

BS EN 15234-6:2012



BSI Standards Publication

# Solid biofuels — Fuel quality assurance

Part 6: Non-woody pellets for non-industrial use

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### **National foreword**

This British Standard is the UK implementation of EN 15234-6:2012.

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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**Solid biofuels - Fuel quality assurance - Part 6: Non-woody pellets for non-industrial use**

Biocombustibles solides - Assurance qualité du combustible - Partie 6: Granulés non ligneux à usage non industriel

Feste Biobrennstoffe - Qualitätssicherung von Brennstoffen - Teil 6: Nicht-holzartige Pellets für nichtindustrielle Verwendung

This European Standard was approved by CEN on 27 November 2011.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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## Foreword

This document (EN 15234-6:2012) 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of an identical text or by endorsement, at the latest by July 2012, and conflicting national standards shall be withdrawn at the latest by July 2012.

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 has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

The European standard series EN 15234, *Solid biofuels — Fuel quality assurance* are provided as a general requirements and additional product standards. Additional product 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;*
- *Part 3: Wood briquettes for non-industrial use;*
- *Part 4: Wood chips for non-industrial use;*
- *Part 5: Firewood for non-industrial use;*
- *Part 6: Non-woody pellets for non-industrial use.*

Although these product standards may be obtained separately, it should be recognized 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 product 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, Turkey and United Kingdom.

## Introduction

The overall aim of this European Standard is to guarantee the non-woody pellet 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 objective of this European Standard is to serve as a tool to enable the efficient trading of non-woody pellets. Thereby:

- 1) the end-user can find a pellet that corresponds to its needs;
- 2) the producer/supplier can produce a pellet with defined and consistent properties and describe the pellet to the customers.

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

Non-woody pellets are specified according to EN 14961-6, *Solid biofuels — Fuel specifications and classes — Part 6: Non woody pellets for non-industrial use*.

## 1 Scope

This European Standard defines the procedures to fulfil the quality requirements (quality control) and describes measures to ensure adequate confidence that the non-woody pellet specification described in EN 14961-6 is fulfilled (quality assurance). This European Standard covers production and delivery chain, from purchasing of raw materials to point of delivery to the end-user.

This European standard covers only quality assurance for non-woody pellets produced from the non-woody biomasses stated in EN 14961-1:2010, Table 1 and EN 14961-6.

## 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*

EN 14961-6:2012, *Solid biofuels — Fuel specifications and classes — Part 6: Non-woody pellets for non-industrial use*

EN 15234-1, *Solid biofuels — Fuel quality assurance — Part 1: General requirements*

NOTE In EN 14961-1:2010 there are listed Normative references of the European Standards for sampling and sample reduction and in EN 14961-6 for determination of solid biofuel properties.

## 3 Terms and definitions

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

### 3.1

#### **non-woody pellet**

densified non-woody biofuel made from pulverised (e.g. ground) biomass with or without additives usually with a cylindrical form diameter < 25 mm, random length and typically 3,15 mm to 40 mm with broken ends, obtain by mechanical compression

NOTE The raw material for non-woody pellets can be herbaceous biomass, fruit biomass, or biomass blends and mixtures. They are usually manufactured in a die with a total moisture content usually less than 15 % of their mass.

### 3.2

#### **additive**

material which improves the quality of the fuel (e.g. combustion properties), reduces emissions or makes production more efficient

### 3.3

#### **chemical treatment**

treatment with chemicals other than air, water or heat

NOTE Examples of chemical treatment are listed in informative Annex C of EN 14961-1:2010.

