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BIOma sudplus

Handbook for the BIOmasud Solid Biofuels Certification v15 - Traders

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)
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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. This last version of the Handbook v15 was made within the project BIOMASUD PLUS which is funded in the H2020 program (Grant Agreement no. 691763).

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 and sustainability certification system. This scheme 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 desided what extra information is needed for conceding the Biomasud seal.

The following Solid biofuels can obtain the Biomasud Quality and Sustainability label (they are divided into two categories: Domestic for small installations (<400 kW) and Domestic for big installations (>400 kW)):

Domestic for small installations (<400 kW)

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- Wood pellets (classes A1, A2)
- Wood chips (classes A1, A2)
- Firewood (classes A1, A2)
- Olive stones (classes A1, A2)
- Pine nut shells (classes A1, A2)
- Almond shells (classes A1, A2)
- Chopped pine cone (classes A1, A2)
- Hazelnut shells (classes A1, A2)
- Pistachio Shells (classes A1, A2)
- Walnut Shells (classes A1, A2)
- Olive tree prunings (classes A1, A2)

- Blends of the cited biomasses (producer must specify the %). (only blends among solid biofuels for small installations are considered. If blended with a solid biofuel for big installation is made, the blend it will be considered a solid biofuel for big installation)

Domestic for big installations (>400 kW)

- Wood pellets (class B)
- Wood chips (classes B1, B2)
- Olive stones (class B)
- Pine nut shells (class B)
- Almond shells (class B)
- Chopped pine cone (class B)
- Hazelnut shells (class B)

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- Pistachio Shells (class B)
- Walnut Shells (class B)
- Vineyard prunings (Classes PI1, PI2, PI3)
- Olive tree prunings (Classes B, P1, P2, P3)
- Blends of the cited biomasses (producer must specify the %). (only blends among solid biofuels for big installations are considered. If blended with a solid biofuel for small installation is made, the blend it will be considered a solid biofuel for big installation)

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 Biomasud steering committee.

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2 NORMATIVE REFERENCES

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

ISO 14780: Solid Biofuels – Sample preparation

EN-ISO 18135: 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 4: Graded wood chips

ISO 17225-5: Solid biofuels - Fuel specifications and classes - Part 5: Graded firewood

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 -

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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

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3 DEFINITIONS OF TERMS

3.1 OWNERS OF THE SCHEME – NATIONAL LICENSERS

Nowadays, the owners of the license for the Biomasud's Quality and Sustainability label are members of the Biomasud's project consortium that decided to continue with the implementation of the system: AVEBIOM (Spain), CIEMAT (Spain), CBE (Portugal) and CVR (Portugal).

With the BIOMASUD PLUS project, new National Licensers are most probably going to join the scheme for the new countries where it will be present (ZEZ from Croatia, CERTH from Greece, AIEL from Italy, SFI from Slovenia and Tubitak from Turkey) after the termination of the project (December 2018)

The owners of the scheme and National Licensers forms the Biomasud's steering committee which will manage the label.

3.2 LABEL ISSUER – CERTIFICATION BODY

The certificate is issued by an independent third party entity. The Biomasud 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. The requirements for Certification Bodies are stated in the handbook's part for Independent Bodies

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

3.3 INSPECTION BODIES

The Inspections bodies must be accepted by the Biomasud steering committee who will publish on its WEB the list of accepted testing bodies for verifying within the Biomasud system. The requirements for Inspection Bodies are stated in the handbook's part for Independent Bodies

3.4 TESTING BODIES

The testing bodies must be accepted by the Biomasud steering committee who will publish on its WEB the list of accepted testing bodies for verifying within the Biomasud system. The requirements for Testing Bodies are stated in the handbook's part for Independent Bodies

3.5 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 follow the regulations of the Biomasud's

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certification system. They have been certified according to the rules of this handbook. They can be of the following type depending on the activity they make:

Certified Producer: a company that produces solid biofuels under the scheme and sells it in bags or to a trader. A producer doesn't need to be the facility producing the raw material (an oil industry or almond shell splitter for example) but the company which is processing it (cleaning, drying, sieving…) the same way that for example a wood pellet factory is buying saw dust and producing pellets.

Sustainable Forest Management (SFM) requirements are required for big producers. Big producers are the ones producing more than 30.000 tonnes based on previous year production. For the first year of certification the estimation will be valid. If the estimation are overpassed the sustainability requirements won't be required retroactively but they will be forced to fulfil for the next year

Certified Trader: a company that make the logistic and deliver of certified solid fuels to final users. Certification is obligatory to traders dealing with bulk format. If the trader is dealing with bag formats, certification is not necessary.

Certified Producer and Trader: a company that have both profiles; Producers solid biofuels under the scheme and Traders making logistic and deliveries selling to final users in bulk. Inspectors must verify both scopes.

Lot / Batch: 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.).

3.6 EUTR Definitions

EUTR operator means any natural or legal person that places timber or timber products on the (EU) market

EUTR Trader means any natural or legal person who, in the course of a commercial activity, sells or buys on the (EU) internal market timber or timber products already placed on the internal market

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4 CERTIFICATION SYSTEM

4.1 OVERVIEW

The essential components of the certification programme are:

- **Quality requirements**. It will be verified that the product fulfils the quality required for obtaining Biomasud label. The Inspection body is responsible for sampling and the registered Testing body of analysing it. The Testing body will come back to the Inspection body with the analysis report. In addition the Inspection Body will verify that the company's facilities fulfils the basic requirements to obtain and maintain the product Quality. Quality product requirements are described in Chapter 5 and tables with product parameters in annexes 1 and 2.
- **Sustainability criteria**. 6 minimum sustainability criteria are established by the label, two of them for all the solid biofuels covered by the system (GHG and Energy Consumed), and four of them which are adapted to the origin and the kind of raw material (Legality of raw material, Sustainable forest management, Carbon stock and Land use). Sustainable Management are applied to big producer (from 30.000 tonnes). The Inspection Body will verify the fulfilment of the required criteria in the Chapter 6.
- **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 Biomasud 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 form

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- 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 is certified with ENplus® it will be enough for obtaining the Biomasud Certification by presenting:

- Their ENplus valid certificate.
- Audit of the Sustainability Criteria as per the Chapter 6 by a registered Inspection Body.
- In addition, this company will have to comply with the Biomass traceability system, so they will proceed as indicated in Chapter 6

4.2.1 Mandate for Distribuition Control

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

4.2.2 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

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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 facilities 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, 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 establish 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 quality on a sustained basis are e.g. defective storage facilities. Major non-conformities can have a direct or indirect influence on the operating performance of equipment using non-conforming biomass.

4.2.3 Issuing the label

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

- in the initial application form.
- in the inspection report of the inspection body.

If the application is approved, the applicant is informed and receives the Biomasud's certification contract and a request for submitting the payment of the license fee. When proof of the 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 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 Biomasud WEB site.

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4.2.4 Surveillance inspections

Distributors must carry one audit every two years.

The Certification Body or the National Licenser can carry out unannounced inspections in case of suspicions.

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 Biomasud steering committee).

When defects or deviations from the Biomasud quality label regulations are found in the facilities in the laboratory test during the periodic inspection, the accredited inspection body/testing body during the periodic inspection, the accredited inspection 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 us inappropriate raw material or defective production and/or storage facilities.

4.2.5 Application Procedure

The interested company submits an application form to the label issuer (national label issuer or Biomasud 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.

4.2.6 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 Biomasud steering committee has been received and the signed quality label contract has been

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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 Biomasud 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 / Biomasud 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.

For biomass traders 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 / Biomasud steering committee has to suspend the license to use the Biomasud label for a limited

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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 / Biomasud 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 Biomasud'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 Biomasud labelled goods.

The Biomasud's certification seal and/or the name of the biomass certified biomass with Biomasud word in the description of the goods (i.e. Biomasud olive stones) must appear on the invoices when these invoices are issued for Biomasud 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 / Biomasud steering committee.

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

4.7 Labelling

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Each sales unit of labelled Biomasud 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 of annex 1 or 2.
- Biomass quality; label must indicate the quality classification according to tables of annex 1 or 2.
- Quality label seal.
- Mass (in kg or ton).
- The Biomasud's certification seal and/or the name of the biomass certified biomass with Biomasud word in the description of the goods must appear on the invoices when these invoices are issued for Biomasud labelled goods.
- 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 Biomasud 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

Traders must conserve at least 1 kg of sample for every day with at least one delivery. The delivery date & lot, product type and product quality must be noted. The samples have to be archived for at least 1 months under proper conditions. The object of keeping the sample is to use it in case of complaints.

Firewood traders are exempted of taking and gathering reference samples. Only registers of the self-inspections are mandatory (see Chapter 8.1.5)

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4.10 Regular and extraordinary audits

For distributors one audit every two years is mandatory.

In addition to that, extraordinary audits can be carried out upon demand by the label issuer, owners of the scheme or the Biomasud steering committee if significant number of complaints have been received or have information showing that there are non conformities or fraudulent use of the label. This audit can be unannounced.

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

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falling stream between silo and boiler, and must consist of 3 individual samples which are mixed afterwards.

