to 12.5 % of the tested layer thickness of the polymer and up to 50 % of the tested layer thickness of the paper can be certified/registered without additional tests.

Recycled paper with 1 % additives or less, without pigmentation and without use of wet strengtheners

The same evaluation rules mentioned above regarding composting properties as for new paper apply.

6.2.5 Manufactured items composed of registered materials and materials indicated in Section A

If certification is being requested for a manufactured item that is intended to contain the fillers and processing auxiliaries indicated in Section A, it is possible to register individual compositions within a predefined composition range. The following documents and information must be submitted along with the application form:

a) Disclosure of the manufactured item's chemical composition (including additives at concentrations below 1 % of mass).

b) Safety Data Sheets according to REACH for all substances being used to determine substances' suitability for composting.

   If substances' harmlessness cannot be determined using the Safety Data Sheet, then it may be necessary to perform additional tests (e.g. ecotoxicity testing and earthworm toxicity test). This is coordinated with DIN CERTCO and, if applicable, with the testing laboratories.

c) The upper limit of 49 % by mass for the proportion of inorganic material and the upper limits specified in Section A for the respective fillers or processing auxiliaries may not to be exceeded in the material as a whole.

d) Safety data sheets according to REACH are to be submitted for all materials used as specified in Section A. Chemical characterisation has to be carried out according to Section B1 on the manufactured item or alternatively on all applied substances of Annex A.

e) Test reports on quantitative testing of disintegration under practice-relevant conditions (disintegration) according to Section B 3.

f) An infrared transmission spectrum in accordance with Section C.

g) Self-declaration that no PFAS or other organic, fluorinated chemicals are intentionally-added or are intentionally used during the production process.

Should various portions of the materials named in Section A be used, then the test must be performed using the largest portion being included in the application.

Provided no more than 3 % of mass consists of inorganic filling according to Section A, then the disintegration test according to Section B 3 can be omitted.

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

Constituents can be fully or partially replaced by others belonging to the same subgroup – up to the approved upper limit. If the total amount replaced exceeds 10 % or exceeds the registered upper limit, a qualitative disintegration test is required.

Example: If a mixture is composed of 85 % of constituent A and 15 % of $CaCO_3$, then:

- in case 15 % $CaCO_3$ is replaced by 15 % Talcum (same subgroup, exceeding 10%), qualitative disintegration testing is required,
- in case 10 % $CaCO_3$ is replaced by 10 % Talcum (same subgroup), no disintegration testing is required,
- in case 15 % $CaCO_3$ is replaced in excess by 20 % Talcum (same subgroup but exceeding the approved upper limit of $CaCO_3$), a qualitative disintegration test is required.

6.2.6 Manufactured items with coatings

If manufactured items are coated, then the following types must be differentiated:

6.2.6.1 Coating using substances whose biodegradation has not been proven, but have excellent water solubility and are being used in portions of 1 % or less of mass

The following documents and information must be submitted along with the application form:

a) Disclosure of the manufactured item's chemical composition (including additives at concentrations below 1 % of mass).

b) Data on the coatings layer thickness.

c) Safety Data Sheets according to REACH for all substances being used to determine substances' suitability for composting.

   If substances' harmlessness cannot be determined using the Safety Data Sheet, then it may be necessary to perform additional tests (e.g. ecotoxicity testing and earthworm toxicity test). This is coordinated with DIN CERTCO and, if applicable, with the testing laboratories.

d) An infrared transmission spectrum in accordance with Section C.

e) Self-declaration that no PFAS or other organic, fluorinated chemicals are intentionally added or are intentionally used during the production process.

Evidence of good water solubility can be provided, for example, by the Material Safety Datasheet according to REACH. Alternative evidence is possible and will be evaluated by DIN CERTCO.

6.2.6.2 Coating using substances whose biodegradation has not been proven and are being used in portions of 1 % or less of mass

The following documents and information must be submitted along with the application form:

a) Disclosure of the manufactured item's chemical composition (including additives at concentrations below 1 % of mass).

b) Data on the coatings layer thickness.

c) Safety Data Sheets according to REACH for all substances being used to determine substances' suitability for composting.

   If substances' harmlessness cannot be determined using the Safety Data Sheet, then it may be necessary to perform additional tests (e.g. ecotoxicity testing and earthworm toxicity test). This is coordinated with DIN CERTCO and, if applicable, with the testing laboratories.

d) Test reports on quantitative testing of disintegration under practice-relevant conditions (disintegration) according to Section B 3 of the coated item.

d) An infrared transmission spectrum in accordance with Section C.

e) Self-declaration that no PFAS or other organic, fluorinated chemicals are intentionally added or are intentionally used during the production process.

6.2.6.3 Coating using materials whose biodegradation has not been proven and are being used in portions more than 1 % of mass

The following documents and information must be submitted along with the application form:

According to EN 13432, ISO 18606, ISO 17088, EN 14995

For ISO 18606, individual testing on ultimate biodegradability of each of the organic constituents present at levels between 1 to 10 % of mass is required.
For ISO 17088, individual testing on ultimate biodegradability of each of the organic constituents present at levels between 1 to 15 % of mass is required.

When using significant organic additives according to Section A 2.1 of EN 13432, the following tests will be required in addition to the requirements stated under Section 6.2.9.

Testing of additives:

a) Test report on the chemical characterization as specified in Section B1.

b) Test report on testing of ultimate biodegradability as specified in Section B2.

And of the coated manufactured item:

c) Test reports on quantitative testing of compostability under practice-relevant conditions and of the quality of the compost as specified in Section B3 (disintegration and ecotoxicity). Alternatively, the ecotoxicity testing can be performed on each single substance.

d) An infrared transmission spectrum in accordance with Section C.

Alternatively:

According to EN 13432, EN 14995

Testing of coated manufactured item according to 6.2.1.

According to AS 4736:

When using significant organic additives in portions more than 1 % of mass the following tests will be required in addition to the requirements stated under Section 6.2.9.

Testing of substances used in portions more than 1 %:

a) Test report on testing of ultimate biodegradability as specified in Section B 2.

And of the coated manufactured item:

b) Test reports on quantitative testing of disintegration under practice-relevant conditions and of the quality of the compost as specified in Section B 3 (disintegration and ecotoxicity or rather earthworm toxicity test). Alternatively, the ecotoxicity testing or rather the earthworm toxicity test can be performed on each single substance.

c) Test report on testing of ultimate biodegradability as specified in Section B 2.

d) Test report on the chemical characterisation as specified in Section B 1. Alternatively, the testing can be performed on each single substance.

e) An infrared transmission spectrum in accordance with Section C.

6.2.6.4 Coatings with materials that have already been registered with portions over 1 % of mass

The following documents and information must be submitted along with the application form:

a) Disclosure of the manufactured item's chemical composition (including additives at concentrations below 1 % of mass).

b) Data on the coatings layer thickness.

c) Safety Data Sheets according to REACH for all substances being used to determine substances' suitability for composting.

   If substances' harmlessness cannot be determined using the Safety Data Sheet, then it may be necessary to perform additional tests (e.g. ecotoxicity testing and earthworm toxicity test). This is coordinated with DIN CERTCO and, if applicable, with the testing laboratories.

d) Test reports on quantitative testing of disintegration under practice-relevant conditions (disintegration) according to Section B 3 of the coated item.

e) An infrared transmission spectrum in accordance with Section C.

6.2.7 Manufactured items consisting of multiple layer structures made of registered materials

If certification is being requested for a manufactured item consisting of multiple layers of mate-

rials already on the list according to Section 6.9 and are therefore demonstrated to be compostable (without using auxiliary materials), then the following documents and information must be submitted along with the application form:

a) Disclosure of the exact structure, including information on coat thickness of the individual coats.

b) Disclosure of the composition of each layer (including additives at concentrations below 1 % of mass).

c) Disclosure of other additives used (including additives used at concentrations below 1 % of mass).

d) Safety Data Sheets according to REACH for all substances being used to determine substances' suitability for composting.

   If substances' harmlessness cannot be determined using the Safety Data Sheet, then it may be necessary to perform additional tests (e.g. ecotoxicity testing and earthworm toxicity test). This is coordinated with DIN CERTCO and, if applicable, with the testing laboratories.

e) List of the materials used, including information on mass portions.

f) Test reports on quantitative testing of disintegration under practice-relevant conditions (disintegration) according to Section B 3.

g) An infrared transmission spectrum in accordance with Section C.

If additives are being used, then each individual layer must fulfil the requirements of this certification scheme regarding biodegradability and the use of additives.

6.2.7.1 Special rules: 2 layers

The following special rules have been developed to minimise testing expenditures.

