Towards a sustainable biomass market

Hacia un mercado de la biomasa sostenible

Valladolid, October 21st, 2014
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Session I

"Advances in baling, storage, pelletization and torrefaction to increase the competitiveness of bioenergy"

Sesión I

“Avances en el empacado, almacenado, peletizado y torrefacción para aumentar la competitividad de la bioenergía”
International standards for wood chip and hog fuel – EN ISO 17225-1

Eija Alakangas, VTT
convenor of WG2 Fuel specification and classes in CEN/TC 335 and ISO/TC 238
Hierarchical classification system in table format:

1. Woody biomass
2. Herbaceous biomass
3. Fruit biomass
4. Aquatic biomass
5. Biomass blends and mixtures
   - blends = intentional
   - mixtures = unintentional

Special requirements for chemically treated biomass

- **Chemical treatment** defined as any treatment with chemicals other than air, heat or water (e.g. glue and paint)
- Biomass, if chemically treated material may not include halogenated organic compounds or heavy metals at levels higher than those in typical virgin material.
Biomass supply chain

Table 5 for hog fuel and wood chips in EN ISO 17225-1 and classes A1, A2, B1 and B2 for wood chips in EN ISO 17225-4

**Origin/Source**

**Biomass**

**Fuel production**

**Solid biofuel**

**Conversion**

**Bioenergy use**

**Quality declaration (EN 15234-1)**

**Fuel quality assurance EN 15234-1**

Documentation of origin (Table 1 EN ISO 17225-1)
Principle of the fuel specification and classification

- Origin and source of raw material (EN ISO 17225-1, Table 1)
  - 4 level hierarcical classification
- Properties according to traded form
  - (e.g. wood chips or hog fuel)
- EN ISO 17225-1 each property is selected separately (suitable for individual contracts)
- EN ISO 17225-4 properties are bound together to form a class:
  - Classes A1, A2, B1 and B2
  - Recommended for smaller plants less 1 MW
1.1 Forest, plantation and other virgin wood
   - Detailed classification next slides

1.2 By-products and residues from wood processing industry
   - 1.2.1 Chemically untreated (bark, sawdust ...)
   - 1.2.2 Chemically treated (plywood, particle board...)

1.3 Used wood
   - Pallets, wood packages, construction wood

1.4 Blends and mixtures
   - Inside 1 Woody biomass
Classification of 1 Woody biomass

1.1 FOREST, PLANTATION AND OTHER
1.1.3 STEM WOOD
Timber
Pulp wood

1.2 BY-PRODUCTS AND RESIDUES
FROM WOOD PROCESSING INDUSTRY
(SECONDARY WOODY BIOMASS) - EN ISO 17225-1
1.2.1 SOLID INDUSTRIAL
WOOD RESIDUES AND
BY-PRODUCTS
chemically untreated wood
1.2.1.3 or 1.2.1.4
Sawdust
Cutter shavings
1.2.1.5
Grinding powder
Mixed with bark
Dewatering

1.2.1.1 WOOD FUELS
(traded forms)
Green chips
1.1.4.1 Brown chips
1.1.4.4
Whole trees
Chips
Log wood
Chips
Stumps
1.1.5
Chips
Hog fuel

1.1.4.3 WOODY ENERGY CROPS
1.1.1.3 SHORT
ROTATION FOREST
(willow energy crops)
Eija Alakangas

1.3 USED WOOD
(TERTIARY WOODY BIOMASS) - EN ISO 17225-1
1.3.1 Chemically untreated wood, building of
new houses
1.3.2 CONSTRUCTION WOOD*

CONSUMERS OF WOOD
AND PAPER PRODUCTS
Wood and
paper products
Sorting
Used paper
and board
Recovered paper for
recycling
NOT recyclable paper
Chips
Crushed or chipped
used wood
Crushed
paper waste

Production of refined wood fuels
Pellets
Briquettes

CONVERSION PROCESSES (COMBUSTION, GASIFICATION, PRODUCTION OF REFINED BIOMASS FUELS)

