



Handbook for the BIOMASUD Solid Biofuels Certification v13

<http://biomasud.eu>

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Owners of the scheme	Asociación Española de Valorización Energética de la Biomasa (Avebiom); Centro de Desarrollo de Energías Renovables (CIEMAT) Centro da Biomassa para a Energia (CBE); Centro para a Valorização de Resíduos (CVR
Main Author(s)	Esteban , L. S. (luis.esteban@ciemat.es) Fernandez, M. J. (miguel.fernandez@ciemat.es) Mira, A. (aliciamira@avebiom.org) Rodero, P. (pablorodero@avebiom.org)
Other Authors	Almeida, T. Araujo , J. Ferreira, M. E.
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1 BACKGROUND AND SCOPE

BioMasud certification system was developed in a project inside the frame of the program Interreg IV B, financed with funds FEDER.

The Mediterranean countries have a biomass market with production of solid biomass fuels such as olive stones, almond shells and pine nut shells that aren't used in other European regions. As a result, there are already some national or European quality labels for wood pellets but there is nothing for other kind of solid biofuels. BioMasud chases the ultimate goal of contributing to the sustainability of the solid biomass-based energy model and consequently the conservation of the natural environment of the Mediterranean region, promoting efficiency and sustainability in the processes. To achieve this goal within the project was developed the certification system BioMasud which cover many of the solid biofuels traded in the Mediterranean region

The present handbook establishes the procedures of a quality label system designed within the project framework. This label has **quality requirements** but also it will have **minimal sustainability criteria** along the whole chain of value, and a **traceability system** that allows managing the resources from a global perspective.

The main scope of the label is the solid biofuels for non-industrial purposes that will be used in small-medium boilers, stoves, or bigger installations but with a need of quality guaranties because of its location (i.e. district heatings located inside the towns). During the creation of the BioMasud quality label knowledge of other quality systems in Europe was made (i.e. ENplus for wood pellets, managed by the European Pellet Council). It's not the intention of BioMasud consortium to compete with other quality systems already on the market so it was decided to focus in other Mediterranean biomass solid fuels and recognise other certification systems if producers report the complementary information not included in its other certification. Every case will be studied and decided what extra information is needed for conceding the BioMasud seal.

Solid biofuels that can achieve the quality label from BioMasud project are domestic biomasses:

- Wood pellets
- Wood chips

- Olive stones
- Pine nut shells
- Almond shells
- Chopped pine cone
- Hazelnut shells
- Blends of the cited biomasses (producer must specify the %)

Other biomasses could be accepted if its quality is acceptable as domestic and fulfil the requirements of any cited biomass. The capacity to admit more biomasses is held by Biomassud steering committee.

2 NORMATIVE REFERENCES

CEN/TC 15370-1: Solid biofuels - Method for the determination of ash melting behaviour - Part 1: Characteristic temperatures method

EN 14778: Solid biofuels - Sampling

EN 15234-2: Solid biofuels - Fuel quality assurance - Part 2: Wood pellets for non-industrial use

ISO 3166: Codes for the representation of names of countries and their subdivisions

ISO 16948: Solid biofuels - Determination of total content of carbon, hydrogen and nitrogen contents

ISO 16968: Solid biofuels - Determination of minor elements

ISO 16994: Solid biofuels - Determination of total content of sulphur and chlorine

ISO 17225-1: Solid biofuels - Fuel specifications and classes - Part 1: General requirements

ISO 17225-2: Solid biofuels - Fuel specifications and classes - Part 2: Graded wood pellets

ISO 17225-4: Solid biofuels - Fuel specifications and classes - Part 2: Graded wood chips

UNE 164003: Solid biofuels – Fuel Specifications and classes. Graded olive stones

UNE 164004: Solid biofuels – Fuel Specifications and classes. Graded fruit shells

ISO 17828: Solid biofuels - Determination of bulk density

ISO 17829: Solid Biofuels - Determination of length and diameter of pellets

ISO 17831-1: Solid biofuels - Determination of mechanical durability of pellets and briquettes - Part 1: Pellets

ISO 18122: Solid biofuels - Determination of ash content

ISO 18125: Solid biofuels - Determination of calorific value

ISO 18134: Solid biofuels - Determination of moisture content -

ISO 18846: Solid biofuels - Determination of fines content in quantities of pellets

ISO 9001: Quality Management Systems – Requirements

ISO/IEC 17020: Conformity assessment - Requirements for the operation of various types of bodies performing inspection

ISO/IEC 17025: General requirements for the competence of testing and calibration laboratories

ISO/IEC 17065: Conformity assessment - Requirements for bodies certifying products, processes and services

EN 45011, General requirements for organisations that operate product certification systems

3 DEFINITIONS OF TERMS

General definitions about biomasses covered by the label can be found cited in the previous chapter as well as in the reports of the Biomassud project.

3.1 OWNERS OF THE SCHEME

The owners of the license for the Biomassud's quality label are members of the Biomassud's project consortium that decided to continue with the implementation of the system: AVEBIOM, CIEMAT, CBE and CVR.

Biomassud's steering committee will manage the label quality.

3.2 LABEL ISSUER

The certificate is issued by an independent third party entity. The Biomassud steering committee is the organ who decides which entity will be able to issue the label. In every country of the Mediterranean region, one entity or two could be designed for that issue.

Out of the Mediterranean region, a producer or trader wishing to obtain the label must deal directly with the Biomassud steering committee.

3.3 INSPECTION BODIES

Listed inspection bodies have to be accredited according to EN ISO 17020 or EN 45011. The scope of accreditation needs to be accepted by the Biomassud steering committee who will publish on its WEB the list of accepted testing bodies for verifying within the Biomassud system.

3.4 TESTING BODIES

The testing bodies must be accepted by the Biomassud steering committee who will publish on its WEB the list of accepted testing bodies for verifying within the Biomassud system.

Listed testing bodies have to be accredited according to EN ISO 17025 and testing standards specified in ISO-17725. Exceptions can be made if they are accepted by Biomassud steering committee as being accredited on older testing standards (EN 14961) or not accredited but being a recognised laboratory. Only listed inspection and testing bodies are accepted for certification within the Biomassud system.

3.6 LABEL HOLDERS

Label holders are companies that produce solid biomass or trade them, and have committed themselves in a contract with the label issuer to observe the regulations of the Biomassud's certification system. They have been certified according to the rules of this handbook.

4 QUALITY LABEL SYSTEM

4.1 OVERVIEW

The essential components of the certification programme are:

- **Quality requirements.** Verification that the product fulfils the quality required for obtaining Biomassud quality label. Testing body is in charge of the sampling and analyse. Quality product requirements are described in chapter 5 and tables with product parameters in annex 1.
- **Sustainability criteria.** 4 minimum sustainability criteria are established by the label (GHG, EC, quality and traceability). Inspection body will verify the fulfilment of the criteria required. In the case of quality, the inspection body will take and send a sample to a registered testing body who will analyse the product and will revert to the inspection body with the results report Also the inspection body will check that the installations fulfil the basic requirements to obtain and maintain the required quality.

- **Traceability system.** One of the main parts of the system is the traceability which helps to warrant the quality and sustainable source of the biomass. Inspection body will verify that the producer / trader fulfils the requirements established by the label and described in chapter 7).

4.2 OBTAINING THE QUALITY LABEL

The interested company, producer or trader, fills in an application form which can be found on Biomassud WEB site (biomasud.eu) or in the owners of the scheme WEB site. The label issuer is responsible in the country where (the headquarters of) the applicant is located. The respective organization has to take a decision on the application within 2 months.

The documents to be submitted are:

- Application
- Inspection (from a listed inspection body) and testing report (from a listed testing body) of the initial inspection

The report of an initial inspection in accordance with this quality label programme has to be presented to the label issuer.

If a pellet company, producer or trader, is certified with ENplus®, submitting an analysis and an audit report from this certification system not older than a year, and sending to the inspection body the GHG and EC data will obtain the quality label. Also, this company will have to fulfil with traceability system from Biomassud, so they will indicate the inspection body how they will proceed.

4.2.1 MANDATE FOR PRODUCTION CONTROL

The interested company enters into an inspection contract with an inspection body listed by Biomassud steering committee and commissions it with the initial inspection of its production facilities.

4.2.2 INITIAL INSPECTION OF A PRODUCER

The inspection body and testing body conducts an initial inspection of the production site(s) of the interested party, where the following points are to be examined:

- Raw material: Classification of the origin and sources of solid biofuels in accordance with EN ISO 17725, Solid biofuels – Fuel specification and classes – Part 1: General requirements.
- Type, exact description and quantity of additives¹ (e.g. pressing aids, slagging inhibitors), if they are used.
- Type and suitability of the raw material storage.
- Production plant: Suitability of the technical facilities in order to be able to produce domestic quality biomass.
- Type and suitability of the product storage.
- Quality management system (in accordance with Chapter 8): in-house manual and/or operating instructions, training records (external and internal), handling of claims and complaints, etc.
- Self-monitoring of production, suitability and condition of the testing devices, reference sample management.
- Product declaration: specify the biofuel or biofuels which are requested to obtain the label.

At the initial inspection, the following tasks must be carried out by the site auditors:

- Sampling from production/storage, description, respectively, photo documentation of the sampling points; the sampling has to be carried out in accordance with EN 14778. The sample shipping to the testing body must be arranged by the inspection body and the sample should be guarded by them until it is shipped. The analysis report has to be forwarded to the applicant and, in copy form, to the label issuer and to the inspection body.
- Inspection of the plant's own sampling procedures for internal quality testing; if necessary, training in representative sampling, including suggestions for improvement.
- Examination of the production process and quality management documentation; these documents are to be treated confidentially by the

¹ Additive is a material, which improves the quality of the fuel (e.g. combustion properties), reduces emissions or makes production more efficient.

inspection body and are not allowed to be passed on to third parties (exceptions are justified inquiries of the label issuer).

The inspection body will be able to access to all parts of the plant and all relevant documentation.

The initial inspection report (including the laboratory results) has to be forwarded to the applicant and, in copy form, to the label issuer.