– Testing according to Section B 3 (disintegration) may be omitted in the case of two-layer structures if the layer thickness of each of the two materials does not exceed half of the maximum compostable material thickness of the individual materials determined by testing in accordance to Section B 3,

or

- if both layers have been manufactured using the same material and the maximum registered thickness of the used material is not exceeded by the two layer structure.

Both the individual layers as well as the overall product must comply with the other requirements in Section 6. These rules apply for laminates and coextrudates, provided no adhesive is being used.

Example:

Material A is registered with a maximum layer thickness of 150 µm.
Material B is registered with a maximum layer thickness of 400 µm.

With a maximum layer thickness of 75 µm for material A and 200 µm for material B and with respecting the other requirements in Section 6, disintegration testing can be omitted.

6.2.7.2 Special rules: 3 layers

The following special rules have been developed to minimise testing expenditures.

For three-layered structures, the test according to Section B 3 (disintegration) can be omitted if

– the overall thickness of the three layered structure does not exceed half of the minimum registered thickness among the three registered materials, as determined in a test according to Section B 3.

or

– if layers have been manufactured using the same material and the maximum layer thickness of the material being used is not exceeded.

These rules apply for laminates and coextrudates, provided no adhesive is being used.

Example:

Material A is registered with a maximum layer thickness of 150 µm.
Material B is registered with a maximum layer thickness of 400 µm
Material C is registered with a maximum layer thickness of 1000 µm.

With a maximum layer thickness of the 3-layer structure of 75 µm and with respecting the other requirements in Section 6, disintegration testing can be omitted.

6.2.7.3 Special rules: multiple layers of the same material

For multiple layered structures where all layers consist of the same registered material (without additives), the test according to Section B 3 (disintegration) can be omitted if the layer thickness of the multiple layer structure does not exceed the maximum registered layer thickness for the material being used.

6.2.7.4 Special rules: registered self-adhesive labels

Provided that a certified selfadhesive label and a certified film are combined into a finished film packaging and the following conditions are fulfilled:

- The maximum used thickness of the film must not exceed half of the registered thickness.
- The maximum applied thickness of the label must not exceed half of the thickness as specified by the notification of registration. The quantity of adhesive used per unit area must not exceed that specified by the notification of registration.
- The maximum surface area of the label does not exceed 10 % of the total surface area of the film.
- In the case of multilayer labels: In addition, the rules as in Sections 6.2.7.1 and 6.2.7.2 apply.

No disintegration test according to Section B3 is required.

Provided that a certified self-adhesive label and a certified film are combined into a finished film packaging and the following conditions are fulfilled:

- The maximum surface area of the label does not exceed 10 % of the total surface area of the film.

Then a qualitative disintegration test according to Section B3 is sufficient.

6.2.8 Manufactured items exceeding the maximum registered/certified layer thickness

If a manufactured item exceeds the maximum registered layer thickness of the material/intermediate/product being used, then the quantitative disintegration of the manufactured item has to be evidenced separately.

Additional Test required:

Test reports on quantitative testing of compostability under practice-relevant conditions according to Section B 3 (quantitative disintegration).

6.2.9 Items consisting of manufactured items already registered/certified and non-biodegradable additives

This can be e.g. a printed shopping bag.

Certification of manufactured items consisting of various alternative materials/intermediates/products is possible provided the certification scheme's requirements have been met for all alternatives.

The other requirements according to Section 6.2 must be met.

6.2.9.1 Use of harmless additives with 1 % or less of mass per additive and 5 % of mass or less of non-biodegradable additives

According to Section A2.1 of DIN EN 13432, A2.1 of DIN EN 14995, 6.3.1 of ISO 17088, 6.3.1 of ISO 18606 and 5.4.2.1 of AS 4736 organic additives whose biodegradability has not been separately determined can be used on the following conditions:

– 1 % of mass or less per organic additive.

– 5 % of mass or less in total of organic additives whose biodegradability has not been proven.

– Additives are harmless for the composting process.

Required information/tests/documents:

a) List of all additives, including portions of mass.

b) Safety Data Sheets according to REACH for all substances being used to determine substances' suitability for composting.

   If substances' harmlessness cannot be determined using the Safety Data Sheet, then it may be necessary to perform additional tests (e.g. ecotoxicity testing and earthworm tox-

icity test). This is coordinated with DIN CERTCO and, if applicable, with the testing laboratories.

c) An infrared transmission spectrum in accordance with Section C.

6.2.9.2 Using printing inks

It is generally possible to use printing inks. In addition to the requirements named in Section 6.2, the printed product must also comply with the threshold values in Table A.1 of DIN EN 13432.

No more than 1 % of mass of dry printing ink per colour (e.g. red, green, etc) may be used, and a total of no more than 5 % printing ink. Compliance with the thresholds according to Table A.1 in DIN EN 13432 for the whole product is decisive. If the individual printing inks are tested, then 80 % of the threshold from table A.1 in EN 13432 may not be exceeded with the maximum colour quantity being requested.

Additionally, the following documents and information must be submitted along with the application form:

a) Safety Data Sheets according to REACH for all colours (e.g. red, yellow, etc.) being used to determine additives' suitability for composting.

   If substances' harmlessness cannot be determined using the Safety Data Sheet, then it may be necessary to perform additional tests (e.g. ecotoxicity testing and earthworm toxicity test). This is coordinated with DIN CERTCO and, if applicable, with the testing laboratories.

b) For each colour used, information on heavy metal contents in the form of test reports according to Section B 1.

   Alternatively: Test report on the chemical characterisation as specified in Section B 1 of a printed product sample. The portions of the individual colours tested here will be defined as maximum useable amount of colours.

c) Self-declaration that no PFAS or other organic, fluorinated chemicals are intentionally added or are intentionally used during the production process.

If different colours are used, the maximum usable amount will be defined by the colour with the lowest possible concentration.

Example:

The inks A, B and C have been limited to the following amounts according to Section B 1:

– Color A: 0.1 % of mass
– Color B: 0.4 % of mass
– Color C: 0.6 % of mass

The single use of each colour is therefore limited to 0.1 % of mass, 0.4 % of mass and 0.6 % of mass, respectively. Is colour A in use the overall amount of printing colour combined is limited to 0.1 %, for the use of colour B (without colour A) 0.4 % only, etc. This is also valid for mixtures of pigments used as printing colours.

In the case UV/EB inks and UV/EB overprint varnishes are used, it will be necessary to test the product regarding ecotoxicity and disintegration after UV or EB curing. If the amount of UV/EB inks used is higher than 1%, then also biodegradability testing is required after the curing process.

6.2.9.3 Use of adhesives

Remark: This does not refer to certified materials used as adhesive.

If an adhesive is being used with mass portions of 1 % of mass or less, then the following documents and information must be submitted along with the application form:

a) List of all adhesives being used, along with mass portions and a description of distribution/areas of application.

b) Safety Data Sheets according to REACH for all adhesives being used to determine additives' suitability for composting.

   If substances' harmlessness cannot be determined using the Safety Data Sheet, then it may be necessary to perform additional tests (e.g. ecotoxicity testing and earthworm toxicity test). This is coordinated with DIN CERTCO and, if applicable, with the testing laboratories.

c) Test reports on quantitative testing of disintegration under practice-relevant conditions (disintegration) according to Section B 3 of the manufactured item including the adhesive.

6.2.9.4 Use of additives with more than 1 % of mass per additive and/or more than 5 % of mass of additives

The following documents and Information have to be submitted along with the application form:

<u>According to EN 13432, ISO 18606, ISO 17088, EN 14995</u>

When using organic additives according to Section A2.1 of EN 13432, A2.1 of EN 14995, 6.3.1 of ISO 18606 and 6.3.1 of ISO 17088, if applicable, the following tests will be necessary in addition to the specifications given above:

Testing of additives:

a) Test report on the chemical characterisation as specified in Section B1.

b) Test report on testing of ultimate biodegradability as specified in Section B2.

And of the manufactured item:

c) Test reports on quantitative testing of disintegration under practice-relevant conditions and of the quality of the compost as specified in Section B3 (disintegration and ecotoxicity). Alternatively, the ecotoxicity testing can be performed on each single substance.

d) An infrared transmission spectrum in accordance with Section C.

For ISO 18606, individual testing on ultimate biodegradability of each of the organic constituents present at levels between 1 to 10 % is required.

For ISO 17088, individual testing on ultimate biodegradability of each of the organic constituents present at levels between 1 to 15 % is required.

Alternatively:

According to EN 13432, EN 14995

Testing of manufactured item according to Section 6.2.1.

According to AS 4736:

When using significant organic additives in portions more than 1 % of mass the following tests will be required in addition to the requirements stated under Section 6.2.9.

