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Pre-normative research on solid biofuels for improved European standards

SPECIFIC TARGETED RESEARCH OR INNOVATION PROJECT

PRIORITY [6-1] – Sustainable energy systems

Task IV.3 – Basics for conformity rules

Basics for conformity rules for solid biofuels

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CONTENTS

PREFACE	6
1 INTRODUCTION	7
2 SURVEY OF CONFORMITY RULES	8
3 DISCUSSION	11
4 CONCLUSIONS AND RECOMMENDATIONS	12
4.1 Product declaration.....	12
4.2 ENplus.....	14
5 REFERENCES	17

List of Abbreviations

CEN	European Committee for Standardization
CENELEC	European Committee for Electrotechnical Standardization
DANCERT	Certification Body of Danish Technological Institute
DBFZ	German Biomass Research Centre
DEPV	German Energy Wood and Pellet Association
EN	European Standard
FSC	Forest Stewardship Council
PEFC	Programme for the Endorsement of Forest Certification schemes
TC	Technical Committee
TS	Technical Specification
WG	Working Group

Preface

The BioNorm II project consortium is a team of 25 experienced partners from 11 European countries (many partners are also active members of TC 335) and German Biomass Research Centre (DBFZ) is the coordinator of this project that runs three years (2007-2009). Within the project framework, four work packages (WP I-IV) exist in which fuel characteristics of solid biofuels and methods to test and verify them are developed:

- WP I: Sampling, sample reduction and planning
- WP II: Chemical and physical testing procedures
- WP III: Quality measures
- WP IV: Specifications of solid biofuels

The objectives of WP IV of BioNorm II are:

- To clarify the specification of solid biofuels to support the upgrading of the CEN/TS 14961 and CEN/TS 15234 to EN-standards.
- To guarantee by measurements, interviews and reviewing data the suitability of different biomass fuels for domestic consumers
- To clarify properties of biomass fuels for different supply chains
- To draft basics for conformity rules for solid biofuels

WP IV consists of the following tasks:

- Task IV.1: Supply chain related fuel properties
- Task IV.2: Combustion (and fuel handling) related fuel properties
- Task IV.3: Basics for conformity rules

This report is concentrating on Task IV.3 Basics for conformity rules.

Stuttgart, December 28th, 2009

Günter Baumbach, task leader

1 Introduction

The aim of the BioNorm II Task IV.3 “Basics for conformity rules” is to provide information on the question, how a producer of solid biofuels can demonstrate and how a customer of solid biofuels can check that the products conform to the requirements laid down in the multipart standard EN 14961 “Solid biofuels – Fuel specification and classes”. This task is closely connected to the scope of the multipart standard EN 15234 “Solid biofuels – Fuel quality assurance” which defines procedures and describes measures in order to ensure adequate confidence that the biofuel specifications are fulfilled. The findings of Task IV.3 shall, therefore, provide additional information on conformity rules for solid biofuels in the above-mentioned meaning, which is needed for the further development of EN 15234.

Starting point was the consideration of a general conformity assessment system consisting of the elements standardisation, accreditation and certification (Rautiainen 2007, Ensthaler et al. 2007). This system can be sub-divided into two stages as outlined in Figure 1:

1. The quality of products and services that is controlled by conformity assessment bodies (e.g. certification bodies, inspection bodies, laboratories) in order to build up customer confidence.
2. The quality of the conformity assessment bodies that again is controlled by superior and neutral accreditation bodies in order to build up producer confidence.

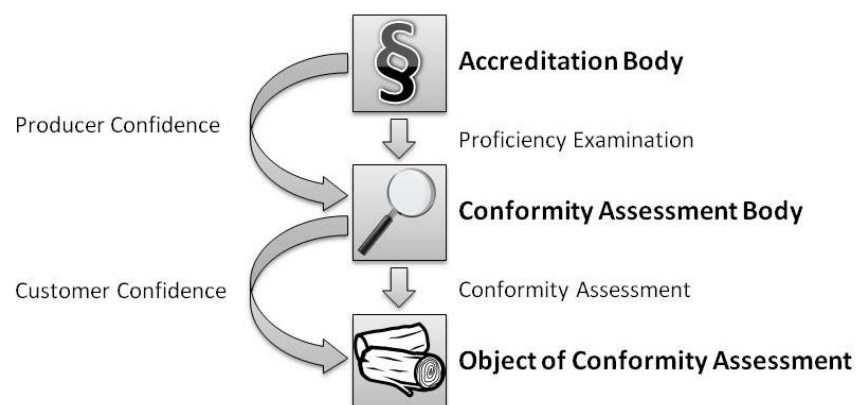


Figure 1: Conformity assessment system (freely adapted from Ensthaler et al. 2007)