If minor non-conformities are found during the inspection or laboratory test, the inspection body sets a commensurable deadline for corrective measures; the applicant has to prove that adequate corrective measures have been taken within the deadline (this deadline will be established by the inspection body, it's recommended is about 30 days).

When major non-conformities have occurred, a completely new audit has to be conducted after the defects have been corrected. Major non-conformities that can influence the production quality on a sustained basis are e.g. inappropriate raw material or defective production and storage facilities. Major non-conformities can have a direct or indirect influence on the operating performance of equipment using biomass produced under these conditions.

4.2.3 INITIAL INSPECTION OF A COMMERCIALIZATION COMPANY

The inspection body conducts an initial inspection of the trading site(s) of the interested party, where the following points are to be examined:

- Type and suitability of the product storage.
- Installation: Suitability of the technical facilities in order to be able to distribute domestic quality biomass.
- Quality management system (in accordance with Chapter 8): in-house manual and/or operating instructions, training records (external and internal), handling of claims and complaints, etc.
- Product declaration: specify the biofuel or biofuels which are requested to obtain the label.

At the initial inspection, the following tasks must be carried out by the site auditors:

- Examination of the manipulation processes and quality management documentation; these documents are to be treated confidentially by the

inspection body and are not allowed to be passed on to third parties (exceptions are justified inquiries of the label issuer).

The inspection body will be able to access to all parts of the plant and all relevant documentation.

The initial inspection report has to be forwarded to the applicant and, in copy form, to the label issuer.

If minor non-conformities are found during the inspection or laboratory test, the inspection body sets a commensurable deadline for corrective measures; the applicant has to prove that adequate corrective measures have been taken within the deadline (this deadline will be established by the inspection body, it's recommended is about 30 days).

When major non-conformities have occurred, a completely new audit has to be conducted after the defects have been corrected. Major non-conformities that can influence the production quality on a sustained basis are e.g. inappropriate raw material or defective production and storage facilities. Major non-conformities can have a direct or indirect influence on the operating performance of equipment using non-conforming biomass.

4.2.4 ISSUING THE LABEL

The label issuer body verifies the conformance of the company's product and installations to the Biomassud quality label guidelines based on the following information:

- in the initial application form.
- in the inspection report of the inspection body.
- in the laboratory report with the results of the commercialised biofuels (in the case of producers).

If the application is approved, the applicant is informed and receives a quality label contract and a request for submitting a down-payment of the license fee. When proof of the down payment of the license fee has been received and the signed contract has been returned, label is carried out by sending the documentation with the identification number and the validity period of the quality label.

The company will be entered into a register with all other companies which have obtained the label, which is to be accordingly published on the websites of the national label issuer and the Biomassud WEB site.

4.2.5 SURVEILLANCE INSPECTIONS

Each production facility has to be inspected annually by the inspection body in accordance with the requirements stated in this manual. The inspection body will take a sample and will send it to the testing body who will analyse it. The inspection body must keep custody of the sample and send it by courier or by other means under its presence.

The monitoring inspection can be carried out unannounced.

Improvements and changes in the certification system (for standards, quality management, etc.) are to be brought to the attention of the person responsible for quality management in the plant by the supplier of the label (national label issuer or Biomassud steering committee).

When defects or deviations from the Biomassud quality label regulations are found in the plant or in the laboratory test during the periodic inspection, the accredited inspection body/testing body has to immediately inform the label holder. When minor deviations occur, the accredited inspection body/testing body can set a reasonable grace period (a maximum, however, of 10 weeks), in which the label holder must show that corrective measures have been taken. The label issuer does not need to be informed.

When major defects have occurred, the label issuer has to be immediately informed by the inspection body/testing body. The label issuer is entitled to order a completely new monitoring inspection after the defects have been corrected. Major defects that can influence the production quality on a sustained basis are especially considered such as inappropriate raw material or defective production and/or storage facilities.

4.2.6 APPLICATION PROCEDURE

The interested company submits an application form to the label issuer (national label issuer or Biomassud steering committee) expressing its interest in obtaining the quality label and declares himself/herself willing to observe the regulations of the quality label system. The label issuer makes a decision on the application within 2 months.

When a positive decision about the application is made, the applicant completes a contract with the certification body, which enables it, if necessary, to mandate an inspection by a listed testing centre.

4.2.7 ISSUING OF THE QUALITY LABEL

On the basis of the information provided in the application, the label issuer examines the conformance to the quality label guidelines. If the application is approved, the applicant is informed. As soon as the proof of the down payment of the license fee to the national label issuer or Biomassud steering committee has been received and the signed quality label contract has been returned, the quality label is carried out by sending the label documentation with the identification number and the validity period of the label. In addition, the label holder will be entered into a register with all the other label holders, which will be published on the Biomassud WEB site

4.3 OBJECTION PROCEEDINGS

Applicants and label holders can send a written objection to the label issuer body against the following decisions:

- Refusal of the requested label concession.
- Ordering of new monitoring inspections.
- Ordering of extraordinary inspections (see 4.9).
- Ordering of more frequent inspections in the scope of internal controls.
- Suspension and cancellation of the label license (see 4.4).
- Public mentioning of grievances (see 4.4).

The objection is only permissible when the applicant or label holder proves that the affected decision violates his/her own rights. A written decision on the objection will be made within two weeks by an objection committee to be set up by the national label issuer / Biomassud steering committee. No persons who have definitively been affected by the objection decision can participate in the decision-making process.

4.4 VALIDITY OF THE CERTIFICATE

Validity of the quality label is five years:

- In the case of biomass producers an **annual inspection** and **test** must be carried out. If the annual inspection and test are under Biomassud label requirements no action must be done by label holder and label issuer must inform to the label holder.
- For biomass traders and distributors are required:

- one initial **inspection**.
- a second **inspection** between 2nd and 4th year.
- if the trader/distributor is going to renovate the quality label a renovation **inspection** is required.

When conscious violations of the regulations of this quality label system occur or when noticed non-conformities continue despite repeated demands to remedy these, the national label issuer / Biomassud steering committee has to suspend the license to use the Biomassud label for a limited period or terminate the contract and request the label issuer to revoke the label. If the label holder has several locations, the license can be suspended for the location where the defects have been assessed until they have been corrected. Biomass products from other locations of the label holder can still be marketed as labelled goods.

In the case that the license and the label is revoked, the former label holder can re-apply for certification and license after being verified by the label issuer to be adequate and sufficient.

In addition, the national label issuer / Biomassud steering committee is authorized to publicize the objections on the Internet in an appropriate manner and to name the affected label holder.

4.5 MAJOR CHANGES

The label holder has to immediately report major changes to the label issuer body. Major changes are all changes of the technical equipment as well as the operation processes or the company structure and rules that have to be reported during the Biomassud's quality label application process.

4.6 USE OF THE QUALITY LABEL

When the label is issued, the label holder acquires the right to use the quality label seal for the corresponding quality class to label its products and for advertising purposes. The seal may be exclusively used in direct connection with the certified product, respectively, the certified service (transport, storage). Label holders, who manufacture quality labelled and non-labelled goods, have to avoid the impression that the complete production and trade quantities have the quality label. The certification seal may only appear on invoices when these invoices are issued for Biomassud labelled goods.

The quality label seal will be linked to the identification number of the label holder. Use of the seal without the combination with the identification number is only possible with the permission of the national label issuer / Biomassud steering committee.

However, trading with Biomassud quality labelled bagged products is permissible without having the label. In combination with the identification number of a Biomassud labelled-supplier, the not labelled trader can declare the goods as Biomassud quality labelled on the bill.

4.7 LABELLING

Each sales unit of labelled Biomassud products according to this system has to be labelled with the following specifications. Bagged products:

- Product classification; label must indicate which kind of biomass is according to the tables in annex 1.
- Biomass quality; label must indicate the quality classification according to tables in annex 1.
- Quality label seal.
- Mass (in kg or ton).
- Traceability identification number (see chapter 7).
- Note: Store in dry conditions.
- Note: Use only in approved and appropriate firing units according to manufacturer's information and national regulations.

For bulk biomasses, the bill must indicate **mass** (in kg or ton) and biomass **class** (i.e. Olive Stones) and **quality** (A, B, etc.).

4.8 INTERFACES

Every actor in the production and supply chain guarantees the quality under the Biomassud quality label requirements in his/her area of responsibility. When service providers are engaged, the contracting entity is responsible for adhering to the regulations of this quality label system. The interface to the end consumer is the blow-in nozzle or delivery of the biomass product at the customer's storage.

4.9 REFERENCE SAMPLES

Producers must conserve at least 1 kg of sample every produced batch² as reference sample. The production date & lot, product quality and product quality must be noted. The samples have to

² Every biomass production facility must define its batch size in its internal quality system which is the final product quantity manufactured in the same conditions (same raw material, machine configuration, etc.)

be archived for at least 2 months under proper conditions. The object of keeping the sample is to use it in case of complaints

4.10 REGULAR AND EXTRAORDINARY AUDITS

One annual audit is mandatory for producers. For distributors only one audit every two years is necessary.

In addition to that, extraordinary audits can be carried out upon demand by the label issuer, owners of the scheme or the Biomassud steering committee if significant number of complaints has been received.

If major non-conformities have occurred, the inspection body has to immediately inform the label holder and the label issuer. In this case, the label issuer is authorized to mandate a new inspection after the defects have been corrected. Major defects that can influence the production quality on a sustained basis are especially considered to be inappropriate raw material or defective production and storage facilities.

When conscious violations occur, the regulations stated in 4.4 are applicable.

4.11 COMPLAINT PROCEDURE

When customers or subordinate actors make complaints, the label issuer will pursue these on the basis of the supply chain documented by the identification number. The complaints will be handled by national rules and the in-house documentation of the involved actors will be inspected by label issuer.

Complaints will be acknowledged if storage installations are designed according to National requirements.