Testing of substances used in portions more than 1 %:

a) Test report on testing of ultimate biodegradability as specified in Section B 2.

b) Test report on the chemical characterization as specified in Section B1.

And of the manufactured item:

c) Test reports on quantitative testing of disintegration under practice-relevant conditions and of the quality of the compost as specified in Section B 3 (disintegration and ecotoxicity or rather earthworm toxicity test). Alternatively, the ecotoxicity testing or rather the earthworm toxicity test can be performed on each single substance.

d) Test report on testing of ultimate biodegradability as specified in Section B 2.

e) Test report on the chemical characterisation as specified in Section B 1. Alternatively, the testing can be performed on each single substance.

f) An infrared transmission spectrum in accordance with Section C.

6.2.10 Use of fibres made of already registered/certified materials

As there are different manufacturing processes for non-woven fibre products, any change of the manufacturing process shall result in the need to be re-tested for quantitative disintegration. Information on the manufacturing process shall be given for the assessment.

For the change of Avivage (finisher) if the replacing Avivage is biodegradable, no additional quantitative disintegration testing will be required. If the replacement Avivage is not biodegradable, quantitative disintegration testing will be required.

Required information/tests/documents:

a) List of all additives, including portions of mass.

b) Safety Data Sheets according to REACH for all substances being used to determine substances' suitability for composting.

   If substances' harmlessness cannot be determined using the Safety Data Sheet, then it may be necessary to perform additional tests (e.g. ecotoxicity testing and earthworm toxicity test). This is coordinated with the Certification Body and, if applicable, with the testing laboratories

c) Qualitative disintegration testing is sufficient if the thickness of the non-woven product does not exceed 50% of the maximum certified grammage or thickness of the polymer used to produce the non-woven article. Results are then accepted only if complete disintegration is obtained. If some fragments are remaining after 12 weeks of testing, results are not considered positive, and retesting is needed (via aquantitative disintegration test).

d) An infrared transmission spectrum in accordance with Section C.

Remark: If additives > 1 % are used Section 6.2.9.4 applies.

6.2.11 Items consisting of materials already registered and biodegradable additives with portions over 1 % of mass of the item

Certification of manufactured items consisting of various alternative materials/intermediates/products is possible provided this Certification Scheme's requirements have been met for all alternatives.

The other requirements according to Section 6.2 must be met.

If additives whose biodegradability has been individually proven according to this Certification Scheme or that are already registered with the Certification Body are being used with more than 1 % of mass, then no separate evidence of biodegradability is necessary. Additionally, the following documents and information must be submitted along with the application form:

a) List of all additives, including portions of mass.

b) Safety Data Sheets according to REACH for all substances being used to determine substances' suitability for composting.

   If substances' harmlessness cannot be determined using the Safety Data Sheet, then it may be necessary to perform additional tests (e.g. ecotoxicity testing and earthworm toxicity test). This is coordinated with the Certification Body and, if applicable, with the testing laboratories

c) Test reports on testing quantitative disintegration under practice-relevant conditions and of the quality of the compost (disintegration and ecotoxity) according to Section B3 for all alternatives. Alternatively, the ecotoxicity testing can be tested on each individual substance.

6.2.12 Special cases for Products/Intermediates

6.2.12.1 Design requirements

All polymer materials used in the product must comply with the maximum degradable layer thickness yielded in the test according to Section B 3.

6.2.12.2 Hollow bodies

In the case of hollow bodies with small diameter apertures, the maximum permissible wall thickness d_{max} is limited to 50 % of the maximum compostable material thickness determined

in accordance with Section B 3 for the material (or intermediate) being used. 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:

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

Hollow bodies with x > 10 cm, may have wall thicknesses up to $d_{max,}$ if a test report is submitted on the determination of the maximum compostable material thickness for this product in accordance with Section B 3. Where justified in exceptional cases, the performance of further tests specified in Section B 3 may be required by DIN CERTCO.

6.2.12.3 Packaging units

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

– Easily separable units (packaging units according to DIN EN 13432).
  This refers to products like bottles with lids or yoghurt cups.

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

– Not manually separable units
  This refers to products like labels on packaging. These products will be processed as one unit. Any additives contained are being related to the whole unit.

6.2.12.4 Manufactured items where the content is mainly (apart from e.g. extraction) still present in the product after use (e.g. coffee capsules, etc.)

For the purpose of this assessment, the products are defined to be composed of an outer envelope and a content. The content corresponds to the coffee, the tea or a similar substance. The outer envelope represents the part of the product containing the content.

Assessment of such type of products is to be made as follows:

- The biodegradation, ecotoxicity and material characterization on the product is made only on the outer envelope without the content (coffee, tea or similar).
- The quantitative disintegration test is made on the whole product, outer envelope with content. The quantitative disintegration test shall be performed on a used product (corresponding to an actually used coffee pad/capsule or tea bag). The testing percentages added to the disintegration test refer to the dry weight of the outer envelope as foreseen in EN 13432, also for the quantitative disintegration test. Therefore, the amount of sample material for testing is defined on the dry weight of the outer envelope. In case the amount of sample material compared to the compost is too high, the percentage of the dry weight of the outer envelope may be reduced down to 0.5 % relative to the wet weight of the compost.

- No disintegration test is required for a change of content on the condition that the outer envelope remains identical and that the change of content is:

  from coffee to tea;

  from coffee to solubles;

  from tea to solubles;

  to similar content (coffee to coffee, tea to tea leaves, solubles to solubles)

  For other changes to content, a quantitative disintegration test is necessary.

The other requirements according to Section 6.2 must be met.

6.2.12.5 Thin voluminous films

It can be difficult to test disintegration of thin voluminous films (< 30 µm) in a concentration of 1%. It is therefore possible to apply the testing percentage for thin films to a concentration ranging between 0.5% and 2%. This can be discussed between the testing laboratory and the certification body. The concentration for ecotoxicity testing remains 10%.

6.2.12.6 Disintegration testing of wet wipes

Preservatives and other additives can influence the disintegration characteristics of a nonwoven, hence, the disintegration testing of a wet wipe/facial mask shall be done with additives, especially if the additives are used in a high (dry) concentration, but not only because these additives can act as preservatives. The disintegration/strength of a non-woven is dependent on the overlay of fibres in the non-woven. Adding other materials that will be part of this overlay or change the interactions between the fibres could eventually influence the disintegration characteristics.

Wipes shall be tested for disintegration in wet form, although the amount of wipes added to the test compost has to be calculated based on the dry weight of the wipe containing the additives. The quantity of product added to the compost is still determined based on the wet weight of the compost.

6.2.12.7 Ecotoxicity testing of constituents present ≤ 0,1%

Ingredients above 0.1% by dry weight must be determined to be harmless for the composting process by one or more of the following:

- Safety Data Sheet according to REACH
- Pass testing of the finished product containing that ingredient, or
- Pass testing of the individual ingredient, either tested on its own or in combination with other ingredients up to the maximum usage in the finished product in question.

Ingredients at or below 0.1% by dry weight are not required to be tested on ecotoxicity. However,if these ingredients ≤ 0.1% dry mass sum up to more than 0.5% dry mass the following plant toxicity testing applies:

- Pass testing of the finished product containing these ingredients with their maximum intended usage, or
- Pass testing of each of these individual ingredients, either tested on their own or in

- combination with all the other ingredients summing up to more than 0.5% in their maximum usage.

This rule does not apply for Earthworm toxicity against AS 4736, ISO 17088.

6.2.13 Use of chemically recycled monomers to produce already certified compostable PLA

PLA made fully or partially from chemically recycled lactic acid/lactide needs to undergo the full test scope of the underlying standards and this certification scheme, showing that these requirements are met. However, biodegradation, disintegration and plant toxicity tests can be omitted, if the molecular weights („M_w“, „M_n“), crystallinities, densities of the polymers in question are covered by existing test reports of the respective polymers already registered. Therefore, chemical characterization according to Annex B 1 and FTIR spectra according to Annex C are sufficient. However, information on potential impurities could require ecotoxicity testing as required by this certification scheme.
To avoid chemical characterization in each verification test for these grades in question, a quality management system based on standard series EN ISO 9000 ff. and a quality control system on incoming feedstock for the chemically recycled lactic acid/lactide can be submitted to the certification body.

6.3 Definition of types, subtypes and manufactured item families

Products, intermediates and materials that largely differ from each other in significant properties relevant to certification are defined as types or models. Properties relevant to certification include, for example:

- for products/intermediates:
  - Intended use and or contents.
  - Shapes.
  - Product characteristics beyond differences in dimensions.

  For example:
  Carrier bags and waste bags are two different types.
  Plates and cutlery are two different types.
  Packaging for fruits and waste bags are two different types.
  Packaging for food and non-food articles are two different types.

