TÜVRheinland®
DIN CERTCO
Precisely Right.


# Certification Scheme

## Biodegradable in Soil

according to

**DIN EN 17033 and/or**
**ISO 23517**

(Edition: January 2023)

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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 "Biodegradable in soil" 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, intermediates and mulch films and other products as specified later.

According to the General Terms and Conditions (GTC) of TÜV Rheinland DIN CERTCO and the Testing, Registration and Certification Regulations of DIN CERTCO, this certification scheme forms the basis for suppliers to mark their manufactured items with the Certification Mark "DIN-Geprüft Biodegradable in soil". This proves that their products fulfil the requirements of DIN EN 17033 and/or ISO 25317 standard as well as this certification scheme.

The "DIN-Geprüft"-mark gives the confidence, that an independent, neutral and competent body has carefully examined and assessed the product based on the test criteria. In addition, third-party surveillance ensures that the quality of the product is maintained. The customer thus receive an added value, which they my take into account when decinding on purchase.

Mulch films or other products given the right to use the "DIN-Geprüft Biodegradable in soil" - mark 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; the right to use the logo is only granted to the certificate holder for marketing and advertisement reasons.

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

## Amendments

- Update of the foreword
- Addition of standard ISO 23517
- Change of Scope
- Requirement for a photo of the tested item in the test reports was added.
- Prohibition of intentional addition poly- and perfluoroalkyl substances was added.
- Addition of specification for testing of properties of ranges in thicknesses of mulch films
- Starch acetate was removed from Annex A.
- Non-Modified naturally occurring Polyhydroxyalkanoates were added to Annex A
- Specification of the chemical characterization for ISO 23517

## Earlier versions

Certification scheme "Biodegradable in soil" (March 2018)
Certification scheme "Biodegradable in soil" (July 2015)
**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 to materials, intermediates and mulch films made partially or wholly from thermoplastic materials, as mentioned in DIN EN 17033 and/or ISO 23517. Natural materials, e.g. jute, pulp, paper, etc., can be applied partially or wholly for the same scope.

Additionally, products used in horticulture and agriculture that have a function in or in proximity to soil can be certified according to ISO 23517 (e.g. drip tape, twine, clips, tree growth shelters and plant pots). It **does not apply** to packaging, bags or other products not meant for the usage in or on soil.

Commercial declarations on products may not be misleading to the final customers. Certification does not allow to discard products in soil. Waste must be disposed of in accordance with federal, state and local environmental control regulations.

In connection with the testing specifications named below, this certification scheme contains all requirements on issuing the conformity mark “DIN-Geprüft Biodegradable in soil” and certificates for materials, intermediates, mulch films and according to ISO 23517 also products used in horticulture and agriculture.

This certification scheme does not take into account functions and service life of biodegradable mulch films (Section 11 of DIN EN 17033) and conditions for installation and use of mulch films (Section 12 of DIN EN 17033).

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

If a material, intermediate, mulch film or product demonstrates conformity to the criteria specified in this certification scheme, then a certificate will be issued. Furthermore, conformity with the “Biodegradable in soil (DIN-Geprüft)“ certification scheme is confirmed by addition to the corresponding lists of certificate holders (see Section 6.9).

There is no legal right to receive 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.

| | |
|---|---|
| DIN EN 17033 | Plastics - Biodegradable mulch films for use in agriculture and horticulture - Requirements and test method |
| DIN EN 13432 | Requirements for packaging recoverable through composting and biodegradation |
| EN 14582 | Characterization of waste — Halogen and sulfur content — Oxygen combustion in closed systems and determination methods |
| OECD 208 | Terrestrial Plant Test: 208: Seedling Emergence and Seedling Growth Test |

