Nederlandse certificatieschema

NCS 16785

(en)

Certificatieschema biobased gehalte

Certification scheme bio-based content

Vervangt NCS 16785:2016-11

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Introduction

Resource supply and environmental aspects are considered of increasing importance to industrial production. Products based on biomass can contribute to both economically and ecologically efficient solutions. Therefore, it can be of interest to be able to determine and communicate the bio-based content of a given product or product family.

This was usually accomplished in the USA and in Europe on the basis of the quantification of ^{14}C carbon according to ASTM D-6866. This approach had the advantage of being simple and easy to implement. Also focusing on carbon can be of interest in the context of carbon footprint and carbon dioxide production evaluation. But when trying to communicate on the content in biomass in a given product or product family, this method needs to be completed.

As a matter of fact, bio-based products, product families and compounds contain also large quantities of other elements. These are primarily oxygen, nitrogen, hydrogen and others, coming from lipids, proteins and carbohydrates. These elements are not covered by the radiocarbon method, which in fact leads to the determination of the “bio-based carbon content” in a product. In this document the term "bio-based content" is used in the meaning of bio-based product or product family including the chemical elements mentioned above according to EN 16785-1.

This certification scheme is based on EN 16785-1, which describes a complementary method for the calculation and the determination of bio-based content in a given raw material, chemical, intermediate, semi-finished product or finished product. The certification scheme defines a system, which provides the opportunity of a third party verification of the bio-based content of the products or product families to be tested.

The determination of the bio-based content is based on a statement by the producer, which is validated by different analyses. If a statement on the bio-based content cannot be provided about some or all constituents, then the certification body will provide a statement about the minimum bio-based content.

Bio-based content approbation according to this certification scheme provides its applicants with a reliable basis for the communication of the bio-based content of the respective products or product families to other parties e.g. business partners, authorities, or the public. The bio-based content of a product does not provide information on its environmental impact or sustainability.

This certification scheme intends to increase transparency about the bio-based content in products by determining and independently verifying the bio-based content before making any claims about the bio-based content. It also aims to facilitate benchmarking amongst similar products for the aspect of the bio-based content. This certification scheme does not set minimum limits for bio-based products, not only for transparency and benchmarking purposes, but also as limits might be arbitrary and will differ amongst the several applications in the bio-based sector.

This certification scheme has been revised by the Committee of Experts “Bio-based content”. NEN as scheme owner complies with the requirements set by the Dutch Accreditation Council (RvA), the Dutch member of the International Accreditation Forum (IAF). Certification bodies that have entered into an agreement with NEN are obliged to apply the certification system as established by the scheme owner “Bio-based content” when certifying on the basis of EN 16785-1. The Committee of Experts is responsible for supervising the functioning of the standard and the certification scheme and for adjusting the certification scheme, if necessary.

Certification scheme bio-based content

1 Scope

This certification scheme contains provisions for the determination, verification and monitoring of the bio-based content of products or product families. It is applicable to all kinds of products containing carbon.

This certification scheme can be used by different types of organizations including:

— organizations that wish to demonstrate by a third party conformity assessment that the claim about the bio-based content of their product or product family is justified;

NOTE 1 In this context, the organization is also referred to as 'applicant'.

— certification bodies that are contracted by applicants for assessing conformity;

NOTE 2 Only certification bodies that have entered into an agreement with NEN may use this certification scheme.

— testing laboratories that analyze sample(s) of products or product families for their bio-based content and elemental composition.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments and corrigenda) applies.

EN 16785-1:2015, *Bio-based products — Bio-based content — Part 1: Determination of the bio-based content using the radiocarbon analysis and elemental analysis*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 16785-1 and the following apply:

3.1
bio-based content
biomass content
fraction of a product that is derived from biomass

Note 1 to entry: Normally expressed as a percentage of the total mass of the product.

[SOURCE: EN 16575:2014, 2.4, modified – Note 2 to entry has been removed and second term has been added (definition 2.8 in EN 16575:2014).]

3.2
Component
part of a finished product (e.g. packaging) that can be separated by hand or by simple physical means

Note 1 to entry: Derived from definition of 'packaging component' in EN 13432:2000, 3.2.

3.3
constituent
chemical material or substance which a material item to this bio-based content approbation is composed of

3.4
integrated component
part of a product that can (easily) be differentiated, but not (easily) separated by hand or simple physical means

3.5
product
substance, mixture of substances, material or object resulting from a production process

Note 1 to entry: Product can be an intermediate, material, semi-finished or final product.

[SOURCE: EN 16575:2014, 2.14]

3.6
product family
family of products
group of products derived from common constituents, using similar or same production processes and having similar physical characteristics

Note 1 to entry: The composition range for the product family to be certified needs to be confirmed between applicant and certification body.

Note 2 to entry: For example, products with different purity grades or products with varying molecular weights but similar reactants can be considered a product family.

3.7
natural product
product wholly derived from biomass that may have undergone a non-chemical or non-biological modification process

Note 1 to entry: Examples of non-chemical or non-biological modification processes are distillation, extraction or similar separation methods.

Note 2 to entry: This definition deviates from the one used in EN 16785-1:2015.

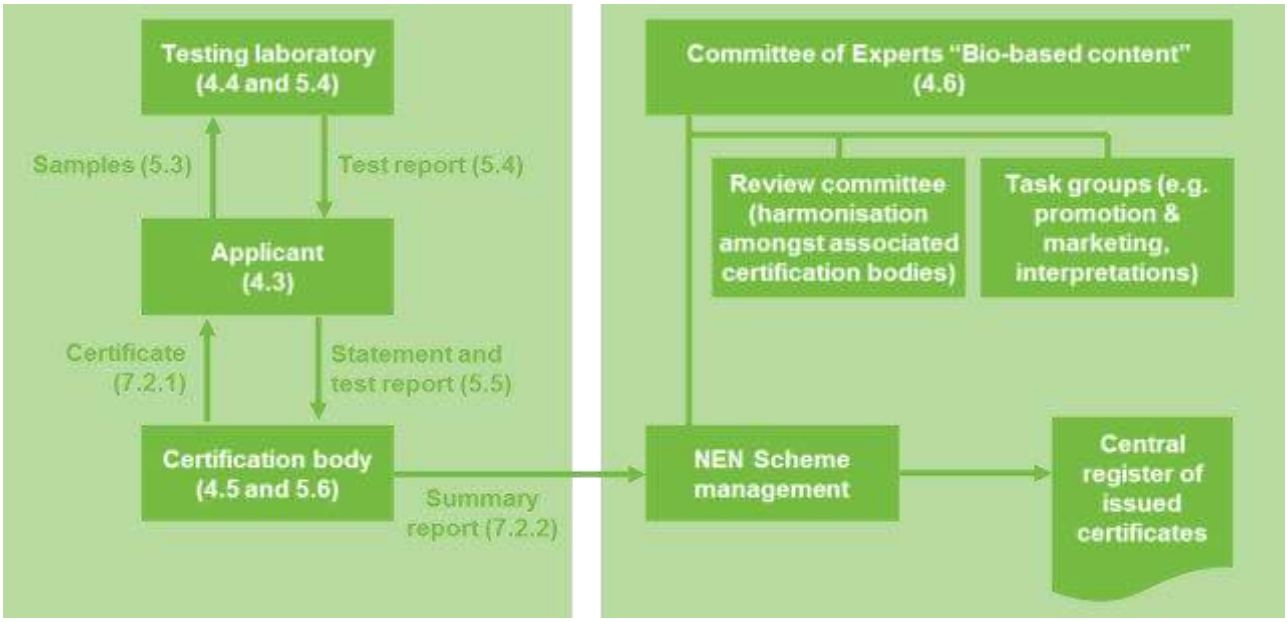
4 Organization of the certification system

4.1 Principle

Certification in the sense of this certification scheme relates to the assessment of conformity of a raw material, chemical, intermediate, semi-finished product or finished product by the certification body on the basis of test reports submitted by testing laboratories recognized by the certification body. In doing so, the raw material, chemical, intermediate, semi-finished product or finished product to be certified for conformity, in accordance with the requirements in Clause 5, is examined and subsequently monitored.