- for materials:
  - Chemical structures.
  - Composition.
  - Compositions that cannot be defined as composition range.

Ranges in connection with materials are grouped into one certificate.
An individual certificate will be issued for each type.

A subtype is defined as the (end) product that is different based on dimensions. Multiple alternative subtypes are grouped into one product family of alternative dimensions.

- for products:
  - Dimensions.
  - Materials used.
  - Printing inks or print layouts used.

  For example:

Carrier bags made from different materials and with different dimensions are subtypes.

- for materials, half-finished items:
  - Various materials used with the same additives.
  - Percentage differences for various materials used with the same additives.

Multiple subtypes can be grouped onto one certificate.

6.4 Sub-licences

According to DIN CERTCO's General Terms and Conditions sub-licences are necessary if certified manufactured items are intended to be brought onto the market on behalf of companies other than the main certificate holder.

6.4.1 Sub-licences without self-production

It is possible to issue sub-licences for all manufactured items as defined in this certification scheme. They facilitate bringing certified manufactured items into circulation on behalf of the sub-licence holder. Sub-licences are dependent upon the validity of the main certificate. Manufactured items may not be changed (e.g. printed) by sub-licence holders. Exceptions to this are packaging seals, batch number printing and best before dates.

Documents and information required for application:

a) Application form with stamp and signature.

b) Sub-licence holder's declaration that the main certificate holder's products enter into commercial trade without being changed.

c) Declaration of confirmation from the main certificate holder that a sub-licence shall be issued.

A sub-licence can be issued

- With its own individual registration number.
- With the main certificate holder's registration number.

6.4.2 Sub-licences for production facilities

Sub-licences for productions facilities may be issued for certified/registered manufactured items. They facilitate bringing certified manufactured goods into circulation on behalf of the production facility's owner. Sub-licences are dependent upon the validity of the main certificate. The production facility owner must produce the manufactured items according to the specifications indicated by the holder of the main licence.

An annual verification test must be performed according to Section 7.4.

Documents and information required for application:

a) Application form with stamp and signature.

b) Declaration from the production facility operator that the products are being manufactured according to the main certificate's stipulations.

c) Declaration of consent from the main certificate holder that a sub-licence may be issued.

d) Forwarding of a datasheet, completely filled out by the production facility operator accordingly.

e) An infrared transmission spectrum in accordance with Section C for each product.

f) A measurement of thickness and grammage.

g) Self declaration that no PFAs or other organic, fluorinated chemicals are intentionally added or are intentionally used during the production process.

A sub-licence can be issued

– With its own individual registration number.
– With the main certificate holder's registration number.

6.5 Confidentiality

The members of committees set up to implement this certification scheme are under obligation to observe strict secrecy. The members of all participating bodies further undertake by signing a declaration of commitment not to pass on to third parties any information on products and companies they may obtain in connection with their certification activities.

6.6 Conformity assessment

On the basis of the documents submitted, DIN CERTCO conducts the conformity examination. The assessment is made with the aid of the test report as to whether the product meets the requirements of the certification scheme and of the underlying standards.

The applicant will receive written notification from DIN CERTCO in the event of any possible deviations.

6.7 Registration numbers of products, materials and intermediates

Composition of the registration number:

– Products	9Gxxxx
– Materials	9Kxxxx
– Intermediates	9Lxxxx

6.8 Certificate and the right to use the mark for (end)products

After successful testing and conformity assessment of the application documents submitted, DIN CERTCO issues a certificate to the applicant and issues the right to use the compostability mark "DIN-Geprüft Industrial Compostable“ for products in conjunction with the respective registration number.

Products made of compostable materials for which a right to use the compostability mark "DIN-Geprüft Industrial Compostable" has been issued must be marked with the "DIN-Geprüft Industrial Compostable"-Logo and the respective registration number.

Logo and registration number must only be used for the product/material/intermediate for which the certificate has been issued and that corresponds to the type-tested product/material/intermediate.

For each respective type, a registration number shall be issued. For design types (sub-types) of a type, the same registration number shall be issued (for information, see Section 6.3).

Materials and intermediates do **only** receive the right to use the mark for **marketing and advertising purposes**. They are certified and receive registration numbers (9Kxxx or 9Lxxx). For each respective type, a registration number shall be issued. For design types (sub-types) of a type, the same registration number shall be issued (for information, see Section 6.3).

Sub-certificate holder gain the same right to use the mark as the main certificate holder regardless of whether an own registration number has been issued.

6.9 Publication

All certificate holders can be viewed on the daily up-dated homepage of DIN CERTCO (www.dincertco.tuv.com) under <Certificates and Registrations>. 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.

6.10 Validity of certificates

The certificate for products is valid for 3 years. The period of validity is shown on the certificate. On expiry of the certificate, the right to use the mark also expires.

The certificate for intermediates and materials is valid for 6 years. The period of validity is shown on the certificate.

6.11 Renewal of certificates

If the validity of certification or acceptability confirmation is to remain remain valid beyond the date indicated, an application for renewal must be submitted to DIN CERTCO sufficiently in advance prior to validity expiring.

The manufactured item's current composition must be submitted with the application for renewal. For renewals, DIN CERTCO will make an assessment based on the certification scheme valid at the time of renewal and may request supplemental documentation.

Furthermore, if no deviations were found during the three verification tests performed within the validity, the certificate may be renewed.

6.12 Expiration of certificates

In the event that the new standard conformity examination 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 DIN CERTCO.

Furthermore, certificates can expire if, for example:

- the surveillance according to Section 7 is not performed punctually or completely.
- the compostability mark “DIN-Geprüft Industrial Compostable” is misused by the certificate holder.
- the requirements laid down in the certification scheme or its accompanying documents are not fulfilled.
- the certification fees are not paid on the due date.
- the pre-requisites for the issuing of the certificate are no longer fulfilled.

6.13 Alterations/Amendments

6.13.1 Alteration/Amendment to a product, intermediate or material

The certificate holder is obliged to notify DIN CERTCO of all alterations to the manufactured item without delay. DIN CERTCO will, if applicable, decide the extent to which testing according to Section 5.2.3 must be performed and whether the change is significant The respective test report shall be forwarded to DIN CERTCO by the test laboratory.

Should DIN CERTCO determine a substantial alteration, the certificate with the corresponding registration number shall expire. For the modified manufactured item, a new application for initial certification may be submitted.

The certificate holder remains obliged to notify of any changes in the formal details (e.g. name of certificate holder or his address). Therefore, an application for those changes is to be submitted. The certificate/ will be adapted accordingly after positive assessment.

The certificate holder may apply to DIN CERTCO for an extension of the existing certificate for further design-types (sub-types) of the same type. It is for DIN CERTCO 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 it.

6.13.2 Alterations to the basic test specifications

If the basic test specifications for the certification are modified, an application for the alteration of the certification shall be generally submitted within 6 months of receiving notification from DIN CERTCO, and as a rule, after 12 months, proof of conformity with the modified examination specifications shall be submitted in the form of a positive test report, if applicable (see Section 5.5).

The time limit will be defined by DIN CERTCO and might last up to the next renewal at the latest.

6.14 Defects in products, intermediates, materials

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

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

In the case of defects having a direct or indirect effect on the degradation properties (serious defects), 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 DIN CERTCO within 3 months, in the form of a test report on a special test in accordance with Section 5.2.4, 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 technical safety or functionality of the product (minor defects), the manufacturer must submit suitable proof to DIN CERTCO within 3 months that the defects in the product in question have been rectified.

Should the manufacturer fail to observe these deadlines, he and the distributor of product will no longer be permitted to use the compostability mark.

Should grounds for complaint continue to exist, DIN CERTCO 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 again not possible to prove that the defects have been rectified, the certificate shall be annulled.

For holders of certificates for intermediates or materials, the measures named above will apply to the effect that certificates can no longer be acquired and delivery may no longer be made to certified buyers.

7 Surveillance

7.1 General

The constant surveillance of the certified product or the registered material or intermediate is an integral component of the certification itself.

7.2 Surveillance by the manufacturer

The manufacturer must ensure, by suitable quality management measures, that the product characteristics confirmed by the certification are maintained. This can be accomplished by means of an in-house factory production control (FPC) focussed on the product itself or on the production and, in addition, can be guaranteed within the framework of a quality management system (QM-System) in accordance with the standard series DIN EN ISO 9000 ff.

7.3 Surveillance by DIN CERTCO

DIN CERTCO examines the conformity of the product with the requirements laid down in the certification scheme

The costs incurred in such tests will be charged to the certificate holder on their completion. In individual cases, supplemental tests may be defined within the scope of certification.

7.4 Verification tests (Control tests)

7.4.1 Products

The verification shall be performed at regular intervals of one year.