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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. They are divided into two categories: Domestic for small installations (<400 kW) and Domestic for big installations (>400 kW). The biomasses covered by the Biomasud certification system:

Domestic for small installations (<400 kW)

1. **Wood pellets**. Quality specifications according to classes A1 & A2 of ISO 17225-2. See Annex 1 table 1 for thresholds.

2. **Wood chips**. Quality specifications according to classes A1 & A2 of ISO 17225-4. See Annex 1 tables 2.1 and 2.2 for thresholds.

3. **Firewood**. Quality specifications according to classes A1 & A2 of ISO 17225-5. See Annex 1 table 3 for thresholds.

4. **Olive stones**. Quality specifications based on classes A1 & A2 of UNE 164003 and updated with BIOMASUD PLUS project deliverable D3.3. See Annex 1 table 4 for thresholds.

5. **Almond / Hazelnut shells**. Quality specifications based on classes A1 & A2 of UNE 164004 and updated with BIOMASUD PLUS project deliverable D3.3. See Annex 1 table 5 for thresholds.

6. **Chopped pine cone**. Quality specifications according to classes A1 & A2 of UNE 164004. See Annex 1 table 6 for thresholds

7. **Pine nut shells**. Quality specifications based on classes A1 & A2 of UNE 164004 and updated with BIOMASUD PLUS project deliverable D3.3. See Annex 1 table 7 for thresholds

8. **Pistachio shells.** Quality specifications of classes A1 & A2 according to deliverable D.3.3. of BIOMASUD PLUS project. See Annex 1 table 8 for thresholds

9. **Walnut shells.** Quality specifications of classes A1 & A2 according to deliverable D.3.3. of BIOMASUD PLUS project. See Annex 1 table 9 for thresholds

10. **Olive tree prunings (domestic for small installations).** Quality specifications of classes A1 & A2 for chips format and P1, P2 & P3 for pellet format according to deliverable D.3.3. of BIOMASUD PLUS project. It can be in pellet or chips format. See Annex 1 table 10.1 and 10.2 for chips format's thresholds and table 11 for pellet format's thresholds

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Blends of the cited biomasses (producer must specify the %). (only blends among solid biofuels for small installations are considered. If blended with a solid biofuel for big installation is made, the blend it will be considered a solid biofuel for big installation)

Making blends are only allowed to the producers. A trader willing to make blends will have to get certify as Producer

Domestic for big installations (>400 kW)

11. **Wood pellets**. Quality specifications according to class B of ISO 17225-2. See Annex 2 table 12 for thresholds.

12. **Wood chips**. Quality specifications according to class B of ISO 17225-4. See Annex 2 tables 13.1 and 13.2 for thresholds.

13. **Olive stones**. Quality specifications according based on class B of UNE 164003 and updated with BIOMASUD PLUS project deliverable D3.3. See Annex 2 table 14 for thresholds.

14. **Almond shells / Hazelnut shells**. Quality specifications based on class B of UNE 164004 and updated with BIOMASUD PLUS project deliverable D3.3. See Annex 2 table 15 for thresholds.

15. **Chopped pine cone**. Quality specifications based on class B of UNE 164004 and updated with BIOMASUD PLUS project deliverable D3.3. See Annex 2 table 16 for thresholds

16. **Pine nut shells**. Quality specifications based on class B of UNE 164004 and updated with BIOMASUD PLUS project deliverable D3.3.. See Annex 2 table 17 for thresholds

17. **Pistachio shells.** Quality specifications. Quality specifications of class B according to deliverable D.3.3. of BIOMASUD PLUS project. See Annex 1 table 18 for thresholds

18. **Walnut shells.** Quality specifications of class B according to deliverable D.3.3. of BIOMASUD PLUS project. See Annex 2 table 19 for thresholds

19. **Vineyards prunings (wood pellet for domestic big installations).** Quality specifications according to classes PI1, PI2 & PI3 of deliverable D.3.3. of BIOMASUD PLUS project. See Annex 2 table 20 for thresholds.

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20. **Olive tree prunings (domestic for big installations).** Quality specifications according to classes P1, P2 & P3 of deliverable D.3.3. of BIOMASUD PLUS project. See Annex 2 table 21 for thresholds.

Blends of the cited biomasses (producer must specify the %). (only blends among solid biofuels for big installations are considered. If blended with a solid biofuel for small installation is made, the blend it will be considered a solid biofuel for big installation)

Making blends are only allowed to the producers. A trader willing to make blends will have to get certify as Producer

Blends between biomasses already inside the system are allowed always that resulting blend is still fulfilling quality requirements (i.e. pine nut shells are usually blended with chopped pine cone). To calculate the thresholds that will be required to the blend a proration will be made. I.e. a company wants to certify a blend between 20% A1 Olive stones (table 3) and 80% A1 Hazelnuts (table 4). The Nitrogen content threshold calculation should be:

$$N\ (20\% \times 0{,}3 + 80\% \times 0{,}4\ ) < 0{,}38\ \text{w-\% dry}$$

Where 0,3 is the limit for Olive Stones and 0,4 is the limit for Hazelnuts

In this case, no quality class A1, A2, B, etc. will be given. In all relevant documents (invoices, bags) will be declared the quality and proportions of the biofuels blended.

Blends with other biomasses not included in the system even if they fulfill the quality requirements must be approved by the Biomasud Steering Committee.

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

Unintentional mixtures are not included in this concept.

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 Biomasud 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 Biomasud Steering Committee and the approval of this committee is required.

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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.

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6 SUSTAINABILITY REQUIREMENTS

The Biomasud Plus project has studied the production chain of all domestic biomasses included in the quality label and defined biomass categories according to the type of materials.

Considering this, the decision of the Biomass Steering Committee has decided to include six minimum sustainability requirements whose application will depend on the type of Biomass and profile of the company.

The requirements applicable to Traders to any biomass are: Greenhouse Emissions (GHG) and the energy consumed for the production of solid biofuel.

GHG (greenhouse gases): The reduction of greenhouse gas emissions derived from the use of fuel in replacement of natural gas will be at least 70%. The emissions produced in the transport of raw materials to the production center and those generated in the process of preparing and conditioning the biofuel are taken into account.

Energy consumed: The energy used in the transport of raw materials to the production center plus the energy used in the processes of preparation, conditioning of the solid biofuel and transport to the customer cannot exceed 40% of the energy contained in the biofuel based on the Net Calorific Value (as received).

An Online platform has been developed to facilitate the calculation of these two criteria by entering the required data. See Chapter 7

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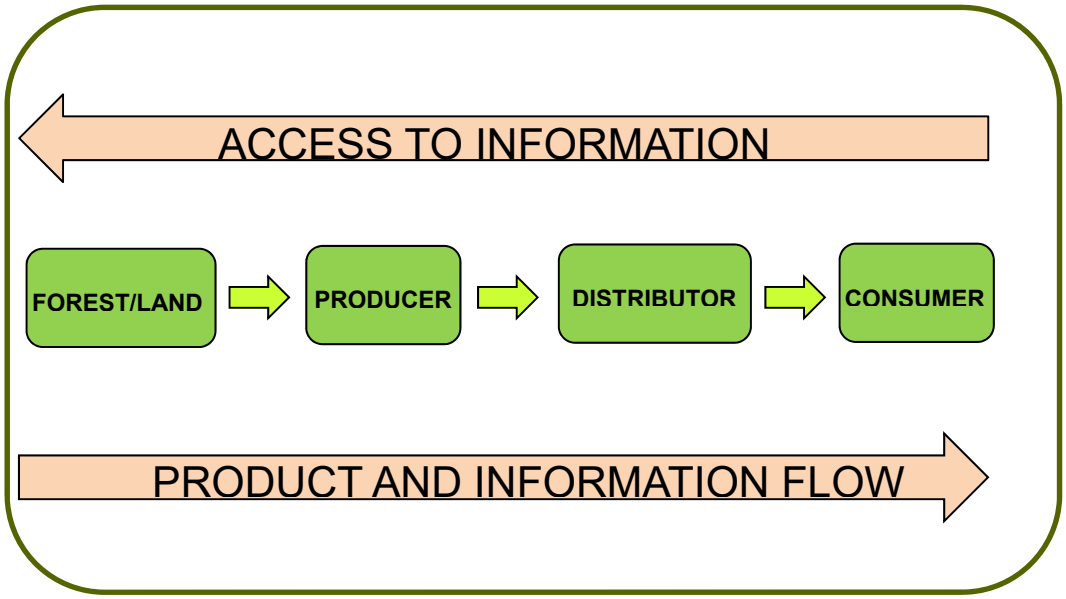
7 TRACEABILITY AND BIOMASUD ON-LINE PLATFORM

The Biomasud quality label is requiring quality (ash, moisture, etc.) and sustainability requirements (GHG, Energy, EUTR, SFM, CS, LUC) 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. Platform has been set up in order to assure the traceability

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 4.9 traders 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.

A code composed of the country 2 characters ISO CODE (ISO 3166-1-alpha-2 for example, ES for

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Spain)

And then an unique and correlative number for each country. The code is composed of three ciphers (001, 002, etc.) starting on 001 for Producers and starting on 300 for Traders

Unique ID. = Country Code + Correlative number

i.e. ES 301 would be a Spanish Trader with the number 301.

