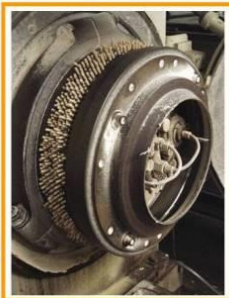




# SolidStandards

Enhancing the implementation of quality and sustainability standards and certification schemes for solid biofuels (EIE/11/218)



**D6.1a  
National Industry  
Position Paper  
Austria**



## The SolidStandards project

The SolidStandards project addresses ongoing and recent developments related to solid biofuel quality and sustainability issues, in particular the development of related standards and certification systems. In the SolidStandards project, solid biofuel industry players will be informed and trained in the field of standards and certification and their feedback will be collected and provided to the related standardization committees and policy makers.

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## About this document

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## Foreword

CEN, the European Committee for Standardisation, represented in this consortium by NEN, is interested in gathering the opinions of industry representatives for the development of new standards, the revision of existing standards, and the representation of European interests within international standardisation (ISO) procedures. The SolidStandards project offers an excellent opportunity to collect a large number of viewpoints through direct contact with industry representatives. In addition, a broader, public approach has been applied to collect feedback from industry players other than those participating in trainings. Furthermore, experience gained through the project has been used to provide recommendations to CEN and the solid biofuel community how to cope with new developments on solid biofuel markets.

The findings of this task under WP 6 of the SolidStandards project will be summarised in a final European industry position paper on international standards for solid biofuels.

This report contains the feedback collection and analysis from Austria.

This national report includes the following:

1. Description of national biofuel markets based on **available data**
2. Description of standardisation activities
3. Description of certification activities
4. Overview of standardisation and certification needs
5. Results of discussion with national mirror committee
6. Summary of national industry needs

The objectives are:

- To explain the industry points of view to standardisation committees
- To initiate and support the development of additional standards (e.g. on biomass storage)
- To increase the practical applicability of standards under development
- To bring European industry viewpoints into on-going CEN and ISO standardisation processes
- To provide the necessary feedback on existing standards in order to facilitate their revision in the future

Holzforschung Austria will discuss this national industry paper with the national mirror committee of the Austrian Standardisation Institute in Austria.

NEN will consolidate all national papers to one, overall European industry position paper about international standards for solid biofuels.

The final European industry position paper will be presented to CEN/TC 335 and/or ISO/TC 238 and distributed among the members of these technical committees.

# 1. Description of the national biofuels market of Austria

## 1.1. General description of the market

Being a heavily forested country the traditional use of wood (log wood) for heating has always been important in Austria. The kick off for technology development in this market segment came from the introduction of strict air pollution legislation in the beginning of the 1980ies. This forced companies to make significant efforts to reduce the emissions of wood boilers. At the same time Austria had started to enforce the installation of biomass district heating facilities - especially in rural communities, where households are provided with heat made from wood chips.

In the 1990ies Austrian researchers and companies searched for a solution to develop a fully automated heating system for domestic use based on wood because over the last few decades many wood boilers had been replaced by oil or gas boilers through the rising demand for comfort. The idea and the first technical solutions for pelletizing wood and combustion of pellets came from the USA and Scandinavia. With the introduction of wood pellet boilers and stoves in the mid 1990ies a new high comfortable solution for heating with biomass was introduced and quickly became a huge success.

An overview of the national solid biofuels market in Austria, based on available data can be found in Table 1.

**Table 1: Overview of the national solid biofuels market in Austria**

Type of organization active on market	Estimate number of companies active on market	Comments
Solid biofuel producers	<p>Wood pellet producers: 30<sup>1</sup></p> <p>Wood briquette producers: &gt; 7<sup>2</sup></p> <p>Wood chip producers (officially offering for sale)<sup>3</sup>: &gt; 200 (exact number unclear)</p> <p>Log wood producer (officially offering for sale)<sup>4</sup>: &gt; 150 (exact number unclear)</p> <p>Non-woody pellets: unknown</p> <p>Straw: unknown</p>	<p>Wood pellets / wood briquettes: Wood pellets and wood briquettes are mainly produced by big wood processing industries with the residuals of their main production. Some smaller pellet plants exclusively depend on the external purchase of raw material.</p> <p>Wood chips / log wood: Wood chip and log wood production is a regional small-structured business. There are some big suppliers like e.g. ÖBf (Österreichische Bundesforste, Austrian federal forest), some biomass trade centres and a large number of professional and semi-professional rural biomass fuel producers, who produce wood chips or log wood. Additional to the number of producers, who offer their products officially for sale, a large amount of wood chips and log wood produced for personal use only exist.</p> <p>Non-woody pellets: Non-woody pellets are only sold as animal food not for combustion so far.</p> <p>Straw: Straw is not sold for combustion so far.</p>

<sup>1</sup> proPellets Austria, Christian Schlagitweit, email information June 2013

<sup>2</sup> Holzforschung Austria

<sup>3</sup> Lwk Steiermark, Metschina Christian, email information June 2013

<sup>4</sup> Lwk Steiermark, Metschina Christian, email information June 2013

Solid biofuel trader and/or logistics providers	> 100 (exact number unclear)	23 of the most important pellet traders are member of proPellets Austria, of which 17 are ENplus certified traders <sup>5</sup> . The total number of pellet traders may be assumed to be twice as high.  Maschinenring Austria is a regional cooperative with 89 subdivisions in Austria <sup>6</sup> . They organise the logistics of wood chip production/delivery to the consumers and work with subcontractors for production/delivery.
Wood pellets users: small scale ( $\leq 100$ kW)	~ 89.300 (with a total output < 1750 MW)	The number represents the sum of the annually installed firing units (1997-2011) and does not take into account the withdrawal of old units since. <sup>7</sup>
Wood pellets users: medium scale (> 100 kW)	~180 (with a total output < 37 MW)	The number represents the sum of the annually installed firing units (2010-2011). <sup>8</sup>
Wood chip users: small scale ( $\leq 100$ kW)	~ 62.800 (with a total output < 2800 MW)	The number represents the sum of the annually installed firing units (1980-2011) and doesn't take into account the withdrawal of old units since. <sup>9</sup>
Wood chip users: medium scale (101 kW - 1 MW)	~ 8.800 (with a total output < 2600 MW)	
Wood chip users: large scale (> 1 MW)	~ 1.000 (with a total output < 2800 MW)	
Consumer association	> 2 (exact number unclear)	The most relevant consumer associations to be mentioned are: <ul style="list-style-type: none"> <li>- VKI Verein für Konsumenteninformation</li> <li>- AK Kammer für Arbeiter und Angestellte</li> </ul>
Industrial association	> 7 (exact number unclear)	There are many associations representing industry interests, some examples are: <ul style="list-style-type: none"> <li>- proPellets Austria</li> <li>- Österreichischer Biomasseverband ÖBV - ARGE Biomasse Nahwärme</li> <li>- Fachverband der Holzindustrie Österreichs (association of wood industry) in WKO (Wirtschaftskammer Österreich, Austrian federal economic chamber)</li> <li>- FHP (a cooperation between forestry, wood and paper industry)</li> <li>- LWK Landwirtschaftskammern (provincial chambers of agriculture)</li> <li>- Österreichischer Kachelofenverband (tile stove association)</li> <li>- Waldverband Österreich (forest association)</li> <li>- IG Holzkraft (interest group for green electricity from biomass)</li> </ul>

<sup>5</sup> proPellets Austria, Christian Schlagitweit, email information June 2013

<sup>6</sup> Maschinenring Österreich; Geschäftsbericht 2011

<sup>7</sup> Lwk Niederösterreich 2012; Biomasse-Heizungserhebung 2011

<sup>8</sup> Lwk Niederösterreich 2012; Biomasse-Heizungserhebung 2011

<sup>9</sup> Lwk Niederösterreich 2012; Biomasse-Heizungserhebung 2011



Combustion, gasification or fuel production equipment manufacturers	> 25 (exact number unclear)	<ul style="list-style-type: none"> <li>– at least 20 producers of combustion equipment - stoves and boilers<sup>10</sup>; 10 of these are member of proPellets Austria<sup>11</sup></li> <li>– at least 3 producers of production equipment for chipping and shredding (Eschlböck, Komptech, Mus-Max)</li> <li>– at least 2 producers of equipment for pellet and other solid biomass production and refinement (Andritz, Knoblinger)</li> </ul>
Certification, inspection or testing bodies	3	<p>Well known national inspection and certification bodies in the field of solid biomass are:</p> <ul style="list-style-type: none"> <li>– BEA Bioenergy Anlagenplanung GmbH</li> <li>– Holzforschung Austria HFA</li> <li>– OFI Technologie &amp; Innovation GmbH</li> </ul>
Laboratory / Research organization	> 9 (exact number unclear)	<p>Well known national research organisations in the field of solid biomass are:</p> <ul style="list-style-type: none"> <li>– BEA Bioenergy Anlagenplanung GmbH</li> <li>– Bioenergy 2020+, competence center for bioenergy research</li> <li>– BIOup.at, research network for solid biomass</li> <li>– BLT Wieselburg</li> <li>– Holzforschung Austria HFA</li> <li>– OFI Technologie &amp; Innovation GmbH</li> <li>– Österreichische Energieagentur (Austrian Energy Agency)</li> <li>– Österreichischer Kachelofenverband (research institute of tile stove builders)</li> <li>– Test Laboratory for Combustion Systems - TU Wien, Institute for chemical engineering</li> </ul>

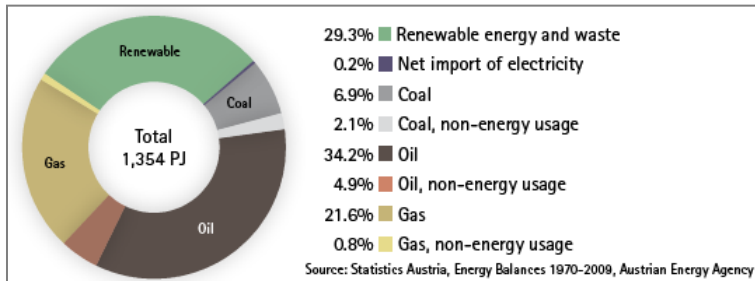
<sup>10</sup> Lwk Niederösterreich 2012; Biomasse-Heizungserhebung 2011

<sup>11</sup> proPellets Austria; <http://www.propellets.at/>

## 1.2. General figures of the market

The Austrian Energy Agency provides information on key data for solid biomass in the brochure 'Basic Data Bioenergy, Austria 2012'. The source of these data is mainly the energy balance of Statistic Austria from 2009. Figure 1 and Figure 2 give an overview on the share of different fuels for the gross energy consumption.