If production is being carried out at multiple production facilities, the following additional requirements shall apply:

- The control test is performed on products from various production facilities. If there are 3 alternative production facilities, then one sample must be alternatingly submitted from each production facility for the control test. If there are more than 3 alternative production facilities, then samples must be submitted on an alternating basis of $\sqrt{n}$ of the production facilities for the control test. The number is rounded up to the next integer digit.

- Samples are to be additionally marked with information regarding the corresponding production facility.

The control test covers the following:

a) Check of identification of product with compostability mark and corresponding registration number according to the logo usage rules.

b) Check of compliance with the certified maximum admissible wall/layer thickness (d_{max}), density and/or grammage using the samples submitted. For paper products, non-wovens or leaf products a higher thickness can be accepted as long as the grammage/base-weight is the same.

c) Checking whether all polymeric materials, intermediates and additives used in manufacturing the product and present in the product to a percentage by mass greater than 1 % are identical with those specified in the type testing. For this purpose, an infrared transmission spectrum is measured according to Section C. Evidence is demonstrated by comparing the results of the spectral analysis submitted during type testing with the results of the spectral analysis for control testing. When compared, the spectra must show that the two sets of polymeric materials, intermediate and/or additives are identical to the polymer materials or intermediates and additives from type testing.

d) Performance of one chemical characterisation according to Table A.1 of DIN EN 13432 during the validity.

e) In the case of recycled paper, the performance of a chemical analysis according to Section B 1 (see Section 6.2.4.) is required annually.

7.4.2 Materials/Intermediates

The verification shall be performed at regular intervals of 2 years (biannually).

If manufactured items are being produced at multiple production facilities, the following additional requirements shall apply:

– The control test is performed on manufactured items from various production facilities. If there are 3 alternative production facilities, then one sample must be alternatingly submitted from each production facility for the control test. If there are more than 3 alternative production facilities, then samples must be submitted on an alternating basis from $\sqrt{n}$ of the production facilities for the control test. The number is rounded up to the next integer digit.

– Samples are to be marked only with the information regarding the corresponding production facility.

The control test covers the following:

a) Written confirmation from the manufacturer that composition has not been changed since initial certification.

b) Check of compliance with the certified maximum admissible wall/layer thickness (d_{max}) using the samples submitted (if applicable).

c) Checking whether all polymeric materials, intermediates and additives used in manufacturing the product and present in the product to a percentage by mass greater than 1 % are identical with those specified in the type testing. An infrared transmission spectrum according to Section C from the sample is used for this purpose. Evidence is demonstrated by comparing the results of the spectral analyses submitted during type testing with the results of the spectral analyses for control testing. When compared, the spectra must show that the two sets of polymeric materials or intermediates and additives are identical to the polymer materials or intermediates and additives from the type testing.

d) Performance of one chemical analysis according to Table A.1 of DIN EN 13432 during the validity.

e) When using recycled paper, it will also be necessary to perform a chemical analysis according to Section B 1 (see Section 6.2.4) every two years.

If a manufacturer has certificates for different manufactured items with identical compositions beside colours, then a control test on one manufactured item will be sufficient. In case that a certification for one or more final product(s) based on self-owned certificates exists at the same time, the verification testing needs to be performed on each type according to Section 7.4.1.

7.5 Assessment of verification test (Control test)

7.5.1 General

The conformity requirements which are tested during verification test have to be fulfilled basically.

7.5.2 Design requirements

If non-conformities are established during testing for compliance with the maximum permissible wall thicknesses according to Section 7, the certificate holder is required to send new samples for retesting.

If the results of the retesting comply with the requirements of the Certification Scheme applying at the time when the certificate was issued, then no complaint will be made.

7.5.3 Spectra (Identification of material)

If deviations from the spectral analyses submitted with the application are established while comparing spectral analyses from the tested samples, then the customer will be requested to send a written statement. If no positive assessment can be reached on the basis of that position statement, then new samples must be submitted for testing.

7.5.4 Complaints

If the requirements according to Section 7.5 are not met after the re-test, the validity of the certificate will be suspended. The certificate holder will be informed immediately and requested to ensure compliance with the criteria within 3 months after receipt of such notice.

While the certificate is suspended, the certificate holder is not entitled to sell manufactured items as certified/registered ones.

If a complaint is made, the control test will be repeated within 3 months. If this re-test yields no further cause for complaint, the certificate will be set valid again. Should reason for complaints continue to exist, the certificate will be cancelled. The latest re-test named will not apply as a regular control test, but rather as a special test for which the certificate holder must cover the costs.

A Fillers, colours and processing auxiliaries

Materials that may be used in varying proportions up to the given upper limits as additives in manufacturing or processing of compostable materials according to Section 6.2.5.

Main Group 1: Fillers

Subgroup 1.1: Inorganic fillers and pigments - admixture up to a maximum of 49 %

- Aluminium silicates
- Ammonium carbonate
- Calcium carbonate
- Calcium chloride
- Dolomite
- Iron oxides (pigment)
- Gypsum
- Mica
- Graphite (pigment)
- Kaolin
- Chalk
- Sodium carbonate
- Natural silicates
- Carbon black (pigment)
- Silicon dioxide; quartz
- Talc
- Titanium dioxide (pigment)
- Wollastonite

Subgroup 1.2: Organic fillers

Section 1.2.1: Non- modified naturally occuring native cellulose

- Vegetable fibers

Section 1.2.2: Non-modified naturally occuring native Ligno-Cellulose

- Wood flour/wood fibers
- Vegetable fibers
- Cork
- Bark

Section 1.2.3: Non-modified naturally occuring natural starch

- Starch
- Rye flour and other flours

Section 1.2.4: Non-modified naturally occuring Polyhydroxyalkanoates

- PHB, PHBH, PHBV

Main Group 2: Processing auxiliaries

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

- Benzoic acid/sodium benzoate
- Euric acide amide/euric amide
- Glycerol monostearate
- Glycerol monooleate
- Natural waxes
- Polyethylene glycol (up to molecular weight 2000)
- Metal stearates, calcium stearates

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

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

B Tests

B 1 Chemical characterisation

B 1.1 According to DIN EN 13432, DIN EN 14995, ISO 17088, ISO 18606 or AS 4736

The chemical test is conducted in accordance with the requirements of DIN EN 13432.

B 2 Testing of ultimate biodegradability

Table 1 Overview about the test methods depending on the standard which is applied for

Testing may be performed in accordance with the following standards	DIN EN 13432 (mandatory)	DIN EN 14995	ISO 17088	ISO 18606	AS 4736
ISO 14855-1	x	x	x	x	x
ISO 14855-2			x	x	
ISO 14851	x*	x*		x*	x*
ISO 14852	x*	x*		x*	x*
ASTM D 5338			x		
DIN EN 14046	x				

* Only possible if the nature and properties of the test material do not permit testing to ISO 14855-1.

Acceptance of OECD 301 a, b, c, d, e, f test results is possible under the following conditions:

- The scope of acceptance of the OECD 301 test results is as described in the OECD guideline for testing of chemicals i.e. for pure chemicals and homologues.
- The number of replicates should be according to the OECD 301, which are minimum 2.
- Only readily biodegradable chemicals are accepted (inherently biodegradable is not sufficient).
- The total maximum dry weight percentage allowed in a finished product for all the additives tested according to OECD 301 is 10 %.
- Only test reports from recognized testing laboratories will be accepted.

Acceptance of biodegradation test at 28°C

Tests for biodegradability at a temperature of 28 °C, according to DIN EN ISO 14855, may be accepted. The test duration may not exceed the 6 months period set down in the standard.