### 3.4

#### **impurities**

material other than the raw material or fuel itself such as soil, stones, metal, plastic, glass

### 3.5

#### weather condition

temperature, humidity and precipitation, e.g. rain, snow

## 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)

*ar* as received

w-% weight-percentage

A designation for ash content,  $A_d$  [w-%, dry basis]<sup>1)</sup>

BD designation for bulk density as received [kg/m<sup>3</sup>]<sup>1)</sup>

D designation for diameter as received,  $D$  [mm]<sup>1)</sup>

DU designation for mechanical durability as received [w-%]<sup>1)</sup>

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

L designation for length as received,  $L$  [mm]<sup>1)</sup>

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

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

NOTE 1 MJ/kg equals 0,277 8 kWh/kg (1 kWh/kg equals 1 MWh/t and 1 MWh/t is 3,6 MJ/kg). 1 g/cm<sup>3</sup> equals 1 kg/dm<sup>3</sup>.

## 5 Quality assurance and quality control measures

### 5.1 General

Quality assurance and control aim 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, etc.), timing and logistics (to provide biofuels in time and to agreed performances criteria).

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

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

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1) Designation symbols are used in combination with a number to specify property levels (see for example Table 1. EN 14961-6:2012). 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.



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.

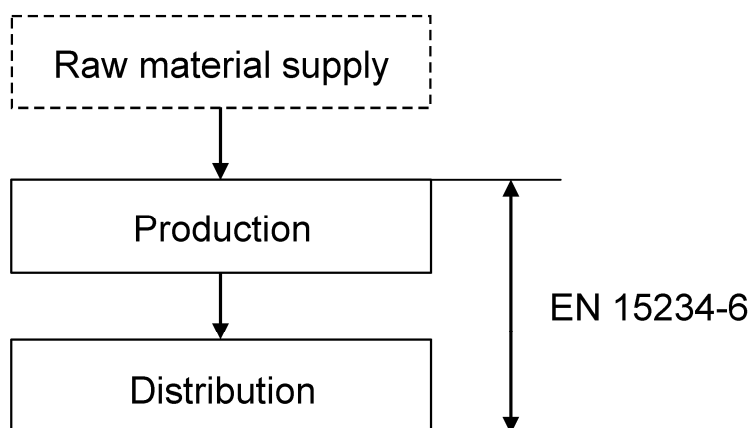
Quality assurance on the other hand, is about reviewing the products and processes, primarily through data provided from the quality control records and using this data

- 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.

## 5.2 Traceability

Non-woody pellets for non-industrial use shall be specified with EN 14961-6. The origin and source of solid biofuel is specified by Table 1 in EN 14961-1:2010.

The main three parts of the supply chain is illustrated in Figure 1.



**Figure 1 — An example for the description of a non-woody pellet supply chain**

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 according to EN 15234-1.

### 5.3 Production requirements

The methodology described below for quality assurance and quality control of the production shall be used, but shall be adjusted for the production requirements of the specific pellets production chain in question.

There are six consecutive steps that have to be followed by every stakeholder in the supply chain. The steps are described below. For examples of documentation, see informative Annex A.

**Step 1:** Define fuel requirements for the final product (see 5.4)

**Step 2:** Document the steps in the production and distribution processes (see 5.5, Figures 2 and 3)

**Step 3:** Identify quality influencing factors including company performance (see 5.5, Figures 2 and 3)

**Step 4:** Define Critical Control Points for compliance with the fuel specification (see 5.5 Figures 2 and 3)

**Step 5:** Select appropriate measures to assure the quality of the product (see 5.6)

**Step 6:** Establish routines of separate handling of nonconforming raw materials and solid biofuels (see 5.7)

The following information will give a general overview about documenting the requirements for the production in a non-woody pellets supply chain.