**Figure 1: Gross domestic energy consumption 2009<sup>12</sup>**



**Figure 2: Gross domestic consumption of renewable energy sources 2009<sup>13</sup>**

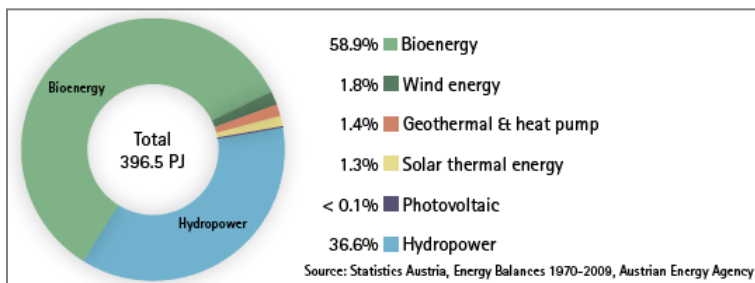
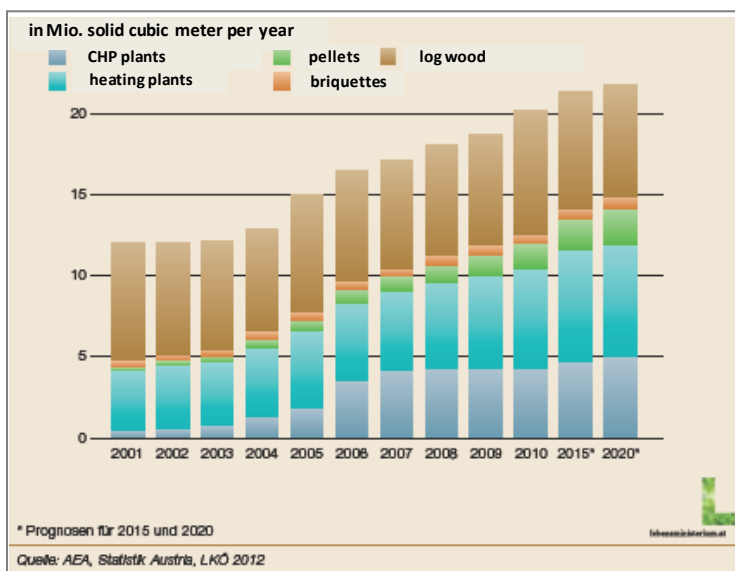


Figure 3 shows the development of solid biomass production since 2001, including a forecast on 2020, while Figure 4 shows a detailed flow chart of solid biomass production in 2009.

**Figure 3: Demand of wood for the energetic use in Austria<sup>14</sup>**



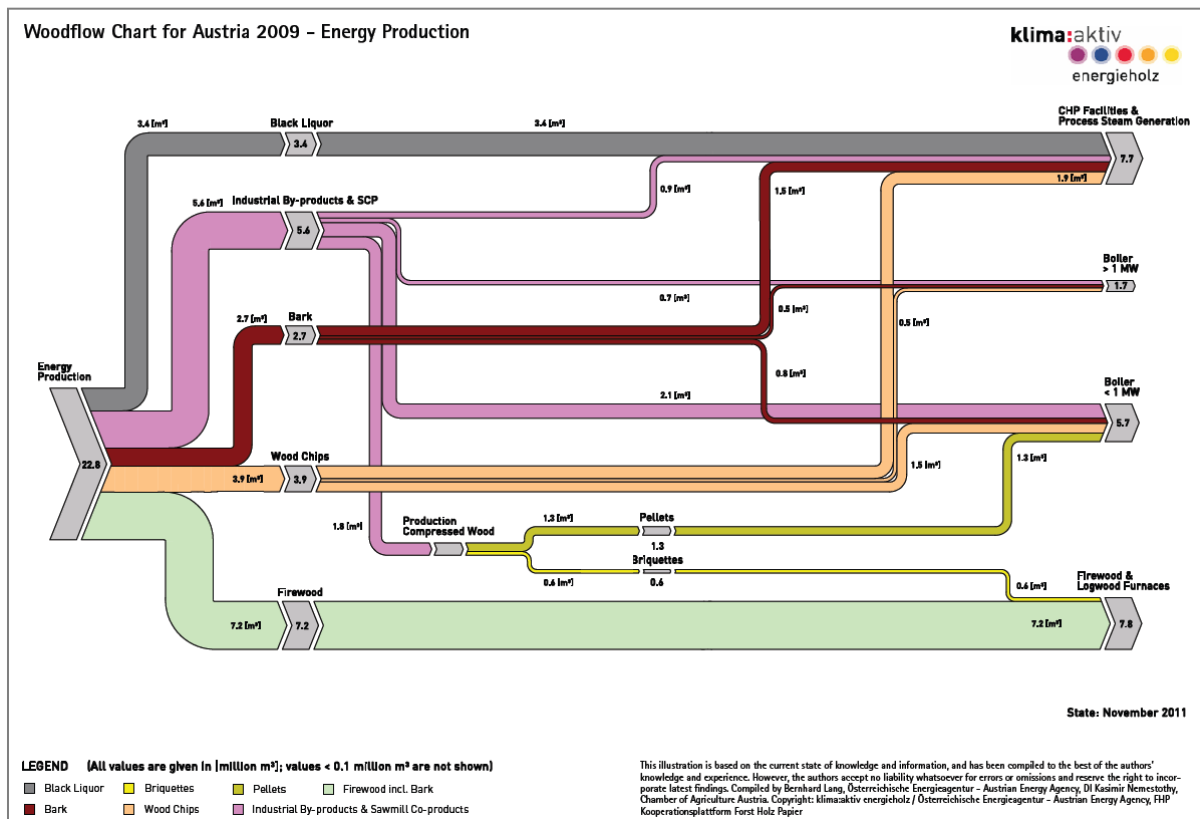
<sup>12</sup> Austrian Energy Agency 2012: Basic Data Bioenergy – Austria 2012

<sup>13</sup> Austrian Energy Agency 2012: Basic Data Bioenergy – Austria 2012

<sup>14</sup> Daten und Zahlen 2012, lebensministerium.at

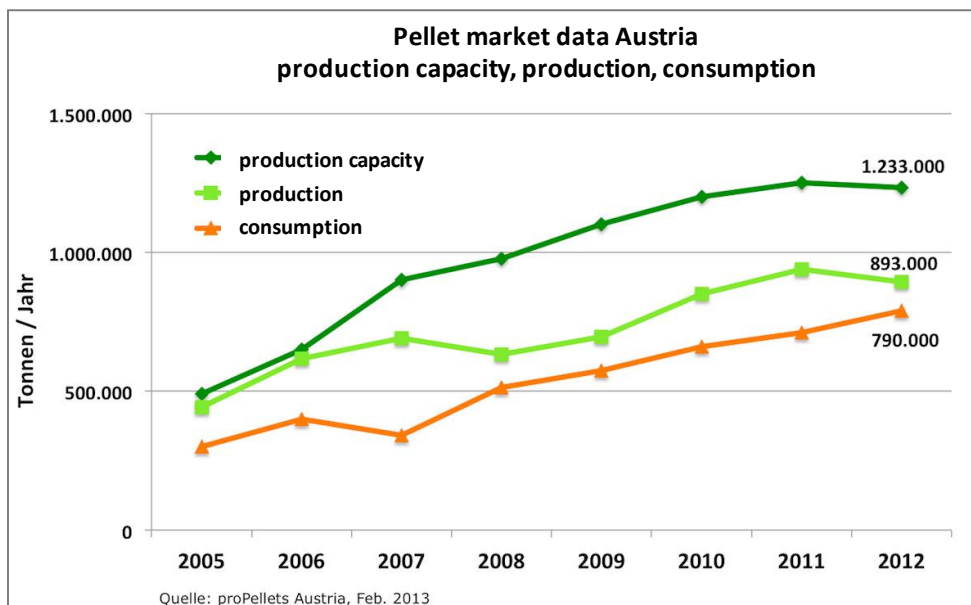


Figure 4: Woodflow chart for Austria 2009 - Energy production<sup>15</sup>



Very precise data exists for market figures of wood pellets collected by proPellets Austria, the Austrian pellet association, through questioning of the pellet companies (Figure 5). 30 plants produce wood pellets in Austria in 2013.

