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Solid biofuels - Fuel quality assurance

Biocombustibles solides - Assurance qualité du combustible

Feste Biobrennstoffe - Qualitätssicherung von Brennstoffen

This Technical Specification (CEN/TS) was approved by CEN on 13 September 2005 for provisional application.

The period of validity of this CEN/TS is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the CEN/TS can be converted into a European Standard.

CEN members are required to announce the existence of this CEN/TS in the same way as for an EN and to make the CEN/TS available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the CEN/TS) until the final decision about the possible conversion of the CEN/TS into an EN is reached.

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Foreword

This Technical Specification (CEN/TS 15234:2006) has been prepared by Technical Committee CEN/TC 335 “Solid biofuels”, the secretariat of which is held by SIS.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to announce this Technical Specification: Austria, Belgium, 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 United Kingdom.

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Introduction

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

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

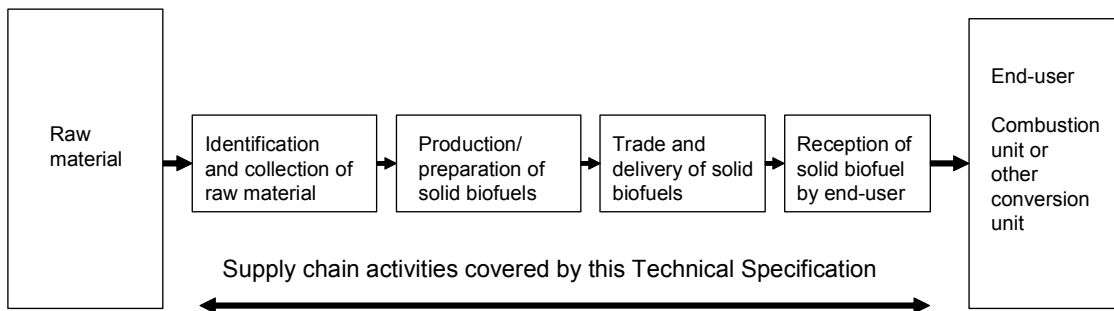


Figure 1—Solid biofuel supply chain

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

- [1] the end-user can find a biofuel that corresponds to his needs;
- [2] the producer/supplier can produce a biofuel with defined and consistent properties and describe the biofuel to the customers.

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

Solid biofuels are specified according to CEN/TS 14961—Solid Biofuels, Fuel Specification and Classes. Each property specification requirement refers to a CEN Standard or a CEN Technical Specification. With a proper quality assurance procedure and specification of origin and source (i.e. kind of biofuel) in the whole production chain, it is possible to reduce or eliminate the parameters that need analysing.

According to the terminology of EN ISO 9001^[1] a Quality Management system generally consist of Quality Planning, Quality Control, Quality Assurance and Quality Improvement. This Technical Specification covers Fuel Quality Assurance and Quality Control.

The users of this Technical Specification may integrate the CEN—Solid biofuels, Fuel Quality Assurance Technical Specification 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 Technical Specification can be used on it's own to help the supplier in documenting fuel quality and creating adequate confidence between the supplier and the end-user.

In parallel to the preparation of this Technical Specification a Guide for Quality Assurance of Solid Biofuels has produced as a CEN Technical Report^[8].

This Technical Specification 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 Technical Specification defines the procedures to fulfil the quality requirements and describes measures to ensure adequate confidence that the biofuel specification is fulfilled. This Technical Specification 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 Technical Committee (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 Technical Specification.

NOTE 2: Health, safety and environmental issues for solid biofuels are important and need special attention, however are outside the scope of this Technical Specification.

NOTE 3: For the avoidance of doubt, demolition wood is not included in the scope of this Technical Specification. Demolition wood is defined as "used wood arising from demolition of buildings or civil engineering installations" (CEN/TS 14588).

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.

CEN/TS 14588:2003 *Solid biofuels – Terminology, definitions and descriptions*

CEN/TS 14961:2005 *Solid biofuels – Fuel Specifications and classes*

NOTE: In the CEN/TS 14961 there is a list (Table 3) of the CEN Technical Specifications for sampling, sample reduction and determination of biofuel properties.

3 Terms and definitions

For the purposes of this Technical Specification, the terms and definitions given in the CEN /TS14588:2003 and the following apply.