Standardisation goes along with this conformity assessment system as it provides on the one hand rules for the specification of quality requirements (as defined in the multipart standard EN 14961), and on the other hand rules for the demonstration and traceability of conformity with these specified requirements (as provided by the multipart standard prEN 15234).

A survey of conformity assessment systems was carried out to provide a basis for the development of a specific conformity scheme for solid biofuels. This includes the development of a proficiency scheme for conformity assessment bodies in order to address uncertainties introduced through sampling and testing and to refer to both data repeatability and reproducibility (Baumbach et al. 2009).

Furthermore, feedback was collected from conformity assessment bodies, associations, producers and research institutions in the field of solid biofuels, and a proposal for conformity rules for an implementation in EN 15234 was deduced from this feedback in close cooperation with CEN/TC 335 WG 2 as described in the following.

2 Survey of conformity rules

The survey of conformity rules that are included in standards and other specifications for particulate materials covers information from the EU, Austria, Denmark, Finland, Germany, Greece, Italy, Latvia, the Netherlands, Russia, Spain, Sweden and the USA. The detailed results of the survey are summarised in Baumbach et al. (2009). This chapter shall provide a brief summary of the survey and its results.

The survey was focused on conformity rules in terms of product certification schemes which include at least the following tasks:

- Application for certification
- Conformity testing (feasibility check)
- Conformity assessment
 - Initial type testing
 - Initial inspection of production control
- Product certification
- Continuous conformity control
 - Continuous in-house production control
 - Regular external control of product an in-house production control

Amongst others, the following questions were addressed:

- What institutions are in charge of certification and conformity assessment?
- How is the certification and conformity assessment scheme built up?
- How to apply for certification? What information is requested by the conformity assessment body?
- How does the conformity assessment body check, if a conformity assessment can be carried out (feasibility study)? What are the rules for acceptance/rejection of an application?
- What are the rules for acceptance/rejection of conformity based on the applied assessment methods (e.g. sampling and testing)?
- How is the production control assessed? What are the rules for acceptance/rejection of conformity based on the assessment of the production control?
- What are the requirements for the assignment of a product certificate? What are the rules for acceptance/rejection of a product certificate? How long is a product certificate valid?
- How is a continuous conformity control carried out? What are the rules for continuous in-house production controls and regular external controls?

Moreover, questions concerning the accreditation of conformity assessment bodies were also considered.

As a result of the survey, it can be concluded that product certification schemes generally follow a common approach, which is exemplarily illustrated by the following flow chart of the Danish certification body DANCERT in Figure 2.