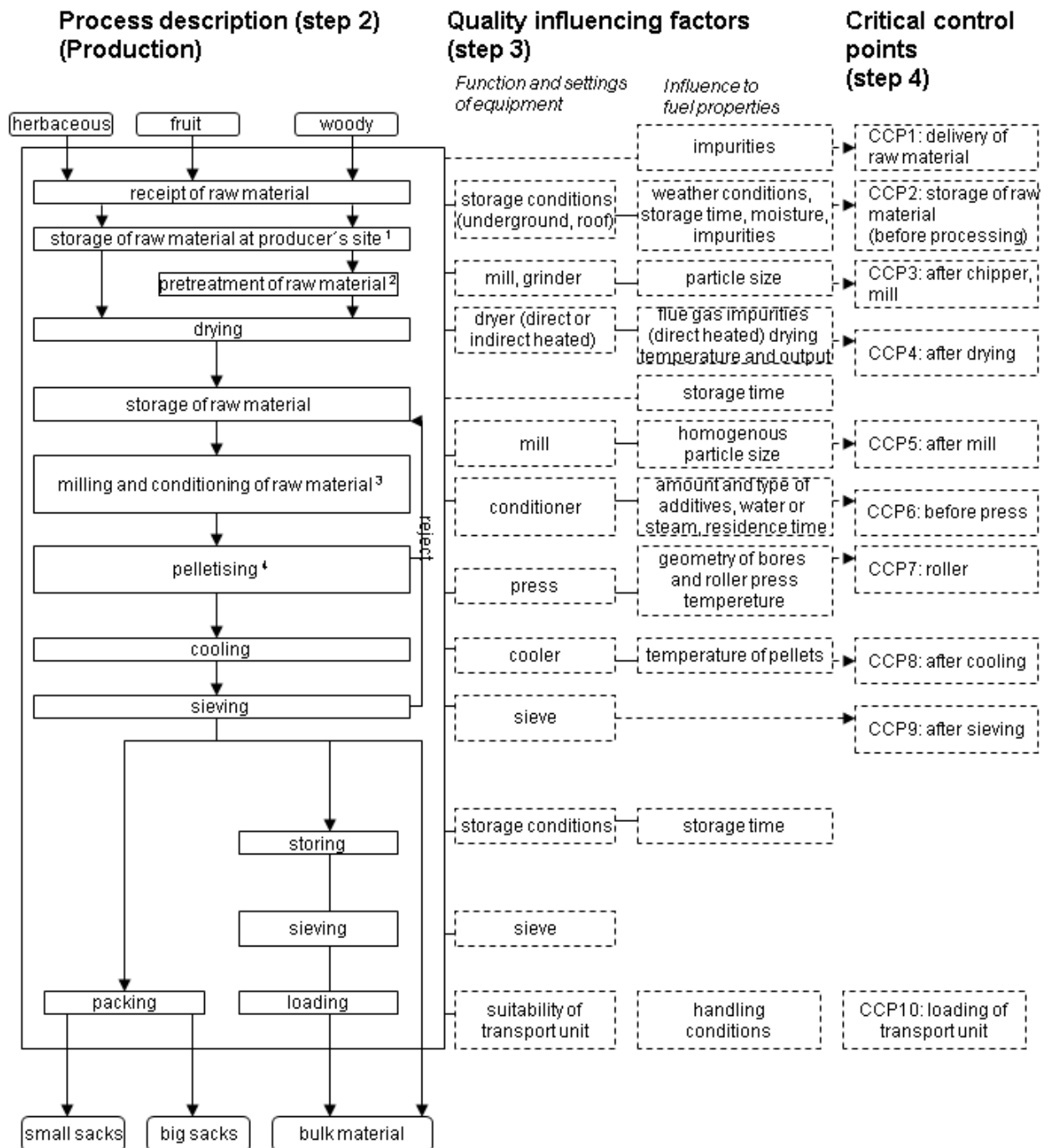
### 5.4 Fuel requirements for the final product(Step 1)

Non-woody pellets for non-industrial use are produced according to EN 14961-6.

NOTE The fuel specification is based on EN 14961-1:2010 general part, table 4 in the case of individually made agreements.

### 5.5 Process description (Steps 2, 3 and 4)

Examples of the process description with the corresponding quality influencing factors and critical control points (CCP) are given in Figure 2 and Figure 3.