It's obligatory to show the producer code or last certified trader inside the Biomasud logo (see example in chapter 11) on the bags, publicity or the invoices.

If a manufacturer operates several production facilities the respective company can request for several numbers or can request the same number to use it commercially with all the plants. In this last case, internally they will have a different code for every plant. i.e. a producer with several plants has the code ES007. Internally for keeping traceability to auditors each plant will have a different code ES007-1, ES007-2 and successively

7.2 TRACEABILITY TOOL AND DOCUMENTATION

By means of the Biomasud Plus project an On line platform has been developed where the Label holders (Certified Producers and Traders) 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 keep the traceability. 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.

The platform can be accessed from the Biomasud Web page (http://biomasud.eu/) or through a direct access http://trazabilidad.grupotercerafase.com/. Producers and Traders will have to log in for being able to introduce their data. An User and a Password will be provided by the National Licenser to access the platform. The inspector body will have access to these data.

In the platform, basic contact data of the company and its quality manager will be included.

The Certified Producer or Trader will include information of Every Lot

- Number of Lot
- Type of Biofuel produced

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- Quality of the solid Biofuel produced (A1, B…)
- Quantity producer
- CO2 emissions (automatically calculated by the platform after entering required data)

A QR code is produced that can be downloaded an used on bags, invoices or webs but it's not obligatory its use.

The data stored in this data base can be used by the National Licensers and the Biomasud Steering Committee for statistics and promotion uses. No individual data will be published without an explicit authorisation

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 Biomasud quality system. Alternatively, a quality management system according to ISO 9001 can be set up.

8.1 COMMERCIALIZATION: HANDLING, STORAGE AND DELIVERY OF BIOMASSES

8.1.1 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.

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- 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 Biomasud 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.

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8.1.2 Reporting of Traded Quantities

Every lot traded must be reported in the On Line platform (see 7.2) with the quantities of the different biomasses traded with the Biomasud label.

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 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 provide training to the other employees. 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.

8.1.4 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 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.
- Invoices. All the invoices for Biomasud certified solid biofuels must include in their concept the type of fuel, quality class, quantity and that is Biomasud certified. Example (24 Tn of Biomasud A1 Olive Stones.). Also the logo Biomasud plus can be used on the invoices but only when the invoices are for Biomasud certified biofuels.

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- 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).

8.1.5 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 4.9).

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

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9 RAW MATERIAL REQUIREMENTS

The types of raw material or sources for biomasses indicated in Annex 1 that are acceptable for the Biomasud 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.

9.1 RAW MATERIALS AND SOURCES PERMITTED

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

	Biomass quality class			
Biomass type	**A / A1 /P1 /PI1**	**A2 / P2 / PI2**	**B / B1 /P3/ PI3**	**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. 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
Firewood	1.1.3 Stemwood 1.2.1 Chemically untreated wood by-products and residues	1.1.1 Whole trees without roots[a] 1.1.3 Stemwood 1.2.1 Chemically untreated wood by-products and residues	1.1.1 Whole trees without roots[a] 1.1.3 Stemwood 1.1.4. Logging residues 1.2.1 Chemically untreated wood by-products and residues	
Olive tree prunnings	1.1.7 Segregated wood from gardens, parks, roadside maintenance, vineyards, fruit orchards and driftwood from freshwater	1.1.7 Segregated wood from gardens, parks, roadside maintenance, vineyards, fruit orchards and driftwood from freshwater	1.1.7 Segregated wood from gardens, parks, roadside maintenance, vineyards, fruit orchards and driftwood from freshwater	1.1.7 Segregated wood from gardens, parks, roadside maintenance, vineyards, fruit orchards and driftwood from freshwater

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Vineyard prunings	1.1.7 Segregated wood from gardens, parks, roadside maintenance, vineyards, fruit orchards and driftwood from freshwater	1.1.7 Segregated wood from gardens, parks, roadside maintenance, vineyards, fruit orchards and driftwood from freshwater	1.1.7 Segregated wood from gardens, parks, roadside maintenance, vineyards, fruit orchards and driftwood from freshwater	1.1.7 Segregated wood from gardens, parks, roadside maintenance, vineyards, fruit orchards and driftwood from freshwater
Olive stones	3.1.2.3 Stone/kernel fruits 3.1.1.2 Stone/kernel fruit fibre 3.2.2.2 Stone/kernel fruits (chemically treated)[c]	3.1.2.3 Stone/kernel fruit fibre 3.1.1.2 Stone/kernel fruit fibre 3.2.2.2 Stone/kernel fruits (chemically treated)[c]	3.1.2.3 Stone/kernel fruit fibre 3.1.1.2 Stone/kernel fruit fibre3.2.2.2 Stone/kernel fruits (chemically treated)[c]	-
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	
Pistachio Shells	3.1.3.2 Shells/husks		3.1.3.2 Shells/husks	
Walnut 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.

[c] The olive stones can come from oil mills or from oil extracting industries. If they come from oil extracting industries they may have undergone chemical treatment with hexane or other solvents to extract the residual oil (this solvent is recovered later). This extraction process and the solvent must be declared. Olive stones treated with chemical additives such as salt or soda are excluded from this standard.

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.

9.2 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.

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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.

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10 LOGO 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 logo must be displayed in one of the colour variations or in monochrome specified here.

There are two different design of label's logo depending on the kind of solid biofuels.

The logo for domestic solid biofuels for small installations (<400 kW) is:

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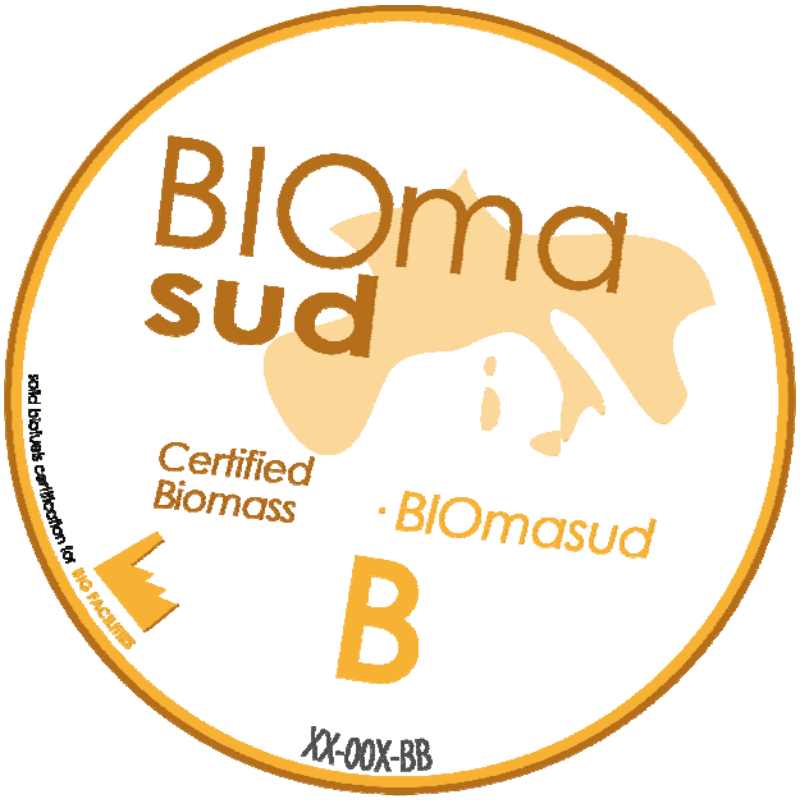
The logo for domestic solid biofuels for big installations (>400 kW) is:



In both logos:

- Where it says “Certified Biomass” it shall be mentioned the solid biofuel certified (olive stone, …) in the language of the country where is going to be mainly distributed.
- Where it says “A” or “B” it shall be stated the quality class of the solid biofuel
- Where it says “XX” it shall be stated the code of the country
- Where it says “00X” it shall be stated the Id. number of the company certified
- Where it says “BB” it shall be stated the code of the Biomass (i.e. OT for Olive Stones)

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

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

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ANNEX 1: SPECIFICATIONS OF DOMESTIC BIOMASSES FOR SMALL INSTALLATIONS (<400 KW)

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

	Property class /Analysis method	**Unit**	**A1**	**A2**
Normative	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
	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
	Moisture, M, ISO 18134-1, ISO 18134-2	as received, w-% wet basis	M10 ≤ 10	M10 ≤ 10
	Ash, A, ISO 18122	w-% dry	A0.7 ≤ 0,7	A1.2 ≤ 1,2
	Mechanical durability, DU, ISO 17831-1	as received, w-%	DU97.5 ≥ 97,5	DU97.5 ≥ 97,5
	Fines F, ISO 18846	w-% as received	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
	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
	Bulk density, BD, ISO 17828	kg/m^3	BD600 ≥ 600	BD600 ≥ 600
	Nitrogen, N, ISO 16948	w-% dry	N0.3 ≤ 0,3	N0.5 ≤ 0,5
	Sulphur , S, ISO 16994	w-% dry	S0.04 ≤ 0,04	S0.05 ≤ 0,05
	Chlorine, Cl, ISO 16994	w-% dry	Cl0.02 ≤ 0,02	Cl0.02 ≤ 0,02
	Arsenic, As, ISO 16968	mg/kg dry	≤ 1	≤ 1
	Cadmium, Cd, ISO 16968	mg/kg dry	≤ 0,5	≤ 0,5
	Chromium, Cr, ISO 16968	mg/kg dry	≤ 10	≤ 10
	Copper, Cu, ISO 16968	mg/kg dry	≤ 10	≤ 10
	Lead, Pb, ISO 16968	mg/kg dry	≤ 10	≤ 10
	Mercury, Hg, ISO 16968	mg/kg dry	≤ 0,1	≤ 0,1
	Nickel, Ni, ISO 16968	mg/kg dry	≤ 10	≤ 10
	Zinc, Zn, ISO 16968	mg/kg dry	≤ 100	≤ 100
	Informative: Ash melting behavior [d], prEN15370	°C	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.