CEN/TS 15234:2006 (E)**3.1****biomass resource owner**

body or enterprise with the right to exploit the biomass resources for energy purposes

NOTE: The biomass resource owner can be a land or forest owner, a company etc.

3.2**chemical treatment**

any treatment with chemicals other than air or water (e. g. glue and paint)

NOTE: See informative Annex D in the CEN/TS 14961:2005—Solid Biofuels, Fuel Specification and Classes.

3.3**critical control point**

point within or between processes at which relevant properties can be most readily assessed and are also the points that offer the greatest potential for quality improvement

3.4**customer**

the next operator in the biofuel supply chain

3.5**delivery agreement**

contract for fuel trade, which specifies e.g. origin and source, quality and quantity of the fuel, as well as delivery terms

3.6**end-user**

consumer (private person, enterprise, utility, etc.) using fuel for energy purposes

3.7**fuel quality declaration**

document dated and signed by the producer/supplier to the retailer or end-user, specifying origin and source, traded form and properties of defined lot

3.8**operator**

body or enterprise, which is responsible for one or several activities in the solid biofuel supply chain

NOTE 1: The operator can be, for example, a biofuel producer or a subcontractor to the biofuel supplier.

NOTE 2: The first operator is a body or an enterprise which operates at the beginning of the supply chain.

3.9**point of delivery**

the delivery location specified in the delivery agreement, at which the proprietary rights of and responsibility for a fuel lot is transferred from the supplier to the end-user

3.10**producer**

operator responsible for the production of the fuel or for any operation with the purpose of changing the biofuel properties

NOTE: The producer can also be the supplier of the fuel.

3.11**quality**

degree to which a set of inherent characteristics fulfils requirements

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3.12**quality assurance**

part of quality management, focused on providing confidence that the quality requirements will be fulfilled

3.13**quality control**

part of quality management, focused on fulfilling the quality requirements

3.14**retailer**

supplier of (usually packaged) biofuels in (small) quantities to end-user

NOTE: Retailers are usually suppliers to the private household consumers.

3.15**supplier**

operator responsible for supplying solid biofuels

NOTE: One supplier may deliver to the end-user directly and take responsibility for fuel deliveries from several producers as well as delivery to the end-user.

3.16**supply chain**

the overall process of handling and processing raw materials to the point of delivery to the end-user

4 Symbols and abbreviations

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

	SIST-TS CEN/TS 15234:2006
d	dry (dry basis)
daf	dry, ash-free
ar	as received
A	Designation for ash content (w-% of dry basis)*
ρ	Density [kg/m ³]
BD	Designation for bulk density [kg/m ³]*
DE	Designation for particle density as received [kg/dm ³]*
D	Designation for diameter [mm]*
DU	Designation for mechanical durability [w-%]*
E_{ar}	Energy density as received [MWh/m ³ loose, solid or stacked volume (amount of energy/volume unit)]
E	Designation for energy density as received [kWh/m ³ or kWh/kg, unit is to be stated in brackets]*
F	Designation for amount of fines (< 3,15 mm, w-%)
L	Designation for length [mm]*
M_{ar}	Total moisture content as received [w-%] on wet basis

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M	Designation for moisture content as received [w-%]*
P	Designation for particle size or particle size distribution [mm]*
$q_{V,gr}$	Gross calorific value at constant volume [MJ/kg]
$q_{p,net}$	Net calorific value at constant pressure [MJ/kg]

*Designation symbols are used in combination with a number to specify property levels in Tables 4—13 and in informative Annex A in the CEN/TS 14961:2005—Solid biofuels, Fuel Specifications and Classes. For designation of chemical properties, chemical symbols like S (sulphur), Cl (chlorine), N (nitrogen) are used and the value is added directly after the symbol.

5 Principle

This Technical Specification 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.

Procedures to establish confidence in the biofuel include the following requirements:

- first operator in the biofuel supply chain shall document the origin and source of the biofuel. Origin and source refers to the kind of biofuel, as listed in Table 1 in the CEN/TS 14961:2005 (7.1);
- biofuel shall be traceable through the entire supply chain (7.1.2);
- biofuel producer shall take quality assurance measures to achieve and secure the fuel quality and the company's performance relating to the production and/or supply of the solid biofuels (6.2);
- transportation, handling and storage of the fuel should be performed with care and shall be documented by the operator (6.3);
- supplier to the end-user or retailer is responsible for the biofuel quality and shall make a Fuel Quality Declaration (6.4);
- for specifications in the Fuel Quality Declaration, CEN/TS 14961 shall be used. The Fuel Quality Declaration shall include:
 - origin and source (7.1);
 - country where the biomass is harvested or first traded as biofuel (7.1.1);
 - traded form (7.2);
 - properties (7.3).