Figure 5: Development of the wood pellet production capacity, production and consumption 2005 to 2012<sup>16</sup>

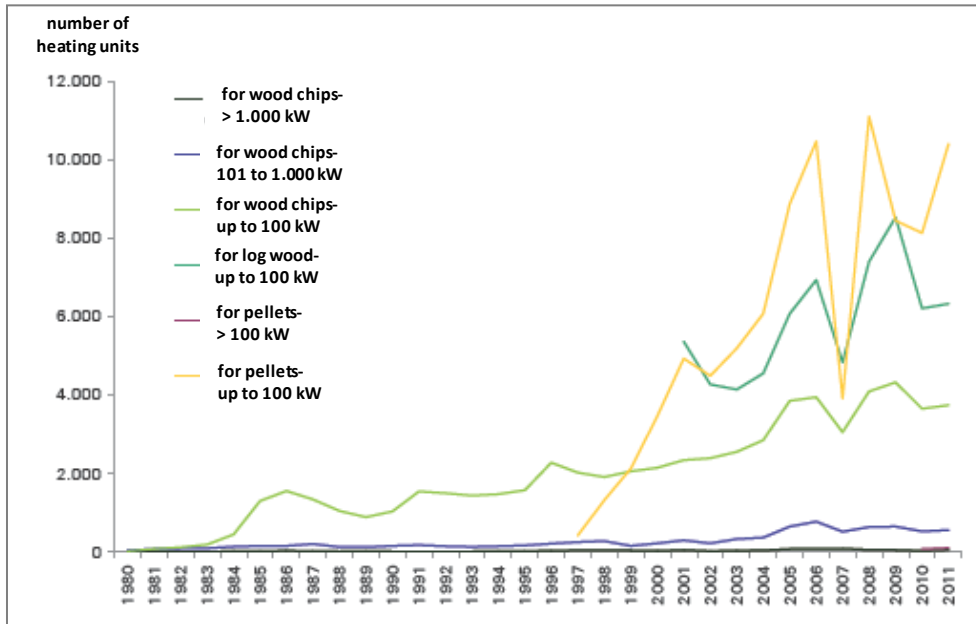


<sup>15</sup> Austrian Energy Agency 2012: Basic Data Bioenergy – Austria 2012

<sup>16</sup> proPellets Austria; <http://www.propellets.at/de/heizen-mit-pellets/statistik/>

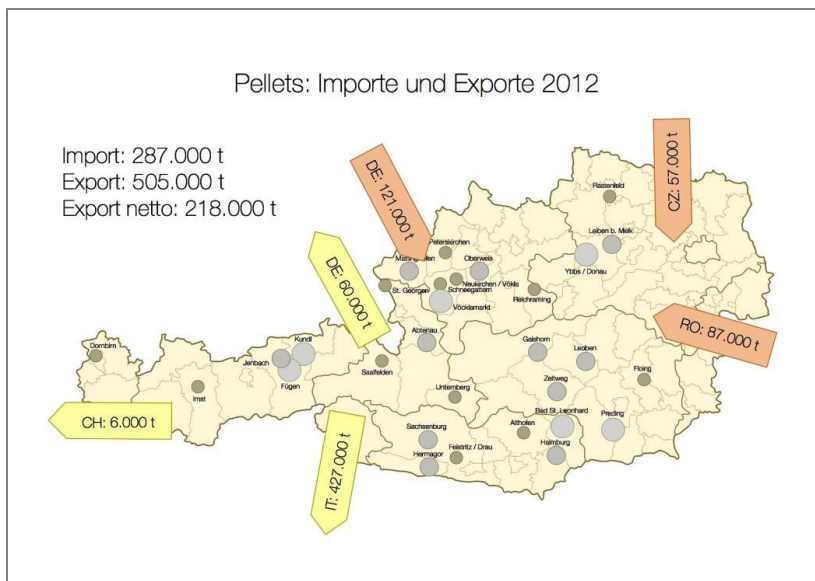
The consumption of solid biomass is estimated by the chamber of agriculture of lower Austria by surveying the newly installed heating appliances for solid biomass. Every year these data are published in the 'Biomasse-Heizungserhebung'. The latest data exist from 2011. Figure 6 shows the growing market for solid biomass for heating purpose.

**Figure 6: Development of the heating appliances for solid biomass 1980 to 2011; annually installed units<sup>17</sup>**



Based on Figure 7 it can be concluded that Austria is a net exporting country for wood pellets mainly exporting to Italy. On the other hand some residues from the sawmilling and pulp and paper industry originate in imports of sawn logs or industrial round wood. But it is difficult to track the exact amounts.

**Figure 7: Imports and exports of wood pellets in Austria 2012<sup>18</sup>**



<sup>17</sup> Lwk Niederösterreich 2012; Biomasse-Heizungserhebung 2011

<sup>18</sup> proPellets Austria; <http://www.propellets.at/de/heizen-mit-pellets/statistik/>

## 2. Standardisation activities

### 2.1. National standardisation activities

In Austria the national committee ONK 241 “Energy from solid biomass” is mirror committee for CEN/TC 335 and ISO/TC 238. Before European and International standardisation for solid biomass started to work on the topic of solid biomass, ONK 241 was one of the first to develop standards for wood chips, wood pellets and wood/bark briquettes.

23 members are listed in the mailing list of ONK 241 (dated April 2013); 9 of them represent company interests, e.g. boiler producers, chipper/shredder producers. No solid biomass producer is member of the national committee. 7 members come from interest groups, 6 from testing/research institutes and 1 member comes from the standardisation institute itself; the latter represent solid biomass in general.

ONK 241 is an active committee with approximately 4 meetings per year. A major task during the last years was to comment European and now International standards on the basis of experience collected during the use of these standards. Members of ONK 241 are also in charge of developing new work item proposals (NWIP) for ISO/TC 238 about e.g. torrefied pellets/briquettes. The input of the testing/research institutes in the standardisation process is only possible through financed research projects on different topics and the financing of travel costs for the participation in international meetings. These costs are usually shared by different interest groups, which support the work of the national committee (sometimes even without being a member). This well working cooperation of testing/research institutes and different interest groups in the field of solid biomass is the main driving factor for the active participation of Austria in the standardisation process.

Apart from the work on the international standardisation, new national standards were developed, mostly as supplements to European standards. The already existing standard ÖNORM M 7137 concerning pellet storage was updated as a consequence of the ongoing CO-discussion. Other existing standards are subsequently updated if necessary.

Recently the need for a method to analyse the content of stones/mineral impurities in wood chips and hog fuel was discussed in national and international committees. It was decided that Austria is going to prepare a new work item proposal NWIP for ISO/TC 238 on that topic.

### 2.2. National standards

Apart from European standards Austria has a few national standards of importance. Most of them are national supplements to European standards; three standards cover topics, for which no comparable standards exist on European level. The most recently published standards are:

**ÖNORM C 4005:2013-02-15** “Wood chips and hog fuel for energetic use in heating appliances with a thermal output over 500 kW – Requirements and test methods – National supplement to ÖNORM EN 14961-1 and ÖNORM EN 15234-1”

- This standard facilitates the declaration of wood chip quality for “forest chips” through reduction of quality classes and a suggestion of typical values for A, F, N and CI for defined raw material groups
- Only raw material of the class “1.1 forest, plantation and other virgin wood” according to ÖNORM EN 14961-1 is within the scope of this standard.

**ÖNORM C 4006:2013-02-15** “Wood briquettes for non-industrial use – Requirements and test methods – National supplement to ÖNORM EN 14961-3 and ÖNORM EN 15234-3”

- This standard provides a certification system for wood briquette quality including an external inspection at the production site, sampling and tests of the briquette quality.

- Only wood briquettes of the quality class A1 according to ÖNORM EN 14961-3 can be certified.

**ÖNORM M 7137:2012-10-01** “Compressed wood in natural state – Woodpellets – Requirements for storage of pellets at the ultimate consumer”

- The revision of this standard takes safety issues into account.

**ÖNORM C 4003:2012-05-15** “Maize cob - Requirements and test methods - National amendment referring to ÖNORM EN 14961-1 and ÖNORM EN 15234-1”

In the following all other national standards for solid biofuels are listed:

**ÖNORM M 7132:2006-10-01** “Energy-economical utilization of wood and bark as fuel – Definitions and properties”

**ÖNORM M 7136:2006-10-01** “Compressed wood in natural state - Woodpellets - Quality assurance in the field of logistics of transport and storage”

**ÖNORM M 7139:2006-10-01** “Energy grain - Requirements and test specifications - National amendment referring to VORNORM ÖNORM CEN/TS 14961

**ÖNORM C 4000:2007-11-01** “Compressed miscanthus - Requirements and test methods - National supplement referring to Prestandard ÖNORM CEN/TS 14961 and Prestandard ÖNORM CEN/TS 15234”

**ÖNORM C 4001:2008-11-01** “Chopped miscanthus - Requirements and test methods - National amendment referring to Prestandard ÖNORM CEN/TS 14961 and Prestandard ÖNORM CEN/TS 15234”

**ÖNORM C 4002:2009-11-01** “Compressed straw - Requirements and test methods - National amendment referring to Prestandard ÖNORM CEN/TS 14961 and Prestandard ÖNORM CEN/TS 15234”

At the moment no other topics are due to be standardized. There is the need to update the Austrian standard ÖNORM M 7132:1998 “Energy-economical utilization of wood and bark as fuel – Definitions and properties”. The conversion factors of cubic meter and loose cubic meter to solid cubic meter are widely used in Austria and can't be found in a European standard.

### 2.3. Uptake of European standards

In the course of 2 trainings on wood chip quality 22 feedbacks were collected. Unfortunately, nobody from Austria filled in the online-questionnaire on [www.solidstandards.eu](http://www.solidstandards.eu) and an additional consultation of 51 stakeholders from Austria per email did not result in additional feedback. Due to the small number of questionnaires a general overview is given on the implementation of European standards in Austria.

For pellets most producers are certified according to the certification programmes ENplus or DINplus. Both certification schemes are based on the ÖNORM EN 14961-2 and ÖNORM EN 15234-2; that is why the implementation of the European standards is already well advanced.

For all other solid biomass products the implementation of the new standards is still pending. For wood briquettes the implementation of ÖNORM EN 14961-3 and ÖNORM EN 15234-3 will take place 2013 due to the release of ÖNORM C 4006. For wood chips it is more difficult to prove the correct implementation of the European standards because no certification

system exists. Nevertheless it can be noticed that due to the release of ÖNORM C 4005 and the training events in the course of the SolidStandards project the awareness of the new standards and the willingness to implement them has increased.

