BS EN 15234-1:2011

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Solid biofuels — Fuel quality assurance

Part 1: General requirements

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National foreword

This British Standard is the UK implementation of EN 15234-1:2011. It supersedes DD CEN/TS 15234:2006 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PTI/17, Solid biofuels.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Biocombustibles solides - Assurance de la qualité des combustibles - Partie 1: Exigences générales

Feste Biobrennstoffe - Qualitätssicherung von Brennstoffen - Teil 1: Allgemeine Anforderungen

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Foreword

This document (EN 15234-1:2011) has been prepared by Technical Committee CEN/TC 335 “Solid biofuels”, the secretariat of which is held by SIS.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2011, and conflicting national standards shall be withdrawn at the latest by September 2011.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes CEN/TS 15234:2006.

The European standard series EN 15234 *Solid biofuels — Fuel quality assurance* are provided as a general requirements and additional standards. Additional standards may extend this series over time.

EN 15234 consists of the following parts, under the general title *Solid biofuels — Fuel quality assurance*:

— *Part 1: General requirements*;

— *Part 2: Wood pellets for non-industrial use (under development)*;

— *Part 3: Wood briquettes for non-industrial use (under development)*;

— *Part 4: Wood chips for non-industrial use (under development)*;

— *Part 5: Firewood for non-industrial use (under development)*;

— *Part 6: Non-woody pellets for non-industrial use (under development)*.

Although these standards may be obtained separately, it should be recognised that they require an understanding of the standards based on and supporting EN 15234-1. It is recommended to obtain and use EN 15234-1 in conjunction with these standards.

NOTE In these standards, non-industrial use means: use in smaller scale appliances, such as, in households, in small commercial and public sector buildings.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

The overall aim of this European Standard is to guarantee the solid biofuel quality through the whole supply chain, from the origin to the delivery of the solid biofuel and to provide adequate confidence that specified quality requirements are fulfilled.

The solid biofuel supply chain usually consists of the main stages described in Figure 1.

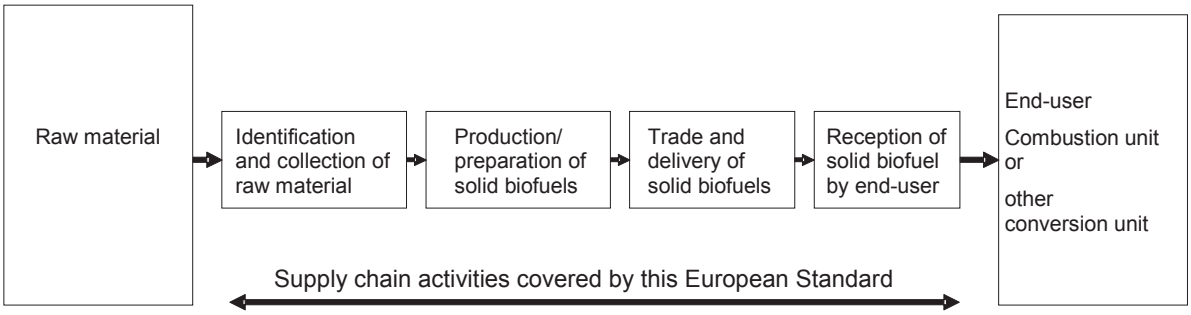


Figure 1—Solid biofuel supply chain

The objective of this European Standard is to serve as a tool to enable the efficient trading of biofuels. Thereby:

a) end-user can find a biofuel that corresponds to its needs;

b) producer/supplier can produce a biofuel with defined and consistent properties and describe the biofuel to the customers.

Quality assurance measures shall establish confidence in the biofuel through systems that are simple to operate and do not cause undue bureaucracy.

Solid biofuels are specified according to EN 14961 series — *Solid biofuels — Fuel specifications and classes*.

According to the terminology of EN ISO 9001:2008 [1], a Quality Management system generally consists of quality planning, quality control, quality assurance and quality improvement. This European Standard covers fuel quality assurance (part of quality management, focused on providing confidence that the quality requirements will be fulfilled) and quality control (part of quality management, focused on fulfilling the quality requirements).

The users of this European Standard may integrate EN 15234-1 in their general quality assurance scheme, e.g. the EN ISO 9000 series [1, 2, 3]. If the company does not have a quality management system, this European Standard can be used on its own to help the supplier in documenting fuel quality and creating adequate confidence between the supplier and the end-user.

NOTE This European Standard for fuel quality assurance is only concerned with the fuel part. To ensure the efficient use of solid biofuels, the relationship between the fuel and the combustion unit is also important to consider. It is recommended that the end-users ensure that the combustion technology used and the solid biofuels are compatible to achieve an optimised burning process. In addition to high efficiency, the environmental impact is reduced when the combustion process is optimised (e.g. unburnt carbon in the ash will be reduced; the emissions from the flue gases are reduced, etc.).

1 Scope

This European Standard defines the procedures to fulfil the quality requirements (quality control) and describes measures to ensure adequate confidence that the biofuel specification is fulfilled (quality assurance). This European Standard covers the whole chain, from supply of raw materials to point of delivery to the end-user.