4.2 Organizational structure

Figure 1 gives a schematic overview of the certification system. The left hand side of Figure 1 shows the organizational structure of the actor subsequent steps to be taken in order that an organization ('applicant') will obtain a certificate for the bio-based content of its product of product family. The right hand side of Figure 1 shows the organizational structure for the management of this certification system. In addition to the standard and the certification scheme, the certification system is supported by the *NEN Scheme management manual*, which has been developed to secure the whole primary process of developing and implementing the certification system.



NOTE References relate to the subclauses in this certification scheme.

Figure 1 — Schematic overview of the certification system for bio-based content

4.3 Applicant

The applicant is the organization that would like to certify for the minimum percentage of bio-based content in its product or product family. Figure 2 provides a (simplified) flowchart of the subsequent steps to be taken in order that the applicant will obtain and maintain a certificate for the bio-based content of its product of product family.

NOTE 1 The applicant may decide to outsource the sampling part to the certification body. In this case, the certification body will submit the required information and the sample to the testing laboratory (second step in this figure) on behalf of the applicant. The applicant remains owner of the test report.

NOTE 2 This flowchart shows the logical pathway for certification; alternative pathways are possible as long as the requirements in this certification scheme are fulfilled (see for example NOTE 1).

Figure 2 — Flowchart with steps to be taken by an applicant for certifying the minimum percentage of bio-based content in its product or product family

4.4 Testing laboratory

For certification purposes, the testing laboratory shall be recognized by the certification body that will be contracted by the applicant. The testing laboratory participating in the system shall be accredited according to ISO/IEC 17025 for the test methods and matrices concerned. In case the testing laboratory is only accredited according to ISO/IEC 17025 for the test method, but not (yet) for the matrix concerned, the certification body is allowed to recognize this testing laboratory in accordance with its ISO/IEC 17065 accreditation rules. An audit to the testing laboratory based on the requirements of ISO/IEC 17025 may be part of this recognition process.

NOTE 1 The list of recognized testing laboratories per certification body is maintained at the web portal www.biobasedcontent.eu. The applicant is advised to contact a testing laboratory after entering into an agreement with one of the certification bodies associated with this certification scheme to ensure that the testing laboratory is recognized by this certification body.

NOTE 2 Accredited test methods are available for the elements C, H and N and for ^{14}C, but not yet for the element O. This implies that the elemental analysis of oxygen cannot be part of the certification process until an accredited test method is available.

The testing laboratory shall be independent of the applicant.

The testing laboratory may outsource part of the analyses to another testing laboratory, provided that this testing laboratory is recognized by the certification body and that outsourcing is stated in the proposition.

4.5 Certification body

The certification body shall have an ISO/IEC 17065 accreditation granted by an IAF/MLA [1)] partner.

The primary processes of the certification system are described in the *NEN Scheme management manual*. The specific requirements for the certification body with respect to EN 16785-1 are described in this certification scheme.

1) An IAF/MLA partner is an accreditation body that is member of the International Accreditation Forum (IAF) and has declared their common intention to join the IAF Multilateral Recognition Agreement (MLA) recognising the equivalence of other members' accreditations to their own. An overview of IAF/MLA partners is available at www.iaf.nu.

The certification body may decide on the languages in which the documents are accepted.

4.6 Committee of Experts

The Committee of Experts “Bio-based content” assesses the functioning of this certification scheme in practice and draw up additional decisions and/or interpretation documents. A complete specification of the authorities and responsibilities of the Committee of Experts and the procedures are part of the *NEN Scheme management manual*. The Committee of Experts shall meet at least once a year.

4.7 Changes

Changes in the certification system for organizations will be effective after decree by the scheme owner under simultaneous appointment of the date of commencement and not until at least 30 days have been passed after the day of announcement. The scheme owner ensures that all parties involved will be informed of the changes and the day of their commencement.

Existing certificate holders are granted a certain transition period, from the day the revised certification scheme becomes effective, during which they can make any changes necessary for compliances with the revised certification scheme. The transition period will be defined by Committee of Experts “Bio-based content” based on the impact of the changes of the revised certification scheme.

5 Method of assessment

5.1 General

Products can be sorted out in three groups. The groups and the type of analysis to be carried out are specified below for each product group.

— **Group I products**: products obtained by chemical or biological reaction.

  Group I products shall undergo ^{14}C analysis and elemental analysis. Their statement shall contain a detailed elemental composition of the bio-based part and the fossil part as described in 5.5.1.

  NOTE 1 Group I products are described by one chemical formula. For example, a polymer is a Group I product.

— **Group II products**: products obtained by mixing Group I products and/or: natural products; bio-based non-certified products; fossil products, without chemical or biological reaction. This category consists of three subcategories, depending on the extend to which the bio-based constituents have been certified as Group I product.

  NOTE 2 Group II products may contain additives. For example, a plastic is a Group II product.

  — Group IIA products contain a mix of Group I products, possibly with fossil constituents and/or certified natural products. Bio-based constituents and/or natural products which have not been certified, will not be taken into account in the portion bio-based content, but they will be treated as fossil content. The Group IIA product shall undergo ^{14}C analysis and elemental analysis. Their statement shall be done by simple calculation of the bio-based content by using data obtained from suppliers, as described in 5.5.2, provided that the bio-based content of the constituents (Group I) are analyzed according to this method. This simplified statement takes into account the possible complexity of formulated products.

- **Group IIB** products contain a mix of certified and non-certified bio-based constituents and/or certified natural products and/or non-certified natural products, possibly with fossil constituents. All non-certified components and the group IIB product shall undergo ^{14}C analysis and elemental analysis. Their statement shall contain a detailed elemental composition of the certified bio-based part, the certified natural products part and the non-certified parts as described in 5.5.1. The bio-based content statement shall be done by adding the bio-based content data obtained from suppliers, as described in 5.5.2, of the Group I constituents and the ^{14}C content of the non-certified bio-based and/or natural products as a share of the total mass of the product.

- Group IIC products contain a mix of non-certified bio-based constituents and/or non-certified natural products, possibly with fossil constituents. These Group IIC products shall undergo ^{14}C analysis and elemental analysis. The bio-based content statement shall be based on the ^{14}C content of the product as a share of the total mass of the product.

- **Natural products**: product wholly derived from biomass that may have undergone a non-chemical or non-biological modification process. Natural products shall undergo ^{14}C analysis and elemental analysis. Their statement shall be done by use of the bio-based content analysis by using data obtained from suppliers as described in 5.5.3, provided that the bio-based content of the natural product is analyzed in accordance with this method.

In the case an organization modifies, without chemical or biological reaction, an externally provided product that is "Bio-based content" certified, the modified product shall be considered a Group II product and shall be assessed in accordance with the applicable requirements of NCS 16785:2016-11.

NOTE 3 This means that an organization cannot endorse the "Bio-based content" certification from its supplier.

EXAMPLE Printing ink on a bio-based packaging is considered a modification of the packaging, as the composition of this packaging and with that the percentage of the bio-based content associated with this packaging may change depending on the composition of the ink and the ratio of the ink used on the packaging.

5.2 Calculation of the bio-based content

5.2.1 General calculation method

The calculation of the bio-based content shall be in accordance with EN 16785-1. This calculation method includes the statement of the bio-based content of the sample obtained by calculation combined with a validation done by comparing the data of the statement and the results of the ^{14}C content determination and the elemental analysis of the sample.