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Normative (mandatory)
- Origin and source
- Moisture, M (in formulas $M_{\text{ar}}$)
- Ash, A (dry basis)
- Particle size distribution (P)

Informative (voluntary)
- Bulk density (BD) if trade is carried out in volume basis
- Net calorific value as received (Q, in formulas $q_{p,\text{net,a}}$) or Energy density (E, in formulas $E_{\text{ar}}$)
- For chemically treated wood nitrogen (N), sulphur (S) and chlorine (Cl)
Wood chips and hog fuel moisture (M) and ash (A)

<table>
<thead>
<tr>
<th>Class, M</th>
<th>w-%</th>
<th>Class, A</th>
<th>w-% dry basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>M10</td>
<td>≤ 10</td>
<td>A0.5</td>
<td>≤ 0.5</td>
</tr>
<tr>
<td>M15</td>
<td>≤ 15</td>
<td>A0.7</td>
<td>≤ 0.1</td>
</tr>
<tr>
<td>M20</td>
<td>≤ 20</td>
<td>A1.0</td>
<td>≤ 1.0</td>
</tr>
<tr>
<td>M25</td>
<td>≤ 25</td>
<td>A1.5</td>
<td>≤ 1.5</td>
</tr>
<tr>
<td>M30</td>
<td>≤ 30</td>
<td>A2.0</td>
<td>≤ 2.0</td>
</tr>
<tr>
<td>M35</td>
<td>≤ 35</td>
<td>A3.0</td>
<td>≤ 3.0</td>
</tr>
<tr>
<td>M40</td>
<td>≤ 40</td>
<td>A5.0</td>
<td>≤ 5.0</td>
</tr>
<tr>
<td>M45</td>
<td>≤ 45</td>
<td>A7.0</td>
<td>≤ 7.0</td>
</tr>
<tr>
<td>M50</td>
<td>≤ 50</td>
<td>A10.0</td>
<td>≤ 10.0</td>
</tr>
<tr>
<td>M55</td>
<td>≤ 55</td>
<td>A10+</td>
<td>&gt; 10.0*</td>
</tr>
<tr>
<td>M55+</td>
<td>&gt; 55*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Maximum value to be stated.
## Particle size distribution, P

<table>
<thead>
<tr>
<th>Class</th>
<th>Main fraction (at least 60%) mm</th>
<th>Course fraction (mm)</th>
<th>Maximum length for oversized particle, mm</th>
<th>Cross sectional area of course fraction m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>P16S</td>
<td>3.15 &lt; P ≤ 16</td>
<td>≤6% &gt; 31.5 mm</td>
<td>≤45 mm</td>
<td>≤2</td>
</tr>
<tr>
<td>P16</td>
<td>3.15 &lt; P ≤ 16</td>
<td>≤6% &gt; 31.5 mm</td>
<td>≤150 mm</td>
<td></td>
</tr>
<tr>
<td>P31S</td>
<td>3.15 &lt; P ≤ 31.5</td>
<td>≤6% &gt; 45 mm</td>
<td>≤150 mm</td>
<td>≤4</td>
</tr>
<tr>
<td>P31</td>
<td>3.15 &lt; P ≤ 31.5</td>
<td>≤6% &gt; 45 mm</td>
<td>≤200 mm</td>
<td></td>
</tr>
<tr>
<td>P45S</td>
<td>3.15 &lt; P ≤ 45</td>
<td>≤10% &gt; 63 mm</td>
<td>≤200 mm</td>
<td>≤6</td>
</tr>
<tr>
<td>P45</td>
<td>3.15 &lt; P ≤ 45</td>
<td>≤10% &gt; 63 mm</td>
<td>≤350 mm</td>
<td></td>
</tr>
<tr>
<td>P63</td>
<td>3.15 &lt; P ≤ 63</td>
<td>≤10% &gt; 100 mm</td>
<td>≤350 mm</td>
<td></td>
</tr>
<tr>
<td>P100</td>
<td>3.15 &lt; P ≤ 100</td>
<td>≤10% &gt; 150 mm</td>
<td>≤350 mm</td>
<td></td>
</tr>
<tr>
<td>P200</td>
<td>3.15 &lt; P ≤ 200</td>
<td>≤10% &gt; 200 mm</td>
<td>≤400 mm</td>
<td></td>
</tr>
<tr>
<td>P300</td>
<td>3.15 &lt; P ≤ 300</td>
<td>To be stated</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Analysis according to EN ISO 17827-1/EN ISO 17827-1
Classes marked by S are for EN ISO 17225-4 standard (for small plants)
## Fine fraction (<3.15 mm)