According to the mandate given for the standardisation work, the scope of the CEN/TC 335 only includes solid biofuels originating from the following sources:

— products from agriculture and forestry;

— vegetable waste from agriculture and forestry;

— vegetable waste from the food processing industry;

— wood waste, with the exception of wood waste which may contain halogenated organic compounds or heavy metal as a result of treatment with wood preservatives or coating, and which includes in particular such wood waste originated from construction and demolition waste;

— fibrous vegetable waste from virgin pulp production and from the production of paper from pulp, if it is co-incinerated at the place of production and heat generated is recovered;

— cork waste.

NOTE 1 The quality assurance systems applied to the operation of conversion plants fuelled by solid biofuels are outside the scope of this European Standard.

NOTE 2 Health, safety and environmental issues for solid biofuels are important and need special attention, however they are outside the scope of this European Standard**.**

NOTE 3 For the avoidance of doubt, demolition wood is not included in the scope of this European Standard. Demolition wood is defined as “used wood arising from demolition of buildings or civil engineering installations” (EN 14588:2010, 4.52).

NOTE 4 The biofuels covered by this European standard are identical to the fuels exempted from the Directive 2000/76/EC [Article 2.2 a) from i) to v)] on incineration of waste.

NOTE 5 Aquatic biomass is not included in the scope of this European Standard.

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) applies.

EN 14588:2010, *Solid biofuels — Terminology, definitions and descriptions*

EN 14961-1:2010, *Solid biofuels — Fuel specifications and classes — Part 1: General requirements*

NOTE In EN 14961-1, there is a list of Normative references of the European Standards for sampling, sample reduction and determination of solid biofuel properties.

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 14588:2010 apply.

4 Symbols and abbreviations

The symbols and abbreviations used in this European Standard comply with the SI—system of units as far as possible.

d dry (dry basis)

daf dry, ash-free

ar as received

w-% weight-percentage

A designation for ash content A_d (w-% of dry basis) [1)]

BD designation for bulk density as received [kg/m^3] [1)]

DE designation for particle density as received [kg/dm^3] [1)]

D designation for diameter as received [mm] [1)]

DU designation for mechanical durability as received [w-%][1)]

E designation for energy density as received E_{ar} [MJ/m^3 or MWh/m^3 loose or stacked volume] amount of energy/volume unit) [1)]

F designation for amount of fines [w-%, particles less than 3,15 mm] [1)]

L designation for length as received [mm] [1)]

M designation for moisture content as received on wet basis, M_{ar} [w-%] [1)]

P designation for particle size distribution [1)]

$q_{V,gr,d}$ gross calorific value at constant volume on dry basis [MJ/kg]

$q_{p,net,d}$ net calorific value at constant pressure on dry basis [MJ/kg]

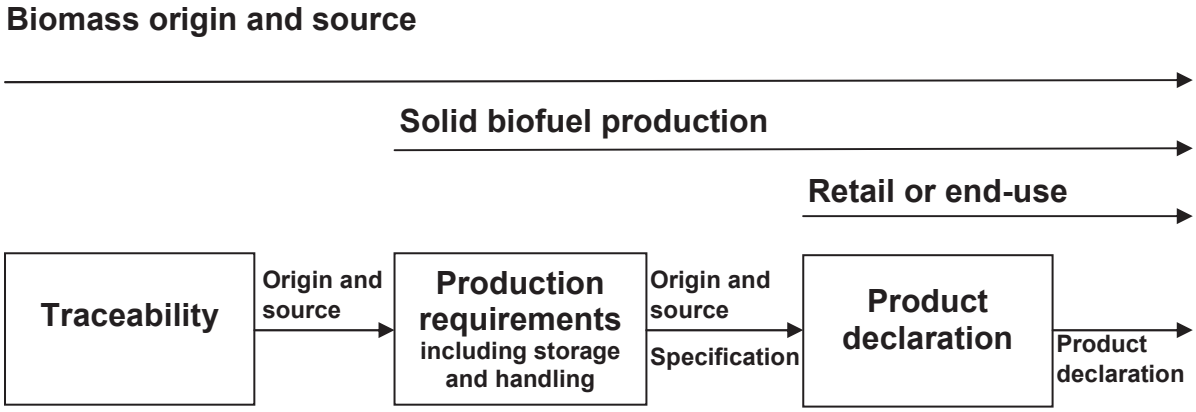
Q designation for net calorific value as received, $q_{p,net,ar}$ [MJ/kg or kWh/kg or MWh/t] at constant pressure[1)]

NOTE 1 MJ/kg equals 0,2778 kWh/kg (1 kWh/kg equals 1 MWh/t and 1 MWh/t is 3,6 MJ/kg). 1 g/cm^3 equals 1 kg/dm^3.

1) Designation symbols are used in combination with a number to specify property levels in Table 3 to Table 15 and in informative Annex A in EN 14961-1:2010. For designation of chemical properties chemical symbols like S (sulphur), Cl (chlorine), N (nitrogen) are used and the value is added at the end of the symbol.