5.2.2 Calculation for combined materials and/or assembled products

Particularly in the field of semi-finished and consumer products, there will be cases of combinations of materials. This certification scheme distinguishes between components that can be easily distinguished and/or separated by hand or simple physical means and integrated components, where either one or both conditions are not fulfilled. In both cases combinations of non-bio-based and bio-based materials (parts) or mixtures of bio-based components can occur.

In particular assembled products offer choices with regard to calculation and labelling. The calculation and labelling can be based on single items (parts) or on an average of the parts. In general, it is recommended to apply average values on products with low complexity, where consumers can be expected not to distinguish. Average values shall be marked as such.

NOTE 1 For example bottle with cap, packaging tray and film wrap.

For products with high complexity it is recommended to calculate the bio-based content for the single bio-based item.

NOTE 2 For example steering wheel and car seat.

5.3 Information for analyzing the sample

The applicant shall provide at least the following documented information when contracting a testing laboratory or certification body for analyzing the sample:

a) the technical data sheet or a description of the product or product family, whatever available;

b) the safety data sheet, if available;

c) the composition of the product or product family, including water content in order to help monitor the sample weighing and the presence of carbonates, minerals and metals, which can interfere with the analytical results;

NOTE 1 Components for which composition is not given are not considered bio-based.

d) if the product or product family is made of different parts, a description of how it should be analyzed: each part individually or as a whole;

e) statement that the sample is representative for the production process of the product or product family to be certified.

NOTE 2 If a bio-based product or product family or a constituent thereof shows strong variation for its bio-based content, the sample might not be representative. Such case needs to be specified in the statement. The number of samples to be representative needs to be determined in consultation with the certification body.

The application can provide additional information that will help directing the work of the analyst.

5.4 Sampling and analysis

The testing laboratory shall at least prepare and analyze one sample of the product or product family. This sample shall be representative for the product or product family to be certified. Sampling shall be in accordance with 7.2 of EN 16785-1:2015 for Group I products and 8.2 of EN 16785-1:2015 for Group II products.

In case of a product consisting of two or more components, the testing laboratory shall ensure that a homogenized sample (e.g. shredded and/or ground and/or mixed) of all constituents of the product will be subject to analysis. In case a homogeneous sample cannot be obtained or if the product is too large or too complex, each component shall be analyzed separately and the biomass content shall be calculated according to Annex A. This is coordinated with the certification body and, if applicable, with the testing laboratory and applicant.

NOTE 1 In case the product or product family to be certified contains volatile constituents, special attention during sampling and shipping will be needed. Such and similar questions are to be clarified between the applicant and the testing laboratory prior to analyses.

The testing laboratory shall analyze the ^{14}C carbon content and the elemental composition of the products or product families to be certified according to the procedures described in 7.3.1 of EN 16785-1:2015 for Group I products and the ^{14}C carbon content of the products or product families to be certified according to the procedures described in 8.3.1 of EN 16785-1:2015 for Group IIA products, in order for the certification body to validate the bio-based content of the statement. In case

of Group IIB products and Group IIC products, additional to the ^{14}C carbon content analysis as specified in 8.3.1 of EN 16785-1:2015, an elemental analysis shall be performed on the sample, according to the procedures described in 7.3.1 of EN 16785-1:2015.

NOTE 2 EN 17351:2020 was published in January 2020.

The testing laboratory shall produce a test report containing the results of its analysis and all necessary information. Test reports used in the validation by the certification body may not be older than two years.

NOTE 3 See 5.6.1 for deviations with EN 16785-1:2015 concerning validation of the statement made by the applicant.

The testing laboratory shall retain samples of the products tested according to the requirements of their respective accreditation, but at least three years.

5.5 Information for application for certification

5.5.1 Group I products

The applicant shall provide at least the following documented information to the certification body when applying for an assessment for products obtained by chemical or biological reaction (Group I products):

a) general information about the organization (name, contact details, legal entity);

b) the statement by the applicant of the bio-based content and the elemental composition of the product differentiated according to 7.1 of EN 16785-1:2015.

NOTE Annex B provides an example of statement of the bio-based content and the elemental composition of the product differentiated according to the fossil and bio-based parts.

c) a technical data sheet or a description of the product;

d) the test reports obtained from authorized laboratories and pertaining to the results of the 14C analysis as well as the elemental analysis (see 5.4);

e) in case of product family, a description of the composition of the products that make part of the family (e.g. density level, purity level, chain length, molecular weight).

5.5.2 Group II products

5.5.2.1 General

The applicant shall provide documented information to the certification body when applying for an assessment for Group IIA products, Group IIB products or Group IIC products. The minimum required information for the different groups is described in 5.5.2.2, 5.5.2.3 and 5.5.2.4.

5.5.2.2 Group IIA products

a) general information about the organization (name, contact details, legal entity);

b) the statement of the bio-based carbon content and the bio-based content in accordance with Annex A;

c) the different constituents of the formulation of the product, or at least the ones containing some bio-based part;

d) the technical data sheet or a description of the product, and the description of the product's formulation based on dry weight percentages (at least the bio-based components and their participation to the overall formulation);

e) the test reports of the ^{14}C analysis and elemental analysis obtained from authorized laboratories;

f) in case of product family, a description of the composition of the products that make part of the family (e.g. density level, purity level, chain length, molecular weight).

5.5.2.3 Group IIB products

a) general information about the organization (name, contact details, legal entity);

b) the statement of the bio-based content for the bio-based constituents of the product which have been certified, in accordance with Annex A;

c) the different certified and non-certified constituents of the formulation of the product, for or at least the ones containing some bio-based portions, including certified and non-certified natural materials;

d) the technical data sheet or a description of the product, and the description of the product's formulation based on dry weight percentages (at least the bio-based and natural components and their participation to the overall formulation);

e) the test reports of the 14C analysis obtained from authorized laboratories of the final product and all non-certified bio-based constituents;

f) the test reports of the elemental analysis obtained from authorized laboratories of the final product and all non-certified bio-based constituents;

g) in case of product family, a description of the composition of the products that make part of the family (e.g. density level, purity level, chain length, molecular weight).

5.5.2.4 Group IIC products

a) general information about the organization (name, contact details, legal entity);

b) the different constituents of the formulation of the product, or at least the ones containing some bio-based portions;

c) the technical data sheet or a description of the product, and the description of the product's formulation based on dry weight percentages (at least the bio-based components and their participation to the overall formulation);

d) the test reports of the ^{14}C analysis obtained from authorized laboratories of the final product;

e) the test reports of the elemental analysis obtained from authorized laboratories of the final product;

f) in case of product family, a description of the composition of the products that make part of the family (e.g. density level, purity level, chain length, molecular weight).

5.5.3 Natural products

The applicant shall provide at least the following documented information to the certification body when applying for an assessment for natural products:

a) general information about the organization (name, contact details, legal entity);

b) the statement of the bio-based carbon content and the bio-based content in accordance with Annex A, and statement about non-chemically modification (see 5.6.4), if applicable;

c) in case of mixtures of formulations: formulation of the product in dry weight percentages and its origin(s);

d) the technical data sheet or a description of the product;

e) the test reports of the ^{14}C analysis and elemental analysis obtained from authorized laboratories.

5.6 Validation methodology by certification body

5.6.1 Use of test reports

According to EN 16785-1:2015, the validation of the statement made by the applicant is done and reported by the testing laboratory. In the framework of this certification scheme, the validation of the statement shall be done by the certification body. As a consequence, the following exceptions of EN 16785-1 apply:

— the applicant is not required to communicate the statement to the testing laboratory (in contrast to 7.1 or 8.1 of EN 16785-1:2015);

— the validation of the statement is not done by the testing laboratory (in contrast to 7.4 or 8.4 of EN 16785-1:2015);

— the testing laboratory does not have to report the results of the validation (in contrast to 7.6, items d) and i), or 8.6, items d) and i), of EN 16785-1:2015).