Furthermore, at least one of the following preconditions must be fulfilled:

- One sample, which was drawn in the presence of all involved parties (customer/ dealer/ installer/ service technician), was examined by a listed testing body and does not conform to the chemical and physical characteristic values (see the tables in annex 1).
- The average fine material quantity in the storage area exceeds 10% and the boiler combustion shows clear signs of malfunction due to this. There must only have been used 20% of the silo load since the last silo filling. A sample is

drawn in presence of the involved parties and examined by a testing body as mentioned beforehand. If possible a representative sample must be taken in a falling stream between silo and boiler, and must consist of 3 individual samples which are mixed afterwards.

5 PRODUCT QUALITY

The scope of this quality label is to assure the quality of the biomasses used for domestic purposes in the Mediterranean region. The biomasses covered by the Biomassud certification system:

1. **Wood pellets.** Quality specifications according to ISO 17225-2. See Annex 1 table 1 for thresholds.
2. **Wood chips.** Quality specifications according to ISO 17225-4. See Annex 1 tables 2.1 and 2.2 for thresholds.
3. **Olive stones.** Quality specifications according to UNE 164003. See Annex 1 table 3 for thresholds.
4. **Almond shells.** Quality specifications according to 164004. See Annex 1 table 4 for thresholds.
5. **Chopped pine cone.** Quality specifications according to 164004. See Annex 1 table 5 for thresholds
6. **Pine nut shells.** Quality specifications according to 164004. See Annex 1 table 6 for thresholds
7. **Hazelnuts shells** Quality specifications according to 164004. See Annex 1 table 4 for thresholds

Mixtures between biomasses already inside the system are allowed always that resulting mixture is still fulfilling quality requirements (i.e. pine nut shells are usually mixed with chopped pine cone). Mixtures with other biomasses not included in the system even if they fulfill the quality requirements must be approved by the Biomassud Steering Committee.

It's obligatory to indicate the percentage of the biomasses used in the mixture, introduce this information into the traceability system and write it in the bag / invoice.

Other similar domestic biomasses can be accepted in the quality label if quality specifications are within the limits of any of the biomasses in the system. A communication to the Biomassud Steering Committee and the approval of this committee is required.

If specifications of a similar domestic biomass are not within the limits by few parameters and with values relatively close its inclusion in the system may be studied. A communication to the Biomassud Steering Committee and the approval of this committee is required.

The relevant quality parameters, the corresponding threshold values, as well as the specifications for the raw materials to be used, are listed in annex 1.

6 SUSTAINABILITY REQUIREMENTS

Certified producers have to document the origin of the raw material and inform the inspection body at the yearly audit regarding the share of raw material. If raw material also includes woody biomass it is recommend to state, if it is coming from certified sources (FSC, PEFC or equivalent systems). The inspection body integrates this information in the audit report.

Biomassud project has studied the production chains of all the domestic biomasses included in the quality label and the decision of the Biomassud Steering committee has been to include two minimum sustainability requirements: Greenhouse gases (GHG) emitted and energy used for the production of the biomass fuel.

The limits were established by the *task 3.4. Establish minimum sustainability criteria for every step in the solid biomass supply chain* of the Biomassud project.

GHG (Green House Gases): The reduction emissions of greenhouse gases emissions thanks to the use of the certified biomass as a substitute for natural gas will be a minimum of 70%. It takes into account the emissions produced by the raw materials transportation to the manufacturing facility and those generated in the process of preparation and conditioning of the biofuel. This limit will be verified during the pilot audits that will be realised during the project.

Energy consumed: The energy used in transporting raw materials to the production facility and the energy used in the processes of preparation and conditioning of biofuel may not exceed 40% of the energy contained in the fuel (PCI on wet basis). This limit will be verified during the pilot audits that will be realised during the project.

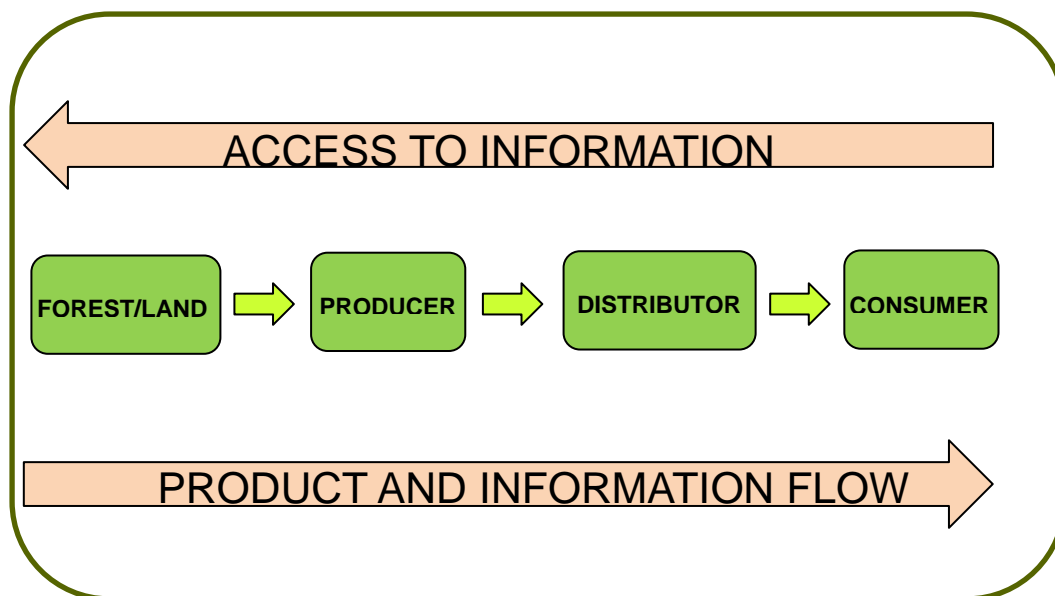
A tool for calculating the GHG and Energy consumed has been created and its results have to be introduced into the traceability system by the producer / trader making able to the consumer to

know this information. Information introduced in the tool to calculate GHG and Energy consumed must be verified by the auditors so all the information for calculating must be accessible.

7 TRACEABILITY

The Biomassud quality label is requiring quality (ash, moisture, etc.) and sustainability requirements (GHG, Energy) along the cycle of life of the biomass, but for warranting that the product bought by a consumer it is the same which has been produced with a minimum quality and sustainability, a traceability system must be set up becoming itself a sustainability requirement.

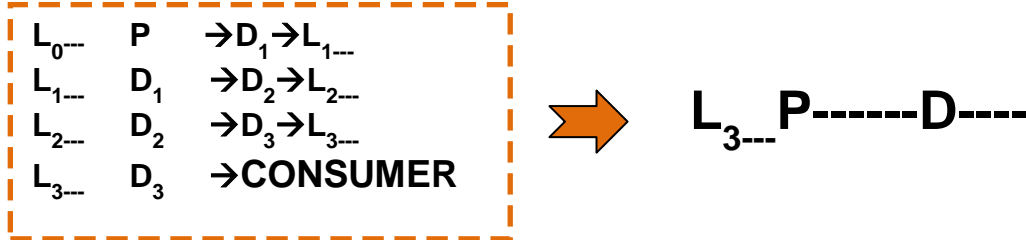
This tracking system serves as self-control and quality assurance, through the identification number and register of the biomass products movements which have been documented in every step of the value chain, makes possible locate quality defects, offer to the consumer information about the quality and sustainability of the biomass products.



As cited in the chapter 4.8.1, producers must archive reference samples that in case of complaints can be analysed by a testing body and may compared with a sample taken at the complainant's if necessary.

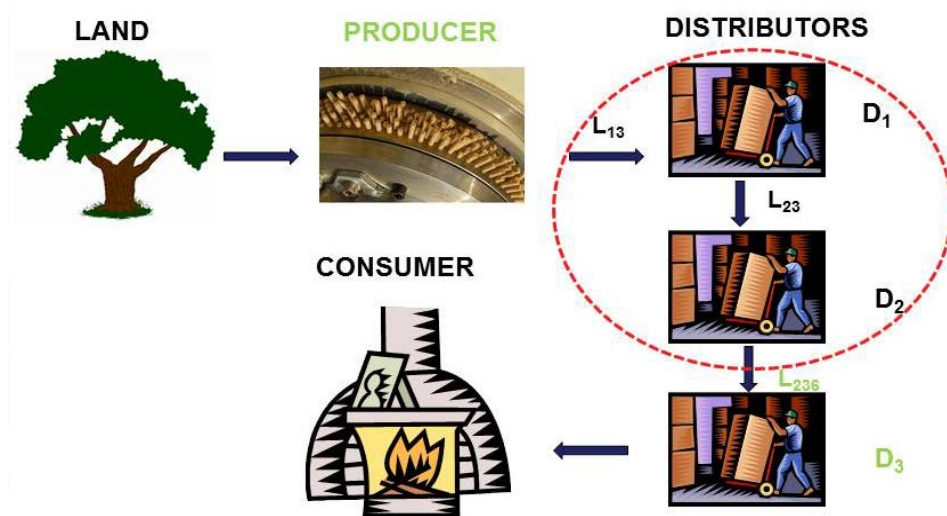
7.1 IDENTIFICATION NUMBER

Through a system of unique identification numbers, each delivery should be able to be traced back the whole value chain from the end customer to the producer passing through the distributor(s) of the logistic chain.



L----: it corresponds to the lot number. It will be formed by a number indicating the step of the chain (0 for producer, 1 for first distributor, 2 for second distributor, etc.) and the lot number. It will allow knowing production date and other details of the production of this biomass. For example: an olive stone producer company produces a lot with the number 149, the code would be → **L0149**

As distributors usually split the lots they buy into several smaller lots, all the companies implicated in the value chain, producers and distributor, must keep the register with the equivalences between the goods entering and the goods going out so the auditor can check them. For preserving commercial interests, the last step which is selling to the consumer can only indicate on the bag/bill its id. number and the producer id. Anyway, the GHG emissions and energy expensed along the chain will be public.



P----: identify the producer. It will be composed of the country 2 characters ISO CODE (ISO 3166-1-alpha-2 for example, ES for Spain) and a unique and correlative number of three ciphers

(001, 002, etc.). This id will allow us to give information of the producer: For example, if an imaginary company which is an olive stone producer called “Huesos Spain” fulfils the requirements and obtains the label will be assigned a number, the 159 for example, so it will be PES159.