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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 cm^2

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 cm^2 pattern.

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Limits according to ISO 17225-4 (table 2.2)

	Property class /Analysis method	**Unit**	**A1**	**A2**
Normative	Origin and source ISO 17225-1		1.1.1 Whole trees without roots[a] 1.1.3 Stemwood 1.2.1 Chemically untreated wood 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 residues 1.1.4.3 Logging residues
	Particle size, P ISO 17827-1	mm	to be selected from table 1	
	Moisture, M[b], ISO 17827-1 ISO 18134-2	as received, w-% wet basis	M10 ≤ 10 M25 ≤ 25	M35 ≤ 35
	Ash, A, ISO 18112	w-% dry	A1.0 ≤ 1,0	A1.5 ≤ 1,5
	Bulk density, BD [c], ISO 17828	kg/loose m^3 as received	BD150 ≥ 150 BD200 ≥ 200 BD250 ≥ 250	BD150 ≥ 150 BD200 ≥ 200 BD250 ≥ 250 BD300 ≥ 300
	Nitrogen, N, ISO 16948	w-% dry	Not applicable	Not applicable
	Sulphur , S, ISO 16994	w-% dry	Not applicable	Not applicable
	Chlorine, Cl, ISO 16994	w-% dry	Not applicable	Not applicable
	Arsenic, As, ISO 16968	mg/kg dry	Not applicable	Not applicable
	Cadmium, Cd, ISO 16968	mg/kg dry	Not applicable	Not applicable
	Chromium, Cr, ISO 16968	mg/kg dry	Not applicable	Not applicable
	Copper, Cu, ISO 16968	mg/kg dry	Not applicable	Not applicable
	Lead, Pb, ISO 16968	mg/kg dry	Not applicable	Not applicable
	Mercury, Hg, ISO 16968	mg/kg dry	Not applicable	Not applicable
	Nickel, Ni, ISO 16968	mg/kg dry	Not applicable	Not applicable
	Zinc, Zn, ISO 16968	mg/kg dry	Not applicable	Not applicable
	Ne t calorific value, Q, 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] 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

[c] The bulk density is lower for coniferous than for broad leaf wood

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3. **Firewood**.

Limits according to ISO 17225-5 (table 3)

	Property class /Analysis method	**Unit**	**A1**	**A2**
Normative	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 1.2.1 Chemically untreated wood residues
	Wood species[a]		to be stated	
	Diameter, D[b]	cm	D2 ≤2 D5 2 < D ≤ 5 D15 5 < D ≤ 15 D15+ > 15 (actual value to be stated)	D15 5 < D ≤ 15 D15+ >15 (actual value to be stated)
	Length, L[c]	cm	L20 ≤ 20 (± 2 cm) L25 ≤ 25 (± 2 cm) L30 ≤ 30 (± 2 cm) L33 ≤ 33 (± 2 cm) L40 ≤ 40 (± 2 cm) L50 ≤ 50 (± 4 cm) L100 ≤ 100 (± 5 cm)	L30 ≤ 30 (± 2 cm) L33 ≤ 33 (± 2 cm) L40 ≤ 40 (± 2 cm) L50 ≤ 50 (± 4 cm) L100 ≤ 100 (± 5 cm)
	Moisture, M[d], ISO 18134-1 ISO 18134-2	as received, w-% wet basis	M20 ≤ 20 M25 ≤ 25	M20 ≤ 20 M25 ≤ 25 M35 ≤ 35
	Volume or weight	Volume m^3 stacked or loose or weight, kg as received	To be stated which unit is used when retailed (m^3 stacked or loose, kg) and/or packaged log wood weight	
informative	Energy density, E[e] Or Net calorific value, Q [e], ISO 18125	MJ/kg or kWh/m^3 stacked or loose MJ/kg or kWh/kg as received	Recommended to be stated	
	Drying		Recommended to be stated, if firewood is dried by natural seasoning by ambient air or artificially by hot air	
	Moisture, U[d]	w-% dry basis	U25 ≤ 25 U33 ≤ 33	
	Decay and mould	% of pieces	No visible decay	≤ 5
	Proportion of split volume	% of pieces		
	The cut-off surface		Even and smooth[f]	No requirements

[a] Wood species (e.g. spruce, birch, beech) can be stated by using EN 13556 Round and sawn timber Nomenclature. If firewood include different wood species, the main wood species should be mentioned first.

[b] 85% of the firewood should be kept in specified diameter property class. For stoves it is recommended to use firewood with a diameter less than 15 cm. D2 and D5 are recommended for cookers and as a kindling (ignition wood). In informative Annex B from ISO 17225-5 a simple method for measuring of the diameter is specified.

[c] It is allowed to have 15% firewood shorter than requested length including the limit value.

[d] Moisture content should not be less 12 w-% on wet basis (M) or 13,64 w-% on dry basis (U).

[e] The energy density (E) may be calculated according to Annex C from ISO 17225-5 on the basis of the bulk density (BD) and the net calorific value.

[f] Use of chainsaw and circular saw will give a smooth and event cut-off surface

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4. **Olive Stones**. Limits based on UNE 164003 and updated with deliverable D3.3 of BIOMASUD PLUS project. (table 4)

	Property class /Analysis method		**Unit**	**A1**	**A2**
Normative	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 fruits[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 fruits
	Particle size[b] EN 15149-1 ISO 17827-1	Fines, F < 2 mm	as received, w-% wet basis	< 15	< 15
	Oil content, ISO 659		w-% dry	≤ 0,6	≤ 1,0
	Moisture, M, EN 14774-1, EN 14774-2 ISO 18134-1; ISO 18134-2		as received, w-% wet basis	M12 ≤ 12	M12 ≤ 12
	Ash, A, EN14775; ISO 18122		w-% dry	A0.7≤ 0,7	A1.0 ≤ 1,0
	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
	Bulk density, BD, EN 15103; ISO 17828		kg/m^3	BD700 ≥ 700	BD650 ≥ 650
	Nitrogen, N, EN 15104; ISO 16948		w-% dry	N0.3 ≤ 0,3	N0.4 ≤ 0,4
	Sulphur , S, EN 15289; ISO 16994		w-% dry	S0.03 ≤ 0,03	S0.04 ≤ 0,04
	Chlorine, Cl, EN 15289; ISO 16968		w-% dry	Cl0.03 ≤ 0,03	Cl0.04 ≤ 0,04
	Arsenic, As, EN 15297; ISO 16968		mg/kg dry	≤ 0,5	≤ 0,5
	Cadmium, Cd, EN 15297; ISO 16968		mg/kg dry	≤ 0,5	≤ 0,5
	Chromium, Cr, EN 15297; ISO 16968		mg/kg dry	≤ 10	≤ 10
	Copper, Cu, EN 15297; ISO 16968		mg/kg dry	≤ 15	≤ 15
	Lead, Pb, EN 15297; ISO 16968		mg/kg dry	≤ 10	≤ 10
	Mercury, Hg, EN 15297; ISO 16968		mg/kg dry	≤ 0,01	≤ 0,01
	Nickel, Ni, EN 15297; ISO 16968		mg/kg dry	≤ 15	≤ 15
	Zinc, Zn, EN 15297; ISO 16968		mg/kg dry	≤ 100	≤ 2100

[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

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5. **Almond / Hazelnut Shells**. Limits based on UNE 164004 and updated with deliverable D3.3 of BIOMASUD PLUS project. (table 5)