Standards for physical and chemical test methods are usually applied by laboratories and testing bodies. It can be assumed that accredited laboratories are working with the European standards. Company laboratories often still use different test methods; like e.g. the Lignotester for the determination of the mechanical durability of pellets.

### 3. Certification activities

To fire something legally in Austria you need a heating system and combustible material which are both tested and meet the legal requirements. No certification is needed.

Nevertheless certification systems are common for wood pellets and wood briquettes, because these solid biofuels are mostly used by private customers, for whom it would be difficult to recognize the necessary quality. For wood chips and log wood on the other hand no certification systems are implemented due to the small structured direct marketing (producer to consumer) or the production for personal use only.

Before the relevant European standards were published in 2011 most **wood pellet** producers (nearly 100 %) were certified according to ÖNORM M 7135 and some additionally according to DINplus certification system (based on ÖNORM M 7135). Beginning 2011 the implementation of EN 14961-2 for the production of wood pellets started rapidly because DINplus certification system was adapted to the European standard and at the same time the ENplus certification system was introduced. At the moment there are only about 5 small pellet companies (less than 5 % of the production capacity in Austria), which have not yet implemented EN 14961-2. The Austrian pellet industry decided that there is no need for another "ÖNORM-certificate". The pellet association proPellets Austria is involved in the development of ENplus through the European pellet council. The acceptance of the ENplus label is very high; most pellet boiler and stoves already require ENplus pellets as a fuel to give a warranty.

Before the relevant European standards were published in 2011 many **wood briquette** producers were certified according to ÖNORM M 7135 and some additionally according to DIN 51731. With the release of ÖNORM C 4006 in February 2013 producers have the possibility to certify their briquette production based on EN 14961-3. The implementation of the European standard for all certified briquette producers will be finished end of 2013 at the latest. Other certification systems based on the European standard, like DINplus and ENplus for wood briquettes, could not be established until today.

For all other types of solid biomass no certification systems exist in Austria.

For the receiving/measuring of **wood chips** and/or **energy wood** at the consumer's site there are special guidelines ('Kooperationsabkommen FPP, 1994', 'PHA Holzübernehmerichtlinie für Biobrennstoffe, 2003/2009') available in Austria. The development of these guidelines was mainly required by the paper industry but they are also used by heating plants. The implementation of these guidelines can be trained by external trainers. There is the possibility to have an exam after the training and a yearly audit, in which the correct procedures according to these guidelines are checked. End of 2013 those guidelines probably will be adapted to European standards in the course of a project; this may lead to a certification system for the receiving/measuring of wood chips and/or energy wood.

Concerning sustainability PEFC and in some cases FSC certification systems are applied to guarantee a sustainable forest management and the chain of custody. For the solid biomass production there is no sustainability certificate required at the moment, although the large wood industry nearly always owns a certificate including wood residues.



## 4. Standardisation and certification needs

### 4.1. Feedback collection about standards for transport/storage

As the trainings in the course of SolidStandards were on the topic of wood chips, none of the participants has implemented a standard for transport/storage, because none exists. A high amount of participants was not familiar with the existing standards for wood pellets.

9 out of 22 participants think that quality issues during transport and logistics are mainly relevant for pellets, and that quality issues in pellet transport and logistics are sufficiently addressed in EN 15234.

6 out of 22 participants are aware of ÖNORM M 7136, 4 participants are aware of DINCertco/ENplus. 7 participants are aware of ÖNORM M 7137. About 75% of those are in favour of such a system at European level.

9 out of 22 participants are in favour of standards on health and security aspects for pellet storage at the end-users. The topics for those standards as well as the amount of participants that mentioned it are:

- dust explosion: 4
- fungi spores: 2
- off-gassing: 3

9 out of 22 participants think that there should be similar standards for wood chips. Still, it can be concluded that there is a low awareness in the wood chip sector about health and security aspects. Especially for large heating facilities topics like fungi spores, off-gassing and self-ignition are topics which need to be addressed in the future.

### 4.2. Feedback collection per type of biomass

Due to the fact that the Austrian trainings were focussed on wood chips, most answers were given related to this type of solid biofuel. The most significant results of the training/questionnaires are described below.

- Terminology  
32 % already use the standard for solid biomass terminology ÖNORM EN 14588
- Quality assurance  
36 % state that they use the fuel specification standard ÖNORM EN 14961-4, other parts of this series are used between 14 % and 32 %. Only 18 % state that they use the quality assurance standard ÖNORM EN 15234-4, all other parts of this series are used between 0 % and 9 %.
- Sampling and sample preparation  
27 % state that they use the standard for sampling ÖNORM EN 14778; 5 % use the standard for sample preparation ÖNORM EN 14780 as well.
- Physical and mechanical properties  
Standards for the determination of moisture content are used by 23 % followed by standards for bulk density and calorific value with 14 %. All other standards for physical properties are used by fewer companies.
- Chemical properties  
Standards for chemical properties are used by up to 9 % of the companies.

Specific questions on the wood chip standards ÖNORM EN 14961-1/-4 were asked only in the first training 2012 to get input for the revision of these standards in the course of the ISO standardisation process. The discussion of this topic with important stakeholders was the main part of the first training. With the results of a wood chip project, initiated by the FHP (an Austrian cooperation of forestry, wood and paper industry) Holzforschung Austria had prepared detailed suggestions for a different particle size classification system. The problem was pointed out that the particle size classification system in ÖNORM EN 14961-1/-4 could



not be applied to most of the wood chip samples, at least as far as forest chips were concerned. The newly developed system was discussed and accepted by all participants.

In the second training 2013 already the new particle size classification system for wood chips was explained. There was again a discussion on the ability to produce wood chips for small scale use due to the requirements for e.g. P16S and P31S which can hardly be fulfilled for 'forest chips' commonly sold in Austria.

Apart from particle size analysis the content of stones was discussed in the trainings because samples with up to 17% of stones were shown.

#### **4.3. Feedback collection about quality certification**

The general opinion of the training participants was that there is no need for a new quality system in the Austrian market, although it is important to watch the quality of solid biofuels.

#### **4.4. Other standardisation and certification needs**

The national committee mentioned a need for the standardisation of torrefied material on international level. This work is already in progress as Austria has developed NWIPs for torrefied wood pellets and briquettes for WG2 of the ISO standardisation committee ISO/TC 238.

A certain interest in the development of a method for the determination of the content of stones in a wood chip sample exists. Austria agreed to develop a NWIP for WG4 of the ISO standardisation committee ISO/TC 238.

The European standard for the determination of particle size distribution ÖNORM EN 15149-1 has to be discussed again to clarify some details of the method. This work is in progress as part of WG4 of the ISO standardisation committee ISO/TC 238.

Apart from that the national committee ONK 241 has satisfied the needs for new standards, e.g. on storage, maize cob and so on, in the past on national level already.

## 5. Results of discussion of feedback collection with national mirror committee

All committee members are in frequent contact with the solid biomass industry and the different needs for adjustments in existing standards or the development of new standards are always discussed promptly on the next meeting of the ONK 241. Especially with the revision of the EN standards for ISO standardization a continuous discussion of the comments was necessary. Table 2 lists the recent meetings, in which feedback on European standards was discussed.

**Table 2: Meetings of the national committee ONK 241 “Energy from solid biomass”**

date	attending CEN(ISO)/TC-member	topic
30.04.2013	Englisch Martin, BEA Rathbauer Josef, FJ-BLT Steiner Monika, HFA Wojcik Magda, ofi	<i>Martin Englisch and Magda Wojcik, who had participated in the ISO meeting in Bangkok, gave an overview on the outcomes of this meeting.</i>  <i>The need for a method to analyze the content of stones in hog fuel was discussed in national and international committees. It was decided that Austria is going to prepare a new work item proposal NWIP for ISO/TC 238 on that topic.</i>
21.01.2013	Englisch Martin, ofi Rathbauer Josef, FJ-BLT Steiner Monika, HFA	<i>For the following standards comments were discussed and passed on to ISO secretariat: ISO CD 17829, ISO CD 17830, ISO CD 17831-1, ISO CD 17831-2, ISO CD 18122, ISO CD 18123, ISO CD 18134-2, ISO CD 18157-1</i>  <i>Comments on ISO 17225 series were discussed and after some amendments passed to ISO secretariat. Additionally a document was prepared to explain especially the comments on wood chip particle size classification. The basis for these comments was a considerable number of test results gained in a project with the wood chip and paper industry. This document was sent to ISO secretariat by ASI on the 05.03.2013 for further discussion at the ISO meeting in March 2013 in Bangkok (see attachment 1). Finally most of the Austrian comments were accepted at the ISO meeting.</i>  <i>Apart from the discussion of the comments on standards, it was agreed on, that a NWIP for torrefied pellets would be elaborated by Martin Englisch and sent to ISO secretariat by ASI for further discussion at the ISO meeting in Bangkok.</i>
31.10.2012	Englisch Martin, ofi Pichler Wilfried, HFA Rathbauer Josef, FJ-BLT	<i>The discussion of the comments on prEN ISO 17225 series started but was going to be continued in the next meeting.</i>
29.08.2012	Englisch Martin, ofi Pichler Wilfried, HFA Rathbauer Josef, FJ-BLT	<i>Information was given, that comments on ISO 17225 series should be handed in until the end of the year.</i>  <i>Discussion on the topic of safety in pellet storage with an expert of the Vienna fire department.</i>