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|---|---|
| DIN EN ISO 17556 | Plastics- Determination of the ultimate aerobic biodegradability of plastic materials in soil by measuring the oxygen demand in a respirometer or the amount of carbon dioxide evolved |
| EN ISO 17294-2 | Water quality -- Application of inductively coupled plasma mass spectrometry (ICP-MS) -- Part 2: Determination of selected elements including uranium isotopes |
| EN ISO 12846 | Water quality -- Determination of mercury -- Method using atomic absorption spectrometry (AAS) with and without enrichment |
| EN ISO 11268-1 | Soil quality - Effects of pollutants on earthworms - Part 1: Determination of acute toxicity to Eisenia fetida/Eisenia andrei |
| EN ISO 11268-2 | Soil quality - Effects of pollutants on earthworms - Part 2: Determination of effects on reproduction of Eisenia fetida/Eisenia |
| EN ISO 11269-2 | Soil quality — Determination of the effects of pollutants on soil flora — Part 2: Effects of contaminated soil on the emergence and early growth of higher plants |
| ISO 11274 | Soil quality — Determination of the water-retention characteristic — Laboratory methods |
| ISO 10390 | Soil quality – Determination of pH |
| ISO 15685 | Soil quality - Determination of potential nitrification and inhibition of nitrification - Rapid test by ammonium oxidation |
| ISO 23517 | Plastics — Soil biodegradable materials for mulch films for use in agriculture and horticulture — Requirements and test methods regarding biodegradation, ecotoxicity and control of constituents |
| ISO 4591 | Plastics - Film and sheeting -- Determination of average thickness of a sample, and average thickness and yield of a roll, by gravimetric techniques (gravimetric thickness) |
| ISO 4592 | Plastics - Film and sheeting -- Determination of length and width |
| ISO 4593 | Plastics - Film and sheeting -- Determination of thickness by mechanical scanning |
| EN ISO 527-1 | Plastics - Determination of tensile properties - Part 1: General principles |
| EN ISO 527-3 | Plastics - Determination of tensile properties - Part 3: Test conditions for films and sheets |
| EN ISO 7765-1 | Plastics film and sheeting - Determination of impact resistance by the free-falling dart method - Part 1: Staircase methods |
| EN ISO 11274 | Soil quality - Determination of the water-retention characteristic - Laboratory methods |
| ASTM D 1709 | Standard Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method |

| | |
|---|---|
| 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 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 soil | Soil obtained from a parallel process according to Annex 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. |
| 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. |
| Mulch film | Film made from thermoplastic material intended to be used in agriculture and horticulture to cover the ground in order to improve growing conditions of crops and depending on the colour to control weeds |
| Organic constituent | chemical constituent that contains carbon covalently bonded to other carbon atoms and to other elements, e.g. hydrogen, oxygen or nitrogen (not including inorganic carbotates, carbides, cyanides, simple oxides (CO, $CO_2$) and allotropes of carbon. |

| | |
|---|---|
| PFAs | poly- and perfluoroalkyl substances: organofluorine compounds containing carbon-fluorine bonds and carbon-carbon bonds but also other heteroatoms |
| Product | Article that remains in soil after use, is manufactured from polymeric materials or intermediates and frequently also contains additives. 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. |

## 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.

### 4.1 DIN EN 17033

- Compliance with the threshold values named in Table 1 in DIN EN 17033.
- PFAs shall not be intentionally used.
- Each substance of very high concern (SVHC) that exceeds a concentration limit of 0.1 % (by weight) and appears on the Candidate List of substances of very high concern for Authorization must not be applied[1]
- Materials used for the manufacture of products biodegradable in soil shall contain not less than 60 % by mass of volatile solids
- Ultimate biodegradability according ISO 17556 (90 % absolute, or 90 % with a suitable reference substrate not longer than 24 months at 20 to 28 °C± 2 °C (preferably 25 °C)). Evidence must be proven via a test according to the standard named under Annex B 2.
- Organic constituents present in a concentration of more than 1 % (by weight) shall demonstrate ultimate biodegradability separately. Alternatively, ultimate biodegradability of the manufactured item can be demonstrated. The sum of organic constituents which do not need to show ultimate biodegradability shall not exceed 5 x 1 %.
- The germination rate and plant biomass of two plant types mentioned in OECD 208 grown on the soil using test substance must be higher than 90 % of the corresponding blank (without test material). Evidence must be demonstrated via a test according to the standards named under Annex B 3. (Remark: The ecotoxicity test shall be performed with soil prepared according DIN EN 17033, Annex A.)
- The difference in the observed mortality as well as in the biomass of surviving adult earthworms between a soil exposed to the test material and the corresponding blank soil not exposed to the test material shall be less than 10 % of those from the corresponding blank soil. Evidence must be demonstrated via a test according to the standards named under Annex B 3. (Remark: The ecotoxicity test shall be carried out with soil prepared according DIN EN 17033 Annex A.)

[1] Candidate List of substances of very high concern: https://echa.europa.eu/candidate-list-table

– The nitrite formation in soil exposed to the test material shall be more than 80 % of those from the corresponding blank soil not exposed to the test material. Evidence must be demonstrated via a test according to the standards named under Annex B 3. (Remark: The ecotoxicity test shall be carried out with soil prepared according DIN EN 17033 Annex A.)

– Materials and additives or exposed to soil must not have any toxic effect on microorganisms in soil.

– Substances that may be exposed to the soil along with the product must not have any toxic effect on microorganisms in soil.

Additional Requirements for biodegradable mulch films:

– Biodegradable mulch films shall fulfil the requirements according DIN EN 17033, Table 3, in regards to dimensional, mechanical and optical properties.

– Biodegradable mulch films shall be labelled according DIN EN 17033, Section 8 and (optional) be marked according DIN EN 17033, Section 9.1.

– Marking on the packaging or label shall include at least information according DIN EN 17033, Section 9.2.