5.6.2 Validation methodology for Group I products

The applicant shall state the bio-based content to the best of its knowledge. The applicant will use minimum values for the statement of the composition of the materials of the formulation. The applicant can easily calculate the bio-based content based on the amount of bio-based materials it uses in accordance with Annex C of EN 16785-1:2015. The bio-based content stated by the applicant shall be a minimum content.

As a Group I product can be the result of a complex chemical reaction, in which some inputs, either fossil-based or bio-based, might not be found back in the final product, the allocation of these evolved constituents, shall be done by the applicant to the best of its knowledge, according to Clause 6 of EN 16785-1:2015. The certification body needs not to assess the realism of this allocation.

The certification body shall receive the statement from the applicant as well as the test reports about the ^{14}C ratio and the elemental analysis. The certification body shall compare the data of the statement

with the results of the analyses. If both data are comparable, the certification body can validate the bio-based content stated by the applicant.

The analytical results may differ from the stated values for the following reasons:

— the composition of the product may show some variability;

NOTE 1 It will be the case of natural fatty acids used in the production of fatty acid esters (surfactants).

— another source of error may be related to the production process;

— product analysis may be a source of uncertainty, which is well documented.

NOTE 2 Examples are ± 3 % of the measured value for the bio-based carbon content, ± 0,4 % of the measured value for the total carbon, total oxygen or total nitrogen content, and ± 0,2 % of the measured value for the total hydrogen content.

The requirements described in 7.4 of EN 16785-1:2015 shall be applied for the validation of the data. If the stated value (x_{B1}) is lower than the measured value (x_{B2}), the confidence level is 1 and the validated value is the stated value. The applicant shall provide a justification if the measured value is higher than the stated value, taking into account the uncertainties.

The certification body shall retain samples of the products assessed according to the requirements of their respective accreditation.

5.6.3 Validation methodology for Group II products

5.6.3.1 Validation methodology for Group IIA products: all bio-based constituents used in the formulation are certified

The certification body shall receive the statement from the applicant as well as the test reports about the ^{14}C ratio. The certification body shall consider only the bio-based constituents used in the formulation that are certified. Bio-based constituents that are not certified shall not be considered as bio-based, but as fossil. The certification body shall compare the bio-based carbon ratio of the statement with the analyzed bio-based carbon content. If both data are comparable within the range of confidence levels, the certification body can validate the bio-based content stated by the applicant. The stated bio-based content is always rounded down to the next integer.

In case of products obtained by blending, different sources of error can interfere with the results (see 5.2).

The requirements described in 8.4 of EN 16785-1:2015 shall be applied for the validation of the data. If the stated value (x_{B1}) is lower than the measured value (x_{B2}), the confidence level is 1 and the validated value is the stated value. The applicant shall provide a justification if the measured value is higher than the stated value, taking into account the uncertainties.

See Annex D for additional requirements for calculation and validation of the biobased content of Group IIA products.

If certification is being requested for a Group II product consisting of materials already certified according to Group I, the following documents and information shall be submitted along with the application form:

a) list of the materials used, including information on mass portions and certificate registration numbers;

b) test reports on bio-based carbon content and bio-based content of the finished item as specified in 5.4.

The certification body shall retain samples of the products assessed according to the requirements of their respective accreditation with a minimum of five years.

5.6.3.2 Validation methodology for Group IIB products in case not all bio-based constituents used in the formulation are certified

The certification body shall receive the information as specified in 5.5.2.3 from the applicant including the test reports about the ^{14}C ratio and the elemental analysis. The certification body shall consider the ^{14}C ratio of the whole product and the bio-based H, N and O mass percentages of the certified ingredients.

The certification body shall validate the mass percentage of the certified bio-based ingredient(s) stated by the applicant by evaluating the ^{14}C and elemental analysis of each non-certified ingredient and the final product, to be able to check the formulation.

The certification body shall state the bio-based content of the product based on all ^{14}C and total carbon and the certified H, N and O content as a share of the total mass of the sample. The stated bio-based content is always rounded down to the next integer.

The requirements described in 8.4 of EN 16785-1:2015 shall be applied for the validation of the data. If the calculated value from the test reports of the ingredients (x_{B1}) is lower than the measured value of the final product (x_{B2}), the confidence level is 1 and the validated value is the stated value. The applicant shall provide a justification if the measured value is higher than the stated value, taking into account the uncertainties.

See Annex D for additional requirements for calculation and validation of the biobased content of Group IIB products.

5.6.3.3 Validation methodology for Group IIC products in case no bio-based constituents used in the formulation are certified

The certification body shall receive the information as specified in 5.5.2.4 from the applicant as well as the test reports about the ^{14}C ratio and the elemental analysis.

The certification body shall state the bio-based content of the product based on all ^{14}C and total carbon content as a share of the total mass of the product. The stated bio-based content is always rounded down to the next integer.

See Annex D for additional requirements for calculation and validation of the biobased content of Group IIC products.

5.6.4 Validation methodology for natural products

According to 5.4 of EN 16785-1:2015, it is not needed to apply the method for the determination of bio-based content in natural products wholly derived from biomass. Certification of natural products in the framework of this certification scheme is only possible if the certification body receives the statement and necessary test reports of the applicant. This means that:

— certification is not possible solely on the statement by the applicant that the product is wholly derived from biomass and that the natural product is not chemically or biologically modified;

— certification as Group I product and further incorporation in Group II product(s) is possible if the applicant provides the certification body with the statement (i.e. 100 % bio-based) and the test reports about the ^{14}C ratio and the elemental analyses.

See Annex D for additional requirements for validation of the biobased content of natural products.

6 Certification procedures

6.1 Certification criteria

The certification body may issue a certificate if according to the decision scheme for Group I and Group II products in EN 16785-1:2015, Figures 1 and 2 respectively, the validation results in a confidence level 1, confidence level 2 or confidence level 3. In the case it is concluded that the bio-based content cannot be validated, no certificate shall be issued. In the case of a relevant deviation during the assessment, no certificate shall be issued.

The certificate holder is not allowed to use the withdrawn certificate and the application for a new certificate will be necessary.

NOTE Normally, the costs of the reassessment will be paid by the third party in case of no relevant deviations or by the certificate holder in case of relevant deviations.

6.2 Validity of certificate

The "bio-based content" certificate is granted for a maximum period of five years.

6.3 Surveillance

The certification body shall verify the certified product or product family by obtaining samples, either from the producer or from the market place. Verification shall be done during the second and fourth year during the validity of the certificate and within three years of obtaining the test results.

The samples shall undergo ^{14}C analysis and elemental analysis (elemental analysis not needed for Group IIA and Group I products) for comparison with the data provided upon application. In case of deviations, 6.1 applies.

In case the "bio-based content" label or "bio-based" logo is not used in accordance with the conditions for use of the label and logo (see 8.2), the certification body shall withdraw the certificate.

Anybody can ask the certification body for reassessment of any issued certificate at any time. Reassessments are considered as surveillance, but will not automatically replace the routine of surveillance as scheduled by the certification body. In case of a relevant deviation of the results, the certification body shall act as above.

6.4 Renewal of certificate

At least three months before expiration of the "bio-based content" certificate, the certificate holder shall apply for renewal of this certificate, if intended, at the certification body. In case no changes to

the certified product or product family have been made in the meantime, the certification body shall perform a surveillance analysis as described in 6.3.