25.06.2012	Englisch Martin, ofi Pichler Wilfried, HFA Rathbauer Josef, FJ-BLT	<i>Wilfried Pichler and Martin Englisch, who had participated in the ISO meeting in Stockholm, gave an overview on the outcomes of this meeting.</i>  <i>Discussion of OENORM C 4005, a national supplement on EN 14961-1 for forest chips and OENORM C 4006, a national supplement on EN 14961-3 for wood briquettes.</i>  <i>Discussion on the need to standardize bark briquettes.</i>
26.04.2012	--	<i>Confirmation from ASI that comments on ISO 17225 series were passed to ISO secretariat. In addition a paper on wood chip particle size was sent to ISO secretariat for further discussion of the particle size analysis at the ISO meeting in May 2012 in Stockholm (see attachment 2).</i>
20.03.2012	Englisch Martin, ofi Rathbauer Josef, FJ-BLT Steiner Monika, HFA	<i>Elaboration and discussion of ÖNORM C 4005, a national supplement on ÖNORM EN 14961-1 for forest chips.</i>  <i>ÖNORM M 7137 was discussed.</i>
23.011.2011	Rathbauer Josef, FJ-BLT Steiner Monika, HFA	<i>The following standards were discussed and voted: EN 16126 and EN 16127</i>  <i>ÖNORM M 7137 and ÖNORM C 4003 were discussed.</i>
27.09.2011	Englisch Martin, ofi Rathbauer Josef, FJ-BLT Steiner Monika, HFA	<i>For the following standards comments were discussed and passed on to CEN secretariat: ÖNORM EN 15234-2 to -6 and ÖNORM EN 14961-6</i>  <i>Discussions mainly on ÖNORM C 4005 and ÖNORM M 7137</i>
31.05.2011	Englisch Martin, ofi Pichler Wilfried, HFA Rathbauer Josef, FJ-BLT	<i>Initiation of new national work item ÖNORM C 4006 for the certification of wood briquettes</i>
16.02.2011	Englisch Martin, ofi Pichler Wilfried, HFA Rathbauer Josef, FJ-BLT	<i>Initiation of new national work item ÖNORM C 4005 on forest chips</i>

At the committee meeting on 30.04.2013 Holzforschung Austria presented the SolidStandards project and explained the aims of this National Industry Position Paper. It was agreed on, that all important issues had already been discussed and that the final National Industry Position paper should only be distributed for acknowledgement among the ONK 241 members. This was done on 27<sup>th</sup> of June. No comments were received as of 01.07.2013.

## 6. Summary of national industry needs

In Austria the national committee ONK 241 “Energy from solid biomass” is mirror committee for CEN/TC 335 and ISO/TC 238. Before European and International standardisation for solid biomass started to work on the topic of solid biomass, ONK 241 was one of the first to develop standards for wood chips, wood pellets and wood/bark briquettes.

ONK 241 is an active committee with approximately 4 meetings per year. A major task during the last years was to comment European and now international standards on the basis of experience collected during the use of these standards. As all committee members are in frequent contact with the solid biomass industry, the different needs for adjustments in existing standards or the development of new standards are always discussed promptly on the following meeting of the ONK 241. Especially with the revision of the EN standards for ISO standardization a continuous discussion of the comments on these standards was necessary.

Some stakeholders expressed concerns about the fact that the standards ÖNORM EN 14961-2, -3 and -4 allow ‘used wood’ and even ‘chemically treated used wood’ as raw material for solid biofuels for the use in non-industrial heating appliances. There are unresolved conflicts between these standards and the Austrian waste related laws. Comments on the respective parts of ISO 17225 by the national committee were accepted during the last ISO meeting in Bangkok (April 2013) for ‘chemically treated used wood’ and therewith resolve this conflict.

The national committee sees a need for the standardisation of torrefied material on international level. This work is already in progress as Austria has developed NWIPs for torrefied wood pellets and briquettes for WG2 of the ISO standardisation committee ISO/TC 238.

Apart from that there is a certain interest in the development of a method for the determination of the content of stones in a wood chip sample. Austria agreed to develop a NWIP for WG4 of the ISO standardisation committee ISO/TC 238.

On part of the laboratories there is the need to discuss the method for the determination of particle size distribution (EN 15149-1) to clarify some details of the method as well as the method of ash melting behaviour (CEN/TC 15370-1). This work is in progress as part of WG4 of the ISO standardisation committee ISO/TC 238.

In the course of the SolidStandards training events it became obvious that there are problems for certain solid biofuels implementing ÖNORM EN 14961 and ÖNORM EN 15234 series. The reason is that all standards have the same structure, convenient for homogeneous material like wood pellets. These standards do not help with the fuel specification for inhomogeneous material like forest chips or non-woody material, where one cannot rely on the typical values mentioned in ÖNORM EN 14961-1 and where analyses are often not possible due to costs/time and changing locations. Austria tried to solve this problem by elaborating ÖNORM C 4005 to facilitate the fuel specification of forest chips. Still it makes no sense to copy this standard on international level because the typical values mentioned only consider forest chips from Austrian forest and it would be impossible to consider all possible tree species.

## 2 Annexes



## Evaluation of different particle size classification schemes



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Vienna, April 2012

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## 1 Introduction

This document evaluates the practicability of the proposal for the particle size classification in committee draft N94 ISO/CD 17225-1 “Solid biofuels - Fuel specifications and classes – Part 1: General requirements”. The basis for this evaluation is the result of 79 wood chip samples, which were analyzed in the course of the Austrian research project “Chip Class”, FFG nr. 828213.

To show the difference in the classification scheme the particle size classes are described according to EN 14961-1 and ISO 17225-1. This way, problems in the classification scheme become more obvious.

## 2 Material and Methods

The raw material was “Forest plantation and other virgin wood” according to EN 14961-1, Table 1. Fig. 1 shows the share of raw material within the sample.

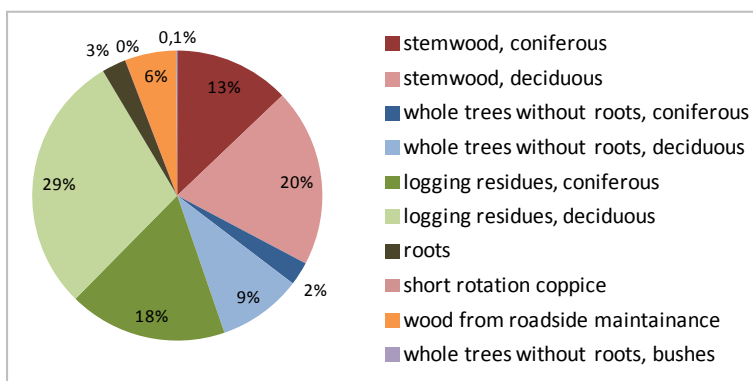


Fig. 1: Share of different raw material according to their origin, n = 73 samples (for 6 samples the origin of the raw material was unknown)

In total, 79 wood chip samples were analyzed according to EN 15149-1 “Solid Biofuels - Determination of particle size distribution – Part 1: Oscillating screen method using sieve apertures of 1 mm and above”.

For screening the dried samples the following set of sieves according to ISO 3310-2 was applied:

63 mm, 45 mm, 31,5 mm, 16 mm, 8 mm, 3,15 mm, 0 mm

### 3 Results

#### 3.1 Particle size according to EN 14961-1

Tab. 1 describes the current particle size classification for wood chips according to EN 14961-1, Table 5.

Tab. 1: Classification of particle size according to EN 14961-1, Table 5 for wood chips and EN 14961-4, Table 1 for wood chips for non-industrial use

class <sup>c</sup>	main fraction (minimum 75 w-%), mm <sup>a</sup>	finer, w-% (< 3.15 mm)	coarse fraction, w-%, max. length of particle, mm	cross sectional area, cm <sup>2</sup>
<b>P16A</b>	$3,15 \leq P \leq 16$	$\leq 12$	$\leq 3 \% > 16 \text{ mm}$ , all < 31,5 mm	< 1
<b>P16B</b>	$3,15 \leq P \leq 16$	$\leq 12$	$\leq 3 \% > 45 \text{ mm}$ , all < 120 mm	< 1
<b>P31,5*</b>	$8 \leq P \leq 31,5$	$\leq 8$	$\leq 6 \% > 45 \text{ mm}$ , all < 120 mm	< 2
<b>P45A</b>	$8 \leq P \leq 45$	$\leq 8$	$\leq 6 \% > 63 \text{ mm}$ , $\leq 3,5 \% > 100 \text{ mm}$ , all < 120 mm	< 5
<b>P45B<sup>b</sup></b>	$8 \leq P \leq 45^b$	$\leq 8$	$\leq 6 \% > 63 \text{ mm}$ , $\leq 3,5 \% > 100 \text{ mm}$ , all < 350 mm	< 5
<b>P63<sup>b</sup></b>	$8 \leq P \leq 63 \text{ mm}$	$\leq 6$	$\leq 6 \% > 100 \text{ mm}$ , all < 350 mm	< 10
<b>P100<sup>b</sup></b>	$16 \leq P \leq 100$	$\leq 4$	$\leq 6 \% > 200 \text{ mm}$ , all < 350 mm	< 18

\* ...Class P31,5 only exists in EN 14961-4.

<sup>a</sup> ...The numerical values (P-class) for dimension refer to the particle size passing through the mentioned round hole sieve size (EN 15149-1).

<sup>b</sup> ...For logging residue chips, which include thin particles like needles, leaves and branches, the main fraction for P45B is  $3,15 < P < 45 \text{ mm}$ , for P63 is  $3,15 < P < 63 \text{ mm}$  and for P100 is  $3,15 < P < 100 \text{ mm}$  and amount of fines (< 3,15 mm) can be maximum 25 w-%.

<sup>c</sup> ... Property classes P16A, P16B and P45A are for non-industrial and property class P45B, P63 and P100 for industrial appliances. In industrial classes P45B, P63 and P100 the amount of fines can be stated from the following F04, F06, F08.

Fig. 2 shows the percentage of different particle size classes according to EN 14961-1, Table 5 for wood chips without 'footnote b'. 81% of the samples couldn't be classified, only 5% of the samples were classified as P45B and 14% as P63.