### 4.2 ISO 23517

– Compliance with thresholds and requirements of Annex B of ISO 23517

– PFAs shall not be intentionally used.

– Other hazardous substances as listed in Annex B.2 of ISO 23517 shall not be intentionally added.[1,2] The mulch film or product shall also not be classified as hazardous according to the UN Globally Harmonized System for Classification and Labelling of Chemicals (GHS).[3]

– Materials used for the manufacturing of products biodegradable in soil shall contain not less than 60 % by mass of volatile solids

– Ultimate biodegradability according ISO 17556 (90 % absolute, or 90 % with a suitable reference substrate not longer than 24 months at 20 to 28 °C+- 2 °C (preferably 25 °C)). Evidence must be proven via a test according to the standard named under Annex B 2.

– Organic constituents which are present in the material at a concentration between 1 % and 15 % (by dry mass), the level of biodegradation shall be determined separately. Organic constituents at these concentrations that turned out to be readily biodegradable in a ready biodegradation test according to an OECD test guideline (OECD 301, Methods A to F; OECD 310) are considered as biodegradable in the context of ISO 23517. Alternatively to testing the single organic constituent used between 1 % and 15 % (by dry mass), the level of biodegradation of that organic constituent can be determined using an artificial blend of the same material consisting of at least 15 % by total organic carbon (TOC) content.

[2] WHO/IPCS (World Health Organization/ International Programme on Chemical Safety), 2002. Global Assessment of the State-of-the-science of Endocrine Disruptors. WHO/PCS/EDC/02.2, 180 pp. https:// www .who .int/ ipcs/ publications/ new _issues/ endocrine _disruptors/ en/

[3] Globally Harmonized System of Classification and Labelling (GHS), United Nations (2011) https:// www .unece .org/ fileadmin/ DAM/ trans/ danger/ publi/ ghs/ ghs _rev04/ English/ ST -SGAC10 -30 -Rev4e .pdf

The sum of organic constituents which do not need to show ultimate biodegradability shall not exceed 3 x 1 %.

- The germination rate and plant biomass of two plant types mentioned in OECD 208 grown on the soil using test substance must be higher than 90 % of the corresponding blank (without test material). Evidence must be demonstrated via a test according to the standards named under Annex B 3(Remark: The plant growth test according to OECD 208 or ISO 11269-2 with the modifications specified in Annex C of ISO 23517 shall be used.)

- The difference in the observed mortality as well as in the biomass of surviving adult earthworms between a soil exposed to the test material and the corresponding blank soil not exposed to the test material shall be less than 10 % of those from the corresponding blank soil. Evidence must be demonstrated via a acute of chronic ecotoxicity test according to the standards named under Annex B 3. (Remark: The ecotoxicity test shall be carried out with soil prepared according DIN EN ISO 23517 Annex G.)

- The nitrite formation in soil exposed to the test material shall be more than 80 % of those from the corresponding blank soil not exposed to the test material. Evidence must be demonstrated via a test according to the standards named under Annex B 3. (Remark: The ecotoxicity test shall be carried out with soil prepared according ISO 23517 Annex G.)

- Materials and additives or exposed to soil must not have any toxic effect on microorganisms in soil.

- Substances that may be exposed to the soil along with the product must not have any toxic effect on microorganisms in soil.

# 5 Testing

## 5.1 General information

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

If applicable, test reports according to the certification scheme “Products made of compostable materials” (Seedling or DIN-Geprüft), “Products made of compostable materials for home and garden composting” or “Additives harmless to the composting process” can be accepted.

All documents must be submitted in German or English language.

## 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, intermediate or material in production phase corresponds to the manufactured item 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 items are obtained from manufacturers' production facilities and provided to DIN CERTCO free of charge.

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

### 5.2.3 Supplementary testing

Supplement testing is performed when supplements, extensions or additions (see Section 6.13) are intended for a certified 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 in coordination with the assessment committee.

## 5.3 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, 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.

## 5.4 Sampling

The samples used for initial, verification and renewal testing are usually delivered by the manufacturer to the recognized 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.

### 5.5 Test procedure

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

According to DIN EN 17033 and ISO 23517 standard the following tests are required:

- Determination of regulated metals and other substances according Annex B 1.
- Determination of volatile solids according to Annex B 1.
- Testing of ultimate biodegradability according to Annex B 2.
- Ecotoxicity testings according to Annex B 3.
- Additionally, for identifying the material it is necessary to perform an IR spectrum in accordance with Annex C.
- A photo of the tested item.

According to EN 17033 for biodegradable mulch films additionally:

- Testing of dimensional, mechanical and optical properties according Annex B 4.
- Testing of the film designation and marking according Annex B 5.

### 5.6 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 may also be accepted if the testing laboratory provides written confirmation of the current validity of the information given in the respective test report.
The test report must correspond to DIN EN ISO/IEC17025, Section 5.10 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 under 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, and/or intermediate and materials being certified for conformity with the requirements named in Section 4 are examined and subsequently monitored. Since this certification 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 they relate to an identical product.