<sup>1</sup> separate raw material storages (e.g. wood residues, freshwood with or without bark)

<sup>2</sup> debarking, chipping, milling or grinding (if necessary),

<sup>3</sup> and separation of impurities (stones, metals)

<sup>4</sup> adding of pressing aid and water or steam (if necessary), maturation bunker

Figure 2 — Example for the description of the production process with quality influencing factors and Critical Control Points

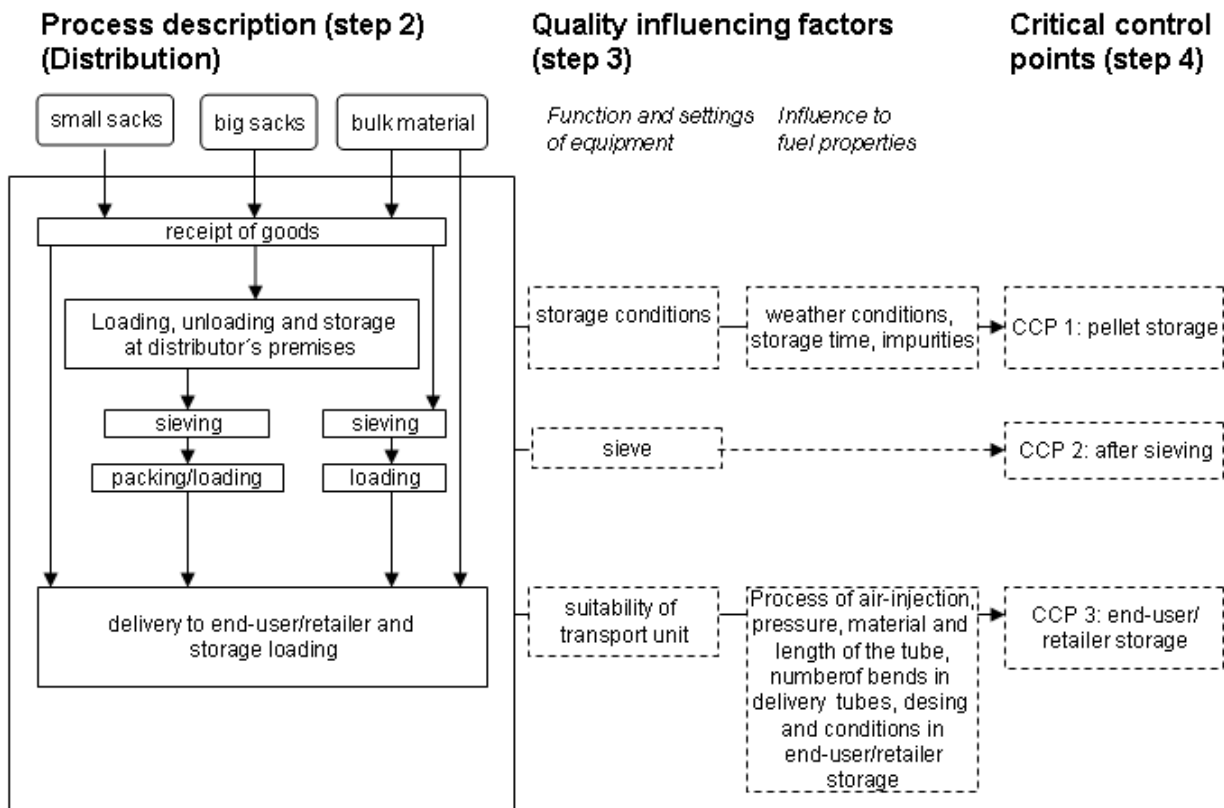


Figure 3 — Example for the description of the delivery chain with quality influencing factors and Critical Control Points

## 5.6 Measures to assure the quality of the product (Step 5)

### 5.6.1 Inspection of incoming raw material and other goods

- carry out visual or other sensory inspections of the delivered raw material,
- make a contract between supplier and producer with “terms of delivery” including fuel specifications and solid biofuel handling,
- document delivery declaration of the supplier e.g. with sustainability certification (PEFC, FSC, etc.<sup>2)</sup>).