B 2.1 As specified in DIN EN 13432

Testing of ultimate biodegradability is conducted in accordance with the criteria of DIN EN 13432 by one of the following methods:

- DIN EN ISO 14855-1 "Determination of the ultimate aerobic biodegradability of plastic materials under controlled composting conditions -- Method by analysis of evolved carbon dioxide -- Part 1: General procedure"

- DIN EN 14046 " Packaging - Evaluation of the ultimate aerobic biodegradability of packaging materials under controlled composting conditions - Method by analysis of released carbon dioxide"

Alternatively, one of the following methods can be used:

- DIN EN 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"

- DIN EN ISO 14852 "Determination of the ultimate aerobic biodegradability of plastic materials in an aqueous medium – Method by analysis of evolved carbon dioxide"

B 2.2 As specified in DIN EN 14995

If the type and properties of the material being tested permit, the controlled aerobic composting test according to EN ISO 14855 must be applied:

DIN EN ISO 14855-1 "Determination of the ultimate aerobic biodegradability of plastic materials under controlled composting conditions -- Method by analysis of evolved carbon dioxide - Part 1: General procedure"

If alternative methods are necessary, then the following methods can be used:

- DIN EN 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"

- DIN EN ISO 14852 "Determination of the ultimate aerobic biodegradability of plastic materials in an aqueous medium – Method by analysis of evolved carbon dioxide"

B 2.3 As specified in ISO 17088

Testing of ultimate biodegradability is conducted in accordance with the criteria of ISO 17088 by one of the following methods:

- DIN EN ISO 14855-1 "Determination of the ultimate aerobic biodegradability of plastic materials under controlled composting conditions -- Method by analysis of evolved carbon dioxide - Part 1: General procedure"

- DIN EN ISO 14855-2 "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"

If alternative methods are necessary, then the following methods can be used:

- EN 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"
- EN ISO 14852 "Determination of the ultimate aerobic biodegradability of plastic materials in an aqueous medium – Method by analysis of evolved carbon dioxide“

B 2.4 As specified in ISO 18606

Testing of ultimate biodegradability is conducted in accordance with the criteria of ISO 18606 by one of the following methods:

- DIN EN ISO 14855-1 "Determination of the ultimate aerobic biodegradability of plastic materials under controlled composting conditions -- Method by analysis of evolved carbon dioxide - Part 1: General procedure"

- DIN EN ISO 14855-2 ”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”

If alternative methods are necessary, then the following methods can be used:

- DIN EN 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"

- DIN EN ISO 14852 “Determination of the ultimate aerobic biodegradability of plastic materials in an aqueous medium – Method by analysis of evolved carbon dioxide“

B 2.5 As specified in AS 4736

If the type and properties of the material being tested permit, the controlled aerobic composting test according to EN ISO 14855 must be applied.

If alternative methods are necessary, then the following methods can be used:

- DIN EN 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"

- DIN EN ISO 14852 "Determination of the ultimate aerobic biodegradability of plastic materials in an aqueous medium – Method by analysis of evolved carbon dioxide“

B 3 Testing of compostability under practice-relevant conditions and of the quality of the composts

B 3.1 As specified in DIN EN 13432

Compostability under practice-relevant conditions (disintegration):

The following methods are available for testing ultimate compostability under practice-relevant conditions in accordance with DIN EN 13432:

- Testing in a pilot-scale test

- Testing in a laboratory-scale test (“qualitative disintegration test”: only allowed for specific cases, see Section 6): disintegration test based on Standards DIN EN ISO 20200 and DIN EN ISO 16929, without sieving procedure, while requirements for process parameters (e.g. temperature, pH value) shall be strictly following DIN EN ISO 16929.

The standard DIN EN 13432 indicates the criteria for a successful test under Section A.4, but it does not prescribe a specific method for the practical performance of the test.

The following test methods can be used for quantitative testing in a pilot-scale test:

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

- DIN EN 14045 "Packaging - Evaluation of the disintegration of packaging materials in practical oriented tests under defined composting conditions”; German version EN 14045

The following test methods are the basis for qualitative testing of disintegration:

- DIN EN ISO 16929 “Plastics – Determination of the degree of disintegration of plastic materials under defined composting conditions in a pilot-scale test”
- DIN EN ISO 20200: “Plastics – Determination of the degree of disintegration of plastic materials under simulated composting conditions in a laboratory-scale test”

Maximum compostable layer thickness must be determined in all cases. The optical quality of the compost prepared from biodegradable materials may not be significantly poorer than that of normal compost (testing in accordance with Methodenhandbuch zur Analyse organischer Düngemittel, chapter II, No. C1 und C3).

In addition, physico-chemical parameters must be determined according to Section 8.2 of DIN EN 13432.

Further specifications for the laboratory-scale test (“Qualitative disintegration test”):

Test set-up of the qualitative disintegration test:

Identical to the quantitative test according to DIN EN ISO 16929 with the below modification:

The film or sheet sample is cut into small pieces and introduced via slide frames in the composting vessel (vessel according to DIN EN ISO 20200 or DIN EN ISO 16929 shall be applied). Three-dimensional products are introduced as such in the composting bin or cut in pieces (e.g. 5x5x5 cm).

In case of film or sheet samples, 30 slide frames are mixed with biowaste from which at least 8 will be removed during the composting process – after 1, 2, 3, 4, 6, 8, 10 and 12 weeks. In case of three-dimensional products the number of pieces mixed with biowaste varies depending on the weight of the pieces taking in mind that a loading concentration of 1 % on wet weight basis shall be applied. Furthermore, the pieces retrieved at each turning interval are immediately reintroduced carefully into the vessel.

Analyses of biowaste of the qualitative disintegration test:

The analyses of the biowaste and the bulking agent at start-up and in the end of the test are executed according to DIN EN ISO 16929 or DIN EN ISO 20200.

Temperature profile, pH value, and analyses of exhaust air of the qualitative disintegration test:

Identical to quantitative test according to DIN EN ISO 16929.

Visual perceptions and disintegration of the qualitative disintegration test:

Identical to the quantitative test according to DIN EN ISO 16929.

The mixture in the composting bin is regularly turned by hand (weekly during the first month and later on every 2 weeks), at which time the visual appearance of the test materials is carefully checked.

Evaluation of the qualitative disintegration:

The duration of the incubation shall be 12 weeks as described in DIN EN ISO 16929.

Slide frames:

At the end of the test, in case of slide frames, the remaining sample still present in the slide frames is quantified by digital means (using, for instance, IrfanView). The calculation is based on the following formula:

$$x_{(\%)} = \frac{remaining\ sample\ area\ (cm^2) \times 100}{slide\ area\ (cm^2)}$$

The test is considered positive if the following requirements are fulfilled:

- At the end of the test at least 81 % of the test material surface within the slide has disappeared corresponding to an averages of 90 % of the length and width;
- No part of the sample is still distinguishable in the compost at the end of the test.

No slide frames:

If the qualitative disintegration test is not performed in slides, the result is evaluated positive if the material is not distinguished from the compost. If necessary, additional qualitative evaluation by means of sieving may be performed.

Determining compost quality (ecotoxicity):

The criteria for the quality of composts are assessed according to Section 8, A.4 and E of DIN EN 13432 by way of a test of the ecological toxicity with not less than two types of plants. According to DIN EN ISO 16929, the addition of 10 % testing material to the disintegration testing is necessary. The basis of determination is the (modified) OECD Guideline 208.

To assure the quality of the blank compost, the respective criteria of the OECD Guideline 208 are to be applied:

1. min. 2 weeks after 50 % of the seedlings in the control have emerged, plants are harvested and weighted

2. Validity: min. 80 % of control seeds should produce healthy seedlings

Deviating from the standard, the use of minimum 50 seeds per replicate is required, if the test is performed using barley.

It is possible to test theoretical samples.

B 3.2 As specified in DIN EN 14995

Compostability under practice-relevant conditions (disintegration):

The following methods are available for testing ultimate compostability under practice-relevant conditions in accordance with DIN EN 14995:

– Testing in a pilot-scale test

– Testing in a laboratory-scale test (“qualitative disintegration test”: only allowed for specific cases, see Section 6): disintegration test based on Standard DIN EN ISO 20200 and DIN EN ISO 16929, without sieving procedure, while requirements for process parameters (e.g. temperature, pH value) shall be strictly according DIN EN ISO 16929.

The following test methods can be used for quantitative testing in a pilot-scale test:

– DIN EN ISO 16929 "Plastics - Determination of the degree of disintegration of plastic materials under defined composting conditions in a pilot-scale test"

The following test methods are the basis for qualitative testing of disintegration:

- DIN EN ISO 16929 “Plastics – Determination of the degree of disintegration of plastic materials under defined composting conditions in a pilot-scale test”
- DIN EN ISO 20200: “Plastics – Determination of the degree of disintegration of plastic materials under simulated composting conditions in a laboratory-scale test”

Maximum degradable layer thickness must be determined in all cases. The optical quality of the compost prepared from biodegradable materials may not be significantly poorer than that of normal compost (testing in accordance with Methodenhandbuch zur Analyse organischer Düngemittel, chapter II, No. C1 und C3).

In addition, physico-chemical parameters must be determined according to Section 8.2 of DIN EN 13432.

Further specifications for the laboratory-scale test (“Qualitative disintegration test”):

Test set-up of the qualitative disintegration test:

Identical to the quantitative test according to DIN EN ISO 16929 with the below modification:

The film or sheet sample is cut into small pieces and introduced via slide frames in the composting vessel (vessel according to DIN EN ISO 20200 or DIN EN ISO 16929 shall be ap-

plied). Three-dimensional products are introduced as such in the composting bin or cut in pieces (e.g. 5x5x5 cm).