5 Principle

This European Standard covers the fuel quality assurance of the supply chain and the information to be used in the quality control of the biofuel. This ensures traceability and gives confidence by demonstrating that all processes along the supply chain (of solid biofuels) up to the point of the delivery to the end-user are under control. Figure 2 illustrates the principle of this standard and the procedures to establish confidence in the biofuel.



	Traceability	Production requirements	Product declaration
Person/ Organisation responsible:	1st operator providing the resource as a feedstock for energy purposes	Producer of the solid biofuel who is responsible for the maintenance of the fuel quality until it is delivered to the end-user or retailer.	If the producer is a direct supplier for end-user it is him/her who has to provide a product declaration. Supplier/retailer of solid biofuels to the end-user
Actions:	Providing accurate information on the origin, source and location the feedstock was taken from.	Processing, handling and storage of the solid biofuels ensuring the solid biofuel is supplied in the quality that has been declared.	Ensuring the customer receives products as declared in the product declaration and the declaration is accurate and appropriate for the end-users requirements
Example of demonstrating compliance	This can be achieved through a combination of using EN 14961-1:2010, Table 1 Origin and Source and having a declaration where possible on the location of the feedstock	This can be achieved by providing a declaration about origin, source an location according to EN 14961-1:2010, Table 1 at the location of the feedstock wherever possible	Product declaration, backed up with quality control verification and quality assurance documentation and test data (as appropriate)

Figure 2 — Illustration of principle.

Figure 3 illustrates some of the different types of solid biofuel supply chains and appropriate points for documenting the origin and source and the points for making the product declaration. Figure 3 is only listing operators and documentation (not harvesting, transport or storage processes). Additional configurations of supply chains are possible.

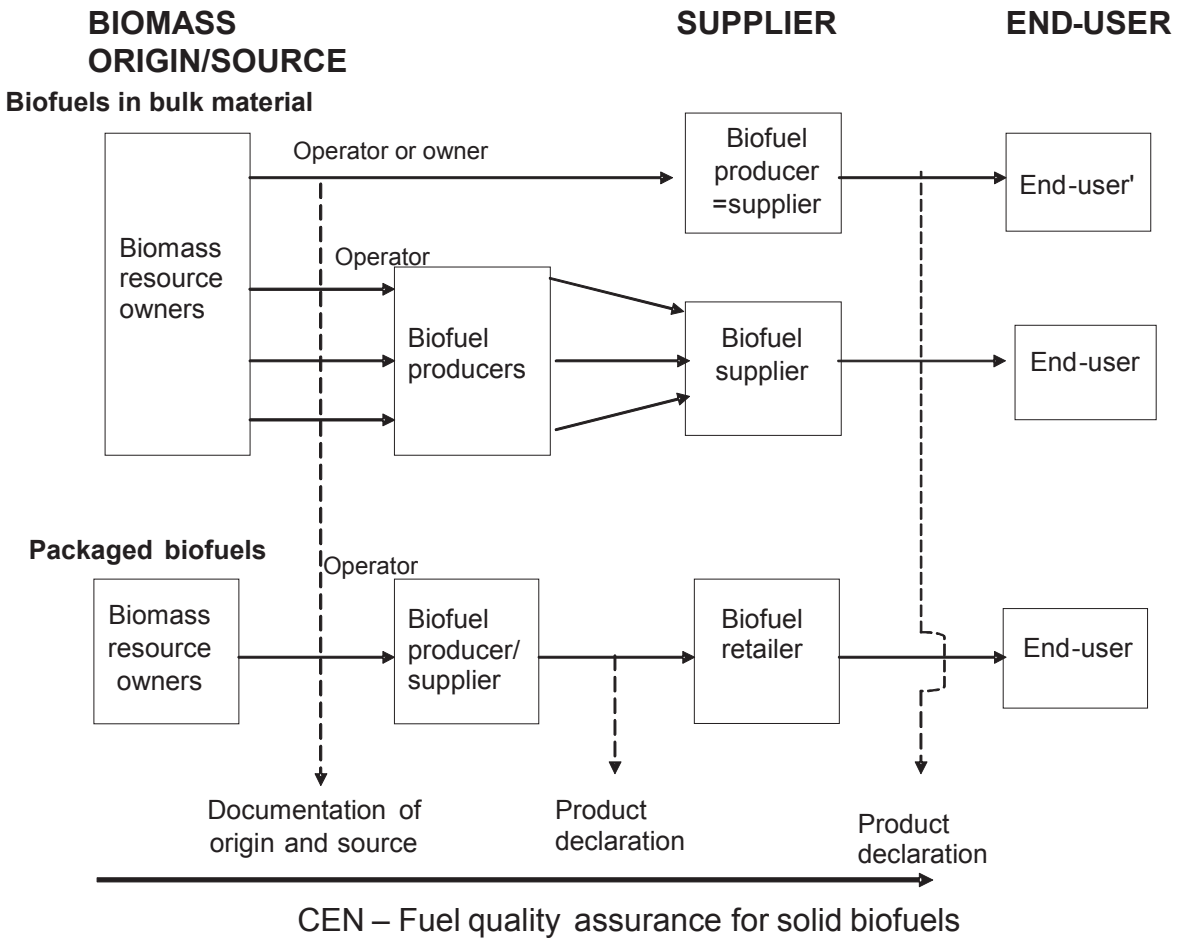


Figure 3 — Examples of the documentation of origin and source and product declaration in different biofuel supply chains