### 6.1 Application for certification

Applicants can be both manufacturers according to Article 4 of the Produkthaftungsgesetz (ProdHaftG) [German Product Liability Act] or retailers who market the products independently within the meaning of the Produkthaftungsgesetz 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 addresses. 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' (e.g. processing auxiliaries, printing inks, etc.) suitability for microorganisms in soil.

  If substance´s harmlessness cannot be determined using the Safety Data Sheet, testing on ecotoxicity must be performed according to Annex B 3. This is coordinated with DIN CERTCO and, if applicable, with the testing laboratories or the assessment committee.
- If required, an up-to-date test report according to Section 5.6 (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, if applicable, e.g. for paper and expanded item.
- Drawings, with data on all wall and layer thicknesses ($d_{max}$), if applicable.
- Test report on an infrared transmission spectrum according to Annex C.

Additionally for products:

- Information on intended use.
- Photo of products and if needed product samples

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.

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 become necessary.

For DIN EN 17033, the following applies additionally for biodegradable mulch films:

a) Testing of dimensional, mechanical and optical properties according Annex B 4

b) Testing of the film designation and marking according Annex B 5.

### 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 the substance´s suitability for micro-organisms in soil.

   If substance´s harmlessness cannot be determined using the Safety Data Sheet, testing on ecotoxicity must be performed according to Annex B 3. This is coordinated with DIN CERTCO and, if applicable, with the testing laboratories or the assessment committee.

c) Test report on the determination of regulated metals and other substances as well as volatile solids as specified in Annex B 1.

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

e) For ISO 23517 individual testing of each of the organic constituents present at levels between 1-15 % is required. As an alternative to testing the single organic constituent used between 1 % and 15 % (by dry mass), the level of biodegradation of that organic constituent can be determined using an artificial blend of the same material consisting of at least 15 % by total organic carbon (TOC) content.

f) Report on the testing of ecotoxicity as specified in Annex B 3.

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

### 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 weight percentages.

b) An infrared transmission spectrum in accordance with Annex C.

### 6.2.3 Manufactured items consisting of natural organic substances

If chemically unmodified constituents of natural origin (e.g. wood, wood fibre, cotton fibre, starch, paper pulp or jute) are used for the manufactured item, such items 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 the substance´s suitability for microorganisms in soil.

   If substance´s harmlessness cannot be determined using the Safety Data Sheet, testing on ecotoxicity must be performed according to Annex B 3. This is coordinated with DIN CERTCO and, if applicable, with the testing laboratories or the assessment committee.

c) Test report on the determination of regulated metals and other substances as well as volatile solids as specified in Annex B 1.

d) Report on the testing of ecotoxicity as specified in Annex B 3. Ecotoxicity testing is not needed if the natural substance is listed in Annex A.

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

If additives are being used, then the requirements according to Section 6.2.8 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 the substance´s suitability for micro-organisms in soil.

If substance´s harmlessness cannot be determined using the Safety Data Sheet, testing on ecotoxicity must be performed according to Annex B 3. This is coordinated with DIN CERTCO and, if applicable, with the testing laboratories or the assessment committee.

d) Test report on the determination of regulated metals and other substances as well as volatile solids as specified in Annex B 1.

e) Report on the testing of ecotoxicity as specified in Annex B 3.

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

The requirements according to 6.2.8 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 1 of DIN EN 17033/ requirements of ISO 23517 via a suitable quality assurance system.

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

### 6.2.5 Manufactured items composed of certified materials and materials indicated in Annex A

If certification is being requested for a manufactured item that is intended to contain the fillers and processing auxiliaries indicated in Annex A, it is possible to certify 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 the substance´s suitability for microorganisms in soil.

If substance´s harmlessness cannot be determined using the Safety Data Sheet, testing on ecotoxicity must be performed according to Annex B 3. This is coordinated with DIN CERTCO and, if applicable, with the testing laboratories or the assessment committee.

c) The upper limit of 39 % by mass for the proportion of inorganic material and the upper limits specified in Annex 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 Annex A. Proof of compliance with the requirements of Annex B 1 with respect to the regulated metals and other substances must be supplied for each individual filler or processing auxiliary. Alternatively, chemical characterisation according to Annex B 1 has to be performed.

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

If materials of Annex A are to be used in different portions, the test shall be carried out with the largest portions involved.

### 6.2.6 Coated products

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

#### 6.2.6.1 Coated products using substances in portions less than 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) Test report on the determination of regulated metals and other substances as well as volatile solids as specified in Annex B 1. Alternatively the testing can be performed on each single substance.

d) Safety Data Sheets according to REACH for all substances being used to determine the substance´s suitability for microorganisms in soil.