In case of film or sheet samples, 30 slide frames are mixed with biowaste from which at least 8 will be removed during the composting process – after 1, 2, 3, 4, 6, 8, 10 and 12 weeks. In case of three-dimensional products the number of pieces mixed with biowaste varies depending on the weight of the pieces taking in mind that a loading concentration of 1 % on wet weight basis shall be applied. Furthermore, the pieces retrieved at each turning interval are immediately reintroduced carefully into the vessel.

Analyses of biowaste of the qualitative disintegration test:

The analyses of the biowaste and the bulking agent at start-up and in the end of the test are executed following DIN EN ISO 16929 or DIN EN ISO 20200.

Temperature profile, pH value, and analyses of exhaust air of the qualitative disintegration test:

Identical to quantitative test according to DIN EN ISO 16929.

Visual perceptions and disintegration of the qualitative disintegration test:

Identical to the quantitative test according to DIN EN ISO 16929.

The mixture in the composting bin is regularly turned by hand (weekly during the first month and later on every 2 weeks), at which time the visual appearance of the test materials is carefully checked.

Evaluation of the qualitative disintegration:
The duration of the incubation shall be 12 weeks as described in DIN EN ISO 16929.

Slide frames:

At the end of the test, in case of slide frames, the remaining sample still present in the slide frames is quantified by digital means (using, for instance, IrfanView). The calculation is based on the following formula:

$$x_{(\%)} = \frac{remaining\ sample\ area\ (cm^2) \times 100}{slide\ area\ (cm^2)}$$

The test is considered positive if the following requirements are fulfilled:

- At the end of the test at least 81 % of the test material surface within the slide has disappeared corresponding to an average of 90 % of the length and width;
- No part of the sample is still distinguishable in the compost at the end of the test.

No slide frames:

If the qualitative disintegration test is not performed in slides, the result is evaluated positive if the material is not distinguished from the compost. If necessary, additional qualitative evaluation by means of sieving may be performed.

Determining compost quality (ecotoxicity):

The criteria for the quality of composts are assessed according to Section 8, A.4 and E of DIN EN 13432 by way of a test of the ecological toxicity with not less than two types of plants. According to DIN EN ISO 16929, the addition of 10 % testing material is necessary. The basis of determination is the (modified) OECD Guideline 208.

To assure the quality of the blank compost, the respective criteria of the OECD Guideline 208 are to be applied:

1. min. 2 weeks after 50 % of the seedlings in the control have emerged, plants are harvested and weighted

2. Validity: min. 80 % of control seeds should produce healthy seedlings

Deviating from the standard, the use of minimum 50 seeds per replicate is required, if the test is performed using barley.

It is possible to test theoretical samples.

B 3.3 As specified in ISO 17088

Compostability under practice-relevant conditions (disintegration):

The following test methods can be used for testing disintegration in a pilot-scale test:

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

– Testing in a laboratory-scale test (“qualitative disintegration test”: only allowed for specific cases, see Section 6): disintegration test based on Standard DIN EN ISO 20200 and DIN EN ISO 16929, without sieving procedure, while requirements for process parameters (e.g. temperature, pH value) shall be strictly following DIN EN ISO 16929.

The following test methods are the basis for qualitative testing of disintegration:

- DIN EN ISO 16929 “Plastics – Determination of the degree of disintegration of plastic materials under defined composting conditions in a pilot-scale test”
- DIN EN ISO 20200: “Plastics – Determination of the degree of disintegration of plastic materials under simulated composting conditions in a laboratory-scale test”

Maximum degradable layer thickness must be determined in all cases. The optical quality of the compost prepared from biodegradable materials may not be significantly poorer than that of normal compost (testing in accordance with Methodenhandbuch zur Analyse organischer Düngemittel, chapter II, No. C1 und C3).

In addition, physico-chemical parameters must be determined according to Section 8.2 of DIN EN 13432.

Further specifications for the laboratory-scale test (“Qualitative disintegration test”):

Test set-up of the qualitative disintegration test:

Identical to the quantitative test according to DIN EN ISO 16929 with the below modification:

The film or sheet sample is cut into small pieces and introduced via slide frames in the composting vessel (vessel according to DIN EN ISO 20200 or DIN EN ISO 16929 shall be applied). Three-dimensional products are introduced as such in the composting bin or cut in pieces (e.g. 5x5x5 cm).

In case of film or sheet samples, 30 slide frames are mixed with biowaste from which at least 8 will be removed during the composting process – after 1, 2, 3, 4, 6, 8, 10 and 12 weeks. In case of three-dimensional products, the number of pieces mixed with biowaste varies depending on the weight of the pieces taking in mind that a loading concentration of 1 % on wet weight basis shall be applied. Furthermore, the pieces retrieved at each turning interval are immediately reintroduced carefully into the vessel.

Analyses of biowaste of the qualitative disintegration test:

The analyses of the biowaste and the bulking agent at start-up and in the end of the test are executed according to DIN EN ISO 16929 or DIN EN ISO 20200.

Temperature profile, pH value, and analyses of exhaust air of the qualitative disintegration test:

Identical to quantitative test according to DIN EN ISO 16929.

Visual perceptions and disintegration of the qualitative disintegration test:

Identical to the quantitative test according to DIN EN ISO 16929.

The mixture in the composting bin is regularly turned by hand (weekly during the first month and later on every 2 weeks), at which time the visual appearance of the test materials is carefully checked.

Evaluation of the qualitative disintegration:

The duration of the incubation shall be 12 weeks as described in DIN EN ISO 16929.

Slide frames:

At the end of the test, in case of slide frames, the remaining sample still present in the slide frames is quantified by digital means (using, for instance, IrfanView). The calculation is based on the following formula:

$$x_{(\%)} = \frac{remaining\ sample\ area\ (cm^2) \times\ 100}{slide\ area\ (cm^2)}$$

The test is considered positive if the following requirements are fulfilled:

- At the end of the test at least 81 % of the test material surface within the slide has disappeared corresponding to an average of 90 % of the length and width;
- No part of the sample is still distinguishable in the compost at the end of the test.

No slide frames:

If the qualitative disintegration test is not performed in slides, the result is evaluated positive if the material is not distinguished from the compost. If necessary, additional qualitative evaluation by means of sieving may be performed.

Determining compost quality (ecotoxicity):

The criteria for the quality of composts are assessed according to Section 8, A.4 and E of DIN EN 13432 by way of a test of the ecological toxicity with not less than two types of plants. According to DIN EN ISO 16929, the addition of 10 % testing material is necessary. The basis of determination is the (modified) OECD Guideline 208.

To assure the quality of the blank compost, the respective criteria of the OECD Guideline 208 are to be applied:

1. min. 2 weeks after 50 % of the seedlings in the control have emerged, plants are harvested and weighted

2. Validity: min. 80 % of control seeds should produce healthy seedlings

It is possible to test theoretical samples.

Deviating from the standard, the use of minimum 50 seeds per replicate is required, if the test is performed using barley.

Additonally, the compost quality needs to be assessed according to Section 6.4 of ISO 17088, which furthermore, i.e., additionally to the plant growth tests, requires:

1. Acute earthworm test according to ISO 11268-1 (with modification given in Annex D of ISO 17088), or
2. Chronic earthworm toxicity test according to ISO 11268-2 (with modification specified in Annex E of ISO 17088)

An optional nitrification inhibition tests can be carried out according to ISO 15685 (with modifications specified in the Annex F of ISO 17088).

B 3.4 As specified in ISO 18606

Compostability under practice-relevant conditions (disintegration):

The following methods are available for testing compostability under practice-relevant conditions in accordance with ISO 18606:

- Testing in a pilot-scale test
- Testing in a laboratory-scale test (“qualitative disintegration test”: only allowed for specific cases, see below): disintegration test based on Standard DIN EN ISO 20200 and DIN EN ISO 16929, without sieving procedure, while requirements for process parameters (e.g. temperature, pH value) shall be strictly following DIN EN ISO 16929.

The following test methods can be used for quantitative testing in a pilot-scale test:

- DIN EN ISO 16929 "Plastics - Determination of the degree of disintegration of plastic materials under defined composting conditions in a pilot-scale test"
- DIN EN ISO 20200: “Plastics – Determination of the degree of disintegration of plastic materials under simulated composting conditions in a laboratory-scale test”

The following test methods are the basis for qualitative testing of disintegration:

- DIN EN ISO 16929 “Plastics – Determination of the degree of disintegration of plastic materials under defined composting conditions in a pilot-scale test”
- DIN EN ISO 20200: “Plastics – Determination of the degree of disintegration of plastic materials under simulated composting conditions in a laboratory-scale test”

In case of differing results, DIN EN ISO 16929 results shall prevail.