	Property class /Analysis method		**Unit**	**A1** [a]	**A2**
Normative	Origin and source ISO 17225-1			3.1.3.2Shells/husks	3.1.3.2 Shells/husks
	Particle size[b] EN 15149-1 ISO 17827-1	Fines, F <2 mm	**as received, w-% wet basis**	< 2	< 2
	Oil content, ISO 659		w-% dry	≤ 0,6	≤ 1,0
	Moisture, M, EN 14774-1, EN 14774-2 ISO 18134-1; ISO 18134-2		as received, w-% wet basis	M12 ≤ 12	M12 ≤ 12
	Ash, A, EN14775		w-% dry	A0.7≤ 0,7	A1.5≤ 1,5
	Net calorific value, Q, EN 14918; ISO 18125		as received, MJ/kg or kWh/kg	Q15.0 Q ≥ 15,0 or Q ≥ 4,2	Q15.0 Q ≥ 15,0 or Q ≥ 4,2
	Bulk density, BD, EN 15103 ISO 17828		kg/m^3	Almond shells BD450 ≥ 500 Hazelnut shells BD300 ≥ 300	BD300 ≥ 300
	Nitrogen, N, EN 15104 ISO 16948		w-% dry	N0.4 ≤ 0,4	N0.6 ≤ 0,6
	Sulphur , S, EN 15289 ISO 16994		w-% dry	S0.03 ≤ 0,03	S0.03 ≤ 0,03
	Chlorine, Cl, EN 15289 ISO 16994		w-% dry	Cl0.02 ≤ 0,02	Cl0.03 ≤ 0,03
	Arsenic, As, EN 15297 ISO 16968		mg/kg dry	≤ 0,5	≤ 0,5
	Cadmium, Cd, EN 15297 ISO 16968		mg/kg dry	≤ 2	≤ 2
	Chromium, Cr, EN 15297 ISO 16968		mg/kg dry	≤ 10	< 10
	Copper, Cu, EN 15297 ISO 16968		mg/kg dry	≤ 15	≤ 15
	Lead, Pb, EN 15297 ISO 16968		mg/kg dry	≤ 15	≤ 15
	Mercury, Hg, EN 15297 ISO 16968		mg/kg dry	≤ 0,01	≤ 0,01
	Nickel, Ni, EN 15297 ISO 16968		mg/kg dry	≤ 15	≤ 15
	Zinc, Zn, EN 15297 ISO 16968		mg/kg dry	≤ 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

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6. **Chopped pine cone**. Limits according to 164004 (table 6)

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

[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

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7. **Pine nut shells**. Limits based on UNE 164004 and updated with deliverable D3.3 of BIOMASUD PLUS project. (table 7)

	Property class /Analysis method		**Unit**	**A1** [a]	**A2**
Normative	Origin and source ISO 17225-1			3.1.3.2 Shells/husks	3.1.3.2 Shells/husks
	Particle size[b] EN 15149-1 ISO 17827-1	Fines, F <2 mm	as received, w-% wet basis	< 2	< 2
	Oil content, ISO 659		w-% dry	≤ 0,6	≤ 1,0
	Moisture, M, EN 14774-1, EN 14774-2 ISO 18134-1; ISO 18134-2		as received, w-% wet basis	M12 ≤ 12	M12 ≤ 12
	Ash, A, EN14775 ; ISO 18122		w-% dry	A0,7≤ 1,3	A1.5≤ 1,5
	Net calorific value, Q, EN 14918 ; ISO 18125		as received, MJ/kg or kWh/kg	Q16.0 Q ≥ 16,0 or Q ≥ 4,4	Q16.0 Q ≥ 16,0 or Q ≥ 4,4
	Bulk density, BD, EN 15103 ISO 17828		kg/m^3	BD470 ≥ 470	BD470 ≥ 470
	Nitrogen, N, EN 15104 ISO 16948		w-% dry	N0.4 ≤ 0,4	N0.6 ≤ 0,6
	Sulphur , S, EN 15289 ISO 16994		w-% dry	S0.03 ≤ 0,03	S0.03 ≤ 0,03
	Chlorine, Cl, EN 15289 ISO 16994		w-% dry	Cl0.02 ≤ 0,02	Cl0.03 ≤ 0,03
	Arsenic, As, EN 15297 ISO 16968		mg/kg dry	≤ 0,5	≤ 0,5
	Cadmium, Cd, EN 15297 ISO 16968		mg/kg dry	≤ 1	≤ 1
	Chromium, Cr, EN 15297 ISO 16968		mg/kg dry	≤ 15	< 15
	Copper, Cu, EN 15297 ISO 16968		mg/kg dry	≤ 20	≤ 20
	Lead, Pb, EN 15297 ISO 16968		mg/kg dry	≤ 15	≤ 15
	Mercury, Hg, EN 15297 ISO 16968		mg/kg dry	≤ 0,01	≤ 0,01
	Nickel, Ni, EN 15297 ISO 16968		mg/kg dry	≤ 15	≤ 15
	Zinc, Zn, EN 15297 ISO 16968		mg/kg dry	≤ 100	≤ 100

[a] Class A1 is specific for grounded and sieved shells
[b] 100% of the mass must pass through a 31,5 mm sieve

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8. **Pistachio shells**. Quality specifications according deliverable D.3.3. of BIOMASUD PLUS project (table 8)

	Property class /Analysis method		**Unit**	**A1** [a]	**A2**
Normative	Origin and source ISO 17225-1			3.1.3.2 Shells/husks	3.1.3.2 Shells/husks
	Particle size[b] EN 15149-1 ISO 17827-1	Fines, F <2 mm	as received, w-% wet basis	< 2	< 2
	Oil content, ISO 659		w-% dry	To be updated	To be updated
	Moisture, M, EN 14774-1, EN 14774-2 ISO 18134-1; ISO 18134-2		as received, w-% wet basis	M12 ≤ 12	M12 ≤ 12
	Ash, A, EN14775 ; ISO 18122		w-% dry	A0.7≤ 0,7	A1.6≤ 1,6
	Net calorific value, Q, EN 14918 ; ISO 18125		as received, MJ/kg or kWh/kg	Q15.0 Q ≥ 15,0 or Q ≥ 4,2	Q15.0 Q ≥ 15,0 or Q ≥ 4,2
	Bulk density, BD, EN 15103 ISO 17828		kg/m^3	BD300 ≥ 300	BD300 ≥ 300
	Nitrogen, N, EN 15104 ISO 16948		w-% dry	N0.4 ≤ 0,4	N0.6 ≤ 0,6
	Sulphur , S, EN 15289 ISO 16994		w-% dry	S0.03 ≤ 0,03	S0.03 ≤ 0,03
	Chlorine, Cl, EN 15289 ISO 16994		w-% dry	Cl0.02 ≤ 0,02	Cl0.03 ≤ 0,03
	Arsenic, As, EN 15297 ISO 16968		mg/kg dry	≤ 0,5	≤ 0,5
	Cadmium, Cd, EN 15297 ISO 16968		mg/kg dry	≤ 1	≤ 1
	Chromium, Cr, EN 15297 ISO 16968		mg/kg dry	≤ 15	< 15
	Copper, Cu, EN 15297 ISO 16968		mg/kg dry	≤ 20	≤ 20
	Lead, Pb, EN 15297 ISO 16968		mg/kg dry	≤ 15	≤ 15
	Mercury, Hg, EN 15297 ISO 16968		mg/kg dry	≤ 0,01	≤ 0,01
	Nickel, Ni, EN 15297 ISO 16968		mg/kg dry	≤ 15	≤ 15
	Zinc, Zn, EN 15297 ISO 16968		mg/kg dry	≤ 100	≤ 100

[a] Class A1 is specific for grounded and sieved shells
[b] 100% of the mass must pass through a 31,5 mm sieve

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9. **Walnut shells**. Quality specifications according deliverable D.3.3. of BIOMASUD PLUS project (table 9)

	Property class /Analysis method		**Unit**	**A1** [a]	**A2**
Normative	Origin and source ISO 17225-1			3.1.3.2 Shells/husks	3.1.3.2 Shells/husks
	Particle size[b] EN 15149-1 ISO 17827-1	Fines, F <2 mm	as received, w-% wet basis	< 2	< 2
	Oil content, ISO 659		w-% dry	To be updated	To be updated
	Moisture, M, EN 14774-1, EN 14774-2 ISO 18134-1; ISO 18134-2		as received, w-% wet basis	M12 ≤ 12	M12 ≤ 12
	Ash, A, EN14775 ; ISO 18122		w-% dry	A0.7≤ 0,7	A1.6≤ 1,6
	Net calorific value, Q, EN 14918 ; ISO 18125		as received, MJ/kg or kWh/kg	Q16.0 Q ≥ 16,0 or Q ≥ 4,4	Q16.0 Q ≥ 16,0 or Q ≥ 4,4
	Bulk density, BD, EN 15103 ISO 17828		kg/m^3	BD250 ≥ 250	BD200 ≥ 200
	Nitrogen, N, EN 15104 ISO 16948		w-% dry	N0.4 ≤ 0,4	N0.6 ≤ 0,6
	Sulphur , S, EN 15289 ISO 16994		w-% dry	S0.03 ≤ 0,03	S0.03 ≤ 0,03
	Chlorine, Cl, EN 15289 ISO 16994		w-% dry	Cl0.02 ≤ 0,02	Cl0.03 ≤ 0,03
	Arsenic, As, EN 15297 ISO 16968		mg/kg dry	≤ 0,5	≤ 0,5
	Cadmium, Cd, EN 15297 ISO 16968		mg/kg dry	≤ 1	≤ 1
	Chromium, Cr, EN 15297 ISO 16968		mg/kg dry	≤ 15	< 15
	Copper, Cu, EN 15297 ISO 16968		mg/kg dry	≤ 20	≤ 20
	Lead, Pb, EN 15297 ISO 16968		mg/kg dry	≤ 15	≤ 15
	Mercury, Hg, EN 15297 ISO 16968		mg/kg dry	≤ 0,01	≤ 0,01
	Nickel, Ni, EN 15297 ISO 16968		mg/kg dry	≤ 15	≤ 15
	Zinc, Zn, EN 15297 ISO 16968		mg/kg dry	≤ 100	≤ 100

[a] Class A1 is specific for grounded and sieved shells
[b] 100% of the mass must pass through a 31,5 mm sieve

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10. **Olive tree prunings (chips for domestic small installations)**. Quality specifications according deliverable D.3.3. of BIOMASUD PLUS project.