Figure 2 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 Fuel Quality Declaration. Additional configurations of supply chains are possible.

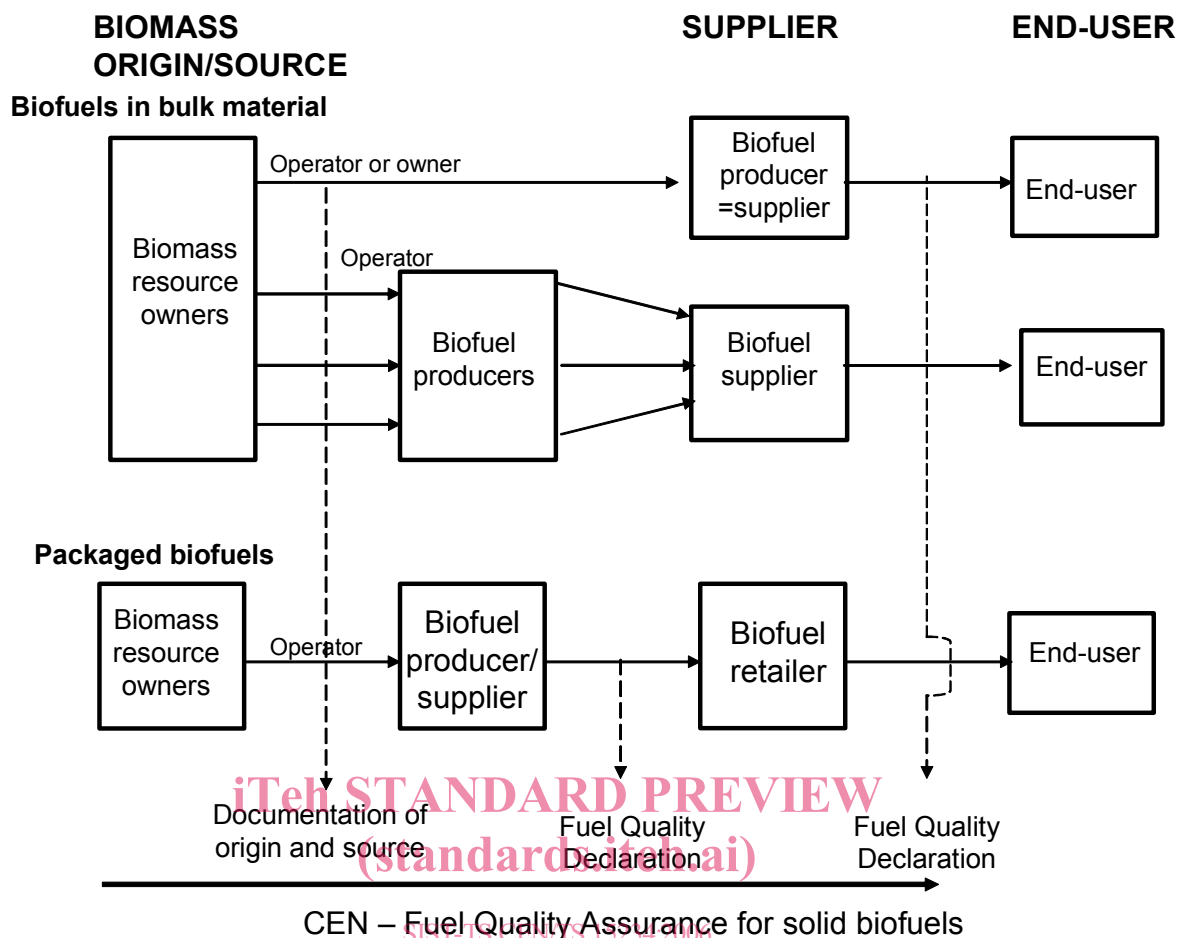


Figure 2 — Examples of the documentation of origin and source and Fuel Quality Declaration in different biofuel supply chains

6 Quality Assurance measures

6.1 General

Quality Assurance 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. Customer requirements include, beside a specified biofuel quality, also the quality of the performance of the company relating to the biofuel or service (such as timing, logistics and proper documentation). Fuel Quality Assurance needs to be applied to the entire supply chain (see Figure 1).