### 5.6.2 Pellet production

- control of key properties when the raw material basis has changed,
- control of settings, function and condition of the equipment regularly,

<sup>2)</sup> PEFC: Programme for the Endorsement of Forest Certification, FSC: Forest Stewardship Council.

- repair and change equipment when necessary; some parts will require changing regularly according to their technical lifetime or the production control system,
- protect and control of non-woody pellets from moisture from e.g. snow or rain or damp walls; also from condensation moisture through suitable storage,
- protect and control of non-woody pellets from contamination with impurities (e.g. stones, soil and grain),
- store separately pellets of different quality (e.g. different classes described in EN 14961-6),
- control the temperature of the pellets while loading, shall not exceed 40°C,
- control and document production conditions and adjustment of the equipment (e. g. power demand of presses, temperature of roller bearings, vibration of presses) regularly,
- determine the quality of the produced pellets regularly; in Table 1 the tests required, the place of sampling and the frequency are listed; the frequency of these checks is calculated by the following formula:

$$N = \frac{10}{\text{days}} * \sqrt{\frac{\text{tonne}}{10}}$$

where

N            number of sample in 24h  
 days        annual working days  
 tonne      annual quantity of pellets in tonnes

example     $N=10/220*\sqrt{50\ 000/10} = 3$  times per 24h

**Table 1 — Regular analyses of non-woody pellet quality**

Property	Place of control	Frequency
Mechanical Durability (DU)	Production line	See formula above
Moisture Content (M)	Production line	See formula above
Bulk density (BD)	Production line	At least once per shift
Length of pellets	Production line	At least once per shift
Amount of Fines (F)	At factory gate	At least once per shift

- document all measures to assure the quality,
- install a system for complaint management.

### 5.6.3 Distribution

- control of settings, function and condition of the delivery equipment regularly,
- protect and control of non-woody pellets from moisture from e.g. snow or rain or damp walls; also from condensation moisture through suitable storage regularly,
- protect and control of non-woody pellets from contamination with impurities (e.g. stones, soil and grain),
- store pellets of different quality (e.g. different classes described in EN 14961-6) separately,

- control the temperature of the pellets while loading, the temperature of the pellets shall not exceed 40°C,
- check visually the quality of the pellets regularly,
- carry out moisture content analysis before delivery to the end user after a long period of intermediate storage,
- sieve of fines unless other agreements are met: amount of fines according to EN 14961-6,
- check and state injection air and pressure during unloading in the supply protocol,
- take for every day deliveries a representative samples of pellets loaded onto delivery vehicle(s) and retained for at least 6 months,
- document all measures to assure the quality,
- install a system for complaint management.

### **5.7 Routines for separate handling of nonconforming raw materials and solid biofuels (Step 6)**

If raw materials or the produced non-woody pellets do not fulfil the requirements, these batches must be stored separately from those that do.

All necessary information has to be documented.

If nonconformity of the product is discovered at the premises of the consumer in connection with a delivery, a nonconformity report is generated and handling of the nonconforming lot is agreed with the consumer.

## **6 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 EN 14961-6 according to EN 15234-1. Product declarations shall be issued for both pellets handled as bulk material and for packaged pellets, in any case for each delivery lot. For packaged pellets, 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.

Examples for product declarations are given in informative Annex A.