In case the surveillance analysis confirms the further fulfilment of the requirements for the respective product or product family, the certification body shall re-issue of the "bio-based content" certificate to the certificate holder and inform the scheme manager (see 7.2.2).

In case the surveillance analysis does not confirm the further fulfilment of the requirements for the respective product or product family, 6.1 applies. Alternatively, the certificate holder can apply for a new certificate.

6.5 Changes to certified product or product family

The certificate holder is obliged to report any modification of the certified product or product family with effect on the claimed bio-based content to the certification body promptly and without request before putting the modified product on the market as certified according to this certification scheme. For maintaining the validity of the certificate, the certificate holder shall provide the certification body a new test report from an authorized testing laboratory, which covers the modification of product of product family.

The certification body shall issue either an amended certificate in case of only slightly changed values or request for an application for a new certificate. A shortfall affecting the confidence level gives reason for requiring a new test.

The actual value of bio-based content may exceed, but not fall below the stated value on the certificate.

6.6 Sublicences

6.6.1 Use of other certificates

An applicant can ask to certify a product by referring to another certificate of that product deployed, provided this deployment does not alter the key features resulting in the certification of the said product. The certification body shall require the formal agreement of the owner of the original certification for the product.

In case of distributers, sublicences may only be agreed if a legal link exists between the owner of the original certificate and the sub-licensee. A letter of agreement shall be signed by both parties and submitted to the certification body with the application documents (may be an internal CB document provided).

In case of production sites, no sub-license is required if the original licensee covers the respective production site with the main license on their own responsibility. All production sites are covered in the scope of certification.

In case of production sites, sub-licenses are required, if the production site brings the product onto the market under its own responsibility, with or without rebranding. A letter of agreement shall be signed by both parties and submitted to the certification body with the application documents (may be an internal CB document provided).

6.6.2 Withdrawal of right to use the other certification

The right for the applicant to use the label, the logo and the certificate associated with the other certification is immediately withdrawn when:

— the owner of the initial certification of the product deployed by the applicant loses the right to use this label, whatever the reason;

— the certification body, that has carried out the initial certification procedure for the product and/or component the applicant relies on to document the conformity of its final product with the specification applied, withdraws the applicant's certificate for the product and/or component, whatever the reason;

— the certificate or certificates to which the applicant refers has or have expired;

— the scope of the certificate or certificates to which the applicant refers has been amended and with that becoming incompatible with the applicant's deployment.

7 Reporting of the certification body

7.1 General

The applicant receives the "bio-based content" certificate, if based on the assessment nothing has come to attention of the certification body that causes to believe that the bio-based content of the product or product family equals or is lower than the claim that is being made by the applicant, and that there is a justifiable confidence that the applicant will comply with the requirements of EN 16785-1, till the period of the next surveillance (see also 6.3) or renewal of certificate (see also 6.4).

7.2 Requirements for the certificate

7.2.1 Certificate statement

The "bio-based content" certificate that the applicant receives from the certification body shall include at least the following information:

a) name and address of applicant;

b) description of the product or product family;

c) date of approval;

d) name of the certification body;

e) minimum percentage of bio-based content of the product or product family, as specified in 5.6 for the respective product category applied;

f) certificate number, specific for the certified product or product family;

g) term of validity of certificate.

The test report shall be added as an appendix to the certificate.

The certificate number shall have the following format:

ABC-12345-xyz

where:

ABC is the unique code of the certification body assigned by the scheme manager;

12345 is a unique number assigned by the certification body;

xyz is an optional code that can be used for additional information with respect to certification (e.g. revision number, date of publication, or link to internal administration system).

NOTE xyz will not be displayed in the "bio-based content" label (see 8.1.2).

7.2.2 Reporting

The written reports of the (re)certification or surveillance and the annexes remain in the possession of the certification body.

The certification body shall submit a summary report to NEN within two weeks after (re)certification that includes at least the following information:

a) name and address of the applicant;

b) the denomination of the product or product family;

c) the certified bio-based content;

d) the attestation number of the product or product family.

This information will be published in the public domain through a central register of certificate holders linked to this certification scheme.

The certification body shall inform NEN about any changes, renewals or withdrawals of issued certificates in accordance with the license agreement.

7.3 Objection, appeal, suspension and/or deregistration

The certification body shall have a documented process about the receipt, evaluation and decision-making of objections. The certification body shall have a procedure for complaints and appeals. The description of the process about complaints, objections and appeals shall be publicly available.

The following applies with respect to the process of considering objections:

— the persons involved in the consideration of objections shall not have been involved in the assessment or the decision-making;

— filing an objection will not have negative consequences in the further consideration for the one who filed the objection;

— the certification body will report the receipt of the objection and inform the one who filed the objection about the progress and result;

— the decision about the objection shall be taken or approved by a person or group that has not been involved in the consideration.

Pending the objection and/or appeal the certificate is valid; this applies during the validity of the certificate.

The complete procedure complaints, objection and appeal is part of the *NEN Scheme management manual*.

8 Use of "bio-based content" label and "bio-based" logo

8.1 Label and logo

8.1.1 General

This certification scheme distinguishes the following two types of visualizations:

1) the "bio-based content" label that shall be used on (the packaging of) the certified product of product family;

2) the "bio-based" logo that may be used for other communication purposes (e.g. promotion and marketing).

The "bio-based content" label and "bio-based" logo are European registered trademarks.

NOTE The "bio-based content" label and "bio-based" logo do not provide information on the sustainability or environmental impact of the product.

8.1.2 Visual appearance of "bio-based content" label

Figure 3 shows the "bio-based content" label that shall be used on (the packaging of) the certified product of product family. The "bio-based content" label is composed of the following elements:

— the value indicating the minimum share of the bio-based content, as a percentage of total (dry) mass of the product, in the certified product or product family (see also 8.1.4) followed by the artwork of the percent bar with leaves and the wording “biobased” below;

— the statement whether the claim of the bio-based content relates to the product, a specific component of the product or the packaging; this statement may be either in English or in the language preferred by the buyer;

— the unique registration number of this certificate that can be traced in the central register of certificates (see 7.2.1).

These elements are at fixed position in the "bio-based content" label as shown in Figure 3. It is not allowed to move or exclude elements (see also 8.2).

Figure 3 — "Bio-based content" label

Requirements for the (graphical) presentation of the "bio-based content" label are included in Annex C.

8.1.3 Visual appearance of "bio-based" logo

Figure 4 shows the "bio-based" logo that may be used for other communication purposes (e.g. promotion and marketing). The "bio-based" logo is composed of the wording 'biobased' followed by the artwork of the percent bar with leaves.

Figure 4 — "Bio-based" logo

Requirements for the (graphical) presentation of the "bio-based" logo are included in Annex C.

8.1.4 Values displayed in the label

For products or product families certified according to this certification scheme, the "bio-based content" label shall never display a value higher than the percentage given in the certificate issued by the certification body. The value shall be a whole number. It is not allowed to display any value when using the "bio-based" logo.

8.2 Conditions of use of label and logo

8.2.1 Use of "bio-based content" label

The certificate holder is allowed to use the "bio-based content" label for products of product families certified according this certification scheme. The "bio-based content" label will be provided in electronic format by the certification body after issuing the certificate linked to the bio-based product

or product family. The certificate holder shall only use the electronic format of the label provided by the certification body.

In business-to-business relations, the label may be applied on accompanying documents among other things. Accompanying documents may include portfolio and presentations as long as there is a clear link with the certified product. In cases where there is no clear link between an accompanying document and the certified product, the certificate holder shall use the "bio-based" logo if it decides to use a visualization related to "bio-based content" certification (see 8.2.2).