D-----: identify the distributor. It will be composed of the country 2 characters ISO CODE (for example, ES for Spain) and a unique and correlative number of three ciphers (001, 002, etc.) so every distributor will have an assigned number.

For example, an olive stones distributor company with the quality label with the number 025 from Spain has sold a bag from the production site of previous example, “Huesos Spain”, and the lot number is the 149, the resulting code could be:

L1149 – PES159 - DES025

It’s obligatory to show the producer code or last certified trader inside the Biomassud logo (see example in chapter 11) on the bags or the invoices if sold in bulk. It’s not necessary to show all the codes from every step of the commercial chain (producer, then first trader, second trader, etc.) but the documentation showing the chain must be accessible to auditors. The batch number must be shown in every unit sale but not necessary together with the producer / trader code.

If a manufacturer operates several production facilities the respective company can request for several numbers. Mixtures between different quality-labelled productions are allowed. It’s obligatory to indicate the percentage coming from each facility, introduce this information into the traceability system and write it in the bag / invoice.

In the case of a trader, it is possible to blend between quality-labelled biomasses from different sources but it’s obligatory to indicate the percentage of the biomasses and sources used in the mixtures, introduce this information into the traceability system and write in the bag / invoice.

Non-labelled dealers without their own storage capacities and transport vehicles have to work together with service providers with the quality label.

A commercialization company can bag biomasses in a quality labelled producer and maintain the quality label always that the identification of the producer is marked in the bag. For bulk biomasses, the same procedure, the trader can sell with the quality label if the trader identifies the producer with its number.

7.2 TRACEABILITY TOOL AND DOCUMENTATION

Biomassud consortium is creating the tools for integrating all these data in a telematics platform (producers, distributors, etc.) making possible to follow the biomass product along the supply chain. Producers and trader joining the quality label must introduce all the required data in order to make possible the traceability system. Also they must keep record of all the data (lots equivalences, producers/traders in / outs, etc.) and make available this documentation to auditors when required.

8 QUALITY MANAGEMENT

In order to fulfil a minimum quality, a basic quality management system must be set up in the label holder installations. In this chapter, the guidelines for internal quality management are established. How these guidelines are implemented is largely left up to the certificate holders. EN 15234-6 requirements will be the basis of the Biomassud quality system. Alternatively, a quality management system according to ISO 9001 can be set up.

8.1 PRODUCTION

8.1.1 TECHNICAL OPERATING EQUIPMENT AND OPERATION PROCESSES

The production facilities must fulfil the following requirements:

- The certificate holder must have adequate technical equipment for the production, loading and possible packaging of biomasses at its disposal. The functions and condition of this equipment must be regularly checked.
- When raw materials are received from new suppliers, their adequacy has to be checked (incoming goods inspection), e.g., through certification of the manufacturer or by an individual inspection (i.e. checking the ash, moisture, chlorine and nitrogen content, the ash melting behaviour).
- Contaminations of the raw materials by substances such as soil, stones and grain, as well as contaminations of the manufactured biomasses, must also be excluded. Manipulation areas, silos and conveyor equipment must be regularly checked for soiling and, if necessary, cleaned. This also applies to each loading of external vehicles, as far as it does not involve special vehicles for the exclusive biomass transport.

- Fines are an important quality requirement in wood pellets. Producers have to sieve wood pellets before loading the trucks or being bagged to fulfil maximum threshold established by Biomassud quality label (see annex 1 for limits).
- Apart from the treatments for drying the biomasses if necessary, they must be stored under cover in an appropriate storage to not absorb any water, i.e. through contact with condensed water, rain or snow.
- In the case of malfunctions in the production process, it must be checked which quantities of defective biomasses were produced up until the malfunction was noticed. These biomass products are not allowed to be sold under the Biomassud quality label.
- After repair and maintenance work has been completed, the manufactured biomasses must undergo an in-house quality inspection.
- All involved employees must receive training from the quality assurance representative concerning the required quality demands.
- The label holder must have the appropriate testing instruments and testing means, as well as the commensurate knowledge to inspect the manufactured biofuels.

8.1.2 REPORTING OF PRODUCED QUANTITIES

Every month, the quantities of the different biomasses produced / traded in the production plant / distributor must be reported for statistical use. Biomasses not sold under the quality label must be included too.

8.1.3 QUALITY ASSURANCE REPRESENTATIVE

Label holder management must appoint an experienced employee as a quality assurance representative. This person must ensure the orderly internal documentation and is responsible for archiving reference samples, as well as carrying out self-inspections, if necessary. The appointed employee must know the effects of different operating processes on the quality of the manufactured biomasses and appropriately train the other employees for their areas. Moreover, he/she is the contact partner for his/her colleagues in the case of malfunctions in the production process. The quality assurance representative can delegate individual monitoring and documentation tasks to other employees. In this case, he/she has to brief the responsible employee and monitor the orderly execution of these tasks. Additionally, the quality assurance

representative has to participate in an external training course for quality assurance in the first year of certification.

8.1.4 INTERNAL DOCUMENTATION

The quality assurance representative must ensure the orderly documentation and evaluation of operating processes that have an effect on the quality of the manufactured biomasses. In detail, the documentation must comprehend the following points:

- Raw materials and additives receiving (date, quantity and name of the supplier; for pressing aids: the type of material, internal storage location identity)
- Outgoing goods (date, quality category, quantity and name of the customer), the used vehicles or external forwarders, and the freight which was last transported by the vehicle – in as much as no special vehicle will be used for the exclusive transportation of the pellets - as well as a description of the respective reference samples
- The addition of pressing aids or other additives (type: data sheet with the chemical composition, as well as dosage)
- Manufacturing of biomasses under the label or not (period, quality, quantity)
- Production process malfunctions (date, type of malfunction, measures taken to solve the problem, quantity and disposition of the biomasses which cannot be sold under the label)
- More extensive repair and maintenance work that could lead to a change in the biomass quality (date, type of work performed)
- Employee training regarding the effect of the various production factors on the biomass quality (date, participants, contents)
- Areas of responsibility of the individual employees
- Self-inspection (documentation and evaluation of the results)
- Customer complaints (date, results of the findings, measures taken to remedy the defects, if necessary).

The documentation is always to be kept up-to-date and regularly presented to management for its verification. For this purpose, it is recommended to maintain a shift book. Discovered defects

are to be immediately disclosed to the responsible employees and to be remedied.

8.1.5 SELF-INSPECTIONS

The producer must regularly inspect the quality of the manufactured biomasses to verify the fulfilment of the product requirements and to avoid the production of larger defective batches. When reasonable doubts concerning the biomass quality exist, the accredited testing centre can stipulate more frequent internal inspections in the scope of monitoring or extraordinary inspections.

Frequency of the checks will be stated by the producer proportionally to its production size and its batch definition³. A big producer⁴ should make a self-inspection per shift (it's batch definition would be of a shift). Smaller producers should be inspected at least once per batch. It's recommended to calculate the frequency of the checks with the following formula (EN 15234-6):

$$N = \frac{10}{days} * \sqrt{\frac{ton}{10}}$$

- N number of sample in 24h
- days annual working days
- ton annual quantity of biomass in tons

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

Parameters that must be inspected in the scope of internal quality inspections are listed below.

Parameter	Point of the Test	Frequency
Bulk density (BD)	After production, before storage	At least once per batch
Moisture (M)	After production, before storage	At least once per batch
Mechanical durability (DU)	After production, before storage	At least once per batch

³ Every biomass production facility must define its batch size in its internal quality system which is the final product quantity manufactured in the same conditions (same raw material, machine configuration, etc.)

⁴ Producers with a >10.000 tons / year are considered big producers

(only in pellets)		
Particle size (only in wood chips)	After production, before storage	At least one per batch
Fines (F)	At the last possible point before delivery	At least once per batch
Length (L) (only in pellets)	After production before storage	At least once per batch o when visual inspections indicate long pellets

Internal controls should be performed according to methods approved by the inspection body. There is no need to follow strictly the laboratory standard but using a method that ensures an adequate accuracy for the purpose of internal controls.

8.2 COMMERCIALIZATION: HANDLING, STORAGE AND DELIVERY OF BIOMASSES

8.2.1 TECHNICAL OPERATING EQUIPMENT AND OPERATION PROCESSES

The following requirements must be fulfilled during storage and delivery to end customers:

- The label holder must have adequate technical equipment for the storage and/or transport of label at its disposal. The functions and condition of this equipment must be regularly checked.
- Manipulation areas, silos and conveyor equipment must be regularly checked for soiling and, if necessary, cleaned. This also applies to the loading of external vehicles, as far as it does not involve special vehicles for the exclusive transport of biomass. Responsibility for the inspection lies with the label holder that delivers the biomass. However, this can also be contractually regulated in a different manner.
- The biomass must not absorb any moisture, i.e. through contact with condensed water, rain or snow. Condensate formation is to be excluded as far as possible.
- The mixing of biomass of different quality (biomasses under quality label and biomasses without label) must be precluded through the conscientious

planning of operation procedures and/or the possibility of spatially divided storage, respectively, of spatially divided transport.

- Wood pellets have to be sieved before loading the trucks or being bagged to fulfil maximum threshold established by Biomassud quality label (see annex 1 for limits).
- Before being loaded onto the delivery trucks, biomasses must be verified in order to check that they don't show high temperatures or self-combustion processes. In the case of wood pellets, the temperature of the loaded biomasses must not exceed 40°C (EN 15234-6).

During the loading process, the driver of the delivery vehicle must assure himself of the quality of the biomass by doing a visual inspection.