<table>
<thead>
<tr>
<th>Fine fraction (&lt;3.15 mm), EN ISO 17225-1</th>
<th>EN ISO 17225-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>F05 ≤ 5 %</td>
<td>-</td>
</tr>
<tr>
<td>F10 ≤ 10 %</td>
<td>P31S and P45S classes</td>
</tr>
<tr>
<td>F15 ≤ 15 %</td>
<td>P16S class</td>
</tr>
<tr>
<td>F20 ≤ 20 %</td>
<td>-</td>
</tr>
<tr>
<td>F25 ≤ 25 %</td>
<td>-</td>
</tr>
<tr>
<td>F30 ≤ 30 %</td>
<td>-</td>
</tr>
<tr>
<td>F30+ &gt; 30 % (maximum value to be stated)</td>
<td>-</td>
</tr>
</tbody>
</table>
Example—Logging residue P31, F25

<table>
<thead>
<tr>
<th>Screen size</th>
<th>amount, w-%</th>
<th>Measured (requirement in standard)</th>
<th>Class¹</th>
<th>Cumulative amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 3,15 mm</td>
<td>24,2</td>
<td>24,2 % (F25)</td>
<td>F25</td>
<td>24,2</td>
</tr>
<tr>
<td>3,15 – 8 mm</td>
<td>34,2</td>
<td>64 % (≥ 60 %)</td>
<td>P16</td>
<td>58,4</td>
</tr>
<tr>
<td>8 – 16 mm</td>
<td>29,8</td>
<td></td>
<td></td>
<td>88,2</td>
</tr>
<tr>
<td>16 – 31,5 mm</td>
<td>8,3</td>
<td></td>
<td>P31</td>
<td>96,5</td>
</tr>
<tr>
<td>31,5 – 45 mm</td>
<td>0,7</td>
<td>8,3% (≤ 6% more 31,5 mm)</td>
<td></td>
<td>97,2</td>
</tr>
<tr>
<td>45 – 63 mm</td>
<td>2,8</td>
<td></td>
<td>P16</td>
<td>100</td>
</tr>
<tr>
<td>63 – 100 mm</td>
<td>0</td>
<td>All &lt; 150 mm</td>
<td>P16</td>
<td>100</td>
</tr>
<tr>
<td>&lt; 100 mm</td>
<td>0</td>
<td></td>
<td></td>
<td>100</td>
</tr>
</tbody>
</table>

¹ Smallest class to be selected, which fulfill the requirements. 
**P31 and fine fraction F25** according to EN ISO 17225-1.
# Product declaration - olive pruning

<table>
<thead>
<tr>
<th>Property</th>
<th>Unit</th>
<th>Property class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Origin</td>
<td>-</td>
<td>1.1.7 Olive tree pruning</td>
</tr>
<tr>
<td>Location</td>
<td>-</td>
<td>Zaragoza, Spain</td>
</tr>
<tr>
<td>Particle size, P</td>
<td>mm</td>
<td>P 63</td>
</tr>
<tr>
<td>Moisture, M</td>
<td>w-%</td>
<td>M 30</td>
</tr>
<tr>
<td>Ash, A</td>
<td>w-% dry</td>
<td>A 10</td>
</tr>
<tr>
<td>Bulk density, BD</td>
<td>kg/m³</td>
<td>BD 260</td>
</tr>
<tr>
<td>Net calorific value as received, Q</td>
<td>MJ/kg</td>
<td>11.40</td>
</tr>
</tbody>
</table>
Thank you :: Gracias

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