   If substance´s harmlessness cannot be determined using the Safety Data Sheet, testing on ecotoxicity must be performed according to Annex B 3. This is coordinated with DIN CERTCO and, if applicable, with the testing laboratories or the assessment committee.

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

#### 6.2.6.2 Coated products 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:

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) Testing of ultimate biodegradability:

   For ISO 17033: Test report on testing of ultimate biodegradability as specified in Annex B 2. Alternatively the testing can be performed on each single substance.

   For ISO 23517: Test report on testing of ultimate biodegradability as specified in Annex B 2. Individual testing of each of the organic constituents present at levels between 1-15 % dry mass is required.

d) Test report on the determination of regulated metals and other substances as well as volatile solids as specified in Annex B 1. Alternatively the testing can be performed on each single substance.

e) Report on the testing of ecotoxicity as specified in Annex B 3.

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

#### 6.2.6.3 Coated products with materials that have already been certified 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 the substance´s suitability for microorganisms in soil.

   If substance´s harmlessness cannot be determined using the Safety Data Sheet, testing on ecotoxicity must be performed according to Annex B 3. This is coordinated with DIN CERTCO and, if applicable, with the testing laboratories or the assessment committee.

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

### 6.2.7 Manufactured items consisting of multiple layer structures made of certified materials

If certification is being requested for a manufactured item consisting of multiple layers of materials already on the list according to Section 6.9 and are therefore demonstrated to fulfil the requirements of this certification scheme (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 the substance´s suitability for microorganisms in soil.

   If substance´s harmlessness cannot be determined using the Safety Data Sheet, testing on ecotoxicity must be performed according to Annex B 3. This is coordinated with DIN CERTCO and, if applicable, with the testing laboratories or the assessment committee.

e) List of the materials used, including information on weight percentages.

f) An infrared transmission spectrum in accordance with Annex 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.

### 6.2.8 Manufactured items consisting of manufactured items already certified and non-biodegradable additives

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.

#### 6.2.8.1 Use of harmless additives with less than 1 % of mass per additive and less than 3 % (ISO 23517) or 5 % (DIN EN 17033) of mass of non-biodegradable additives

Organic additives whose biodegradability has not been separately determined can be used on the following conditions (on the basis of Section A 5.2.2 of DIN EN 17033):

– Less than 1 % of mass per organic additive.

– Less than 5 % of mass in total of organic additives whose biodegradability has not been proven.according to DIN EN 17033.

– Less than 3 % of mass in total of organic additives whose biodegradability has not been proven according to ISO 23517.

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 the substance´s suitability for microorganisms in soil.

   If substance´s harmlessness cannot be determined using the Safety Data Sheet, testing on ecotoxicity must be performed according to Annex B 3. This is coordinated with DIN CERTCO and, if applicable, with the testing laboratories or the assessment committee.

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

#### 6.2.8.2 Usage of 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 1 of DIN EN 17033 and/or the thresholds defined for ISO 23517 in Annex B 1.

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 3 % (ISO 23517) or 5 % (DIN EN 17033) printing ink. Compliance with the thresholds according to Table 1 in DIN EN 17033 and/or the thresholds defined for ISO 23517 in Annex B 1 is required.

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

a) Safety Data Sheets according to REACH for each colour (e.g. red, yellow, etc.) being used to determine the additive´s suitability for microorganisms in soil.

   If substance´s harmlessness cannot be determined using the Safety Data Sheet, testing on ecotoxicity must be performed according to Annex B 3. This is coordinated with

DIN CERTCO and, if applicable, with the testing laboratories or the assessment committee.

b) For each colour used, information on regulated metals and other substances in the form of test reports according to Annex B 1.

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

If the individual printing inks are tested, then 80 % of the threshold from table 1 in DIN EN 17033 and/or maximum concentrations according to ISO 23517section 5.1 may not be exceeded with the maximum colour quantity being requested.

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 Annex B 1:

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

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

#### 6.2.8.3 Use of adhesives

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

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

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

b) Safety Data Sheets according to REACH for all adhesives being used to determine the additive´s suitability for microorganisms in soil.

If substance´s harmlessness cannot be determined using the Safety Data Sheet, testing on ecotoxicity must be performed according to Annex B 3. This is coordinated with DIN CERTCO and, if applicable, with the testing laboratories or the assessment committee.

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

#### 6.2.8.4 Use of additives with more than 1 % of mass per additive and/or more than 3 % (ISO 23517) / 5 % (EN 17033) of mass of additives

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) For DIN EN 17033: Test report on testing of ultimate biodegradability as specified in Annex B 2. Alternatively the testing can be performed on each single substance.

g) For ISO 23517 Test report on testing of ultimate biodegradability as specified in Annex B 2. Individual testing of each of the organic constituents present at levels between 1-15 % dry mass is required.

c) Test report on the determination of regulated metals and other substances as well as volatile solids as specified in Annex B 1. Alternatively the testing can be performed on each single substance.

d) Report on the testing of ecotoxicity as specified in Annex B 3.