To be able to classify most of the samples it was necessary to interpret the results of the particle size analysis considering the specifications described in 'footnote b' of Table 5 of EN 14961-1. This footnote, which is only meant for logging residues with a high amount of thin particles, adapts the particle size classes according to the hog fuel classification of EN 14961-1, Table 6. With 'footnote b' the amount of samples, that can't be classified, decreases to 13%.

In Fig. 3 it is shown, that 42% of the forest chip samples can be classified as P45B and 35% can be classified as P63. Attention should be paid to the fact that those 10% of the samples which are classified as P100, could be classified as P63 or even P45B if only the main fraction (75-w%) of the forest chip sample is considered; but due to an exceeding cross sectional area those samples had to be classified in the next ('coarser') class. If the classification is done only according to the requirements of the main fraction, 63%, the

biggest part of the samples, is classified as P45B and 24% as P63 (always considering 'footnote b').

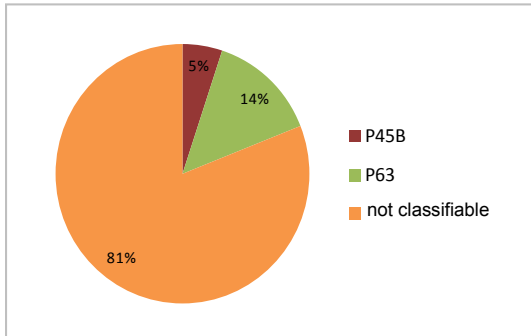


Fig. 2: Percentage of particle size classes according to EN 14961-1, Table 5 for wood chips, without considering 'footnote b', n = 79 samples

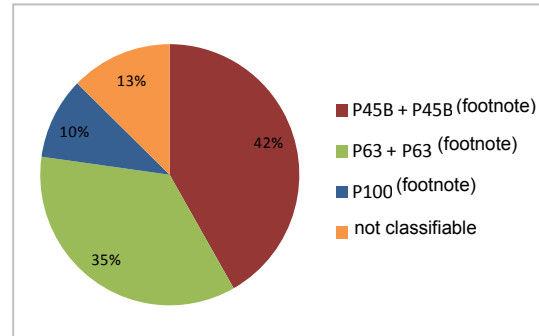


Fig. 3: Percentage of particle size classes according to EN 14961-1, Table 5 for wood chips, considering 'footnote b', n = 79 samples

The reason for the difficulties in classification were mostly the high content of fines of forest chips as well as the restrictions with maximum length and cross sectional area of the wood chip particles (see Tab. 2).

Tab. 2: Number of samples not corresponding with the respective requirements of max. content of fines, max. cross sectional area and max. length according to Table 5 of EN 14961-1 and Table 1 of EN 14961-4, n = 79 samples

max. content of <b>fines</b> (< 3,15 mm), %	≤ 4	≤ 6	≤ 8	≤ 12	≤ 25
number of not corresponding samples	72	63	54	34	7

max. <b>cross sectional area</b> , cm <sup>2</sup>	< 1	< 2	< 5	< 10	< 18
number of not corresponding samples	79	78	40	10	1

max. <b>length</b> , mm	< 31,5	< 120	< 350
number of not corresponding samples	79	67	1

### 3.2 Particle size according to proposal ISO 17225-1

Tab. 3 describes the current proposal for the particle size classification of the committee draft N94 ISO 17225-1. Tab. 4 shows the Austrian comments highlighted in red.

Tab. 3: Classification of particle size according to the committee draft N94 of ISO 17225-1 for wood chips and hog fuel

class	particle size		cross sectional area, cm <sup>2</sup>
	main fraction (minimum 60 w-%), mm	coarse fraction, w-%, max. length of particle, mm	
<b>P16</b>	3,15 ≤ P ≤ 16	≤ 3 % > 31,5 mm, all < 45 mm	< 1
<b>P31</b>	3,15 ≤ P ≤ 31,5	≤ 6 % > 45, mm, ≤ 3 % > 100 mm, all < 200 mm	≤ 5
<b>P45</b>	8 ≤ P ≤ 45	≤ 12 % > 63 mm, all < 300 mm	≤ 10
<b>P63</b>	8 ≤ P ≤ 63	≤ 8 % > 100 mm, all < 300 mm	18
<b>P90</b>	16 ≤ P ≤ 90	≤ 10 % > 125 mm, all < 300 mm	--
<b>P300</b>	3,15 ≤ P ≤ 300	to be specified	--

Tab. 4: Classification of particle size according to **AT-proposal** of ISO 17225-1 for wood chips and hog fuel

class	particle size		cross sectional area, cm <sup>2</sup>
	main fraction (minimum 60 w-%), mm	coarse fraction, w-%, max. length of particle, mm	
<b>P16</b>	3,15 ≤ P ≤ 16	≤ <b>6 %</b> > 31,5 mm, all ≤ 45 mm	≤ 1
<b>P31</b>	3,15 ≤ P ≤ 31,5	≤ 6 % > 45 mm, ≤ 3 % > 100 mm, all ≤ 200 mm	≤ 5
<b>P45</b>	<b>3,15</b> ≤ P ≤ 45	≤ <b>10 %</b> > 63 mm, all ≤ <b>350</b> mm	≤ 10
<b>P63</b>	<b>3,15</b> ≤ P ≤ 63	≤ <b>10 %</b> > 100 mm, all ≤ <b>350</b> mm	≤ 18
<b>P100</b>	<b>3,15</b> ≤ P ≤ <b>100</b>	≤ 10 % > 125 mm, all ≤ <b>350</b> mm	--
<b>P300</b>	<b>3,15</b> ≤ P ≤ 300	to be specified	--

Fig. 4 and Fig. 5 show the percentage of particle size classes acc. to these two proposals.

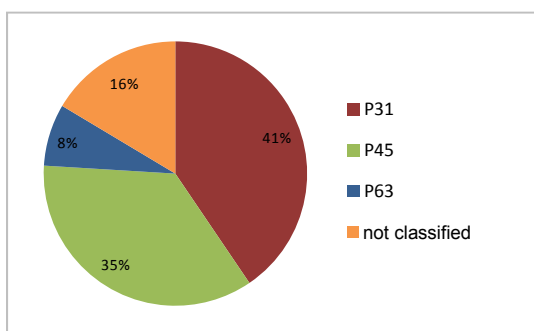


Fig. 4: Percentage of particle size classes according to committee draft N94 ISO 17225-1 for wood chips and hog fuel, n = 79 samples

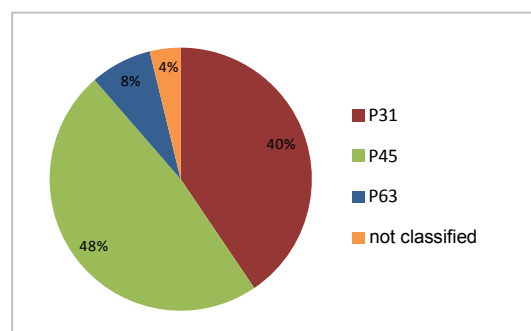


Fig. 5: Percentage of particle size classes according to **AT-proposal** of ISO 17225-1 for wood chips and hog fuel, n = 79 samples

Classifying the samples according to committee draft N94 of ISO 17225-1 (Tab. 3), 16% or 13 samples cannot be classified due to the following reasons (see Tab. 5):

- 5 samples due to classification problems described in Fig. 6,
- 4 samples don't meet the requirement for 60% particles in the main fraction,
- 1 sample doesn't fulfil the requirement for the max. cross sectional area of  $\leq 18 \text{ cm}^2$  and
- 3 samples don't fulfil the requirement for the max. length of  $< 300 \text{ mm}$ .

Tab. 5: Number of samples not corresponding with the respective requirements for the main fraction, max. cross sectional area and max. length according to committee draft N94 ISO 17225-1, n = 79 samples

<b>main fraction, %</b>	$\geq 60$		
number of not corresponding samples	<b>4</b> (less than 60% in every particle size class)		
<b>max. cross sectional area, cm<sup>2</sup></b>	$< 5$	$< 10$	$< 18$
number of not corresponding samples	32	7	<b>1</b>
<b>max. length, mm</b>	$< 45$	$< 200$	$< 300$
number of not corresponding samples	79	27	<b>3</b>

According to the classification scheme proposed in Tab. 4 (Austrian proposal) there is no classification problem as described in Fig. 6. 4% or 3 samples cannot be classified due to the following reasons (see Tab. 6):

- 1 sample doesn't meet the requirement for 60% particles in the main fraction,
- 1 sample doesn't fulfil the requirement for the max. cross sectional area of  $\leq 18 \text{ cm}^2$  and
- 1 sample doesn't fulfil the requirement for the max. length of  $< 350 \text{ mm}$ .

Tab. 6: Number of samples not corresponding with the respective requirements for the main fraction, max. cross sectional area and max. length according to **AT-proposal** of ISO 17225-1, n = 79 samples.

<b>main fraction, %</b>	$\geq 60$		
number of not corresponding samples	<b>1</b> (less than 60% in every particle size class)		
<b>max. cross sectional area, cm<sup>2</sup></b>	$< 5$	$< 10$	$< 18$
number of not corresponding samples	32	7	<b>1</b>
<b>max. length, mm</b>	$< 45$	$< 200$	$< 300$
number of not corresponding samples	79	27	<b>1</b>

To avoid the possibility to classify wood chips or hog fuel into more than one particle size class a NOTE should be added to Table 5 in ISO 17225-1, which states that "Wood chips or hog fuel must be specified as the smallest possible class".

Fig. 6 to Fig. 10 explain the problems which occur using the current classification of the committee draft N94 ISO 17225-1 on three different samples.