The certificate holder shall take into account the following conditions when using the "bio-based content" label:

a) The use of the label is only allowed after formal approval in writing by the certification body. The certificate holder is responsible for the correct use of the label.

b) The unique registration number of the certificate, which is assigned by the certification body, shall be stated in the label at the appropriate position. This unique registration number consists of the abbreviation of the certification body and the unique attestation number assigned by the certification body (see also 7.2.1).

c) The use of the label and the unique registration number is only allowed for the certified product or product family:

— In business-to-business relations, the label may be applied primarily on the accompanying documents, data sheets, packaging, tags, etc. In addition, the respective product itself may be labelled according to 8.1.2, if technically possible.

— In business-to-consumer relations:

— The label shall where possible be applied to the product itself. In case of assemblies or simple combinations of components, an individual component can be labelled, if the respective part is easily recognizable. Specific cases of use can be referred to the scheme manager.

— In addition to the actual product, the information about the bio-based content of the product, product family or component may be conveyed in accompanying documents such as manuals, packaging, tags, etc.

d) It shall be clearly stated whether the “bio-based content” claim that is made with the label refers to the whole product, to a specific component or to the packaging.

e) The label shall not exceed the size and prominence of the product name, brand name and/or trade name and shall be legible without aids.

f) The label shall meet the requirements of 8.1.2.

8.2.2 Use of "bio-based" logo

The certificate holder is allowed to use the "bio-based" logo for communication purposes (e.g. website, company brochure, letterhead) if one or more products of product families have been certified according this certification scheme. The "bio-based" logo will be provided in electronic format by the certification body after issuing the first certificate. The certificate holder shall only use the electronic format of the logo provided by the certification body.

The certificate holder shall take into account the following conditions when using the "bio-based" logo:

a) The use of the logo is only allowed after formal approval in writing by the certification body. The certificate holder is responsible for the correct use of the logo.

b) The use of the logo is not allowed to be used for the certified product or product family.

NOTE 1 The "bio-based content" label is to be used for the certified product or product family as defined in item c) of 8.2.1.

c) It shall be stated in the communication where information can be found about what the “bio-based” logo entails.

NOTE 2 The certificate holder can provide this information on its own website or other medium or can refer to the website of the scheme manager (i.e. www.biobasedcontent.eu).

d) The logo shall not exceed the size and prominence of the company name or any other logo used in the communication and shall be legible without aids.

e) The logo shall meet the requirements of 8.1.3.

8.3 Assessment correct use of label and logo by certification body

The certification body shall assess the intended use of the "bio-based content" label and "bio-based" logo during the initial assessment. During surveillance and renewal assessments the actual use of label and logo shall be assessed. In all cases, the certification body shall assess whether the certificate holder complies with 8.2. As stated in Clause 6, the certificate shall be withdrawn in case the label or logo is not correctly used.

8.4 Monitoring improper use of label and logo by scheme manager

The scheme manager for this certification scheme (i.e. NEN) will periodically conduct market surveillances to monitor improper use of "bio-based content" label, "bio-based" logo and name and will undertake the necessary actions. Improper use of label or logo can occur both with organizations that are not certified according to this certification scheme or with organizations that are certified but do not comply with 8.2. In case of the latter, the scheme manager will also inform the certification body that has issued the certificate associated with the claim about the bio-based content of the product or product family.

Annex A
(normative)

Calculation of bio-based carbon content and bio-based content for Group II products

A.1 Calculation of the bio-based carbon content

Calculate the bio-based carbon content, as a percentage of the total mass of the sample, using Formula (A.1):

$$x_B = \frac{\sum_{i=1}^{n} W_i \cdot x_{B,i}}{W} \quad \text{(A.1)}$$

where

n is the number of constituents of the sample;

W is the total mass of the sample, expressed in grams;

W_i is the mass of the constituent i, expressed in grams;

x_B is the bio-based carbon content, expressed as a percentage of the total mass of the sample;

$x_{B,i}$ is the bio-based carbon content of the constituent i, expressed as a percentage of the mass of the constituent i.

A.2 Calculation of the bio-based content

Calculate the bio-based content using Formula (A.2):

$$m_B = \frac{\sum_{i=1}^{n} W_i \cdot m_{B,i}}{W} \quad \text{(A.2)}$$

where

m_B is the bio-based content of the product expressed as a percentage of the total mass of sample;

$m_{B,i}$ is the bio-based content of the constituent i, expressed as a percentage of the mass of the constituent i;

n is the number of constituents of the sample;

W is the total mass of the sample, expressed in grams;

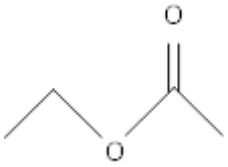
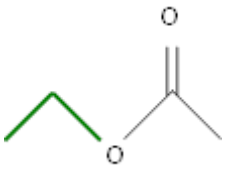
W_i is the mass of the constituent i, expressed in grams.

Annex B
(informative)

Example of bio-based content and the elemental composition of the product

Table B.1 provides an example of statement of the bio-based content and the elemental composition of the product differentiated according to the fossil and bio-based parts that can be used to obtain the required information to be provided to the certification body as per 5.5.1.

Table B.1 — Example of bio-based content and the elemental composition of the product based on bio-ethyl acetate

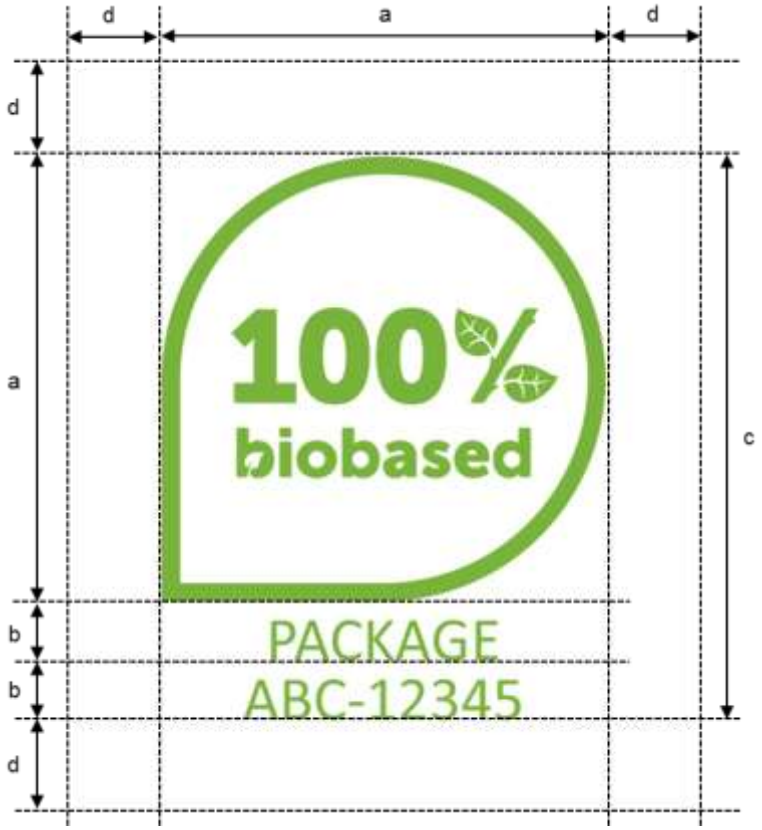
<table>
<tr><th>Indicator</th><th colspan="6">Response</th></tr>
<tr><td>Description of chemical pathway</td><td colspan="6">Esterification between bio-ethanol from fermentation of sugar and acetic acid from fossil resources</td></tr>
<tr><td>Drawing or description of chemical structure of product</td><td colspan="3">  </td><td colspan="3">$CH_3COOCH_2CH_3$</td></tr>
<tr><td>Number of atoms for each element in product</td><td>C = 4</td><td>H = 8</td><td>O = 2</td><td>N = 0</td><td>Others = 0</td></tr>
<tr><td>Molecular weight of product</td><td colspan="5">M = 4×12 + 8×1 + 2×16 = 88 g/mol</td></tr>
<tr><td>Elemental composition for each element in product</td><td>C = 4×12 / 88 = 54,5 %</td><td>H = 8×1 / 88 = 9,1 %</td><td>O = 2×16 / 88 = 36,4 %</td><td>N = 0</td><td>Others = 0</td></tr>
<tr><td>Identification of atoms coming from bio-based resources on molecule</td><td colspan="5">  </td></tr>
<tr><td>Ratio of atoms coming from bio-based sources for each element in product</td><td>C_{bio} = 2/4</td><td>H_{bio} = 5/8</td><td>O_{bio} = 1/2</td><td>N_{bio} = 0</td><td>$Others_{bio}$ = 0</td></tr>
<tr><td>Elemental composition coming from bio-based fraction and fossil fraction for each element in product</td><td>C_{bio} = 54,5 % × 2/4 = 27,25 %
C_{fos} = 54,5 % × 2/4 = 27,25 %</td><td colspan="2">H_{bio} = 9,1 % × 5/8 = 5,7 %
H_{fos} = 9,1 % × 3/8 = 3,4 %</td><td colspan="2">O_{bio} = 36,4 % × 1/2 = 18,2 %
O_{fos} = 36,4 % × 1/2 = 18,2 %</td></tr>
<tr><td>Total bio-based fraction and fossil fraction</td><td colspan="5">Total bio-based fraction = 27,25 % + 5,7 % + 18,2 % = 51,15 %
Total fossil fraction = 27,25 % + 3,4 % + 18,2 % = 48,85 %</td></tr>
<tr><td rowspan="4">Overall elemental composition</td><td></td><td colspan="5">Elemental composition in %</td></tr>
<tr><td></td><td>C</td><td>H</td><td>O</td><td>N</td><td>Others</td><td>Total</td></tr>
<tr><td>Total</td><td>54,5</td><td>9,1</td><td>36,4</td><td>0</td><td>0</td><td>100</td></tr>
<tr><td>Bio-based fraction</td><td>27,25</td><td>5,7</td><td>18,2</td><td>0</td><td>0</td><td>51,15</td></tr>
<tr><td>Fossil fraction</td><td>27,25</td><td>3,4</td><td>18,2</td><td>0</td><td>0</td><td>48,85</td></tr>
</table>