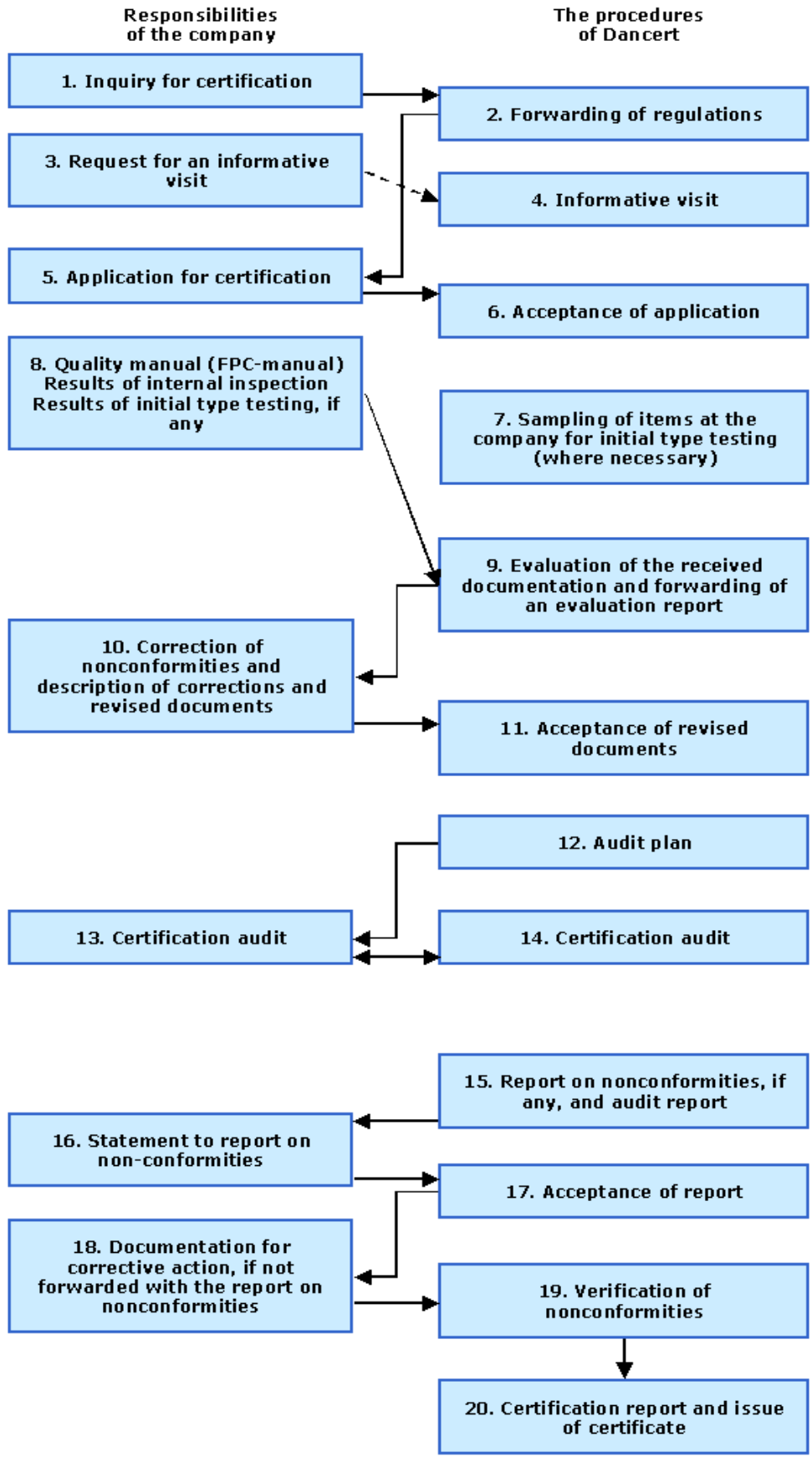


Figure 2: DANCERT certification process (DANCERT 2009)

For the elaboration of a conformity scheme for solid biofuels, the scheme rules of the European voluntary third-party certification mark, the Keymark (see Figure 3), were applied and adapted to the specific scope.



Figure 3: The Keymark

The Keymark scheme rules substantially follow the above-mentioned process steps of a product certification. Moreover, regulations for the accreditation of certification bodies as well as cooperating testing laboratories and inspection bodies are covered by the Keymark scheme rules. The objective of the Keymark is to demonstrate to customers that a product complies with relevant European standards. It involves regular product testing and inspection of the factory production control by a third party. The Keymark can only be granted by certification bodies that have been empowered by the Certification Board of CEN for a specific European standard or a group of European standards. To improve the confidence in the Keymark, it will only be granted in combination with marks of existing national certification systems which are based on the conformity with the considered European standards (CEN/CENELEC 2006).

In addition to the adapted Keymark scheme for solid biofuels, a proficiency scheme for laboratories was outlined. The proficiency scheme shall refer to both repeatability and reproducibility of sampling and testing data in order to provide confidence to the manufacturer that the results are not misinterpreted due to errors introduced through sampling and testing. Therefore, regular round-robin tests of solid biofuels were proposed.

3 Discussion

The drafted conformity scheme for solid biofuels, including the proficiency scheme for laboratories, was up for discussion among experts in the field of conformity assessment and solid biofuels. Interviews were carried out with conformity assessment bodies, solid biofuel associations, producers and research institutions. Furthermore, an international workshop was organised in Riga, Latvia, to discuss the findings. The drafted conformity scheme was also put to the vote of CEN/TC 335 WG 2.