6 Quality assurance and quality control measures

6.1 General

Quality assurance and control aims to provide confidence that a stable quality is continually achieved in accordance with the customer requirements. It means that specified requirements are fulfilled, but it does not necessarily mean a high quality but a steady and continually achieved quality in accordance with the customer´s requirements. The customer is the next operator in the supply chain. Customer requirements include not only the fuel quality, but also the quality of the company's performance, such as documentation (product declaration, labelling of packaging, system for traceability, etc.), timing and logistics (to provide biofuels in time and to agreed performance criteria).

Fuel quality assurance needs to be applied to the entire supply chain (see Figure 1). As the supply chains for solid biofuels in most cases need to be kept very simple, the same documents are often used for documentations of quality assurance and quality control measures.

NOTE 1 When the customer is a supplier, a retailer or end user, the customer requirements are usually written in sales contracts.

NOTE 2 For non-industrial use customer production requirements are described in Parts 2 to 6 of EN 14961 [11, 12, 13, 14, 15] and quality requirements in Parts 2 to 6 of prEN 15234 [17, 18, 19, 20, 21].

The methodology (described in this chapter) facilitates the design of a fuel quality control and assurance system. Its function is to make sure that:

— traceability exists;

— factors that influence the fuel quality are controlled;

— the end-user can have confidence in the fuel quality.

Documentation is an important part of quality assurance and quality control. In this European Standard the following documentations are mandatory (see Table 1).

Table 1 — Mandatory documents on quality assurance and control measures

Area	Mandatory documentation	Subclause
Traceability of raw material	Documenting origin and source	6.3
Production requirements	Steps in the process chain [a] (*Step 2*) Critical Control Points (*Step 4*) Criteria and methods to ensure appropriate control at Critical Control Points (*Step 5*) Nonconforming biofuels (*Step 6*)	6.4
Transportation, handling and storage after production	Description of transportation, handling and storage	6.5
Final fuel specification	Product declaration/labelling	6.6
[a] The steps refer to the steps in the methodology described in subclause 6.4.		

6.2 Comparison of quality control and quality assurance

It is important to understand the differences between quality control and quality assurance.

Quality control is fundamentally about controlling the quality of a product or process to enable the delivery of the product or service within agreed parameters in the most efficient and cost effective way. The consequences of having good quality control will be a cost effective product and process.

EXAMPLE 1: **Quality control of a pellet factory**

A pellet factory operator will sample and record the pellet moisture content over the shift. If the moisture alters outside given parameters the process will be adjusted to bring the moisture content back within specification. If the process of drying the feedstock is known to be problematic and the operator does not monitor the moisture content in an appropriate timescale, the company could have produced many hours worth of nonconforming pellets before the issue is picked up.

EXAMPLE 2: **Quality control of a wood chip producer**

A wood chip producer has an agreement with a customer to provide no more than 6 % oversized chips. When the chipper blades are blunt the producer knows the chipper makes chips out of specification. The producer has to shape blades or change them to reduce amount of oversize chips. Other option is to sieve produced chips to fulfil the customer requirements.

Quality assurance on the other hand, is about reviewing the products and processes, primarily through data provided from the quality control records and using this data:

a) to provide confidence that products are produced within the required specification and processes are operated as they should be, and

b) to assure that over a longer term either consistency is being maintained (stability in process results) or that quality improvements are making the intended impact.

Quality assurance tools are excellent at providing data that allows the company to manage a process through exception reporting.

NOTE Exception reporting – reporting issues or activities that fall outside the normal pattern or are outside the selected minimum or maximum range. Exception reporting enables the quality team to only investigate those incidences that are outside the norm. Exception reporting also reduces the volume of data to be reviewed.

From the two examples above for quality control, practical examples of quality assurance will be demonstrated:

EXAMPLE 3: **Quality assurance of a pellet factory**

In the example of the pellet factory, if the processing moisture content data was trended and shown to be a particular problem every three weeks on a particular nightshift, the issue could be identified as being a particular delivery of feedstock or that a particular operator who coincides with that shift requires additional training. To provide confidence that a stable quality is continually achieved, data from the quality control recordings can be expected and added to the product declaration. For example, if durability of pellets is recorded on a regular basis, the average value of the durability can be stated on the product declaration.

EXAMPLE 4: **Quality assurance of a wood chip producer**

The chip producer, after reviewing a series of months of customer service and blade sharpening data, realises that his customer's satisfaction is reduced at the same time as the chipper blades' running hours have been extended over a specific number of hours; however, the producer now has an understanding of the additional blade running hours before there is a detrimental effect on his customer service and the cost benefits over the life of the blades due to the time saved and additional life gained by extending the run hours between blade sharpening or change.

By trending and reviewing the data through the quality assurance system these issues are more easily established.

Quality assurance measures should

- be simple to operate;
- not cause undue bureaucracy;
- support regimes for cost reductions.