Annex C
(normative)

"Bio-based content" label and "bio-based" logo – visual representation

C.1 Shape and size

The "bio-based content" label is a teardrop with the angle in the below left corner. The teardrop contains the value indicating the minimum share of the bio-based content. The product description and unique registration number are aligned centered below the teardrop. Figure C.1 shows the "bio-based content" label including the sizes and mutual ratios. The shape, ratios of sizes and positions of the elements may not be modified. The white space between the "bio-based content" label and other printed artwork or text is at least 0,2 × the width of the label with a minimum distance of 3 mm.



Key

a size of teardrop: width and height are similar
b distance between qualifiers (b = a / 7,5)
c total length of label (c = a + 2 × b)
d minimum white space between label and other printed artwork or text (d ≥ 0,2 × a where d is at least 3 mm)

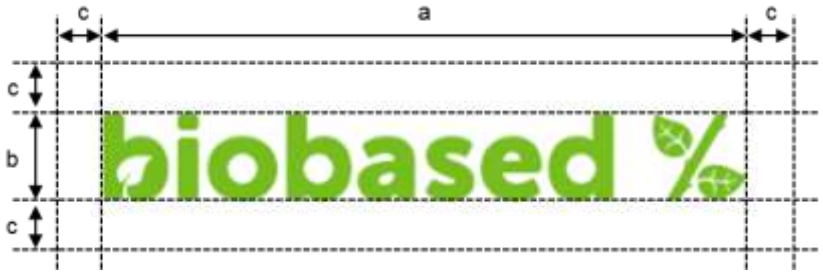
NOTE 1 The value of "100 %" is for illustration and can be any value between 0 % and 100 %.

NOTE 2 The qualifier "PACKAGE" indicates the position of the statement whether the claim of the bio-based content relates to the product, a specific component of the product or the packaging.

NOTE 3 The qualifier "ABC-12345" indicates the position of the unique registration number.

Figure C.1 — "Bio-based content" label including sizes

Figure C.2 shows the "bio-based" logo including the sizes and mutual ratios. The ratios of sizes and may not be modified. The white space between the "bio-based" logo and other printed artwork or text is at least 0,5 × the height of the label logo with a minimum distance of 3 mm.



Key

a width
b height (b = a / 7,5)
c minimum white space between logo and other printed artwork or text (c ≥ 0,5 × b where c is at least 3 mm)

Figure C.2 — "Bio-based" logo including sizes

C.2 Color

The green color in the "bio-based content" label and "bio-based" logo is specified in Table C.1 with the usual standards.

Table C.1 — Specifications of colors "bio-based content" label and "bio-based" logo

Color	Pantone	Hex	RGB	CMYK
Green	368 C	#76bc43	R118 G188 B67	C 59 % M 2 % Y 100 % K 0 %

If the green color or layout of the background of the "bio-based content" label or "bio-based" logo is inappropriate for the label and logo as presented in Figure C.1 and Figure C.2, respectively, the label and logo may be used in black and white configuration. When using a black-and-white configuration, the green color may be black and the white color may be either white or transparent. The black-and-white configuration may be used in both business-to-business and business-to-consumer communications.

C.3 Font

The text in the "bio-based content" label shall be displayed using the following fonts:

— value: Museo Sans 900;

— product description: Calibri Regular capitalized;

— unique registration number: Calibri Regular capitalized.

The "bio-based" logo doesn't include text that can be amended.

Annex D
(normative)

Calculation and validation steps for Group IIA, Group IIB and Group IIC products and natural products

D.1 General

In addition to the symbols of 4.1 of EN 16785-1:2015, the following apply:

P product

I ingredients

w mass share

NOTE W (capital) is defined as: mass of a sample, expressed in grams in 4.1 of EN 16785-1:2015.

The following color codes apply to indicate the source of information:

■ Stated by the client

■ Measured for this request

■ Certified or measured during certification

D.2 Group IIA products

The following constituents are taken into account in the biobased content of the Group IIA products:

— certified group I products;

— certified natural products.

The following constituents are <u>not</u> taken into account in the biobased content of the Group IIA products:

— non-certified biobased/natural constituents;

— fossil constituents;

— inorganic components.

Calculation and validation of the biobased content shall be done by the following stepwise approach:

a) <u>Statement:</u>

The client shall state:

— mass percentage of each constituent, expressed as percentage of the total mass of the product: wi (wi = Wi/W);

— biobased content for the certified constituents (to be checked by the CB on the certificate).

b) Measurements:

Analysis shall be performed to generate the following information:

— biobased carbon content of the product, expressed as percentage of the total carbon of the product: $x_{B,P}^{TC}$. This is the *measured* ^{14}C;

— total carbon content of the product, expressed as percentage of the total mass of the product: $x^{TC}{}_{P}$. This is the *measured TC.*

c) Values to use from certified constituents:

The following information shall be obtained from the certified constituent(s), expressed as percentage of the total mass of the constituent:

— biobased carbon content of the certified constituent, expressed as percentage of the total mass of the constituent (formula (D.1)):

$$X_{B,i} = (x^{TC}{}_{i} * x_{B,i}^{TC}) \quad \text{(D.1)}$$

where

$x^{TC}{}_{i}$ = total carbon content of the certified constituent, expressed as percentage of the total mass of the constituent;

$x_{B,i}^{TC}$ = biobased carbon content of the certified constituent, expressed as percentage of the total carbon of the constituent;

— biobased content of the certified constituent, expressed as percentage of the total mass: $m_{B,I}$.

d) Validity:

The difference between XB2 and XB1 shall be calculated using formula (D.2):

$$XB1 - XB2 \quad \text{(D.2)}$$

where

X_{B1} is the biobased carbon content on total mass of the product, measured on the product;

X_{B2} is the biobased carbon content on total mass of the product, calculated by using the client's statement (mass %) and the values of the constituents measured during certification.