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

#### 6.2.8.5 Thickness ranges of mulch films according to DIN EN 17033

In case of application of a range of thicknesses the thinnest and the thickest film shall be tested according to DIN EN 17033, Table 3. These tests can cover all the thicknesses in between.

For film width and length it is sufficient to test one film if films only differ in layer-thickness.

### 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 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 an (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:
Mulch films made from different materials are subtypes.

- for materials, semi-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, the rules governing logo use and logo usage guidelines, sub-licences are necessary if certified products are intended to be brought into 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 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 Annex C for each product.

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/specifications.

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

### 6.7 Registration numbers of products, intermediates, materials

Composition of the registration number:

| | |
|---|---|
| – Products | 9Zxxxx |
| – Intermediates | 9Yxxxx |
| – Materials | 9Xxxxx |

### 6.8 Certificate and the right to use the mark

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 mark "DIN-Geprüft Biodegradable in soil“ for products in conjunction with the respective registration number (see Section 6.7).

Products biodegradable in soil for which a right to use the mark "DIN-Geprüft Biodegradable in soil" has been issued must be marked with the "DIN-Geprüft Biodegradable in soil"-Logo and the respective registration number.

Logo and registration number may 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 (9Xxxx or 9Yxxx). 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-licenses of 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.

The General Terms and Conditions of DIN CERTCO also apply.

### 6.9 Publication

All certificate holders can be viewed on the daily up-dated homepage of DIN CERTCO (www.dincertco.de) under <Certificates/Registrations>. Manufacturers, users and consumers use this research possibility for obtaining information on certified products, materials or intermediates.

Besides the contact details of the certificate holders (telephone, telefax, e-mail, homepage), it is also possible to view the technical data for the certified product and registered intermediate or material.

### 6.10 Validity of certificates

The certificate for products is valid for 5 years. The period of validity is shown on the certificate. On expiry of the certificate, the right to use the mark also expires.

The certification of 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 is to 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 supplementary documentation.

Furthermore, if no deviations were found during the 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 ─ 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 conformity mark “DIN-Geprüft Biodegradable in Soil” 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 requirements for the issuing of the certificateare 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 in conjunction with the assessment committee 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 the testing laboratory determine a substantial alteration, the certificate with the corresponding registration number shall expire. For the modified manufactured item, a new application for initial certification authorising the use of the conformity mark or initial registration 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). For this purpose an application for amendment must be sent to DIN CERTCO. The certificate will be changed respectively.

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 on 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 same.

### 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 5.6).

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 instructed 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 specified 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 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 **Fehler! Verweisquelle konnte nicht gefunden werden.**, 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 the product will no longer be permitted to use the conformity mark “DIN-Geprüft Biodegradable in Soil”.

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 cancelled.

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, 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 annually on the anniversary of the certificate.

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 $\sqrt{n}$ the production facilities for the control test. The number is rounded up to the next highest integer.

– 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 conformity mark and corresponding registration number according to the logo usage rules.

b) 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, one of the 5 submitted samples is used to perform an infrared transmission spectrum according to Annex 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.

c) Determination of regulated metals and other substances according to Table 1 of DIN EN 17033 during the validity.

d) When using recycled paper, the Determination of regulated metals and other substances according to Annex B 1 (see Section 6.2.4.) is required annually.

### 7.4.2 Materials/Intermediates

The verification shall be performed at regular intervals of two years.

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 highest integer.

– 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) 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 Annex C from one of the submitted 5 samples 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.

c) Determination of regulated metals and other substances according to Table 1 of DIN EN 17033 during the validity.

d) When using recycled paper, the Determination of regulated metals and other substances according to Annex B 1 (see Section 6.2.4.) is required annually.

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 certification of materials/intermediates 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 Infrared 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.

### 7.5.3 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 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 Annex 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 materials biodegradable in soil according to Section 6.2.5.

### Main Group 1: Fillers

### Subgroup 1.1: Inorganic fillers and pigments - admixture up to a maximum of 39 %

– 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
– Wollastonite

### Subgroup 1.2: Organic fillers

### Section 1.2.1: Non- modified native cellulose

– Vegetable fibers

### Section 1.2.2: Non-modified native Ligno-Cellulose

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

### Section 1.2.3: Non-modified natural starch

– Starch
– Rye flour and other flours

### Section 1.2.4 Non-Modified naturally occurring 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 39 %**

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

# B Annex Tests

## B 1 Chemical characterisation

According to DIN EN 17033:

The chemical test is conducted in accordance with the limits of DIN EN 17033, table 1, as well as the requirements in Section 5.1.3 of DIN EN 17033 (volatile solids).
Test reports according EN 13432 are accepted.