As stated, quality control is important in assessing the properties of the fuel produced and the processes used.

6.3 Traceability

Solid biofuels shall be specified with the appropriate part of EN 14961. The series of EN 14961 allows the possibility to differentiate and specify solid biofuel with the detail necessary. The origin and source of solid biofuel is specified in Table 1 of EN 14961-1:2010.

All operators in the supply chain are responsible for the traceability of the origin and source of the material delivered by them. The first operator is responsible for the documents being prepared the first time. The documents shall be available and provided on justified request throughout the entire supply chain.

The first operator in the supply chain is a body or enterprise, which operates at the beginning of the supply chain.

Country/countries and location (e.g. county or region) where the biomass is harvested, produced to biofuel or first traded as biofuel (by-products and residues from wood, herbaceous or fruit processing industry or used wood) shall be stated.

If more detailed information is requested it may be added in the product declaration.

NOTE 1 Identifying and describing the location of the raw material will be important as part of the demands for information on the sustainability of the material. Also for identification of contamination from succeeding areas the knowledge of the location of raw material could be useful.

In the case of solid biofuels produced from by-products and residues from wood, herb or fruit processing industries, the first operator is the industrial plant.

For used wood the first operator is the first owner who decides to trade or use it as a biofuel. The producer of solid biofuels from used wood or by-products and residues from wood, herb or fruit processing industries is responsible that the raw materials fall within the scope of the EN 14961-1.

NOTE 2 When solid biofuels consist of a mixture from a number of first operators, all possible first operators should be listed as the first operator.

6.4 Production requirements

The production requirements for solid biofuels vary depending on the complexity of the production process as well as on the requirements of the biofuel (for example between small-scale users that may require high-grade biofuels and large-scale users who may take advantage of fuel flexible combustion units). This leads to different measures and requirements for the quality assurance and quality control process. The methodology described below for quality assurance and quality control of the production shall be used for all processes, but shall be adjusted for the production requirements of the specific production chain in question.

There are six consecutive steps. The steps are shown in Figure 4 and described below.

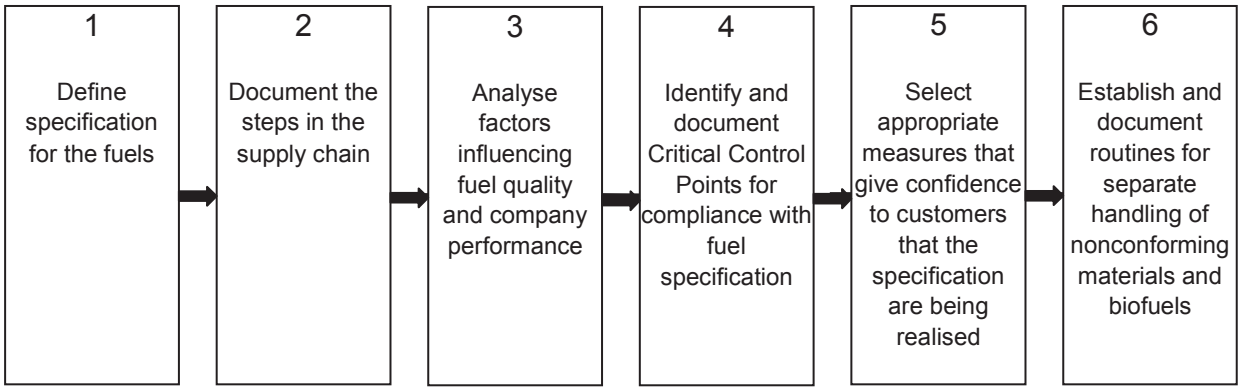


Figure 4 — Methodology for quality assurance

a) Step 1: Define specification(s) for the biofuel(s)

1) **Fuel quality description.** The fuel quality is described by the specification of the fuel in accordance with the appropriate part of EN 14961 and should be the result of an agreement between one operator and the next operator in the supply chain. The next operator should be considered as the customer of the previous operator. The definition of the specification of the biofuels should be the initial step. This step will influence the subsequent decisions about equipment, raw materials and production site. Specifications can also be established

according to anticipated market demands. In reality the specification is often a combination of customer requirements, market demands and the operator's preconditions (e.g. equipment limitations).

2) **Determination of key properties.** The biofuel producer and/or supplier should determine the key properties in accordance with the end-user needs. The following topics should be considered in the determination of the key properties:

   i. Use of the biofuel and compliance with an appropriate part of EN 14961;

   ii. Legal constraints and regulations concerning emission limits and other environmental issues;

   iii. Possible quality effects of mixing and blending biofuels of different raw materials, their qualities and their subsequent storage.

b) Step 2: Document the steps in the process chain

1) **Using a flow diagram.** A flow diagram is recommended to illustrate the process-chain or material flow under consideration. It should not be more detailed than necessary. For examples of flow diagrams see appropriate part of EN 15234. The flow diagram should be carefully assessed with the purpose to emphasising the quality assurance aspects.

2) **Allocation of responsibilities.** To support the structure and information provided in the process chain an allocation of responsibilities may be helpful. This is likely to be a useful starting point when assessing a process in the light of quality assurance.