The main idea of accreditation and certification is to provide confidence to producers and customers by an independent third-party assessment. However, standards are considered to describe (technical and other) product (and service) requirements only, i.e. they predominantly define the specifications of a product (dimensions, chemical and physical properties, etc.) and, if necessary, basic sampling and test conditions or whole procedures. However, beyond the determination of technical sampling and test specifications, standards shall not determine responsibilities, i.e. if it is up to the producer/supplier (first party), the customer (second party) or any conformity assessment body (third party) to carry out sampling and test procedures. This should finally be the result of market mechanisms.

Furthermore, certification should not be the only way to attest conformity. From the view of standardisation, conformity assessment should be broken down from a general level in order to take the manifold supply chains and applications of solid biofuels into account. Certification might be a good way to attest conformity for a widespread small-scale use of well-defined solid biofuels like e.g. wood pellets. On the other hand, certification might not be appropriate for small actors on the market or industrial applications. In these cases, there should be alternatives like a reliable self-control or mutual agreements between producers and customers.

4 Conclusions and recommendations

4.1 Product declaration

Taking the findings from the survey of conformity rules, the feedback on the drafted conformity scheme and the previous work on quality assurance for solid biofuels into account, a proposal of conformity rules for solid biofuels for an implementation in prEN 15234 was elaborated. According to CEN/TC 335 WG 2, the standard can not require an independent control of the fuel quality by a third party in any way as it is done e.g. in certification schemes. Therefore it was agreed, that the proposal is limited to the definition of a product declaration. This also prevents overlapping, since quality assurance and control measures as well as procedures are already described in the current draft of the quality assurance standard.

According to the proposal, the fuel properties shall be specified in the product declaration according to the requirements of the appropriate part of prEN 14961. With the product declaration of the fuel quality, the producer or supplier confirms that the properties of the end-product are in accordance with the requirements of the relevant part of prEN 14961.

Product declarations shall be issued for both solid biofuels handled as bulk material and for packaged solid biofuels, in any case for each delivery lot. For packaged solid biofuels, the quality information given in the product declaration shall be labelled on the packaging. The supplier shall date the declaration and keep all relevant records for a minimum of one year after the delivery. The product declaration shall state the fuel quality in accordance to the relevant part of EN 14961.

The product declaration of the fuel quality shall as a minimum include the following information as agreed with CEN/TC 335 WG 2:

- supplier (body or enterprise) including contact information;
- traded form (according to EN 14961-1 Table 2);
- origin and source (according to EN 14961-1 Table 1);
- country/countries (locations) of origin;
- chemically treated material (yes/no);
- specifications of properties in accordance with the appropriate part of EN 14961
 - normative properties;
 - informative properties;
- signature, date.

NOTE: The fuel product declaration can be approved electronically. Signature and date can be approved by signing of the waybill or stamping of the packages in accordance with the appropriate part of prEN 14961.

An example of a product declaration is given in
Figure 4.

PRODUCT DECLARATION		
Supplier:	Solid Biofuels Ltd. 123 Main Street Anytown, 12345 Anycountry	
Traded form:	Class A1 wood pellets for non-industrial use	
Origin and source:	1.1.3 Stemwood	
Country/countries (locations) of origin:	Anylocation, Anycountry	
Chemically treated material:	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Normative properties according to prEN 14961-2:		
Diameter, D and Length, L:	D06 6 ± 1 ; $3,15 \leq L \leq 40$ [mm]	
Moisture, M:	$M10 \leq 10$	[w-% as received]
Ash, A:	$A0.5 \leq 0,5$	[w-% dry]
Mechanical durability, DU:	$DU 97.5 \geq 97,5$	[w-% as received]
Fines, F:	$F1.0 \leq 1,0$	[w-%]
Additives:	none	[w-%]
Net calorific value, Q:	$Q16.5 \geq 16,5$	[MJ/kg as received]
Bulk density, BD:	$BD600 \geq 600$	[kg/m ³]
Nitrogen, N:	$N0.3 \leq 0,3$	[w-% dry]
Sulphur, S:	$S0.05 \leq 0,05$	[w-% dry]
Chlorine, Cl:	$Cl0.02 \leq 0,02$	[w-% dry]
Arsenic, As:	≤ 1	[mg/kg dry]
Cadmium, Cd:	$\leq 0,5$	[mg/kg dry]
Chromium, Cr:	≤ 10	[mg/kg dry]
Copper, Cu:	≤ 10	[mg/kg dry]
Lead, Pb:	≤ 10	[mg/kg dry]
Mercury, Hg:	$\leq 0,1$	[mg/kg dry]
Nickel, Ni:	≤ 10	[mg/kg dry]
Zinc, Zn:	≤ 100	[mg/kg dry]
Ash melting behaviour, DT:	$DT1200 \geq 1200$	[°C]
Date: August 12th, 2009		
Name and position of signatory: Mr. John Q. Public, General Manager		
Signature:		