According to ISO 23517:

The chemical test is conducted in accordance with the limits of ISO 23517, Annex A, as well as the requirements in Annex B and Section 5.1 of ISO 23517 (volatile solids).

ISO 23517 requires that the concentrations of regulated metals and other elements in a mulch film, material of the mulch film or product shall be less than 50 % of those prescribed for sludges, fertilizers and composts in the country where the final product will be placed on the market or disposed of. To ensure that products can be handled internationally, this certification scheme requires that the concentrations of regulated metals and other elements in a mulch film or material of the mulch film shall be less than 50 % of those prescribed for sludges, fertilizers as mentioned in EN 13432, plus 50 % of the Cobalt concentration as mentioned in BNQ 9011-911-I/2007.

Inorganic fluorine content shall be analysed according to EN 14582 using the digestion method. If testing on a material that contains an inert mineralic filler (e.g. talcum), results in a value of more than 100 mg F/kg material (dry matter), then in addition, the material without that filler shall be determined. See Annex B 1.2 of ISO 23517.

## B 2 Testing of ultimate biodegradability

Testing of ultimate biodegradability is conducted in accordance with the criteria of DIN EN 17033 and ISO 23517 standard in a temperature range of 20 – 28 °C (preferably at 25 °C) by the following method:

– DIN EN ISO 17556 Plastics- Determination of the ultimate aerobic biodegradability of plastic materials in soil by measuring the oxygen demand in a respirometer or the amount of carbon dioxide evolved

A biodegradation of 90 % (total or relative to a suitable reference material) is required in order to show an ultimate biodegradation under mesophilic conditions. The maximum testing duration is 24 months.

A fixed biodegradable polymer (microcrystalline cellulose powder, ashless cellulose filter or only for EN 17033 poly(3-hydroxybutyrate ) is used as reference material. If possible, the physical shape and size of the reference material should be comparable to that of the test material.

A supplementary test (e.g. according to DIN EN ISO 14855, at 58 °C) is not accepted.

## B 3 Testing of ecotoxicity

### B 3.1 Preparation of soils for ecotoxicity tests

**According to DIN EN 17033:**

The ecotoxicity of the materials of mulch films and remaining degradation products (intermediates) shall be evaluated according to the test methods specified in 5.3.2.2, 5.3.2.3 and 5.3.2.4 using test soils prepared according to Annex A of DIN EN 17033.

**According to ISO 23517:**

The ecotoxicity of the materials of mulch films/products and remaining degradation products (intermediates) shall be evaluated according to the test methods specified in 5.3 using test soils prepared according to Annex E of ISO 23517.

### B 3.2 Testing on acute toxicity plant growth test

**According to DIN EN 17033 and ISO 23517:**

Test items that have been already assessed for plant toxicity following EN 13432, EN 14995, ISO 17088, ISO 18606, ASTM D6400, ASTM D 6868, NF T 51-800 (only DIN EN 17033), AS 4736 or AS 5810 and fulfilled the pass level for plant toxicity laid down in the standard specifications do not need to be retested.

The germination rate and the plant biomass of the tested plant species in the soil exposed to the test material shall be more than 90 % of those from the corresponding blank soil not exposed to the test material.

Acute toxicity plant growth test shall be carried out according DIN EN 17033, Section 5.3.2.2 with the following method with modifications specified in Annex B of DIN EN 17033:

– OECD 208 Terrestrial Plant Test: 208: Seedling Emergence and Seedling Growth Test

To assure the quality of the blank, 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. 70 % 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 Earthworm tests

Adverse effects of materials on mortality and biomass of adult earthworms shall be determined in an acute earthworm test according Annexe B.3.3.1 or in a chronic toxicity earthworm test according Annex B 3.3.2.

Test items that have been already assessed for toxicity to earthworms following AS 4736 and AS 5810 and fulfilled the pass level for toxicity to earthworm laid down in the standard specifications do not need to be retested.

### 3.3.1. Acute toxicity earthworm test

The difference in the observed mortality as well as in the biomass of surviving adult earthworms between a soil exposed to the test material and the corresponding blank soil not exposed to the test material shall be less than 10 % of those from the corresponding blank soil.