3) **Management issues.** Many quality parameters have nothing to do with the physical and chemical properties altered during the processing of the biofuel, but rather with management issues. Companies, who trade and service biofuels, may well find this approach useful.

c) Step 3: Analyse factors influencing the fuel quality and company performance

All activities referring to both technical processes and management issues should be examined.
The following factors determine the quality of the biofuel and its performance:

1) **The effectiveness of preliminary inspection of fuel sources and checking of incoming raw materials.** This is of importance for establishing the general suitability of the material supplied (with support from sampling and testing, where necessary), ensuring the delivery documentation (e.g. declaration of origin and source) is in order. General evidence of suitability can be obtained from knowledge of the type of wood, cereals, etc., or the composition of a material blend. The key properties may have to be checked by a programme of sampling and testing. The frequencies of testing can be greatly reduced if there is evidence of continuous compliance to specifications with no significant changes. This especially applies when the supplier is always the same.

2) **The care with which the material is stored and processed.** This aspect is important for achieving and maintaining the required fuel properties e.g. mechanical durability of pellets or the moisture content and particle size distribution of wood chips. The conditions in which the raw material and final biofuels are processed and stored must be appropriate and should avoid or minimise adverse environmental impacts.

3) **The knowledge, competence and qualification of the staff.** The staff needs to know about possible interactions between process steps and the operations that affect the quality of the biofuel. Also interactions with other important areas connected to the performance, for example environmental regulations, should be well known. Systematically providing information about the new factors and circumstances for the staff in these subjects is essential.

d) Step 4: Identify and document Critical Control Points for compliance with the fuel specification

1) **Identification of Critical Control Points.** An important element of providing confidence in the product is to identify Critical Control Points in the relevant supply chain. Critical Control Points are points within or between processes at which properties can be most readily assessed and the points that offer the greatest potential for quality improvement.

2) **Choosing Critical Control Points.** At the chosen Critical Control Points, appropriate checking is carried out to ensure that the final requirements will be met. Checking can be done by visual inspection and/or sampling and testing and/or instrumental control.

3) **Monitoring Critical Control Points.** Critical Control Points do not necessarily require monitoring continuously. Frequency of monitoring will depend on the process and volumes being processed. One main purpose of identifying Critical Control Points is to control the process in the most efficient and cost effective way. Another purpose is to provide a system for traceability within the process. Instrumentation may be installed, calibrated and used if necessary to monitor and control Critical Control Points.

NOTE Detailed information like values of parameters in Critical Control Points are for internal use only.

e) Step 5: Select appropriate measures to give confidence to customers that the specification(s) is/are being realised

1) **Allocation of responsibilities**. A system to inform and manage who is responsible for what activities is essential. The allocation of responsibilities is the duty of senior management. The senior management should appoint named staff (by operational title or responsibility) for each link in the process chain and should ensure that they are properly trained and managed within a clear chain of command.

2) **Training of staff**. To ensure the demanded quality, staff must be skilled and their skills are appropriate through ongoing training. It is therefore advisable to develop training guidelines for activities having special regard to quality issues.

3) **Work instructions**. Procedures should be available for each work stage, e.g. transport, preparation processes, sampling and test procedures and maintenance, as appropriate. Linking work instructions with the Critical Control Points is one way to ensure that quality issues are taken into consideration at all times.

4) **Establishment of quality control measures**. According to 6.1 the criteria to ensure appropriate control of the Critical Control Points shall be documented. The frequency of testing should be managed in order to accomplish an appropriate level of control at the lowest possible cost.

5) **Proper documentation of processes and test results**. Important elements to provide confidence are the proper documents to report on procedures throughout the supply chain (including test results). Some documents are mandatory, see Table 1. Informative documents can serve as evidence for the suitability of the production process and on the quality of the fuels. Examples of information which might be recorded are: the source(s) and the type(s) of material; procedure of handling, the key process steps, the results of quality control measures (including test results) and information on nonconforming materials.

6) **System of procedures for complaints**. Information from complaints can be useful to determine factors influencing quality. From specific and/or multiple complaints it often becomes clear what should be improved. A procedure for handling and reviewing complaints should be implemented. Additionally documents for feedback can serve to determine customer satisfaction.

f) Step 6: Establish and document routines for separate handling of nonconforming materials and biofuels

1) **Nonconforming material.** All materials that are found to be nonconforming at any stage of the production process shall be separated and removed from the process chain. If the visual or other sensory inspection/test method of the raw material or the intermediate/final biofuel shows that it is not conforming to defined requirements the nonconforming lot shall be rejected.

2) **Nonconforming biofuel.** Examples of indicators of nonconforming biofuels might be excessive contents of over-sized particles, impurities and/or fines. Re-screening processes could be applied in such cases to achieve compliance. In some circumstances, a nonconforming biofuel may be used for another application, or be reintegrated into the supply chain as a raw material.

6.5 Transportation, handling and storage

Appropriate transportation, handling and storage are very important factors in the final quality of the biofuel. It also ensures that the fuel is kept in a suitable environment. Decreasing the fuel quality on these operations should be avoided.

