bericht

report

bioenergy2020+

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D6.3 Material Safety Data Sheet (MSDS) for Biomass Pellets

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Commercial partner	Firefly AB
	Laxå Pellets AB
	Pusch AG
	AEBIOM-European Biomass Association
	proPellets Austria
	PF-Swedish Pellets Association
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COMET

Competence Centers for Excellent Technologies

V02

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1 General Considerations on MSDS for wood pellets

In the **brochure REACH within the Wood Industry**[1] it's recommended that companies in the timber industry try to remain in the role of downstream users to avoid the costs and organizational efforts of the registration process, thus to avoid the use of substances and preparations from non-EU origin

Pellet manufacturers are downstream users, if the substances necessary for the production are purchased in the EU. The product is not subject to registration, as it contains no hazardous materials as a rule.

Pellets can be considered as products under REACH whose material properties are dependent on the design.

The materials for the production of wood pellets referred to in Annex IV are exempted from registration (wood, wax, starch).

For other substances, which are used within the production (lubricants, detergents) the instructions for use on the safety data sheet must be obeyed and these instructions have to be kept for 10 years.

REGULATION (EC) No 1907/2006 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02006R1907-20140410&qid=1404211217184

TITLE-IV: INFORMATION IN THE SUPPLY CHAIN
ARTICLE 31: Requirements for safety data sheets

4. The safety data sheet need not be supplied where substances that are hazardous in accordance with Regulation (EC) No 1272/2008 or mixtures that are dangerous in accordance with Directive 1999/45/EC, offered or sold to the general public, are provided with sufficient information to enable users to take the necessary measures as regards the protection of human health, safety and the environment, unless requested by a downstream user or distributor.

COMMISSION REGULATION (EC) No 987/2008 of 8 October 2008 amending Regulation (EC) No 1907/2006ANNEX V: EXEMPTIONS FROM THE OBLIGATION TO REGISTER IN ACCORDANCE WITH ARTICLE 2(7)(b)

[1] **REACH in der Holzindustrie** (*Holzforschung Austria; Fürhapper, Pernkopf; www.holzindustrie.at/Publikationen/REACH_Broschuere.pdf*)

http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1404211678821&uri=CELEX:32008R0987

7. The following substances which occur in nature, if they are not chemically modified: Minerals, ores, ore concentrates, raw and processed natural gas, crude oil, coal.

8. Substances which occur in nature other than those listed under paragraph 7, if they are not chemically modified, unless they meet the criteria for classification as dangerous according to Directive 67/548/EEC or unless they are persistent, bioaccumulative and toxic or very persistent and very bioaccumulative in accordance with the criteria set out in Annex XIII or unless they were identified in accordance with Article 59(1) at least two years previously as substances giving rise to an equivalent level of concern as set out in Article 57(f).

(…)

12. Compost and biogas;

2 Existing MSDS-templates for Pellets / Other Works

Requirements for a MSDS for torrefied material, SECTOR, Deliverable No. 8.2

- Submission date: 08.02.2013
- Author: Martin Hoeft (DBFZ)

Templates for MSDS Wood Pellets

- Issued May 5, 2009
- Author: Wood Pellet Association of Canada (WPAC)
- Wood Pellets in Bags
- Wood Pellets in Bulk

3 Draft MSDS for Wood Pellets

The following MSDS-template for wood pellets is structured according to the EU regulation EU 1907/2006. Section titles are given in § 31 and Annex II (requirements for on the compilation of safety data sheets) of the regulation. Explanatory notes to the sub-items are in the Commission Regulation (EU) No. 453/2010. The present document provides a template for a specific MSDS which has to be modified to the users product properties. Additionally to the MSDS often a chemical analysis of the product composition (including all contained substance or mixture) is a pre-condition to most of the REACH processes.