Particle size thresholds according to ISO 17225-4 (table 10.1)

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 cm^2

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 cm^2 pattern.

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Limits according to ISO 17225-4 (table 10.2)

	Property class /Analysis method	**Unit**	**A1**	**A2**
Normative	Origin and source ISO 17225-1		1.1.7 Segregated wood from gardens, parks, roadside maintenance, vineyards, fruit orchards and driftwood from freshwater	1.1.7 Segregated wood from gardens, parks, roadside maintenance, vineyards, fruit orchards and driftwood from freshwater
	Particle size, P ISO 17827-1	mm	to be selected from table 1	
	Moisture, M[a], ISO 17827-1 ISO 18134-2	as received, w-% wet basis	M10 ≤ 10 M25 ≤ 25	M35 ≤ 35
	Ash, A, ISO 18112	w-% dry	A1.0 ≤ 1,0	A1.5 ≤ 1,5
	Bulk density, BD, ISO 17828	kg/loose m^3 as received	BD150 ≥ 150 BD200 ≥ 200 BD250 ≥ 250	BD150 ≥ 150 BD200 ≥ 200 BD250 ≥ 250 BD300 ≥ 300
	Nitrogen, N, ISO 16948	w-% dry	Not applicable	Not applicable
	Sulphur , S, ISO 16994	w-% dry	Not applicable	Not applicable
	Chlorine, Cl, ISO 16994	w-% dry	Not applicable	Not applicable
	Arsenic, As, ISO 16968	mg/kg dry	Not applicable	Not applicable
	Cadmium, Cd, ISO 16968	mg/kg dry	Not applicable	Not applicable
	Chromium, Cr, ISO 16968	mg/kg dry	Not applicable	Not applicable
	Copper, Cu, ISO 16968	mg/kg dry	Not applicable	Not applicable
	Lead, Pb, ISO 16968	mg/kg dry	Not applicable	Not applicable
	Mercury, Hg, ISO 16968	mg/kg dry	Not applicable	Not applicable
	Nickel, Ni, ISO 16968	mg/kg dry	Not applicable	Not applicable
	Zinc, Zn, ISO 16968	mg/kg dry	Not applicable	Not applicable
	Ne t calorific value, Q, ISO 18125	MJ/kg or kWh/kg as received	Minimum value to be stated	

[a] 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

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10. Olive tree prunings (pellets for domestic small installations). Quality specifications according deliverable D.3.3. of BIOMASUD PLUS project. (table 11)

	Property class /Analysis method	**Unit**	**P1**	**P2**	**P3**
Normative	Origin and source ISO 17225-1		1.1.7 Segregated wood from gardens, parks, roadside maintenance, vineyards, fruit orchards and driftwood from freshwater	1.1.7 Segregated wood from gardens, parks, roadside maintenance, vineyards, fruit orchards and driftwood from freshwater	1.1.7 Segregated wood from gardens, parks, roadside maintenance, vineyards, fruit orchards and driftwood from freshwater
	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	Q15.0 15,0 or Q4.2 Q ≥ 4,2	Q15.0 15,0 or Q4.2 Q ≥ 4,2	Q15.0 15,0 or Q4.2 Q ≥ 4,2
	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.

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ANNEX 2: SPECIFICATIONS OF DOMESTIC SOLID BIOFUELS FOR BIG INSTALLATIONS (>400KW)

11. **Wood pellets**. Limits according to ISO 17225-2 (table 12)

	Property class /Analysis method	**Unit**	**B**
Normative	Origin and source ISO 17225-1		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
	Moisture, M, ISO 18134-1, ISO 18134-2	as received, w-% wet basis	M10 ≤ 10
	Ash, A, ISO 18122	w-% dry	A2.0 ≤ 2,0
	Mechanical durability, DU, ISO 17831-1	as received, w-%	DU96.5 ≥ 96,5
	Fines F, ISO 18846	w-% as received	F1.0 ≤ 1,0
	Additives [c]	w-% dry	≤ 2 w-% Type and amount to be stated
	Net calorific value, Q, ISO 18125	as received, MJ/kg or kWh/kg	Q16.0 16,0 ≤ Q ≤ 19 or Q 4.4 4,4 ≤ Q ≤ 5,3
	Bulk density, BD, ISO 17828	kg/m^3	BD600 ≥ 600
	Nitrogen, N, ISO 16948	w-% dry	N1.0 ≤ 1,0
	Sulphur , S, ISO 16994	w-% dry	S0.05 ≤ 0,05
	Chlorine, Cl, ISO 16994	w-% dry	Cl0.03 ≤ 0,03
	Arsenic, As, ISO 16968	mg/kg dry	≤ 1
	Cadmium, Cd, ISO 16968	mg/kg dry	≤ 0,5
	Chromium, Cr, ISO 16968	mg/kg dry	≤ 10
	Copper, Cu, ISO 16968	mg/kg dry	≤ 10
	Lead, Pb, ISO 16968	mg/kg dry	≤ 10
	Mercury, Hg, ISO 16968	mg/kg dry	≤ 0,1
	Nickel, Ni, ISO 16968	mg/kg dry	≤ 10
	Zinc, Zn, ISO 16968	mg/kg dry	≤ 100
	Informative: Ash melting behavior [d], prEN15370	°C	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.

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12. **Wood chips**.

Particle size thresholds according to ISO 17225-4 (table 13.1)

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 cm^2

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 cm^2 pattern.

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Limits according to ISO 17225-4 (table 13.2)

	Property class /Analysis method	**Unit**	**B1**	**B2**
Normative	Origin and source ISO 17225-1		1.1 Forest, plantation and other virgin wood[a] 1.2.1 Chemically untreated wood residues	1.1 Forest, plantation and other virgin wood[a] 1.2 By-products and residues from wood processing industry 1.3.1 Chemically untreated used Wood
Normative	Particle size, P ISO 17827-1	mm	to be selected from table 1	
Normative	Moisture, M[b], ISO 17827-1 ISO 18134-2	as received, w-% wet basis	Maximum value to be stated	
Normative	Ash, A, ISO 18112	w-% dry	A3.0 ≤ 3,0	
Normative	Bulk density, BD [c], ISO 17828	kg/loose m^3 as received	Minimum value to be stated	
Normative	Nitrogen, N, ISO 16948	w-% dry	N1.0 ≤ 1,0	
Normative	Sulphur , S, ISO 16994	w-% dry	S0.1 ≤ 0,1	
Normative	Chlorine, Cl, ISO 16994	w-% dry	Cl0.05 ≤ 0,05	
Normative	Arsenic, As, ISO 16968	mg/kg dry	≤ 1	
Normative	Cadmium, Cd, ISO 16968	mg/kg dry	≤ 2,0	
Normative	Chromium, Cr, ISO 16968	mg/kg dry	≤ 10	
Normative	Copper, Cu, ISO 16968	mg/kg dry	≤ 10	
Normative	Lead, Pb, ISO 16968	mg/kg dry	≤ 10	
Normative	Mercury, Hg, ISO 16968	mg/kg dry	≤ 0,1	
Normative	Nickel, Ni, ISO 16968	mg/kg dry	≤ 10	
Normative	Zinc, Zn, ISO 16968	mg/kg dry	≤ 100	
	Ne t calorific value, Q [e], ISO 18125	MJ/kg or kWh/kg as received	Minimum value to be stated	

[a] Excluding classes 1.1.5 Stumps/roots and 1.1.6 Bark.