- Reference samples are to be taken when biomass is delivered in bulk to the end customer (see 4.8.1).
- It's recommended, not obligatory, when a delivery to end customers is made, the transport mechanisms and the store should be checked for irregularities (i.e. missing impact mats or unfavourable pipe angles). Obvious defects of the storage area or existing dust build-up are recommended to be documented on the delivery note and are to be confirmed by the customer if present.
- The filling level of the store must be estimated before the filling process.
- It's recommended, not obligatory, when a delivery to end customers is made, a checklist stating all relevant details for the quality of delivery has to be filled out.
- Drivers with contact to end customers must have an internal training course.
- Instructions for healthy and safety issues for delivery and storage must be provided. Especially, instructions of ventilation in order to avoid any harmful CO-level in transport or storage rooms shall be given.

8.2.2 QUALITY ASSURANCE REPRESENTATIVE

Certificate holder management must appoint an experienced employee as a quality assurance representative. This person must ensure the orderly internal documentation and is responsible for carrying out self-inspections, as well as for archiving reference samples. The appointed

employee must know the effects of different operating processes on the quality of the traded pellets and train the other employees accordingly. Drivers who deliver biomass to end customers are furthermore responsible for customer contact and must be correspondingly instructed. The quality assurance representative can delegate individual monitoring and documentation tasks to other employees. In this case, he/she has to brief the responsible employee and monitor the orderly execution of these tasks. Additionally, the quality assurance representative has to participate in an external training course for quality assurance in the first year of certification.

8.2.3 INTERNAL DOCUMENTATION

The quality assurance representative must ensure the orderly documentation and evaluation of operating processes that have an effect on the quality of the traded biomass.

In detail, the documentation must encompass the following points:

- Materials received (date, biomass quality, quantity and name of the supplier).
- Outgoing goods (date, biomass quality, quantity, name of the customer, the store which the batch originates from, the used vehicles or external forwarders and the freight which was last transported by the vehicle, as well as a confirmation of the carried out cleaning of the vehicle - inasmuch as no special vehicle will be used for the exclusive transportation of the biomass).
- Problems during storage and transport (date, type of problem, effect on the biomass quality, measures taken to remedy the defects, quantity and disposition of the substandard biomasses).
- Repair and maintenance work that can lead to a change in the biomass quality (date, type of work performed, either a confirmation that no irregularities could be determined during the visual inspection or of measures taken to remedy the defects, as well as the quantity and disposition of the substandard biomasses).
- Self-inspections (documentation and evaluation of the results, see 8.2.4).
- Delivery to the end customer (quality of the biomass at loading, irregularities as well as the estimated remainder of the stock; when a delivery is made with a silo vehicle, the blowing-in pressure and the hose lengths) are to be documented.

- Areas of responsibility of the individual employees (organisation flowchart and description of work).
- Employee training regarding the effect of the various operating processes on the biomass quality (date, participants, and contents).
- Customer complaints (date, measures taken to remedy the defects).

8.2.4 SELF-INSPECTIONS

The quality assurance representative is responsible for regularly inspecting the quality of the traded biomasses to verify the fulfilment of the product quality requirements. The extent and type of the inspections are left up to the label holder. However, the minimum requirement is a weekly visual inspection of the stored biomasses, including the storage facilities. This can also be done based on reference samples (see 4.10.2).

The tests have to be carried out according to a previously determined inspection plan; the execution and the results are to be documented.

9 LISTED INSPECTION AND TESTING BODIES

Biomassud's quality label listed inspection bodies are qualified organizations that audit the technical facilities and the internal quality management of biomass producers or traders. Biomassud's quality label listed testing bodies are qualified laboratories that analyse biomass quality. They are listed on the Biomassud website <http://biomasud.eu>

9.1 APPLICATION PROCEDURE

Biomassud quality label is an European project initiative so, in the first steps of the quality label, while the system is trial phase, the inspection testing bodies will be formed by members of the consortium which is integrated by organizations with laboratories and technicians. In case, there isn't testing body or inspection body, the partner/s responsible for the country will search an appropriate inspection / testing body. It's also recommended by Biomassud Steering Committee to invite to inspection companies to the pilot implantations of the quality label for training purposes.

Later on, when the quality will be in commercial phase, Biomassud steering committee will publish the requirements for testing and inspections body.

Inspection and testing bodies must be accepted by the Biomassud steering committee who will publish on its WEB the list of accepted testing bodies for verifying within the Biomassud label.

10 RAW MATERIAL REQUIREMENTS

The types of raw material or sources for biomasses indicated in Annex 1 that are acceptable for the Biomassud quality label are obtained from ISO 17225-1 standard. In the next table are defined the sources permitted for every domestic biomass fuel under the quality label.

10.1 RAW MATERIALS AND SOURCES PERMITTED

Table 1: Raw material and sources permitted for Biomassud quality label biomasses as per the ISO-17225-1

Biomass type	Biomass quality class			
	A / A1	A2	B / B1	B2
Wood pellets	1.1.3 Stemwood 1.2.1 Chemically untreated wood by-products and residues	1.1.1 Whole trees without roots 1.1.3 Stemwood 1.1.4 Logging residues 1.1.6 Bark (from forestry operations) 1.2.1 Chemically untreated wood by-products and residues	1.1 Forest, plantation and other virgin wood 1.2 By-products and residues from wood processing industry 1.3 Used wood	-
Wood chips	1.1.1 Whole trees without roots ^a 1.1.3 Stemwood 1.2.1 Chemically untreated wood by-products and residues 1.1.4.3 Logging residues	1.1.1 Whole trees without roots ^a 1.1.3 Stemwood 1.2.1 Chemically untreated wood by-products and residues 1.1.4.3 Logging residues	1.1 Forest, plantation and other virgin wood ^b 1.2.1 Chemically untreated wood by-products and residues	1.2 By-products and residues from wood processing industry 1.3 Used Wood
Olive stones	3.1.2.3 Stone/kernel fruits (chemically untreated) 3.2.2.2 Stone/kernel fruits (chemically treated)		3.1.2.3 Stone/kernel fruits (chemically untreated) 3.2.2.2 Stone/kernel fruits (chemically treated)	-
Almond shells	3.1.3.2 Shells/husks		3.1.3.2 Stone/kernel fruits (chemically untreated)	-
Chopped pine cone	3.1.3.2 Shells/husks		3.1.3.2 Shells/husks	-

Pine nut shells	3.1.3.2 Shells/husks		3.1.3.2 Shells/husks	
Hazelnut shells	3.1.3.2 Shells/husks		3.1.3.2 Shells/husks	
^a Excluding class 1.1.1.3 Short rotation coppice, if reason to suspect contamination of land or if planting has been used for the sequestration of chemicals or wood is fertilized by sewage sludge (issued from waste water treatment or chemical process). ^b Excluding classes 1.1.5 Stumps/roots and 1.1.6 Bark.				

If composition of mixture is known, the w-% can be used to specifying blends.

Example 1: 80 w-% 1.1.1 Whole trees without roots, 20 w-% 1.2.1 chemically untreated wood residues

In the case of mixture, the main component should be stated first.

10.2 REQUIREMENTS FOR ADDITIVES

Additives (i.e. pressing aids or slagging inhibitors) are used to improve fuel quality, to decrease emissions or to boost burning efficiency are allowed. The type (material and trade name) and quantity (in max.-%) of the pressing additives used have to be documented.

Also additives, which are used after production, before delivery to end-user storages, must be documented. Water, heat and steam are not additives in terms of this regulation.

11 SEAL AND EXAMPLES OF THE PRODUCT DECLARATION

Firstly, the seal has to feature a minimum height of 15 mm. The identification number of the label holder is an essential component for traceability purposes and must be displayed close to the seal. Furthermore, the height of the identification number may not be any smaller than ten percent of the seal’s height, but a minimum height of 1.5 mm (Arial font size of 10).

The seal must be displayed in one of the colour variations or in monochrome specified here.



The quality label seal has to be used only in addition with the identification number of the certificate holder.

Using the seal without the identification number is not possible but with written authorization of the BiomaSud Steering committee.

ANNEX 1: SPECIFICATIONS OF DOMESTIC BIOMASSES INSIDE THE BIOMASUD QUALITY LABEL

1. Wood pellets. Limits according to ISO 17225-2 (table 1)

	Normative				
	Property class /Analysis method	Unit	A1	A2	B
Origin and source ISO 17225-1			1.1.3 Stemwood 1.2.1 Chemically untreated wood residues	1.1.1 Whole trees without roots 1.1.3 Stemwood 1.1.4 Logging residues 1.1.6 Bark 1.2.1 Chemically untreated wood residues	1.1 Forest, plantation and other virgin wood 1.2 By-products and residues from wood processing industry 1.3 Used wood
Diameter, D ^a and Length L ^b , ISO 17829	mm	D06, 6 ± 1; 3,15 ≤ L ≤ 40 D08, 8 ± 1 3,15 ≤ L ≤ 40	D06, 6 ± 1; 3,15 ≤ L ≤ 40 D08, 8 ± 1; 3,15 ≤ L ≤ 40	D06 6 ± 1; 3,15 ≤ L ≤ 40 D08 8 ± 1; 3,15 ≤ L ≤ 40	
Moisture, M, ISO 18134-1, ISO 18134-2	as received, w-% wet basis	M10 ≤ 10	M10 ≤ 10	M10 ≤ 10	
Ash, A, ISO 18122	w-% dry	A0.7 ≤ 0,7	A1.2 ≤ 1,2	A2.0 ≤ 2,0	
Mechanical durability, DU, ISO 17831-1	as received, w-%	DU97.5 ≥ 97,5	DU97.5 ≥ 97,5	DU96.5 ≥ 96,5	
Fines F, ISO 18846	w-% as received	F1.0 ≤ 1,0	F1.0 ≤ 1,0	F1.0 ≤ 1,0	
Additives ^c	w-% dry	≤ 2 w-% Type and amount to be stated	≤ 2 w-% Type and amount to be stated	≤ 2 w-% Type and amount to be stated	
Net calorific value, Q, ISO 18125	as received, MJ/kg or kWh/kg	Q16.5, 16,5 ≤ Q ≤ 19 or Q4.6, 4,6 ≤ Q ≤ 5,3	Q16.3, 16,3 ≤ Q ≤ 19 or Q4.5, 4,5 ≤ Q ≤ 5,3	Q16.0, 16,0 ≤ Q ≤ 19 or Q4.4, 4,4 ≤ Q ≤ 5,3	
Bulk density, BD, ISO 17828	kg/m ³	BD600 ≥ 600	BD600 ≥ 600	BD600 ≥ 600	
Nitrogen, N, ISO 16948	w-% dry	N0.3 ≤ 0,3	N0.5 ≤ 0,5	N1.0 ≤ 1,0	
Sulphur, S, ISO 16994	w-% dry	S0.04 ≤ 0,04	S0.05 ≤ 0,05	S0.05 ≤ 0,05	
Chlorine, Cl, ISO 16994	w-% dry	Cl0.02 ≤ 0,02	Cl0.02 ≤ 0,02	Cl0.03 ≤ 0,03	
Arsenic, As, ISO 16968	mg/kg dry	≤ 1	≤ 1	≤ 1	
Cadmium, Cd, ISO 16968	mg/kg dry	≤ 0,5	≤ 0,5	≤ 0,5	
Chromium, Cr, ISO 16968	mg/kg dry	≤ 10	≤ 10	≤ 10	
Copper, Cu, ISO 16968	mg/kg dry	≤ 10	≤ 10	≤ 10	
Lead, Pb, ISO 16968	mg/kg dry	≤ 10	≤ 10	≤ 10	
Mercury, Hg, ISO 16968	mg/kg dry	≤ 0,1	≤ 0,1	≤ 0,1	
Nickel, Ni, ISO 16968	mg/kg dry	≤ 10	≤ 10	≤ 10	
Zinc, Zn, ISO 16968	mg/kg dry	≤ 100	≤ 100	≤ 100	
Informative: Ash melting behavior ^d , prEN15370	°C	Should be stated	Should be stated	Should be stated	