Maximum degradable layer thickness must be determined in all cases. The optical quality of the compost prepared from biodegradable materials may not be significantly poorer than that of normal compost (testing in accordance with Methodenhandbuch zur Analyse organischer Düngemittel, chapter II, No. C1 und C3).

Additionally, the physico-chemical parameters according to Section 8.2 of DIN EN 13432 standard must be determined.

Further specifications for the laboratory-scale test (“Qualitative disintegration test”):

Test set-up of the qualitative disintegration test:

Identical to the quantitative test according to DIN EN ISO 16929 with the below modification:

The film or sheet sample is cut into small pieces and introduced via slide frames in the composting vessel (vessel according to DIN EN ISO 20200 or DIN EN ISO 16929 shall be applied). Three-dimensional products are introduced as such in the composting bin or cut in pieces (e.g. 5x5x5 cm).

In case of film or sheet samples, 30 slide frames are mixed with biowaste from which at least 8 will be removed during the composting process – after 1, 2, 3, 4, 6, 8, 10 and 12 weeks. In case of three-dimensional products, the number of pieces mixed with biowaste varies depending on the weight of the pieces taking in mind that a loading concentration of 1 % on wet weight basis shall be applied. Furthermore, the pieces retrieved at each turning interval are immediately reintroduced carefully into the vessel.

Analyses of biowaste of the qualitative disintegration test:

The analyses of the biowaste and the bulking agent at start-up and in the end of the test are executed according to DIN EN ISO 16929 or DIN EN ISO 20200.

Temperature profile, pH value, and analyses of exhaust air of the qualitative disintegration test:

Identical to quantitative test according to DIN EN ISO 16929.

Visual perceptions and disintegration of the qualitative disintegration test:

Identical to the quantitative test according to DIN EN ISO 16929.

The mixture in the composting bin is regularly turned by hand (weekly during the first month and later on every 2 weeks), at which time the visual appearance of the test materials is carefully checked.

Evaluation of the qualitative disintegration:

The duration of the incubation shall be 12 weeks as described in DIN EN ISO 16929.

Slide frames:

At the end of the test, in case of slide frames, the remaining sample still present in the slide frames is quantified by digital means (using, for instance, IMAGE J The calculation is based on the following formula:

$$x_{(\%)} = \frac{remaining\ sample\ area\ (cm^2) \times\ 100}{slide\ \ area\ (cm^2)}$$

The test is considered positive if the following requirements are fulfilled:

- At the end of the test at least 81 % of the test material surface within the slide has disappeared corresponding to an average of 90 % of the length and width;
- No part of the sample is still distinguishable in the compost at the end of the test.

No slide frames:

If the qualitative disintegration test is not performed in slides, the result is evaluated positive if the material is not distinguished from the compost. If necessary, additional qualitative evaluation by means of sieving may be performed.

Determining compost quality (ecotoxicity):

The criteria for the quality of composts are assessed according to Section 8, A.4 and E of DIN EN 13432 by way of a test of the ecological toxicity with not less than two types of plants. According to DIN EN ISO 16929, the addition of 10 % testing material is necessary. The basis of determination is the (modified) OECD Guideline 208.

To assure the quality of the blank compost, the respective criteria of the OECD Guideline 208 are to be applied:

1. min. 2 weeks after 50 % of the seedlings in the control have emerged, plants are harvested and weighted

2. Validity: min. 80 % of control seeds should produce healthy seedlings

Derivating from the standard, the use of minimum 50 seeds per replicate is required, if the test is performed using barley.

It is possible to test theoretical samples.

B 3.5 As specified in AS 4736

Compostability under practice-relevant conditions (disintegration):

The following test methods can be used for testing in a pilot-scale test:

- DIN EN ISO 16929 "Plastics - Determination of the degree of disintegration of plastic materials under defined composting conditions in a pilot-scale test"
- Testing in a laboratory-scale test (“qualitative disintegration test”: only allowed for specific cases, see Section 6): disintegration test based on Standard DIN EN ISO 20200 and DIN EN ISO 16929, without sieving procedure, while requirements for process parameters (e.g. temperature, pH value) shall be strictly following DIN EN ISO 16929.

The following test methods can be used for quantitative testing in a pilot-scale test:

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

The following test methods are the basis for qualitative testing of disintegration:

- DIN EN ISO 16929 “Plastics – Determination of the degree of disintegration of plastic materials under defined composting conditions in a pilot-scale test”
- DIN EN ISO 20200: “Plastics – Determination of the degree of disintegration of plastic materials under simulated composting conditions in a laboratory-scale test”

Maximum degradable layer thickness must be determined in all cases. The optical quality of the compost prepared from biodegradable materials may not be significantly poorer than that of normal compost (testing in accordance with Methodenhandbuch zur Analyse organischer Düngemittel, chapter II, No. C1 und C3).

In addition, physico-chemical parameters must be determined according to Section 8.2 of DIN EN 13432.

Further specifications for the laboratory-scale test (“Qualitative disintegration test”):

Test set-up of the qualitative disintegration test:

Identical to the quantitative test according to DIN EN ISO 16929 with the below modification:

The film or sheet sample is cut into small pieces and introduced via slide frames in the composting vessel (vessel according to DIN EN ISO 20200 or DIN EN ISO 16929 shall be applied). Three-dimensional products are introduced as such in the composting bin or cut in pieces (e.g. 5x5x5 cm).

In case of film or sheet samples, 30 slide frames are mixed with biowaste from which at least 8 will be removed during the composting process – after 1, 2, 3, 4, 6, 8, 10 and 12 weeks. In case of three-dimensional products, the number of pieces mixed with biowaste varies depending on the weight of the pieces taking in mind that a loading concentration of 1 % on wet weight basis shall be applied. Furthermore, the pieces retrieved at each turning interval are immediately reintroduced carefully into the vessel.

Analyses of biowaste of the qualitative disintegration test:

The analyses of the biowaste and the bulking agent at start-up and in the end of the test are executed according to DIN EN ISO 16929 or DIN EN ISO 20200.

Temperature profile, pH value, and analyses of exhaust air of the qualitative disintegration test:

Identical to quantitative test according to DIN EN ISO 16929.

Visual perceptions and disintegration of the qualitative disintegration test:

Identical to the quantitative test according to DIN EN ISO 16929.

The mixture in the composting bin is regularly turned by hand (weekly during the first month and later on every 2 weeks), at which time the visual appearance of the test materials is carefully checked.

Evaluation of the qualitative disintegration:

The duration of the incubation shall be 12 weeks as described in DIN EN ISO 16929.

Slide frames:

At the end of the test, in case of slide frames, the remaining sample still present in the slide frames is quantified by digital means (using, for instance, IrfanView). The calculation is based on the following formula:

$$x_{(\%)} = \frac{remaining\ sample\ area\ (cm^2) \times 100}{slide\ area\ (cm^2)}$$

The test is considered positive if the following requirements are fulfilled:

- At the end of the test at least 81 % of the test material surface within the slide has disappeared corresponding to an average of 90 % of the length and width;
- No part of the sample is still distinguishable in the compost at the end of the test.

No slide frames:

If the qualitative disintegration test is not performed in slides, the result is evaluated positive if the material is not distinguished from the compost. If necessary, additional qualitative evaluation by means of sieving may be performed.

Determining compost quality (plant ecotoxicity test):

The criteria for the quality of composts are assessed according to Section 8, A.4 and E of DIN EN 13432 by way of a test of the ecological toxicity with not less than two types of plants. According to DIN EN ISO 16929, the addition of 10 % testing material is necessary. The basis of determination is the (modified) OECD Guideline 208.

To assure the quality of the blank compost, the respective criteria of the OECD Guideline 208 are to be applied:

1. min. 2 weeks after 50 % of the seedlings in the control have emerged, plants are harvested and weighted

2. Validity: min. 80 % of control seeds should produce healthy seedlings

It is possible to test theoretical samples.

Deviating from the standard, the use of minimum 50 seeds per replicate is required, if the test is performed using barley.

Determining compost quality (earthworm toxicity test):

The criteria for the quality of composts are assessed according to ASTM E 1676 by way of a 14-day *Eisenia Fetida* earthworm toxicity test. According to DIN EN 13432, Sections 8, A.4 and E, the addition of 10 % testing material is necessary.

In addition to the requirements defined in ASTM E 1676 the respective criteria are to be applied:

1. Blank compost needs to reach at least 90 % of the result of the reference substrate.

2. At least 90 % of the number and mean weight of the respective living worms used in the blank compost shall be traceable.

C Infrared transmission spectrum

The spectrum should be recorded at least in a range between the wave numbers 4000 cm^{-1} and 400 cm^{-1}, and a transmission level from 0-100 % being indicated on the vertical axis.