These values shall be calculated with formula (D.3) and formula (D.4):

$$X_{B2} = x_{B,P}^{TC} * x^{TC}{}_{P} \quad \text{(D.3)}$$

$$X_{B1} = \sum_{i=1-n}^{certified\ constituents} (w_i * X_{B,i}) \quad \text{(D.4)}$$

$$= \sum_{i=1-n}^{certified\ constituents} (w_i * x_{B,i}^{TC} * x^{TC}{}_{i})$$

The statement by the client shall be checked with the results from analysis, taking into account the confidence levels as specified in 8.4 of EN16785-1:2015.

e) <u>Calculation biobased content:</u>

This approach complies with Annex C of EN 16785-1:2015.

The biobased content to be stated on the certificate shall be calculated using formula (D.5):

$$m_B \approx \sum_{i=1-n}^{certified\ constituents} (w_i * m_{B,i}) \qquad (D.5)$$

D.3 Group IIB products

The following constituents are taken into account in the biobased content of the Group IIB products:

— certified group I products;

— certified natural products;

— non-certified biobased/natural constituents (but only carbon).

The following constituents are <u>not</u> taken into account in the biobased content of the Group IIB products:

— fossil constituents;

— inorganic components.

a) <u>Statement:</u>

The client shall state:

— mass percentage of each constituent, expressed as percentage of the total mass of the product: w_i ($w_i = W_i/W$);

— biobased content for the certified constituents (to be checked by the CB on the certificate).

b) <u>Measurements:</u>

Analysis shall be performed to generate the following information:

— biobased carbon content of the product, expressed as percentage of the total carbon of the product: $x_{B,P}^{TC}$. This is the *measured* ^{14}C;

— total carbon content of the product, expressed as percentage of the total mass of the product: $x^{TC}{}_P$. This is the measured TC;

— biobased carbon content of each non-certified (biobased/natural) constituent, expressed as percentage of the total carbon of the constituent: $x_{B,i}^{TC}$ This is the measured ^{14}C;

— total carbon content of each non-certified (biobased/natural) constituent, expressed as percentage of the total mass of the constituent: $x^{TC}{}_i$ This is the measured TC.

c) <u>Values to use from certified constituents:</u>

The following information shall be obtained from the certified constituent(s), expressed as percentage of the total mass of the constituent:

— biobased carbon content of the certified constituent, expressed as percentage of the total mass of the constituent (formula (D.6)):

$$X_{B,i} = (x^{TC}_i * x_{B,i}{}^{TC}) \quad \text{(D.6)}$$

where

x^{TC}_i = total carbon content of the certified constituent, expressed as percentage of the total mass of the constituent;

$x_{B,i}{}^{TC}$ = biobased carbon content of the certified constituent, expressed as percentage of the total carbon of the constituent.

— biobased content of the certified constituent, expressed as percentage of the total mass: $m_{B,i}$.

d) <u>Validity</u>: Check statement & confidence level:

The difference between XB2 and XB1 shall be calculated using formula (D.7):

$$X_{B1} - X_{B2} \quad \text{(D.7)}$$

where

X_{B1} = (biobased carbon content on total mass) of the product, measured on the product;

X_{B2} = (biobased carbon content on total mass) of the product, calculated by using the client's statement (mass %), the values of the constituents measured (during certification and for this request).

These values shall be calculated as follows:

$$X_{B2} = x_{B,P}{}^{TC} * x^{TC}_P$$

$$X_{B1} = \sum_{i=1-n}^{certified\ constituents} (w_i * X_{B,i}) + \sum_{i=1-n}^{non-cert\ constituents} (w_i * X_{B,i})$$

$$= \sum_{i=1-n}^{certified\ constituents} (w_i * x_{B,i}{}^{TC} * x^{TC}_i) + \sum_{i=1-n}^{non-cert\ constituents} (w_i * x_{B,i}{}^{TC} * x^{TC}_i)$$

The statement by the client shall be checked with the results from analysis, taking into account the confidence levels as specified in 8.4 of EN 16785-1:2015.

e) <u>Calculation biobased content:</u>

This approach is based on the approach specified in Annex C of EN 16785-1:2015.

The biobased content to be stated on the certificate shall be calculated using formula (D.8):

$$m_B \approx \sum_{i=1-n}^{certified\ constituents} (w_i * m_{B,i}) + \sum_{i=1-n}^{non-certified\ constituents} (w_i * X_{B,i}) \quad \text{(D.8)}$$

$$= \sum_{i=1-n}^{certified\ constituents} (w_i * m_{B,i}) + \sum_{i=1-n}^{non-certified\ constituents} (w_i * x_{B,i}{}^{TC} * x^{TC}_i)$$

D.4 Group IIC products

The following constituents are taken into account in the biobased content of the Group IIC products:

— non-certified biobased/natural constituents (but only carbon).

The following constituents are not taken into account in the biobased content of the Group IIC products:

— fossil constituents;

— inorganic components.

a) Statement:

There is no statement by the client, as no biobased constituents are certified. This approach will only make use of the measured values in the calculation.

b) Measurements:

Analysis shall be performed to generate the following information:

— biobased carbon content of the product, expressed as percentage of the total carbon of the product: $x_{B,P}{}^{TC}$. This is the *measured ^{14}C;*

— total carbon content of the product, expressed as percentage of the total mass of the product: $x^{TC}{}_{P}$. This is the *measured TC.*

c) Validity:

A check with the statement by the client is not applicable.

d) Calculation biobased content:

The biobased content to be stated on the certificate shall be calculated using formula (D.9):

$$m_B \approx X_{B,P} = x_{B,P}{}^{TC} * x^{TC}{}_{P} \quad \text{(D.9)}$$

D.5 Natural products

The following constituents are taken into account in the biobased content of the Group IIC products:

— only natural products, not chemically modified.

a) Statement:

The client shall state that the natural product is:

— 100 % natural; and

— not chemically modified.

b) Measurements:

Analysis shall be performed to generate the following information:

— biobased carbon content of the product, expressed as percentage of the total carbon of the product: $x_{B,P}^{TC}$. This is the *measured* ^{14}C;

— total carbon content of the product, expressed as percentage of the total mass of the product: $x^{TC}{}_{P}$. This is the *measured TC.*

c) Validity & calculation biobased content:

Validity of the statement shall be checked by the following stepwise approach:

1) Based on the results from analysis, it shall be checked whether:

   $x_{B,P}^{TC} = 100\ \%$

   If $x_{B,P}^{TC} \geq 97\ \%$, then the statement will be made with confidence level 1: mB = 100 %.

   If $x_{B,P}^{TC} < 97\ \%$, then the mB is considered not to be validated. The product shall be considered biobased, but not certified. It may be taken into account according to the methods specified for Group IIB or Group IIC products, depending on the other constituents.

2) The certification body shall check the technical data sheet/production process to confirm that the product is natural.

Bibliography

EN 16575:2014, *Bio-based products — Vocabulary*

EN 17351, *Determination of the oxygen content using an elemental analyser*

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EN ISO/IEC 17065, *Conformity assessment — Requirements for bodies certifying products, processes and services*

NEN Scheme management manual (https://www.nen.nl/en/nen-als-schemabeheerder)