^a Actual diameter class (D06, D08) of pellets to be stated.

^b Amount of pellets longer than 40 mm can be 1 w-%. Maximum length shall be < 45 mm.

^c Type of additives to aid production, delivery or combustion (e.g., pressing aids, slagging inhibitors or any other additives like starch, corn flour, potato flour, vegetable oil,...). Also additives which are used after production, before unloading to end-user storages, shall be stated similarly (type and amount).

^d All characteristic temperatures (shrinkage starting temperature (SST), deformation temperature (DT), hemisphere temperature (HT) and flow temperature (FT) in oxidizing conditions should be stated.

2. Wood chips.

Particle size thresholds according to ISO 17225-4 (table 2.1)

Dimensions (mm). ISO 17827-1					
	Main fraction ^a (minimum 60 w-%). mm	Fines fraction, w-% (< 3,15 mm)	Coarse fraction, w-%, (length of particle mm)	Max. length of particles ^b , mm	Max. cross section area of the coarse fraction ^c , cm ²
P16S	3,15 mm < P ≤ 16 mm.	≤ 15 %	≤ 6% (> 31,5 mm)	≤ 45 mm	≤ 2 cm ²
P31S	3,15 ≤ P ≤ 31,5 mm	≤ 10%	≤ 6% (> 45 mm)	≤ 150 mm	≤ 4 cm ²
P45S	3,15 ≤ P ≤ 45 mm	≤ 10%	≤ 10% (> 63 mm)	≤ 200 mm	≤ 6 cm ²

^a The numerical values (P-class) for dimension refer to the particle sizes passing through the mentioned round hole sieve size (ISO-17827-1). The lowest possible class should be stated. Only one class shall be specified for wood chips.

^b Length and cross sectional area only have to be determined for those particles, which are to be found in the coarse fraction. Maximum 2 pieces of about 10 litre sample may exceed the maximum length, if the cross sectional area is < 0,5 cm²

^c For measuring the cross sectional area it is recommended to use a transparent set square, place the particle orthogonally behind the set square and estimate the maximum cross sectional area of this particle of the cm² pattern.

Limits according to ISO 17225-4 (table 2.2)

	Property class /Analysis method	Unit	A1	A2	B1	B2
Normative	Origin and source ISO 17225-1		1.1.1 Whole trees without roots ^a 1.1.3 Stemwood 1.1.4 Logging residues 1.2.1 Chemically untreated wood residues	1.1.1 Whole trees without roots ^a 1.1.3 Stemwood 1.1.4 Logging residues 1.2.1 Chemically untreated wood residues	1.1 Forest, plantation and other virgin wood ^b 1.2.1 Chemically untreated wood residues	1.1 Forest, plantation and other virgin wood ^b 1.2 By-products and residues from wood processing industry 1.3.1 Chemically untreated used Wood
	Particle size, P ISO 17827-1	mm	to be selected from table 1		to be selected from table 1	
	Moisture, M ^c , ISO 17827-1 ISO 18134-2	as received, w-% wet basis	M10 ≤ 10 M25 ≤ 25	M35 ≤ 35	Maximum value to be stated	
	Ash, A, ISO 18112	w-% dry	A1.0 ≤ 1,0	A1.5 ≤ 1,5	A3.0 ≤ 3,0	
	Bulk density, BD ^d , ISO 17828	kg/loose m ³ as received	BD150 ≥ 150 BD200 ≥ 200 BD250 ≥ 250	BD150 ≥ 150 BD200 ≥ 200 BD250 ≥ 250 BD300 ≥ 300	Minimum value to be stated	
	Nitrogen, N, ISO 16948	w-% dry	Not applicable	Not applicable	N1.0 ≤ 1,0	
	Sulphur, S, ISO 16994	w-% dry	Not applicable	Not applicable	S0.1 ≤ 0,1	
	Chlorine, Cl, ISO 16994	w-% dry	Not applicable	Not applicable	Cl0.05 ≤ 0,05	
	Arsenic, As, ISO 16968	mg/kg dry	Not applicable	Not applicable	≤ 1	
	Cadmium, Cd, ISO 16968	mg/kg dry	Not applicable	Not applicable	≤ 2,0	
	Chromium, Cr, ISO 16968	mg/kg dry	Not applicable	Not applicable	≤ 10	
	Copper, Cu, ISO 16968	mg/kg dry	Not applicable	Not applicable	≤ 10	
	Lead, Pb, ISO 16968	mg/kg dry	Not applicable	Not applicable	≤ 10	
	Mercury, Hg, ISO 16968	mg/kg dry	Not applicable	Not applicable	≤ 0,1	
	Nickel, Ni, ISO 16968	mg/kg dry	Not applicable	Not applicable	≤ 10	
Zinc, Zn, ISO 16968	mg/kg dry	Not applicable	Not applicable	≤ 100		
Net calorific value, Q ^e , ISO 18125	MJ/kg or kWh/kg as received	Minimum value to be stated				

^a Excluding class 1.1.1.3 Short rotation coppice, if reason to suspect contamination of land or if planting has been used for the sequestration of chemicals or wood is fertilized by sewage sludge (issued from waste water treatment or chemical process).

^b Excluding classes 1.1.5 Stumps/roots and 1.1.6 Bark.

^c Lowest possible property class to be stated. Certain boilers require minimum moisture content, which should to be stated. Moisture class M10 is for artificially dried wood chips

^d The bulk density is lower for coniferous than for broad leaf wood

^e See Annex D from ISO 17225-1 for calculation of net calorific value as received

3. Olive Stones. Limits according to UNE 164003 (table 3)

Property class /Analysis method		Unit	A1	A2	B
Origin and source ISO 17225-1			3.1.2.3 Stone/kernel/fruit fibre 3.2.1.2 Stone/kernel/fruit fibre 3.2.2.2 Chemically treated Stone/kernel/fruit fibre ^a	3.1.2.3 Stone/kernel/fruit fibre 3.2.1.2 Stone/kernel/fruit fibre 3.2.2.2 Chemically treated Stone/kernel/fruit fibre	3.1.2.3 Stone/kernel/fruit fibre 3.2.1.2 Stone/kernel/fruit fibre 3.2.2.2 Chemically treated Stone/kernel/fruit fibre
Particle size EN 15149-1 ISO 17827-1	Fines, F < 1 mm	as received, w-% wet basis	< 1	< 1	< 3
	Fines, F < 2 mm	as received, w-% wet basis	< 15	< 15	< 25
	Maximum nominal size ^b	as received, w-% wet basis	< 8	< 8	< 8
Skin content ISO 658		as received, w-% wet basis	≤ 1.0	≤ 2.0	≤ 3.0
Oil content, ISO 659		w-% dry	≤ 0,6,0	≤ 1,0	<u>1,5</u>
Moisture, M, EN 14774-1, EN 14774-2 ISO 18134-1; ISO 18134-2		as received, w-% wet basis	M12 ≤ 12	M12 ≤ 12	M16 ≤ 16
Ash, A, EN14775; ISO 18122		w-% dry	A0.7 ≤ 0,7	A1.0 ≤ 1,0	A1.5 ≤ 1,5
Net calorific value, Q, EN 14918; ISO 18125		as received, MJ/kg or kWh/kg	Q15.7, Q ≥ 15,7 or Q ≥ 4,4	Q15.7, Q ≥ 15,7 or Q ≥ 4,4	Q15.1, Q ≥ 15,1 or Q ≥ 4,2
Bulk density, BD, EN 15103; ISO 17828		kg/m ³	BD700 ≥ 700	BD650 ≥ 650	BD600 ≥ 600
Nitrogen, N, EN 15104; ISO 16948		w-% dry	N0.3 ≤ 0,3	N0.4 ≤ 0,4	N0.6 ≤ 0,6
Sulphur, S, EN 15289; ISO 16994		w-% dry	S0.03 ≤ 0,03	S0.04 ≤ 0,04	S0.05 ≤ 0,05
Chlorine, Cl, EN 15289; ISO 16968		w-% dry	Cl0.03 ≤ 0,03	Cl0.04 ≤ 0,04	Cl0.05 ≤ 0,05
Arsenic, As, EN 15297; ISO 16968		mg/kg dry	≤ 0,5	≤ 0,5	≤ 0,5
Cadmium, Cd, EN 15297; ISO 16968		mg/kg dry	≤ 1,0	≤ 1,0	≤ 1,0
Chromium, Cr, EN 15297; ISO 16968		mg/kg dry	≤ 10	≤ 10	≤ 10
Copper, Cu, EN 15297; ISO 16968		mg/kg dry	≤ 15	≤ 15	≤ 15
Lead, Pb, EN 15297; ISO 16968		mg/kg dry	≤ 10	≤ 10	≤ 10
Mercury, Hg, EN 15297; ISO 16968		mg/kg dry	≤ 0,01	≤ 0,01	≤ 0,01
Nickel, Ni, EN 15297; ISO 16968		mg/kg dry	≤ 15	≤ 15	≤ 15
Zinc, Zn, EN 15297; ISO 16968		mg/kg dry	≤ 20	≤ 20	≤ 20

^a Olive stones can come from olive mills or oil extractor industries. If they come from oil extractor industries may have suffer a chemical treatment with hexane or other solvents for extracting the residual oil (this solvent is recovered later on). This extraction process and the solvent have to be declared. Olive stones treated with chemical additives such as salt or soda are excluded from this standard.