[b] 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

[c] The bulk density is lower for coniferous than for broad leaf wood

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13. **Olive Stones**. Limits based on UNE 164003 and updated with deliverable D3.3 of BIOMASUD PLUS project (table 14)

	Property class /Analysis method		**Unit**	**B**
Normative	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
	Particle size[b] EN 15149-1 ISO 17827-1	Fines, F < 2 mm	as received, w-% wet basis	< 15
	Oil content, ISO 659		w-% dry	≤ 3,0
	Moisture, M, EN 14774-1, EN 14774-2 ISO 18134-1; ISO 18134-2		as received, w-% wet basis	M16 ≤ 16
	Ash, A, EN14775; ISO 18122		w-% dry	A1.3≤ 1,3
	Net calorific value, Q, EN 14918; ISO 18125		as received, MJ/kg or kWh/kg	Q14.9 Q ≥ 14,9 or Q ≥ 4,1
	Bulk density, BD, EN 15103; ISO 17828		kg/m^3	BD600 ≥ 600
	Nitrogen, N, EN 15104; ISO 16948		w-% dry	N0.6 ≤ 0,6
	Sulphur , S, EN 15289; ISO 16994		w-% dry	S0.05 ≤ 0,05
	Chlorine, Cl, EN 15289; ISO 16968		w-% dry	Cl0.05 ≤ 0,05
	Arsenic, As, EN 15297; ISO 16968		mg/kg dry	≤ 0,5
	Cadmium, Cd, EN 15297; ISO 16968		mg/kg dry	≤ 0,05
	Chromium, Cr, EN 15297; ISO 16968		mg/kg dry	≤ 10
	Copper, Cu, EN 15297; ISO 16968		mg/kg dry	≤ 15
	Lead, Pb, EN 15297; ISO 16968		mg/kg dry	≤ 10
	Mercury, Hg, EN 15297; ISO 16968		mg/kg dry	≤ 0,01
	Nickel, Ni, EN 15297; ISO 16968		mg/kg dry	≤ 15
	Zinc, Zn, EN 15297; ISO 16968		mg/kg dry	≤ 100

[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

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14. **Almond Shells and Hazelnuts**. Limits based on UNE 164004 and updated with deliverable D3.3 of BIOMASUD PLUS project (table 15)

	Property class /Analysis method		**Unit**	**B**
Normative	Origin and source ISO 17225-1			3.1.3.2 Shells/husks
	Particle size[b] EN 15149-1 ISO 17827-1	Fines, F <2 mm	as received, w-% wet basis	< 4
	Oil content, ISO 659		w-% dry	≤ 1,5
	Moisture, M, EN 14774-1, EN 14774-2 ISO 18134-1; ISO 18134-2		as received, w-% wet basis	M16 ≤ 16
	Ash, A, EN14775		w-% dry	A2.0 ≤ 2,0
	Net calorific value, Q, EN 14918; ISO 18125		as received, MJ/kg or kWh/kg	Almond shells Q14.0 Q ≥ 14,0 Hazelnut shells Q15.0 Q ≥ 15,0
	Bulk density, BD, EN 15103 ISO 17828		kg/m^3	BD270 ≥ 270
	Nitrogen, N, EN 15104 ISO 16948		w-% dry	N0.8 ≤ 0,8
	Sulphur , S, EN 15289 ISO 16994		w-% dry	S0.05 ≤ 0,05
	Chlorine, Cl, EN 15289 ISO 16994		w-% dry	Cl0.04 ≤ 0,04
	Arsenic, As, EN 15297 ISO 16968		mg/kg dry	≤ 0,5
	Cadmium, Cd, EN 15297 ISO 16968		mg/kg dry	≤ 1
	Chromium, Cr, EN 15297 ISO 16968		mg/kg dry	< 15
	Copper, Cu, EN 15297 ISO 16968		mg/kg dry	≤ 20
	Lead, Pb, EN 15297 ISO 16968		mg/kg dry	≤ 15
	Mercury, Hg, EN 15297 ISO 16968		mg/kg dry	≤ 0,01
	Nickel, Ni, EN 15297 ISO 16968		mg/kg dry	≤ 15
	Zinc, Zn, EN 15297 ISO 16968		mg/kg dry	≤ 100

[a] Class A1 is specific for grounded and sieved shells
[b] 100% of the mass must pass through a 31,5 mm sieve

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15. **Chopped pine cone**. Limits according to 164004 (table 16)

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

[a] 100% of the mass must pass through a 31,5 mm sieve

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16. **Pine nut shells**. Limits based on UNE 164004 and updated with deliverable D3.3 of BIOMASUD PLUS project (table 17)

	Property class /Analysis method		**Unit**	**B**
Normative	Origin and source ISO 17225-1			3.1.3.2 Shells/husks
	Particle size[a] EN 15149-1 ISO 17827-1	Fines, F <2 mm	**as received, w-% wet basis**	< 4
	Oil content, ISO 659		w-% dry	≤ 1,5
	Moisture, M, EN 14774-1, EN 14774-2 ISO 18134-1; ISO 18134-2		as received, w-% wet basis	M16 ≤ 16
	Ash, A, EN14775 ; ISO 18122		w-% dry	A2.0 ≤ 2,0
	Net calorific value, Q, EN 14918 ; ISO 18125		as received, MJ/kg or kWh/kg	Q15.0 Q ≥ 15,0 or Q ≥ 4,2
	Bulk density, BD, EN 15103 ISO 17828		kg/m^3	BD450 ≥ 450
	Nitrogen, N, EN 15104 ISO 16948		w-% dry	N0.8 ≤ 0,8
	Sulphur , S, EN 15289 ISO 16994		w-% dry	S0.05 ≤ 0,05
	Chlorine, Cl, EN 15289 ISO 16994		w-% dry	Cl0.04 ≤ 0,04
	Arsenic, As, EN 15297 ISO 16968		mg/kg dry	≤ 0,5
	Cadmium, Cd, EN 15297 ISO 16968		mg/kg dry	≤ 1
	Chromium, Cr, EN 15297 ISO 16968		mg/kg dry	< 15
	Copper, Cu, EN 15297 ISO 16968		mg/kg dry	≤ 20
	Lead, Pb, EN 15297 ISO 16968		mg/kg dry	≤ 10
	Mercury, Hg, EN 15297 ISO 16968		mg/kg dry	≤ 0,01
	Nickel, Ni, EN 15297 ISO 16968		mg/kg dry	≤ 15
	Zinc, Zn, EN 15297 ISO 16968		mg/kg dry	≤ 100

[a] 100% of the mass must pass through a 31,5 mm sieve

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17. **Pistachio shells**. Quality specifications according deliverable D.3.3. of BIOMASUD PLUS project (table 18)

	Property class /Analysis method		**Unit**	**B**
Normative	Origin and source ISO 17225-1			3.1.3.2 Shells/husks
	Particle size[a] EN 15149-1 ISO 17827-1	Fines, F <2 mm	**as received, w-% wet basis**	< 4
	Oil content, ISO 659		w-% dry	To be updated
	Moisture, M, EN 14774-1, EN 14774-2 ISO 18134-1; ISO 18134-2		as received, w-% wet basis	M16 ≤ 16
	Ash, A, EN14775 ; ISO 18122		w-% dry	A2.0 ≤ 2,0
	Net calorific value, Q, EN 14918 ; ISO 18125		as received, MJ/kg or kWh/kg	Q14.0 Q ≥ 14,0 or Q ≥ 3,9
	Bulk density, BD, EN 15103 ISO 17828		kg/m^3	BD270 ≥ 270
	Nitrogen, N, EN 15104 ISO 16948		w-% dry	N0.8 ≤ 0,8
	Sulphur , S, EN 15289 ISO 16994		w-% dry	S0.05 ≤ 0,05
	Chlorine, Cl, EN 15289 ISO 16994		w-% dry	Cl0.04 ≤ 0,04
	Arsenic, As, EN 15297 ISO 16968		mg/kg dry	≤ 0,5
	Cadmium, Cd, EN 15297 ISO 16968		mg/kg dry	≤ 1
	Chromium, Cr, EN 15297 ISO 16968		mg/kg dry	< 15
	Copper, Cu, EN 15297 ISO 16968		mg/kg dry	≤ 20
	Lead, Pb, EN 15297 ISO 16968		mg/kg dry	≤ 15
	Mercury, Hg, EN 15297 ISO 16968		mg/kg dry	≤ 0,01
	Nickel, Ni, EN 15297 ISO 16968		mg/kg dry	≤ 15
	Zinc, Zn, EN 15297 ISO 16968		mg/kg dry	≤ 100

[a] 100% of the mass must pass through a 31,5 mm sieve

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18. **Walnut shells**. Quality specifications according deliverable D.3.3. of BIOMASUD PLUS project (table 19)

	Property class /Analysis method		**Unit**	**B**
Normative	Origin and source ISO 17225-1			3.1.3.2 Shells/husks
	Particle size[a] EN 15149-1 ISO 17827-1	Fines, F <2 mm	as received, w-% wet basis	< 4
	Oil content, ISO 659		w-% dry	To be updated
	Moisture, M, EN 14774-1, EN 14774-2 ISO 18134-1; ISO 18134-2		as received, w-% wet basis	M16 ≤ 16
	Ash, A, EN14775 ; ISO 18122		w-% dry	A2.0 ≤ 2,0
	Net calorific value, Q, EN 14918; ISO 18125		as received, MJ/kg or kWh/kg	Q15.0 Q ≥ 15,0 or Q ≥ 4,2
	Bulk density, BD, EN 15103 ISO 17828		kg/m^3	BD200 ≥ 200
	Nitrogen, N, EN 15104 ISO 16948		w-% dry	N0.8 ≤ 0,8
	Sulphur , S, EN 15289 ISO 16994		w-% dry	S0.05 ≤ 0,05
	Chlorine, Cl, EN 15289 ISO 16994		w-% dry	Cl0.04 ≤ 0,04
	Arsenic, As, EN 15297 ISO 16968		mg/kg dry	≤ 0,5
	Cadmium, Cd, EN 15297 ISO 16968		mg/kg dry	≤ 1
	Chromium, Cr, EN 15297 ISO 16968		mg/kg dry	< 15
	Copper, Cu, EN 15297 ISO 16968		mg/kg dry	≤ 20
	Lead, Pb, EN 15297 ISO 16968		mg/kg dry	≤ 15
	Mercury, Hg, EN 15297 ISO 16968		mg/kg dry	≤ 0,01
	Nickel, Ni, EN 15297 ISO 16968		mg/kg dry	≤ 15
	Zinc, Zn, EN 15297 ISO 16968		mg/kg dry	≤ 100