## Annex A (informative)

### Examples of product declarations

**Table A.1 — Example of a template for the product declaration for non-woody pellets**

<b>PRODUCT DECLARATION BASED ON EN 14961-6</b>			
	<b>Supplier</b>	Name, contact information Number of contract	
	<b>Amount of delivery</b>	Agreed mass, volume or number of bags of the delivery. (The supplier and end-user shall also agree upon the methods of weighing or volume determination)	
	<b>Origin:</b>	According to Table 1 from EN 14961-1:2010 (select the level which is needed)	
	<b>Country</b>	Country/countries (or more detailed location if agreed)	
	<b>Chemically treated raw material</b>	No <input type="checkbox"/> Yes <input type="checkbox"/>	
	<b>Traded Form</b>	Pellets	
	<b>Class or raw material type</b>	A or B or Cereal Straw or Miscanthus or Reed canary grass	
<b>Normative</b>	<b>Specifications of properties according to EN 14961-6</b>	Unit	Value <sup>a</sup>
	Diameter class, EN 16127	mm	
	Moisture, M, EN 14774-1, EN 14774-2	as received, w-%	
	Ash, A, EN 14775	w-% dry	
	Mechanical durability, DU EN 15210-1	as received, w-%	
	Fines, F <sup>b</sup> , EN 15210-1	w-% as received	
	Additives, type	w-% dry	
	Net calorific value, Q EN 14918	as received, MJ/kg or kWh/kg	
	Bulk density, BD, EN 15103	kg/m <sup>3</sup>	
	Nitrogen, N, EN 15104	w-% dry	
Sulphur, S, EN 15289	w-% dry		
Chlorine, Cl, EN 15289	w-% dry		
<b>Informative</b>	Arsenic, As, EN 15297	mg/kg dry	
	Cadmium, Cd, EN 15297	mg/kg dry	
	Chromium, Cr, EN 15297	mg/kg dry	
	Copper, Cu, EN 15297	mg/kg dry	
	Lead, Pb, EN 15297	mg/kg dry	
	Mercury, Hg, EN 15297	mg/kg dry	
	Nickel, Ni, EN 15297	mg/kg dry	
	Zinc, Zn, EN 15297	mg/kg dry	
	Ash melting behaviour, CEN/TS 15370-1 (SST, DT, HT, FT <sup>c</sup> )	°C	
<b>Signature of assigned person</b>		<b>Place and date</b>	
<sup>a</sup> The value column can be used for stating the average (mean) value or minimum and maximum values. <sup>b</sup> At factory gate in bulk transport (at the time of loading) and in small (up to 20 kg) and large sacks (at time of packing or when delivering to end-user). <sup>c</sup> All characteristic temperatures (shrinkage starting temperature (SST), deformation temperature (DT), hemisphere temperature (HT) and flow temperature (FT)) in oxidizing conditions should be stated.			

Table A.2 — Example of template for a simplified product declaration

FUEL PRODUCT DECLARATION BASED ON EN 14961-6	
<b>Supplier</b>	Name, contact information Number of contract
<b>Amount of delivery</b>	Agreed mass, volume or number of bags of the delivery (The supplier and end-user shall also agree upon the methods of weighing or volume determination.)
<b>Origin</b>	According to Table 1 from EN 14961-1:2010 (select the level which is needed)
<b>Country</b>	Country/countries (or more detailed location if agreed)
<b>Chemically treated raw material</b>	No <input type="checkbox"/> Yes <input type="checkbox"/>
<b>Diameter class</b>	D06 <input type="checkbox"/> D08 <input type="checkbox"/>
<b>Traded Form</b>	Pellets
<b>Class or raw material type</b>	A or B or Cereal Straw or Miscanthus or Reed canary grass

Table A.3 — Example of product declaration for A class blended pellets

PRODUCT DECLARATION BASED ON EN 14961-6	
<b>Supplier</b>	Agropellets GmbH Number of contract: 12345
<b>Amount of delivery</b>	4 tons
<b>Origin</b>	2.1.1.2 (80w-%), 1.2.1.2 (w-20%)
<b>Country</b>	Germany, Hessen
<b>Chemically treated raw material</b>	No <input checked="" type="checkbox"/> Yes <input type="checkbox"/>
<b>Diameter class</b>	D06 <input checked="" type="checkbox"/> D08 <input type="checkbox"/>
<b>Traded Form</b>	Pellets
<b>Class</b>	A



## Annex B (informative)

### A-deviations

A-deviation: National deviation due to regulations, the alteration of which is for the time being outside the competence of the CEN/CENELEC member.