**DIN EN 17033:**

Acute toxicity on earthworms shall be determined according DIN EN 17033, Section 5.3.2.3.1 with the following method with modifications specified in Annex C of DIN EN 17033:

– EN ISO 11268-1 Soil quality - Effects of pollutants on earthworms - Part 1: Determination of acute toxicity to Eisenia fetida/Eisenia andrei

Or alternatively

– ASTM E 1676 Conducting laboratory soil toxicity or bioaccumulation tests with the Lumbricid Earthworm *Eisenia Fetida* and the Enchytraeid Potworm *Enchytraeus albidus*

**ISO 23517:**

Acute toxicity on earthworms shall be determined according ISO 23517, Section 5.3.4.2 with the following method with modifications specified in Annex D of ISO 23517:

– EN ISO 11268-1 Soil quality - Effects of pollutants on earthworms - Part 1: Determination of acute toxicity to Eisenia fetida/Eisenia andrei

### 3.3.2. Chronic toxicity earthworm test

Alternative to 3.3.1: After an incubation period of 28 days the difference in the observed mortality as well as in the biomass of surviving adult earthworms between a soil exposed to the test material and the corresponding blank soil not exposed to the test material shall be less than 10 % of those from the corresponding blank soil.

After an incubation period of 56 days the difference in the observed number of offspring between a soil exposed to the test material and the corresponding blank soil not exposed to the test material shall be less than 10 % of those from the corresponding blank soil.

**DIN EN 17033:**

Chronic toxicity on earthworms shall be determined according DIN EN 17033, Section 5.3.2.3.2 with the following method with modifications specified in Annex D of DIN EN 17033:

– EN ISO 11268-2 Soil quality - Effects of pollutants on earthworms - Part 2: De termination of effects on reproduction of Eisenia fetida/Eisenia andrei

**ISO 23517:**

Chronic toxicity on earthworms shall be determined according ISO 23517, Section 5.3.4.3 with the following method with modifications specified in Annex E of ISO 23517:

– EN ISO 11268-2 Soil quality - Effects of pollutants on earthworms - Part 2: De termination of effects on reproduction of Eisenia fetida/Eisenia andrei

### B 3.4 Nitrification inhibition test with soil microorganisms

The nitrite formation in soil exposed to the test material shall be more than 80 % of those from the corresponding blank soil not exposed to the test material.

**DIN EN 17033:**

The effects of materials on the microbial nitrification activity in soil shall be determined with the following method with the modifications specified in Annex E of DIN EN 17033:

– ISO 15685 Soil quality -- Determination of potential nitrification and inhibition of nitrification -- Rapid test by ammonium oxidation

**ISO 23517:**

The effects of materials on the microbial nitrification activity in soil shall be determined with the following method with the modifications specified in Annex F of ISO 23517:

– ISO 15685 Soil quality -- Determination of potential nitrification and inhibition of nitrification -- Rapid test by ammonium oxidation

## B 4 Mulch films: Dimensional, mechanical and optical properties according to DIN EN 17033

Biodegradable mulch films shall fulfil the requirements according DIN EN 17033, Table 3.

## B 5 Appearance of films according to DIN EN 17033

The appearance of the film must comply with the requirements of section 6.2 of DIN EN 17033**.**

## B 6 Thickness of films according to DIN EN 17033

The thickness of the single points of the film shall be determined with the following method:

– ISO 4593 Plastics -- Film and sheeting -- Determination of thickness by mechanical scanning

The average thickness of the film shall be determined with the following method:

– ISO 4591 Plastics -- Film and sheeting -- Determination of average thickness of a sample, and average thickness and yield of a roll, by gravimetric techniques (gravimetric thickness)

## B 7 Width of films according to DIN EN 17033

The width of the film shall be determined with the following method:

– ISO 4592 Plastics -- Film and sheeting -- Determination of length and width

## B 8 Film length according to DIN EN 17033

The length of the film shall be determined by the method described in section 6.3.3 of DIN EN 17033.

## B 9 Tensile characteristics according to DIN EN 17033

The tensile characteristics of the film shall be determined by EN ISO 527-1 and EN ISO 527-3 on five test pieces type 2, 10 mm wide, cut in each direction of the firm, MD (= machine direction) and TD (= transverse direction), at a testing speed of 50 mm/min.

– EN ISO 527-1 Plastics - Determination of tensile properties - Part 1: General principles

– EN ISO 527-3 Plastics - Determination of tensile properties - Part 3: Test conditions for films and sheets

Calculate the arithmetic average value of the five measurements.

### B 10 Impact resistance according to DIN EN 17033

The impact resistance of the film shall be determined with one of the following methods:

– EN ISO 7765-1 Plastics film and sheeting - Determination of impact resistance by the free-falling dart method - Part 1: Staircase methods (Method A)

– ASTM D 1709 Standard Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method1 (Method A)

### B 11 Relative light transmission according to DIN EN 17033

The relative light transmission of the film shall be determined on five test pieces cut from the film with the method described in Annex F of DIN EN 17033.

Calculate the arithmetic average value of the five measurements.

### B 12 Mulch films: Designation and marking according to DIN EN 17033

Biodegradable mulch films shall be designated according DIN EN 17033, Section 8 and (optional) be marked according DIN EN 17033, Section 9.1.

Marking on the packaging or label shall include at least information according DIN EN 17033, Section 9.2.

## C Annex Infrared transmission spectrum

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