Transportation, handling and storage of the fuel should be performed with care according to requirements of the fuel and agreements with the customer, and shall be documented by the operator. This can for example be done in the delivery agreement or using delivery terms [8].

Appropriate methods [9].should be applied in the production, storage and delivery of the solid biofuels and care should be exercised to avoid impurities and degradation in the fuel lot. Examples of impurities are stones, pieces of metal, and plastic. Degradation can be caused by moisture absorption due to storage under inappropriate conditions.

Factors requiring special attention:

— Weather and climatic conditions (e.g. risk of rain, snow and condensation of moisture) during storage and the need for covering;

— Storage conditions (e.g. ventilation, moisture absorption) and the foreseen duration of storage;

— Storage construction (e.g. risk of contamination from a stony underground);

— The size of the storage;

— Possible contamination with other products/fuels;

— Suitability and cleanliness of all equipment;

— Effects of transportation on the biofuels, e.g. formation of dust;

— Professional skills of personnel.

6.6 Fuel analysis and specification

6.6.1 General

The fuel properties shall be specified in the product declaration according to the requirements of the appropriate part of EN 14961.

If the properties being specified are sufficiently known through information about the origin and handling (or preparation method combined with experience) then physical/chemical analysis may not be needed.

To ensure resources are used appropriately and the declaration is accurate, utilise the most appropriate measure below:

1) using typical values, e.g. laid down in Annex B of EN 14961-1:2010, or obtained by experience;

2) calculation of properties, e.g. by using typical values and considering documented specific values;

3) carrying out of analysis: a) with simplified methods if available, b) with reference methods.

The responsibility of the producer or supplier to provide correct and accurate information is exactly the same whether laboratory analysis is performed or not. Typical values do not release the producer or supplier from providing accurate and reliable information.

NOTE 1 Seasonal variation should be taken into account and agreed between the supplier and end-user.

NOTE 2 Properties related to health and safety issues (e.g. smouldering and burning biofuels) are not covered in this European Standard.

NOTE 3 Where any operator in the fuel supply chain suspects serious contamination of the site (e.g. coal slag heaps) or if planting has been used specifically for the sequestration of chemicals, fuel analysis should be carried out to identify chemical impurities such as halogenated organic compounds or heavy metals.

6.6.2 Sampling and sample handling

The sampling procedure is of utmost importance for obtaining a representative sample and by that a reliable determination of the properties. Samples will be representative when the following methodologies are used: prEN 14778 [22] and prEN 14780 [23].

The transportation, handling and storage of the sample shall be carried out in such a way that the properties to be measured remain unaltered and the sample is also otherwise unaffected as far as possible.

Lots shall be selected at random for sampling at a frequency that ensures the reliable verification of the fulfilment of the quality requirements.

The primary sampling point for bulk material is at the point of delivery, if not otherwise agreed or at another point of the supply chain where the property is to be measured (e.g. loading, unloading).

The result of the test should be available, if possible, before the biofuel is used. A back-up sample shall be kept as a record until the test results are available.

NOTE In practice, especially with “field produced” biofuels, e.g. chips, the time delay from production to delivery and use may be usually so short that the results are available only afterwards.

6.6.3 Accuracy in determination of properties

In each European Standard for determination of properties of solid biofuels, the precision (repeatability and reproducibility) is estimated (when available).

To avoid bias and to secure laboratory proficiency, including reproducibility, repeatability and precision, etc., the use of reference samples and comparison with other laboratories is recommended [4, 5, 6 and 7].

7 Product declaration of fuel quality and labelling

With the product declaration of fuel quality the producer or supplier confirms that the properties of the end-product are in accordance with the requirements of the relevant standard part of EN 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 fuel quality shall as a minimum include information on:

a) Supplier (body or enterprise) including contact information;

b) Traded form (according to EN 14961-1:2010, Table 2);

c) Origin and source (according to the EN 14961-1:2010, Table 1);

d) Country/countries (locations) of origin;

e) Specification of properties (according to the relevant part of EN 14961):

   1) Normative properties;

   2) Informative properties;

f) Chemically treated material (yes/no);

g) Signature, date.

A template example for a product declaration (for solid biofuels) is given in informative Annex A and examples of using this template are provided in the appropriate part of EN 15234.

NOTE1 The 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 EN 14961.

NOTE 2 The seller and buyer should come to an agreement on how location (e.g. county or region) should be specified and how to handle it in practice.

NOTE 3 If appropriate, also the actual species (e.g. spruce, wheat) of biomass can be stated. Wood species can be stated according to EN 13556, *Round and sawn timber — Nomenclature of timbers used in Europe* [10].

NOTE 4 An overview of the normative and informative properties in the EN 14961-1 is given in Annex B.