The methodology described in Clause 6 "Quality Assurance measures" facilitates the design of a fuel quality system for producers and suppliers of solid biofuels. Its function is to make sure that:

- traceability exists;
- requirements that influence the fuel quality is controlled;
- end-user can have confidence in the fuel quality.

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In sub-clauses: 6.2 Production requirements and 6.3 Transportation, handling and storage, both fuel quality and company performance aspects, are covered. Sub-clause 6.4 covers the mandatory Fuel Quality Declaration/labelling from the supplier.

Documentation is an important part of Quality Assurance. In this Technical Specification some documents are mandatory while other documents are voluntary (see Table 1). For general guidance on “Quality Assurance measures” see Informative Annex A.

Table 1—Mandatory documents on Quality Assurance measures

Area	Mandatory documentation	Sub-clause
Traceability of raw material	Documenting origin and source ^{a)}	7.1.2
Production requirements	Steps ^{b)} in the process chain (<i>Step 1</i>) Critical Control Points (<i>Step 4</i>) Criteria and methods to ensure appropriate control at Critical Control Points (<i>Step 5</i>) Nonconforming biofuels (<i>Step 6</i>)	6.2
Transportation, handling and storage after production	Description of transportation, handling and storage	6.3
Final fuel specification	Fuel Quality Declaration/labelling	6.4

^{a)} The producer of the solid biofuel from used wood or by-products and residues from the wood, herb or fruit processing industry must ensure that the raw material used falls within the scope of the CEN/TS 14961:2006

^{b)} The steps refer to the steps in the methodology described in sub-clause 6.2.

6.2 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 process. The methodology described below for Quality Assurance of the production shall be used for all processes, but shall be adjusted for the production requirements of the specific production chain in question.

Methodology for production quality assurance - step-by-step (see also Informative Annex A):

- Step 1: Document the steps in the production chain;
- Step 2: Define specification(s) for the biofuel(s);
- Step 3: Analyse factors influencing fuel quality and company performance;
(This includes transportation, handling and storage see sub-clause 6.3)
- Step 4: Identify and document the Critical Control Points for compliance with the fuel specification;

- Step 5: Select the appropriate measures that give confidence to customers that the specification(s) is/are being realised, by:
- identifying and documenting criteria and methods to ensure appropriate control of the Critical Control Points;
 - monitoring and controlling the production process and making necessary adjustments for compliance with the quality requirements.
- Step 6: Establish and document routines for separate handling of nonconforming materials and biofuels.
- If any deviation from the stated specification is noticed in the biofuel, the deviating part shall be removed from this specific production chain if possible. If the deviating part cannot be taken away, the producer shall inform the customer immediately and take the necessary corrective actions. See informative Annex D for an example of a template on nonconformity.

All documents shall be dated and signed by the person assigned and authorised by the producer to do so. It shall be available, on justified request, to the next customer in the production chain. In informative Annex B there are some examples to illustrate the fulfilment of document requirements within production chains of varying complexity.

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

6.3 Transportation, handling and storage

Suitable transportation, handling and storage are very important factors in the final quality of the biofuel. It also ensures the fuel is kept in a correct environment. Negative influences on these operations should be avoided.

Transportation, handling and storage operations after biofuel production shall be documented by the operator. This can for example be done in the delivery agreement.

Appropriate methods 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. Factors requiring special attention:

- weather and climatic conditions (e.g. risk of rain and snow) during storage and the need for covering;
- storage conditions (e.g. ventilation, moisture absorption) and the foreseen duration of storage;
- storage construction;
- suitability and cleanliness of all equipment;
- effects of transportation on the biofuels, e.g. formation of dust;
- professional skills of personnel.

6.4 Fuel Quality Declaration and labelling

The Fuel Quality Declaration for the solid biofuel shall be issued by the producer/supplier to the end-user or retailer. The Fuel Quality Declaration shall be issued for each defined lot. The quantity of the lot shall be defined in the delivery agreement. The supplier shall date the declaration and keep the records for a minimum of one year after the delivery. The Fuel Quality Declaration shall state the fuel quality in accordance to the CEN/TS 14961. Fuel Quality Declarations shall be issued for both solid biofuels handled as bulk material and for packaged solid biofuels.