In Fig. 6 the sample can be classified only as P31 according to a main fraction  $\geq 60\%$ , the max. cross sectional area of  $> 5 \text{ cm}^2$  excludes this – the sample can't be classified according to ISO 17225-1. According to the AT-proposal the sample meets the requirement for the main fraction in the next higher class as well, where the requirements for the max. cross sectional area are fulfilled. The sample is classified as P45.

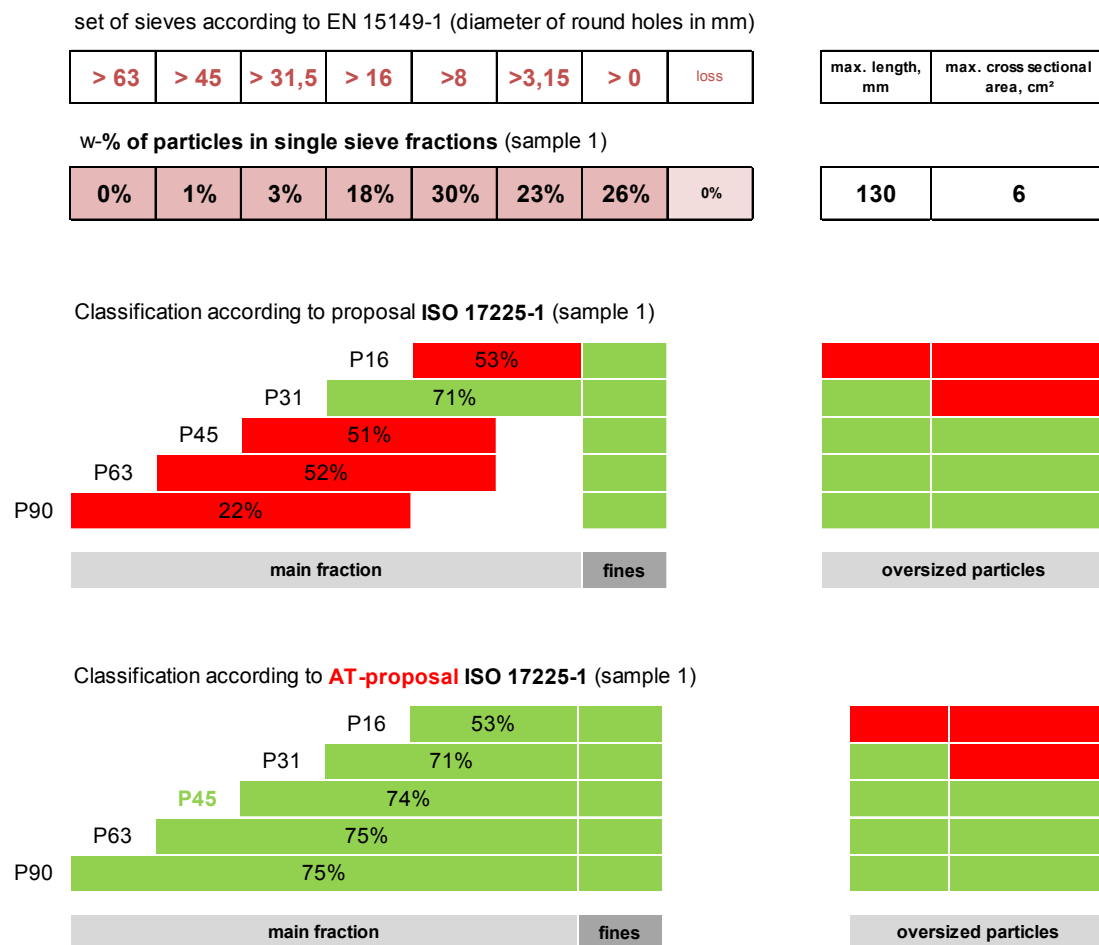


Fig. 6: Sieve fractions of particle size analysis for sample 1. Determination of the particle size class according to the committee draft N94 ISO 17225-1 for wood chips and hog fuel and according to the AT-proposal. Red bars: requirements not fulfilled, green bars: requirements fulfilled.

In Fig. 7 the sample can be classified as P31, P45 and as P63. This example shows, that the difficult classification approach doesn't help to gain distinctive classes. According to the AT-proposal the sample must be specified as the smallest possible class (in this case P31).



set of sieves according to EN 15149-1 (diameter of round holes in mm)

> 63	> 45	> 31,5	> 16	>8	>3,15	> 0	loss
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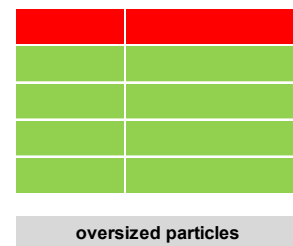
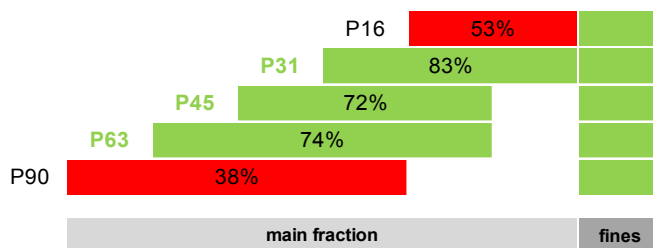
max. length, mm	max. cross sectional area, cm <sup>2</sup>
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w-% of particles in single sieve fractions (sample 2)

0%	2%	6%	30%	36%	17%	9%	-0,1%
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170	4
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Classification according to proposal ISO 17225-1 (sample 2)



Classification according to AT-proposal ISO 17225-1 (sample 2)

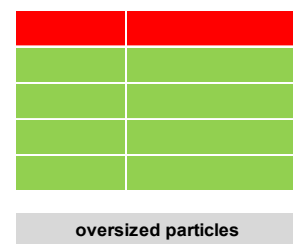
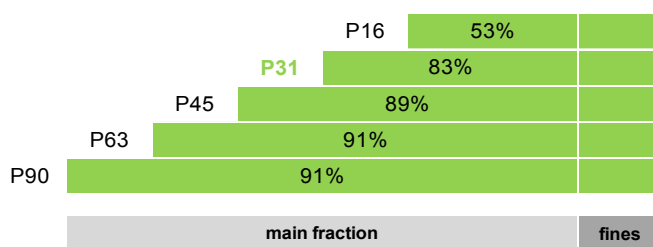


Fig. 7: Sieve fractions of particle size analysis for sample 2. Determination of the particle size class according to the committee draft N94 ISO 17225-1 for wood chips and hog fuel and according to the AT-proposal. Red bars: requirements not fulfilled, green bars: requirements fulfilled.

To emphasize the problem Fig. 8 shows, the percentage of samples, that can be classified into more than one particle size class. In total, 64% of the samples fulfil the requirements of class P63 but for only 8% the P63 is the only possible class (see Fig. 9).

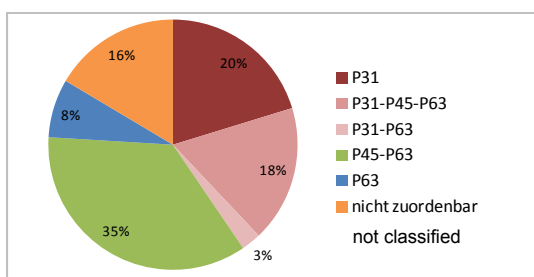


Fig. 8: Percentage of particle size classes according to committee draft N94 ISO 17225-1 for wood chips and hog fuel, n = 79 samples

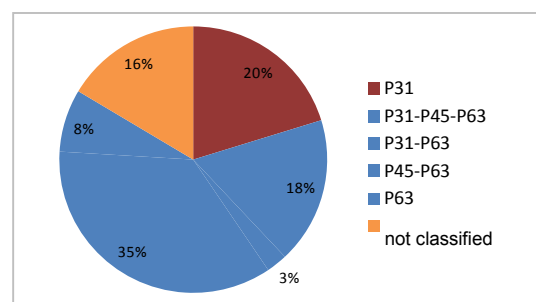


Fig. 9: Percentage of particle size classes according to committee draft N94 ISO 17225-1 for wood chips and hog fuel, n = 79 samples

In Fig. 10 the sample can be classified as P31 and as P63. The shift of the bottom limit of the main fraction from > 3,15 mm to > 8 mm prevents the classification as P45. Again, the difficile classification approach doesn't help to gain distinctive classes. According to the AT-proposal the sample must be specified as the smallest possible class (in this case P31).