Figure 4: Example of a product declaration referring to prEN 14961-2 (2009)

With the proposal of a product declaration for solid biofuels, minimum requirements for conformity rules are introduced providing a generally applicable tool for the demonstration of conformity of solid biofuels with the corresponding European fuel standards. With regard to an implementation of these rules in the fuel quality assurance (prEN 15234) multipart standard, an independent third-party assessment of the fuel quality can not be specified. This can only be the result of the market mechanisms and additionally developed rules for conformity independent of the fuel standards as e.g. the recently developed ENplus programme which is described in the following section. However, the mandatory issuing of a product declaration for traded solid biofuels is considered to force the corresponding market mechanisms and to provide confidence in the applied European fuel standards.

4.2 ENplus

As aforementioned, certification might be a good way to attest conformity for a widespread small-scale use of well-defined solid biofuels like e.g. wood pellets. In this regard, a voluntary certification could be the way, pointing out that the supply of such a product needs special care and associated expertise. However, it shall be emphasised again, that a certification can only be the result from the interest of the market actors.

As one of the first initiatives on this field, the German Energy Wood and Pellet Association (DEPV) in cooperation with the German Biomass Research Centre (DBFZ) developed a new certification programme called ENplus. It does not represent an official CEN proposal and the development is still in progress.

The certificate ENplus shall demonstrate conformity with the product specifications determined in the upcoming product standard prEN 14961-2 “Solid biofuels – Fuel specifications and classes – Part 2: Wood pellets for non-industrial use” (see Figure 5). The following text summarises the available information by Behr et al. (2009).



Figure 5: ENplus mark

In addition to the requirements of EN 14961-2, a minimum percentage of the raw material has to come from PEFC¹- or FSC²-certified origin in order to account for a sustainable energy supply.

Beyond a common product certification, the ENplus certification shall cover the whole supply chain from the raw material to the end user (see Figure 6). In other words, only wood pellets are allowed

¹ Programme for the Endorsement of Forest Certification schemes (<http://www.pefc.org/>)

² Forest Stewardship Council (<http://www.fsc.org/>)

to be introduced to the market under the label ENplus, if the whole chain is certified, independent of the number of involved stakeholders.

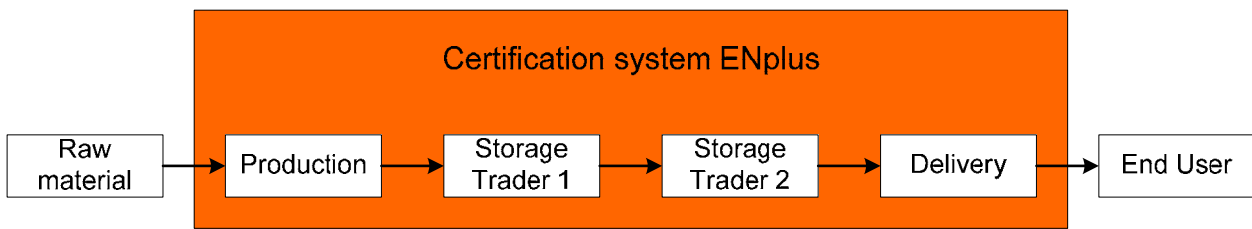


Figure 6: Certification system ENplus

Each stakeholder in the production and supply chain has to guarantee the required pellet quality in his field of responsibility. If a pellet charge passes from one stakeholder to another, the responsibility devolves to the second one. If a service provider is assigned, the ordering party has the responsibility for the compliance to the certification rules.