This European Standard does not fall under any Directive of the EC.

In the relevant CEN/CENELEC countries these A-deviations are valid instead of the provisions of the European Standard until they have been removed.

<b>Deviation</b>	
<b>Country</b>  <b>France</b>	<b>National Regulation</b>  Rubrique 2910 de la nomenclature ICPE (Installations classées pour la protection de l'environnement) – Décret n° 2010-419 du 28 avril 2010 modifiant la nomenclature des installations classées  The use of solid biofuels as mentioned in this standard is possible only for heating boilers up to a nominal heat output of 100 kWth, which are thus potentially subject to ICPE Regulation (Classified installation for the protection of the environment regulation). In any cases, heating boilers categories remains subject to the criteria set out in ICPE Regulation, in particular according to the source of biofuels and its composition.
<b>Introduction Last Paragraph</b> <b>Clause 1</b> <b>Clause 2</b> <b>Clause 4 Footnote</b> <b>Clause 5.2 1<sup>st</sup> paragraph</b> <b>Clause 5.4</b> <b>Clause 5.6</b> <b>Clause 6</b>	All references to EN 14961-6 involve taking into account its A-Deviation, which is authorized only class 1.1.1, 1.1.2, 1.1.3, 1.1.4, 1.1.5, 1.1.6, 1.1.7, 1.1.8, 1.2.1, 1.3.1, 2.1.1, 2.1.2, 2.1.3, 2.1.4, 2.1.5, 2.1.6, 2.1.7, 2.1.8, 2.2.1, 3.1.1, 3.1.2, 3.1.3, 3.1.4 and 3.2.1 in Table 1 of EN 14961-1 and Class B2.1.1, B2.1.2, B2.1.3, B2.1.4, B2.1.5, B2.1.6, B2.1.7, B2.1.8, B2.2.1, B3.1.1, B3.1.2, B3.1.3, B3.1.4 and B3.2.1 of EN14961-6..
<b>Annex A</b> <b>Tables A.1, A.2 and A.3</b>	In accordance with “rubrique 2910” of ICPE Regulation, there is no mention on Class A2.2.2, A2.2.3, A2.3, A3.2.2, A3.2.3, A3.3, A4 and B2.2.2, B2.2.3, B2.3, B3.2.2, B3.2.3, B3.3, B4 products in declaration.

## Bibliography

- [1] EN 14774-1, *Solid biofuels — Determination of moisture content — Oven dry method — Part 1: Total moisture — Reference method*
- [2] EN 14774-2, *Solid biofuels — Determination of moisture content — Oven dry method — Part 2: Total moisture — Simplified method*
- [3] EN 14775, *Solid biofuels — Determination of ash content*
- [4] EN 14918, *Solid biofuels — Determination of calorific value*
- [5] EN 15103, *Solid biofuels — Determination of bulk density*
- [6] EN 15104, *Solid biofuels — Determination of total content of carbon, hydrogen and nitrogen — Instrumental methods*
- [7] EN 15210-1, *Solid biofuels — Determination of mechanical durability of pellets and briquettes — Part 1: Pellets*
- [8] EN 15289, *Solid biofuels — Determination of total content of sulfur and chlorine*
- [9] EN 15297, *Solid biofuels — Determination of minor elements — As, Cd, Co, Cr, Cu, Hg, Mn, Mo, Ni, Pb, Sb, V and Zn*
- [10] CEN/TS 15370-1, *Solid biofuels - Method for the determination of ash melting behaviour - Part 1: Characteristic temperatures method*
- [11] EN 16127, *Solid biofuels — Determination of length and diameter of pellets*



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