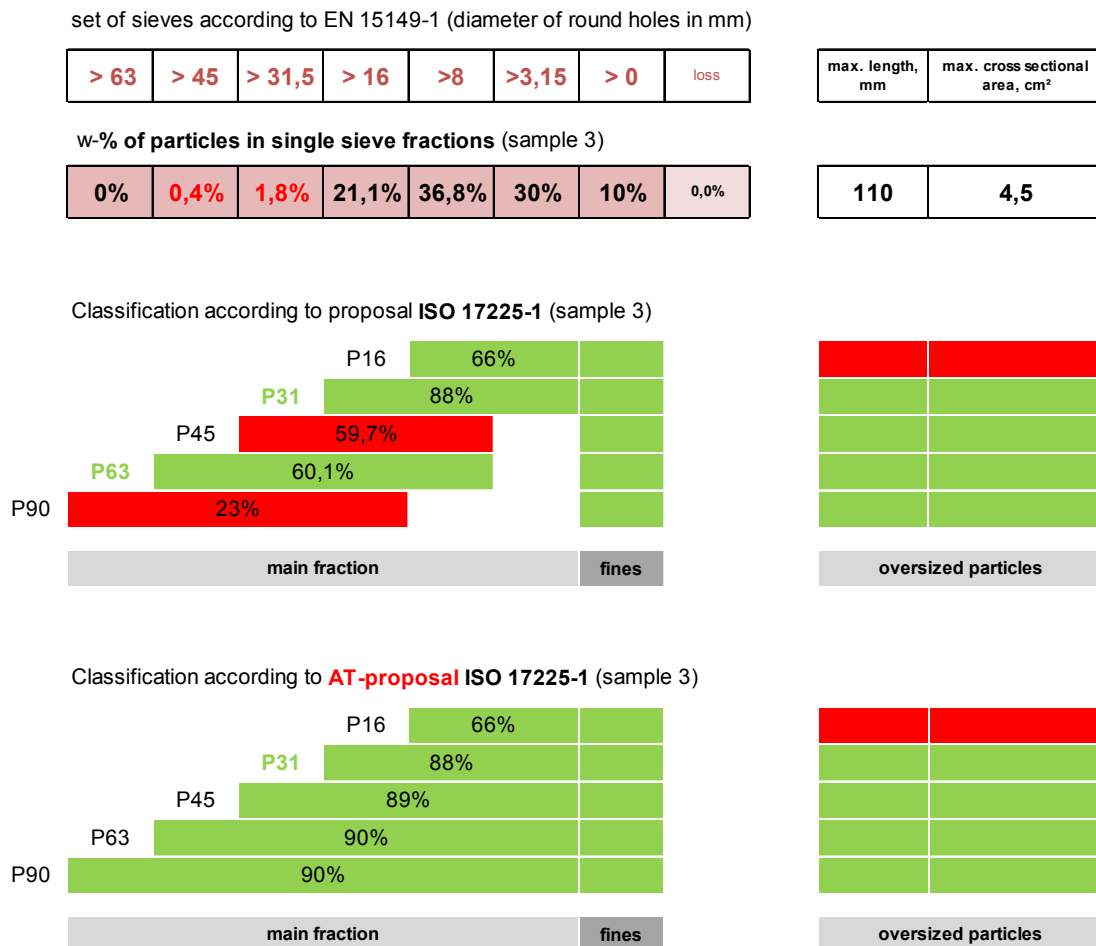


Fig. 10: Sieve fractions of particle size analysis for sample 3. Determination of the particle size class according to the committee draft N94 of ISO 17225-1 for wood chips and hog fuel and according to the AT-proposal. Red bars: requirements not fulfilled, green bars: requirements fulfilled.

### 3.3 Fines according to EN 14961-1 and proposal ISO 17225-1

Since detailed information concerning fines is lost by using the classification of ‘footnote b’, the amount of fines was classified separately according to the hog fuel classification according to EN 14961-1, Table 6. Fig. 11 shows that classes F06 and F10 with a low content of fines appear most often. 9% of the samples cannot be classified because their content of fines exceeds 25%. Fig. 12 shows the distribution of these 9% according to the committee draft N94 ISO 17225-1.

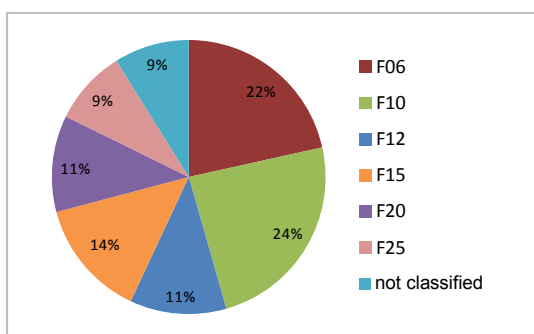


Fig. 11: Percentage of classes of content of fines according to EN 14961-1, Table 6 for hog fuel, n = 79 samples

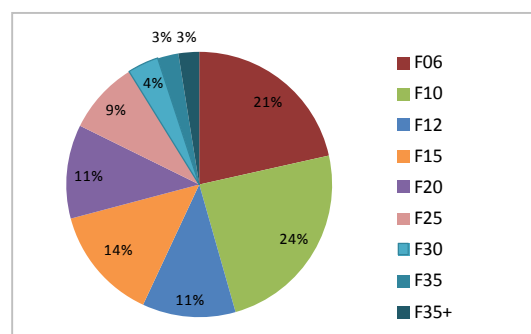


Fig. 12: Percentage of classes of content of fines according to committee draft N94 of ISO 17225-1 for wood chips and hog fuel, n = 79 samples

Tab. 7 describes the classification of fines according to EN 14961-1, Table 6 for hog fuels, the current committee draft N94 of ISO 17225-1 and the Austrian comments highlighted red.

Tab. 7: Classification of content of fines according to EN 14961-1, Table 6 hog fuel, committee draft N94 ISO 17225-1 for wood chips and hog fuel and the adapted **AT-proposal** of ISO 17225-1 for wood chips and hog fuel

Amount of fines acc. ÖNORM EN 14961-1, Table 6 for hog fuel		Amount of fines acc. committee draft N94 ISO 17225-1, for wood chips and hog fuel		Amount of fines acc. <b>AT-proposal</b> ISO 17225-1, for wood chips and hog fuel	
class		class		<b>F06</b>	≤ 6 %
<b>F06</b>	≤ 6 %	<b>F06</b>	≤ 6 %	<b>F06</b>	≤ 6 %
<b>F10</b>	≤ 10 %	<b>F10</b>	≤ 10 %	<b>F10</b>	≤ 10 %
<b>F12</b>	≤ 12 %	<b>F12</b>	≤ 12 %	<b>F12</b>	≤ 12 %
<b>F15</b>	≤ 15 %	<b>F15</b>	≤ 15 %	<b>F15</b>	≤ 15 %
<b>F20</b>	≤ 20 %	<b>F20</b>	≤ 20 %	<b>F20</b>	≤ 20 %
<b>F25</b>	≤ 25 %	<b>F25</b>	≤ 25 %	<b>F25</b>	≤ 25 %
		<b>F30</b>	≤ 30 %	<b>F30</b>	≤ 30 %
		<b>F35</b>	≤ 35 %	<b>F35</b>	≤ 35 %
		<b>F35+</b>	maximum value to be stated	<b>F40</b>	≤ 40 %*

\* According to this classification 1 sample cannot be classified (the same sample doesn't meet the requirements for the main fraction > 60%).

### 3.4 Particle size according to proposal ISO 17225-4

Tab. 8 describes the current proposal for the particle size classification of committee draft N97 ISO 17225-4 “Solid biofuels – Fuel specifications and classes – Part 4: Graded wood chips”.

Tab. 8: Classification of particle size according to committee draft N97 of ISO 17225-4 Graded wood chips

class	particle size			cross sectional area, cm <sup>2</sup>
	main fraction (minimum 60 w-%), mm	finer fraction, w-% (<3,15 mm)	coarse fraction, w-%, max. length of particle, mm	
<b>P16</b>	3,15 ≤ P ≤ 16	≤ 12	≤ 3 % > 31,5 mm, all < 45 mm	< 1
<b>P31</b>	3,15 ≤ P ≤ 31,5	≤ 8	≤ 6 % > 45 mm, ≤ 3 % > 100 mm, all < 200 mm	< 5
<b>P45</b>	8 ≤ P ≤ 45	≤ 8	≤ 12 % > 63 mm, all < 300 mm	< 10

There was no evaluation of the particle classes with the results of the 79 forest chip samples because the material wasn't meant to be used for non-industrial use.

The proposed changes in classification aim at the unification of the bottom limit of the main fraction to 3,15 mm and at the adoption of the current limits for max. length and max. cross sectional area of EN 14961-4 (only class P16 corresponds with ISO 17225-4).

Since the particle size classes P31 and P45 have the same main fraction as in ISO 17225-1, Table 5, but different max. length and cross sectional area, the proposed size classes for ISO 17225-4 “Graded wood chips” for non-industrial use will need a suffix in order to demonstrate this difference; e.g. P16A, P31A, P45A.

Tab. 9 shows the Austrian comments for the classification system highlighted in red.

Tab. 9: Classification of particle size according to **AT-proposal** ISO 17225-4 "Graded wood chips" for non-industrial use

class	particle size			cross sectional area, cm <sup>2</sup>
	main fraction (minimum 60 w-%), mm	finer fraction, w-% (<3,15 mm)	coarse fraction, w-%, max. length of particle, mm	
<b>P16A</b>	3,15 ≤ P ≤ 16	≤ 12	≤ <b>6</b> % > 31,5 mm, all ≤ 45 mm	≤ <b>1</b>
<b>P31A</b>	3,15 ≤ P ≤ 31,5	≤ 8	≤ 6 % > 45 mm, all ≤ <b>120</b> mm	≤ <b>2</b>
<b>P45A</b>	<b>3,15</b> ≤ P ≤ 45	≤ 8	≤ <b>10</b> % > 63 mm, all ≤ <b>120</b> mm	≤ <b>5</b>

## 4 Conclusion

The new proposal for the particle size classification in ISO 17225-1 and ISO 17225-4 improves the classification scheme in comparison to the scheme of EN 14961-1 and EN 14961-4. While EN 14961-1 results in a high percentage of material which cannot be specified, under ISO 17225-1 over 80 % of the analyzed forest chip samples could be specified.

On the other hand, data of 79 wood chip samples show, that raising the lower limit for the main fraction above 3,15 mm does not help to gain distinctive classes, but can lead to ambiguous classification results.

The Austrian proposal tries to simplify the classification scheme to make it more practical and hence encourage the use of this standard. The main fraction in this proposal starts at 3,15 mm in each class, and reaches different upper levels. For example in class P63 the main fraction contains all material between 3,15 and 63 mm. Always the lowest possible class has to be chosen. This type of classification is easy to understand and prevents ambiguous results. In addition the share of specified samples under the proposed classification scheme increases to almost 100 %.

## References

N94: ISO/CD 17225-1:2012-01-20, Solid biofuels - Fuel specifications and classes –  
Part 1: General requirements

N97: ISO/CD 17225-4: 2012-01-20, Solid biofuels - Fuel specifications and classes –  
Part 4: Graded wood chips

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

EN 15149-1:2011, Solid biofuels – Determination of particle size distribution –  
Part 1: Oscillating screen method using sieve apertures of 1 mm and above.