[a] 100% of the mass must pass through a 31,5 mm sieve

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19. **Vineyards prunings (wood pellet for domestic big installations)**. Quality specifications according deliverable D.3.3. of BIOMASUD PLUS project (table 20)

	Property class /Analysis method	**Unit**	**PI1**	**PI2**	**PI3**
Normative	Origin and source ISO 17225-1		1.1.7 Segregated wood from gardens, parks, roadside maintenance, vineyards, fruit orchards and driftwood from freshwater	1.1.7 Segregated wood from gardens, parks, roadside maintenance, vineyards, fruit orchards and driftwood from freshwater	1.1.7 Segregated wood from gardens, parks, roadside maintenance, vineyards, fruit orchards and driftwood from freshwater
	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 D10, 10 ± 1; 3,15 ≤ L ≤ 40	D06, 6 ± 1; 3,15 ≤ L ≤ 40 D08, 8 ± 1; 3,15 ≤ L ≤ 40 D10, 10 ± 1; 3,15 ≤ L ≤ 40 D12, 12 ± 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	A3.5 ≤ 3,5	A4.0 ≤ 4,0	A4.5 ≤ 4,5
	Mechanical durability, DU, ISO 17831-1	as received, w-%	97,5 ≤ DU ≤ 99,0	97,0 ≤ DU ≤ 99,0	96,5 ≤ DU ≤ 99,0
	Fines F, ISO 18846	w-% as received	F4.0 ≤ 4,0	F5.0 ≤ 5,0	F6.0 ≤ 6,0
	Additives [c]	w-% dry	≤ 3 w-% Type and amount to be stated	≤ 3 w-% Type and amount to be stated	≤ 3 w-% Type and amount to be stated
	Net calorific value, Q, ISO 18125	as received, MJ/kg or kWh/kg	Q15.0 Q ≥ 15,0 or Q4.2 Q ≥ 4,2	Q15.0 Q ≥ 15,0 or Q4.2 Q ≥ 4,2	Q15.0 Q ≥ 15,0 or Q4.2 Q ≥ 4,2
	Bulk density, BD, ISO 17828	kg/m^3	BD600 ≥ 600	BD600 ≥ 600	BD600 ≥ 600
	Nitrogen, N, ISO 16948	w-% dry	N0.8 ≤ 0,8	N0.8 ≤ 0,8	N1.0 ≤ 1,0
	Particle size distribution of disintegrated pellets, ISO 17830	w-% dry	≥ 99% (<3.15 mm) ≥ 95% (<2.0 mm) ≥ 60% (<1.0 mm)	≥ 98% (<3.15 mm) ≥ 90% (<2.0 mm) ≥ 50% (<1.0 mm)	≥ 97% (<3.15 mm) ≥ 85% (<2.0 mm) ≥ 40% (<1.0 mm)
	Sulphur , S, ISO 16994	w-% dry	S0.05 ≤ 0,05	S0.06 ≤ 0,06	S0.06 ≤ 0,06
	Chlorine, Cl, ISO 16994	w-% dry	Cl0.03 ≤ 0,03	Cl0.05 ≤ 0,05	Cl0.1 ≤ 0,1
	Arsenic, As, ISO 16968	mg/kg dry	≤ 2	≤ 2	≤ 2
	Cadmium, Cd, ISO 16968	mg/kg dry	≤ 1,0	≤ 1,0	≤ 1,0
	Chromium, Cr, ISO 16968	mg/kg dry	≤ 15	≤ 15	≤ 15
	Copper, Cu, ISO 16968	mg/kg dry	≤ 30	≤ 40	≤ 50
	Lead, Pb, ISO 16968	mg/kg dry	≤ 20	≤ 20	≤ 20
	Mercury, Hg, ISO 16968	mg/kg dry	≤ 0,1	≤ 0,1	≤ 0,1
	Nickel, Ni, ISO 16968	mg/kg dry	≤ 30	≤ 30	≤ 30
	Zinc, Zn, ISO 16968	mg/kg dry	≤ 200	≤ 200	≤ 200
	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.

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1. **Olive tree prunings (pellets for domestic big installations)**. Quality specifications according deliverable D.3.3. of BIOMASUD PLUS project. (table 21)

	Property class /Analysis method	**Unit**	**PI1**	**PI2**	**PI3**
Normative	Origin and source ISO 17225-1		1.1.7 Segregated wood from gardens, parks, roadside maintenance, vineyards, fruit orchards and driftwood from freshwater	1.1.7 Segregated wood from gardens, parks, roadside maintenance, vineyards, fruit orchards and driftwood from freshwater	1.1.7 Segregated wood from gardens, parks, roadside maintenance, vineyards, fruit orchards and driftwood from freshwater
	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 D10, 10 ± 1; 3,15 ≤ L ≤ 40	D06, 6 ± 1; 3,15 ≤ L ≤ 40 D08, 8 ± 1; 3,15 ≤ L ≤ 40 D10, 10 ± 1; 3,15 ≤ L ≤ 40 D12, 12 ± 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	A3.5 ≤ 3,5	A4.0 ≤ 4,0	A4.5 ≤ 4,5
	Mechanical durability, DU, ISO 17831-1	as received, w-%	97,5 ≤ DU ≤ 99,0	97,0 ≤ DU ≤ 99,0	96,5 ≤ DU ≤ 99,0
	Fines F, ISO 18846	w-% as received	F4.0 ≤ 4,0	F5.0 ≤ 5,0	F6.0 ≤ 6,0
	Additives [c]	w-% dry	≤ 3 w-% Type and amount to be stated	≤ 3 w-% Type and amount to be stated	≤ 3 w-% Type and amount to be stated
	Net calorific value, Q, ISO 18125	as received, MJ/kg or kWh/kg	Q15.5 Q ≥ 15,5 or Q4.3 Q ≥ 4,3	Q15.5 Q ≥ 15,5 or Q4.3 Q ≥ 4,3	Q15.5 Q ≥ 15,5 or Q4.3 Q ≥ 4,3
	Bulk density, BD, ISO 17828	kg/m^3	BD550 ≥ 550	BD550 ≥ 550	BD550 ≥ 550
	Nitrogen, N, ISO 16948	w-% dry	N0.6 ≤ 0,6	N1.0 ≤ 1,0	N1.5 ≤ 1,5
	Particle size distribution of disintegrated pellets, ISO 17830	w-% dry	≥ 99% (<3.15 mm) ≥ 95% (<2.0 mm) ≥ 60% (<1.0 mm)	≥ 98% (<3.15 mm) ≥ 90% (<2.0 mm) ≥ 50% (<1.0 mm)	≥ 97% (<3.15 mm) ≥ 85% (<2.0 mm) ≥ 40% (<1.0 mm)
	Sulphur , S, ISO 16994	w-% dry	S0.05 ≤ 0,05	S0.08 ≤ 0,08	S0.15 ≤ 0,15
	Chlorine, Cl, ISO 16994	w-% dry	Cl0.04 ≤ 0,04	Cl0.05 ≤ 0,05	Cl0.1 ≤ 0,1
	Arsenic, As, ISO 16968	mg/kg dry	≤ 2	≤ 2	≤ 2
	Cadmium, Cd, ISO 16968	mg/kg dry	≤ 1,0	≤ 1,0	≤ 1,0
	Chromium, Cr, ISO 16968	mg/kg dry	≤ 15	≤ 15	≤ 15
	Copper, Cu, ISO 16968	mg/kg dry	≤ 30	≤ 40	≤ 50
	Lead, Pb, ISO 16968	mg/kg dry	≤ 20	≤ 20	≤ 20
	Mercury, Hg, ISO 16968	mg/kg dry	≤ 0,1	≤ 0,1	≤ 0,1
	Nickel, Ni, ISO 16968	mg/kg dry	≤ 30	≤ 30	≤ 30
	Zinc, Zn, ISO 16968	mg/kg dry	≤ 200	≤ 200	≤ 200
	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.

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ANNEX 3: CHECK LISTS

1. Check list for a trader

Phase	Action
Quality assurance – biomass storages	• Type and capacity • Storage of different qualities • Protection of moisture and impurities • Screening of fines before loading or package
Quality assurance – outgoing goods/complaints	• Documentation of outgoing goods • Retain sampling (frequency, amount, retaining period) • Sample labelling • Storage of retain samples • Documentation of customer complaints
Sampling for laboratory analysis	• Sampling point, amount and sizes (bags and bulk) (during auditing)
Delivery sample to laboratory	• Carry out sampling and deliver samples to laboratory agreed by a producer
Reporting	• Report of evaluation results to company and label issuer.