Annex A
(informative)

Examples of product declarations

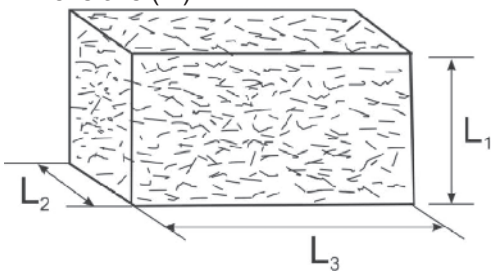
Table A.1 — Example of a template for the product declaration for solid biofuels

	PRODUCT DECLARATION BASED ON EN 14961-1			
	Supplier	Name Contact information Number of contract		
	Amount of delivery	The supplier and end-user shall agree upon the methods of weighing or volume determination and delivery.		
	Origin:	According to Table 1 from EN 14961-1:2010 (select the level which is needed)		
	Country	Country/countries (or more detailed location if agreed)		
	Chemical treated material	Yes ☐ No ☐		
	Traded Form	According to EN 14961-1		
Normative	**Specifications of properties**	To be selected from Tables 3 – 15 of EN 14961-1:2010 for each property		
Informative				
	Signature of assigned person	Place and date		

Table A.2 — Example of a product declaration for hog fuel
End-user: large power plant

	PRODUCT DECLARATION FOR HOG FUEL BASED ON EN 14961-1	
	Supplier	Solid biofuel Ltd P.O. Box 11 FI-40101 Jyvaskyla, Finland Tel.+358-14-000 000 Fax. .+358-14-000 000 Contact person: Mr. Erkki Puu e-mail: erkki.puu@biofuel.fi Contract number SB3456789
	Origin:	Logging residues (1.1.3)
	Country	Finland (Leivonmäki)
	Traded Form	Hog fuel (produced by crusher)
	Chemically treated material	Yes ☐ No ☒
	Amount of delivery	3 200 tons/month
Normative	**Properties**	
	Particle size (mm)	P63
	Moisture (w-%)	M55
	Ash content (w-%)	A3.0
	Net calorific value as received (MJ/kg)	7,0 MJ/kg
	Signature of assigned person	Place and date

Table A.3 — Example of product declaration for straw bales

	PRODUCT DECLARATION FOR STRAW BALES BASED ON EN 14961-1	
Normative	**Supplier**	Halm 80 Contact person: Niels Jeppesen
	Amount of delivery	8 000 tons/month
	Origin:	Wheat straw (2.1.1.2)
	Chemically treated material	Yes ☐ No ☒
	Country	Denmark
	Traded Form	Straw bales
	Determination of properties	
	Dimensions (m)  	L_1: 1.25 – 1.35 cm L_2 : 1.20 – 1.30 cm L_3: 2.25 – 2.55 cm
	Moisture (w-%)	M25
	Ash (w-%) dry	A5
	Bale density (kg/m^3)	BD 220
	Net calorific value as received (MJ/kg)	Q13.0
Informative	Production method	Combined harvesting, crop has been threshed
	Chlorine (w-%) dry	Cl 0.4
	Signature of assigned person	Place and date

Annex B
(informative)

Overview of properties being specified in EN 14961-1

	Briquettes	Pellets	Wood chips	Hog fuel	Log wood	Sawdust and shavings	Bark	Herbaceous bales	Energy grain	Olive residues, Fruit seed
Normative										
Dimensions, P, D, L	X	X	X	X	X		X	X	X	X
Moisture, M	X	X	X	X	X	X	X	X	X	X
Ash, A	X	X	X	X		X	X	X	X	X
Particle density, DE	X									
Mechanical durability, DU		X								
Bale density, BD								X		
Additives, w-%	X	X								X
Fines, F		X								
Bulk density, BD		X								
Net calorific value, as received, Q	X	X		X		X	X	X	X	X
Volume or weight					X					
Shredding							X			
Species of biomass								X		
Normative/informative										
Mechanical durability, DU	X [a]									
Nitrogen,N	X [b]	X [b]	X [c]	X [c]		X [c]	X [c]		X [d]	X [d]
Sulphur, S	X [b]	X [b]							X [d]	
Chlorine, Cl	X [b]	X [b]	X [c]	X [c]		X [c]	X [c]			
Informative										
Ash melting behaviour	X	X	X	X		X	X	X	X	X
Net calorific value, as received, Q			X							
Bulk density, BD			X	X		X	X		X	X
Energy density, E					X					
Proportion of split volume					X					
Cut-off surface					X					
Mould and decay					X					
Production method								X		
Binding type of bales								X		
Chlorine, Cl								X	X	X
Fines, F									X	X
Sulphur, S										X

[a] Informative if trade in bulk.

[b] Normative for chemically treated biomass (according to EN 14961-1:2010, Table 1, classes 1.2.2; 1.3.2; 2.2.2; 3.2.2).

[c] Normative for chemically treated biomass (according to EN 14961-1:2010, Table 1, classes 1.2.2, 1.3.2).

[d] Normative for herbaceous biomass (according to EN 14961-1:2010, Table 1, classes 2.1.1.3).

NOTE 1 The quality of a solid biofuel should be as homogeneous as possible with special attention to the moisture variations.

NOTE 2 Suppliers and customers may also agree on a range for moisture content, which is not specified in the appropriate part of EN 14961.

NOTE 3 Mechanical durability influences the stability and amount of fines in the pellets and briquettes during the handling and transportation.

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