^b 100% of the mass must pass through a 16 mm sieve

4. Almond Shells and Hazelnuts. Limits according to UNE 164004 (table 4)

Property class /Analysis method		Unit	A1 ^a	A2	B
Origin and source ISO 17225-1			3.1.3.2 Shells/husks	3.1.3.2 Shells/husks	3.1.3.2 Shells/husks
Particle size EN 15149-1 ISO 17827-1	Fines, F <1 mm	as received, w-% wet basis	< 1	< 1	< 3
	Fines, F <2 mm	as received, w-% wet basis	< 2	< 2	< 4
	Maximum nominal size	mm	< 16	< 16	< 16
Oil content, ISO 659		w-% dry	≤ 0,6	≤ 1,0	≤ 1,5
Moisture, M, EN 14774-1, EN 14774-2 ISO 18134-1; ISO 18134-2		as received, w-% wet basis	M12 ≤ 12	M12 ≤ 12	M16 ≤ 16
Ash, A, EN14775		w-% dry	A0.7 ≤ 0,7	A1.6 ≤ 1,6	A2.0 ≤ 2,0
Net calorific value, Q, EN 14918; ISO 18125		as received, MJ/kg or kWh/kg	Q15, Q ≥ 15 or Q ≥ 4,2	Q15, Q ≥ 15 or Q ≥ 4,2	Q14.2, Q ≥ 14,2 or Q ≥ 3,9
Bulk density, BD, EN 15103 ISO 17828		kg/m ³	BD500 ≥ 500	BD300 ≥ 300	BD270 ≥ 270
Nitrogen, N, EN 15104 ISO 16948		w-% dry	N0.4 ≤ 0,4	N0.6 ≤ 0,6	N0.8 ≤ 0,8
Sulphur , S, EN 15289 ISO 16994		w-% dry	S0.03 ≤ 0,03	S0.03 ≤ 0,03	S0.04 ≤ 0,04
Chlorine, Cl, EN 15289 ISO 16994		w-% dry	Cl0.02 ≤ 0,02	Cl0.02 ≤ 0,02	Cl0.03 ≤ 0,03
Arsenic, As, EN 15297 ISO 16968		mg/kg dry	≤ 0,5	≤ 0,5	≤ 0,5
Cadmium, Cd, EN 15297 ISO 16968		mg/kg dry	≤ 2	≤ 2	≤ 2
Chromium, Cr, EN 15297 ISO 16968		mg/kg dry	≤ 10	< 10	< 10
Copper, Cu, EN 15297 ISO 16968		mg/kg dry	≤ 15	≤ 15	≤ 15
Lead, Pb, EN 15297 ISO 16968		mg/kg dry	≤ 15	≤ 15	≤ 15
Mercury, Hg, EN 15297 ISO 16968		mg/kg dry	≤ 0,01	≤ 0,01	≤ 0,01
Nickel, Ni, EN 15297 ISO 16968		mg/kg dry	≤ 15	≤ 15	≤ 15
Zinc, Zn, EN 15297 ISO 16968		mg/kg dry	≤ 20	≤ 20	≤ 20

Normative

^a Class A1 is specific for grounded and sieved shells

^b 100% of the mass must pass through a 31,5 mm sieve

5. **Chopped pine cone.** Limits according to 164004 (table 5)

Property class /Analysis method		Unit	A1 ^a	A2	B
Origin and source ISO 17225-1			3.1.3.2 Shells/husks	3.1.3.2 Shells/husks	3.1.3.2 Shells/husks
Particle size EN 15149-1 ISO 17827-1	Fines, F <1 mm	as received, w-% wet basis	≤ 1	≤ 1	≤ 2
	Fines, F <2 mm	as received, w-% wet basis	≤ 2	≤ 2	≤ 4
	Maximum nominal size	mm	≤ 31,5	≤ 31,5	≤ 45
Moisture, M, EN 14774-1, EN 14774-2 ISO 18134-1; ISO 18134-2		as received, w-% wet basis	M12 ≤ 12	M12 ≤ 12	M16 ≤ 16
Ash, A, EN14775 ISO 18122		w-% dry	A0.8 ≤ 0,8	A1.1 ≤ 1,1	A1.5 ≤ 1,5
Net calorific value, Q, EN 14918; ISO 18125		as received, MJ/kg or kWh/kg	Q15.8 Q ≥ 15,8 or Q ≥ 4,4	Q15.8 Q ≥ 15,8 or Q ≥ 4,4	Q14.9 Q ≥ 14,9 or Q ≥ 4,1
Bulk density, BD, EN 15103 ISO 17828		kg/m ³	BD400 ≥ 400	BD350 ≥ 350	BD300 ≥ 300
Nitrogen, N, EN 15104 ISO 16948		w-% dry	N0.3 ≤ 0,3	N0.4 ≤ 0,4	N0.6 ≤ 0,6
Sulphur , S, EN 15289 ISO 16994		w-% dry	S0.03 ≤ 0,03	S0.03 ≤ 0,03	S0.04 ≤ 0,04
Chlorine, Cl, EN 15289 ISO 16994		w-% dry	Cl0.05 ≤ 0,05	Cl0.07 ≤ 0,07	Cl0.10 ≤ 0,10
Arsenic, As, EN 15297 ISO 16968		mg/kg dry	≤ 0,5	≤ 0,5	≤ 0,5
Cadmium, Cd, EN 15297 ISO 16968		mg/kg dry	≤ 2	≤ 2	≤ 2
Chromium, Cr, EN 15297 ISO 16968		mg/kg dry	≤ 10	< 10	< 10
Copper, Cu, EN 15297 ISO 16968		mg/kg dry	≤ 15	≤ 15	≤ 15
Lead, Pb, EN 15297 ISO 16968		mg/kg dry	≤ 10	≤ 10	≤ 10
Mercury, Hg, EN 15297 ISO 16968		mg/kg dry	≤ 0,01	≤ 0,01	≤ 0,01
Nickel, Ni, EN 15297 ISO 16968		mg/kg dry	≤ 10	≤ 10	≤ 10
Zinc, Zn, EN 15297 ISO 16968		mg/kg dry	≤ 20	≤ 20	≤ 20

Normative

^a Class A1 is specific for grounded and sieved shells

^b 100% of the mass must pass through a 45 mm sieve in classes A1 and A2 and through a 63 mm sieve in class B

6. Pine nut shells. Limits according to UNE 164004 (table 6)

	Property class /Analysis method	Unit	A1 ^a	A2	B	
Normative	Origin and source ISO 17225-1		3.1.3.2 Shells/husks	3.1.3.2 Shells/husks	3.1.3.2 Shells/husks	
	Particle size EN 15149-1 ISO 17827-1Size Particle	Fines, F <1 mm	as received, w-% wet basis	< 1	< 1	< 2
		Fines, F <2 mm	as received, w-% wet basis	< 2	< 2	< 4
		Maximum nominal size	mm	< 16	< 16	< 16
	Oil content, ISO 659	w-% dry	≤ 0,6	≤ 1,0	≤ 1,5	
	Moisture, M, EN 14774-1, EN 14774-2 ISO 18134-1; ISO 18134-2	as received, w-% wet basis	M12 ≤ 12	M12 ≤ 12	M16 ≤ 16	
	Ash, A, EN14775 ; ISO 18122	w-% dry	A1.3 ≤ 1,3	A1.6 ≤ 1,6	A2.0 ≤ 2,0	
	Net calorific value, Q, EN 14918 ; ISO 18125	as received, MJ/kg or kWh/kg	Q16, Q ≥ 16 or Q ≥ 4,4	Q16, Q ≥ 16 or Q ≥ 4,4	Q15,2, Q ≥ 15,2 or Q ≥ 4,2	
	Bulk density, BD, EN 15103 ISO 17828	kg/m ³	BD470 ≥ 470	BD470 ≥ 470	BD450 ≥ 450	
	Nitrogen, N, EN 15104 ISO 16948	w-% dry	N0.4 ≤ 0,4	N0.4 ≤ 0,4	N0.8 ≤ 0,8	
	Sulphur , S, EN 15289 ISO 16994	w-% dry	S0.03 ≤ 0,03	S0.03 ≤ 0,03	S0.05 ≤ 0,05	
	Chlorine, Cl, EN 15289 ISO 16994	w-% dry	Cl0.02 ≤ 0,02	Cl0.04 ≤ 0,04	Cl0.06 ≤ 0,06	
	Arsenic, As, EN 15297 ISO 16968	mg/kg dry	≤ 0,5	≤ 0,5	≤ 0,5	
	Cadmium, Cd, EN 15297 ISO 16968	mg/kg dry	≤ 2	≤ 2	≤ 2	
	Chromium, Cr, EN 15297 ISO 16968	mg/kg dry	≤ 10	< 10	< 10	
	Copper, Cu, EN 15297 ISO 16968	mg/kg dry	≤ 15	≤ 15	≤ 15	
	Lead, Pb, EN 15297 ISO 16968	mg/kg dry	≤ 10	≤ 10	≤ 10	
	Mercury, Hg, EN 15297 ISO 16968	mg/kg dry	≤ 0,01	≤ 0,01	≤ 0,01	
	Nickel, Ni, EN 15297 ISO 16968	mg/kg dry	≤ 15	≤ 15	≤ 15	
	Zinc, Zn, EN 15297 ISO 16968	mg/kg dry	≤ 20	≤ 20	≤ 20	