With the certification system ENplus, identification numbers for each producer and trader within the supply chain will be introduced. By listing these numbers on the delivery note or product package, the traceability of the pathway of a pellet charge shall be demonstrated. Furthermore, an internal documentation as well as retain samples shall support the traceability of the end product. Moreover, the reliability in the security of the pellet supply shall be strengthened by a continuous monitoring of the amount of produced and traded pellets.

Quality management and quality control according to ENplus will follow the specifications of EN ISO 9001 and prEN 15234. Therein, requirements for the production and logistics are specified (technical facilities, sequence of operations, quality control manager, documentation, self-monitoring). With the introduction of a quality management system, a quality control manager will be appointed by the management. The quality control manager has to know the influence of all processes on the pellet quality. He is contact person for all questions about the quality control and also responsible for the internal documentation, the training of the staff with regard to quality questions, as well as the accomplishment of the internal quality control.

The production will periodically be controlled by an accredited testing body. This includes the inspection of the productions facilities, the competence of the quality control manager, the internal documentation and the reported production volume. Furthermore, product samples are taken at the end of the production chain and the quality of the product is analysed. The whole certification procedure, as outlined in Figure 7, will be described in detail in a corresponding ENplus handbook, including the application procedure, external controls, traceability issues, the objection procedure, a penalty system as well as a scale of fees.

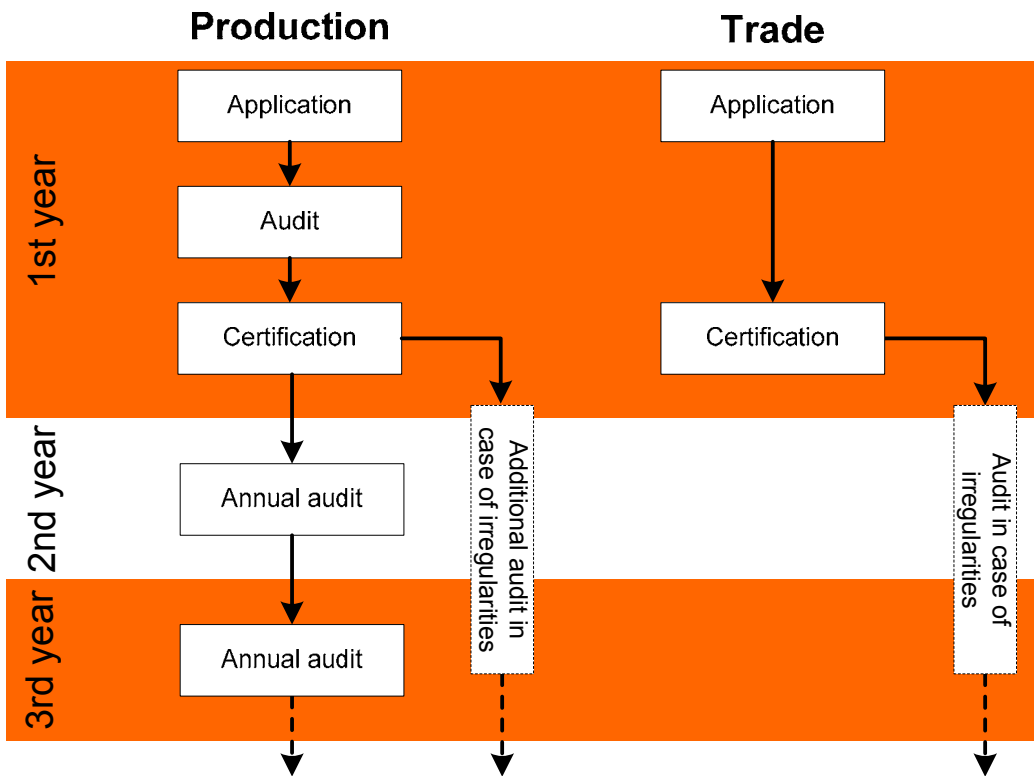


Figure 7: ENplus certification procedure

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