^a Class A1 is specific for grounded and sieved shells

^b 100% of the mass must pass through a 31,5 mm sieve

ANNEX 2: CHECK LISTS

1. Check list for a producer

Phase	Action
Quality management system development	EN 15234-6 or ISO 9001
Internal documentation	<ul style="list-style-type: none"> • Raw materials including sustainability certification • Additives • Outgoing goods • Manufacturing of labelled and non-labelled biomasses • Malfunctions in production, storage and transport • Repair and maintenance work • Employee training records • Areas of responsibilities of the employees • Self-inspections, sampling and sample storage • Product declarations • Delivery to customer • Customer complaints
Application for certification	Communication to Biomassud Steering Committee or national entity/ies in charge of the quality label in the country
Selection of inspection body and testing organisation	See Biomassud website
Labelling	Labelling of bagged biomasses

2. Check list for a trader

Phase	Action
Quality assurance – biomass storages	<ul style="list-style-type: none"> • Type and capacity • Storage of different qualities • Protection of moisture and impurities • Screening of fines before loading or package
Quality assurance – outgoing goods/complaints	<ul style="list-style-type: none"> • Documentation of outgoing goods • Retain sampling (frequency, amount, retaining period) • Sample labelling • Storage of retain samples • Documentation of customer complaints
Sampling for laboratory analysis	<ul style="list-style-type: none"> • Sampling point, amount and sizes (bags and bulk) (during auditing)
Delivery sample to laboratory	<ul style="list-style-type: none"> • Carry out sampling and deliver samples to laboratory agreed by a producer
Reporting	<ul style="list-style-type: none"> • Report of evaluation results to company and label issuer.

ANNEX 3: TEST METHODS FOR INTERNAL SAMPLING AND QUALITY CONTROL

The test methods listed below are suitable for internal quality control. However, these methods or laboratory standards don't need to be followed exactly for these internal controls, others methods may be used if its validity is checked in the audition by the inspection body.

1. Sampling

As the procedures listed in the respective standards are very extensive, a simplified procedure for drawing samples for in-house analyses will be described in the following. Single samples (increments) should, if possible, be taken from the moving material, as the quality of the total batch can be best indicated in this way. During sample partitioning for the individual analyses, it should also be made certain that the respective subsamples represent the quality of the total batch. The subsamples should be taken with a small sampling scoop in order to assure that the fine material quantity can also be tested.

From moving material

At least five individual samples, with a mass of 4 kg per sample, will be taken. Attention should be paid that at least 20 kg of material passes through the sampling point between the individual sampling procedures. The individual samples will be thoroughly mixed and compiled into a cone. This will subsequently be pressed flat and divided into four equally large parts by a vertically inserted scoop. The process is to be so often repeated until the required sample size for the respective test is approximately achieved. Care must be taken to assure that all subsamples possess the same consistency.

From static material

At least five individual samples, with a mass of 4 kg per sample, are to be taken at different points of the filling process. With bagged wood pellets, an individual sample will be respectively taken from one bag. The individual samples will be thoroughly mixed and compiled into a cone. This will subsequently be pressed flat and divided into four equally

large parts by a vertically inserted scoop. The process is to be so often repeated until the required sample size for the respective test is approximately achieved. Care must be taken to assure that all subsamples possess the same consistency.

2. Determination of overlength

The internal quality control has to ensure that the amount of pellets with a length > 40 mm is less than 1% of the pellet mass and that not a single pellet exceeds the maximum length of 45 mm. Experienced staff will find oversized pellets by visual inspection of the sample. The size of those pellets should be measured with a caliper that has a resolution of at least 0.1 mm.

For documentation it is sufficient to confirm the check for oversized pellets on the test protocols and make notes when pellets with overlength are found.

3. Mechanical durability (DU)

The determination of the mechanical durability is done on the basis of EN 15210-1. Firstly, two subsamples drawn from the sieved pellets, with a mass of (500 ± 10) g respectively, are formed and weighed. They are successively put into the testing chamber of the measuring device, which rotates at (50 ± 2) revolutions per minute. After 500 rotations, the drum is to be emptied and the fine material is to be sieved again. Afterwards, the remaining wood pellets will be weighed and the mechanical durability will be determined using the following formula:

$$DU = \frac{m_A}{m_E} * 100$$

DU mechanical durability [%]

m_e : mass of the pre-sieved wood pellets before the handling process [g]

m_a : mass of the sieved wood pellets after the handling process [g]

An average value will be generated from the results of the testing of both subsamples.

An alternative procedure:

As an alternative, the mechanical durability can be determined according to the following testing instruction with the Ligno-Tester. The fines must be separated before determination of abrasion by manually passing according to EN 15210-1 through a sieve with 3.15 mm according to ISO 3310-1.

About 100 g ± 0.5 g pellets are weighed and treated in the Ligno-Tester for 60 seconds at 70 mbar by the flow of air. At the end, the pellets are weighed out and the abrasion in % is calculated.

The mean value is calculated from the results of 5 determinations. The dust filter of the Ligno-Tester must be changed, at latest, after every third determination. Mechanical durability is 100 % - AR.

$$AR = \frac{m_E - m_A}{m_E} \cdot 100$$

AR abrasion in w-%
 m_e mass of pellets before treatment in g
 m_a mass of pellets after treatment in g

The abrasion can also be determined by other methods giving equal results.

Note: On account of the expected divergence from the determination, a divergence of the mean value from the threshold value of an abrasion of up to 0.2 % must be accepted.

4. Bulk density (BD)

The determination of the bulk density follows on the basis of EN 15103.

Biomass will be poured from a height of 200 to 300 mm into a measuring cylinder, with a volume of five liters and a defined diameter-height ratio, until the cylinder is full and a debris cone has formed. Subsequently, the cylinder will be dropped three times from a height of 150 mm onto a hard surface in order to consolidate the biomass. After excess material has been removed by striking a straight edge along the top and larger cavities have been filled, the mass of the biomass in the cylinder is determined.

The bulk density (BD) will be calculated using the following formula:

$$BD = \frac{(m_2 - m_1)}{V}$$

BD bulk density

m_1 mass of the empty container [kg]

m_2 mass of the full container [kg]

V net volume of the measuring cylinder [m³]

5. Moisture

Determining the moisture content may be effected by several methods depending on the biomass. There are some methods more suitable for some biomasses and other methods for other biomasses, mainly depending on the particle size.

It's very important in any of the methods used taking a representative sampling and follow the instrument manufacturer indications as malpractice may cause a significant error.

Thermal balance: The calculation of moisture is determined by weight loss experienced by the sample after being subjected to a heating process. The thermobalance is a combination of a microbalance with an oven, a temperature controller and a computer to control it allows the sample to be heated or cooled by measuring the weight change simultaneously versus the temperature or time.

This method is suitable for all biomasses with small particle sizes such as pellets (sample must previously crushed in a mortar), olive stone, etc.. Not suitable for wood chip unless the particle size reduced beforehand. It is a quite fast method to find the moisture.

Drying oven: The drying oven is an oven that is often used in laboratories to find moisture content according to the European standard EN 14774-2. It has more capacity than the thermal balance and is more accurate but has the disadvantage that it takes about 24 hours to dry the

biomass sample. A scale should be used for recording weight variations.

The moisture content is calculated using the following formula:

$$M = \left[\frac{(m_2 - m_3)}{(m_2 - m_1)} * 100 \right]$$

M	M moisture content as received (w-%)
m ₁	mass of the empty drying pan [g]
m ₂	mass of the drying pan and sample before drying [g]
m ₃	mass of the drying pan and sample after drying [g]

Indirect methods of measuring moisture

Indirect methods use the change in an electrical or structural characteristic of a material as a relationship of its moisture content. Common measurements used are changes in capacitance, conductivity, reaction to radio frequencies and absorption of electro magnetic radiation. Because these methods are indirect, a calibration against different known moisture amounts is needed. This extra step is often offset by the speed of obtaining a moisture measurement (Seconds instead of minutes or hours).

According to scientific literature (Nyström, J. 2003; Daugbjerg, J. et al 2006); The indirect method that today offers reliable results in online applications is the NIR (Near infrared spectroscopy). Many companies provide industry process adapted instruments based on this method. The working principle is that when a material is illuminated by IR, some of the light will be absorbed and some reflected. For every material an IR-spectra can be achieved by measuring the reflection from a surface. The spectrum depends, e.g. on the chemical composition, the density, and the moisture content of the material. NIR penetrates the sample deeper than IR (a few millimetres) and is therefore useful for measuring woodchips and other particulate biofuels. The NIR devices require to be calibrated for different biomass materials or when colour changes sensible occur within the same biomass product.

6. Particle size

Wood chips particle size is determined by taking a representative sample and separating the different fractions with the sieves. Then, the amount of separated material is weighted. Wood chips are classified by its particle size with the table we can found in Annex 2 point 2 extracted from EN 14961-4 norm. Depending on the desired class (P16A, P31,5, etc.) we would need different sieves.

7. Amount Fine Material (F)

The mass is determined by taking a sample of approximately 1.2 kg. Subsequently, the amount of fine material is separated with a sieve of 3.15 mm in pellets and wood chips according to the ISO-3310-2 and 1 to 2 mm. in the rest of the biofuels of as specified in this manual. When the screening is carried out manually in accordance with EN-15210-1, care should be taken that all the fine particles to be separated and, moreover, and that no more fine particles are formed by mechanical stress. This can be achieved by shaking the sample in 5 to 10 circular motions using a sieve with a diameter of 40 cm. Then sieved particles are weighed.

The fine material amount (F) will be calculated as follows:

$$F = \frac{m_A}{m_E} * 100$$

m_e	mass of the sample before sieving
m_a	mass of the sieved particles