SECTION 1. Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

- Name: Bulk Wood Pellets, Bagged Wood Pellets for Heating
- Description: Pellets made from untreated woody biomass
- Appearance: Light to dark blond or chocolate brown, glossy to semi-glossy, coloured cylindrical pellets of 6 (±1 mm) diameter, 3.15 up to 40 mm length[2].
- REACH Registration Code: *not existent yet*

1.2. Relevant identified uses of the substance or mixture and uses advised against

- Biofuel for conversion to energy, for example in residential room heating; animal bedding, absorbent

1.3. Details of the supplier of the safety data sheet

- [COMPANY]
- **Street Address**: postal address
- **City**: city
- **Postal Code**: postal code
- **Province**: province
- **Non-Emergency assistance***:* contact person, phone number, office hours

1.4. Emergency telephone number

- [phone number, name, office hours]

[2] According to EN 14961-2: Wood pellets for non-industrial use

SECTION 2. Hazards identification

Wood pellets are classified as Material Hazardous in Bulk (MHB) by the International Maritime Organization (IMO). Due to naturally occurring biodegradation processes wood pellets emit gaseous substances such as carbon monoxide, carbon dioxide, small amounts of methane and volatile organic compounds in combination with oxygen depletion. The material shall be handled only by trained personnel and with the necessary care. Furthermore, various species of wood produce a dust that can elicit allergic contact dermatitis in sensitised individuals. In non-sensitised individuals the dust may cause irritation in the eyes and respiratory organs.

2.1. Fire and Explosive Risk

- Flammable/combustible material
- May be ignited by friction, heat, sparks or flames
- Highly explosive dust may be generated during handling
- Powders, dusts or shavings, may explode or burn with explosive violence
- May re-ignite after fire is extinguished
- When pneumatically transported, static discharge may occur
- May self-heat when stored in bulk

Applicable Hazard Statements:

- H228: Flammable solid
- H241: Heating may cause a fire or explosion
- H252: Self-heating in large quantities; may catch fire

2.2. Health

- Fire may produce irritating and/or toxic gases
- Contact may cause burns to skin and eyes
- Runoff from fire control may cause pollution

2.3. Risks from toxic emissions and low oxygen environment

- Ventilate space where wood pellets are stored before entry
- Always measure both carbon monoxide and oxygen content before entry in space where wood pellets are stored in bulk
- Entry of personnel into cargo and adjacent confined spaces shall not be permitted until tests have been carried out and it has been established that the oxygen content and carbon monoxide levels have been restored to the following levels:
  oxygen 20.7% and
  carbon monoxide <60 ppmv.
- If these conditions are not met, additional ventilation shall be applied to the cargo hold or adjacent confined spaces and re-measuring shall be conducted after a suitable interval.

- An oxygen and carbon monoxide meter shall be worn and activated by all crew when entering cargo and adjacent enclosed spaces.

2.4. Potential Health Effects

- Skin: May cause irritations to the skin (Redness, scaling, itching)
- Eyes: May cause irritations to the eyes (tearing, burning)
- Ingestion: May cause gastrointestinal irritations
- Inhalation: May cause irritations to the respiratory system (Irritation to the lungs and mucous membrane)

Applicable Hazard Statements:

- H315: Causes skin irritation
- H320: Causes eye irritation
- H335: May cause respiratory irritation

2.5. Label elements

- H315: Causes skin irritation
- H320: Causes eye irritation
- H335: May cause respiratory irritation

- H251: Self-heating; may catch fire

SECTION 3. Composition/information on ingredients

3.1. Substances

The product consists of biomass.

Ingredients:

- **Raw Material:** 100% virgin wood.
- **Additives or Binders:** Additives or binders used in the production must be stated in the product specifications.

Composition

Wood Pellets are manufactured from lingo-cellulosic saw dust and wood chips by means of one or a combination of the following operations; drying, comminution, densification, cooling and dust removal. The chemical composition of Wood Pellets varies between species of raw

material, components of the wood, soil conditions and the age of the tree. Wood Pellets are typically manufactured from a blend of feedstock with the following compositions:

	Spruce	Pine
Cellulose	39.5	40
Hemi-cellulose	30.6	28.5
Lignin	27.5	27.5
Extractives (terpenes, fatty acids, phenols)	2.1	3.5

Information on the raw material used in the production of the wood pellets must be provided by the producer.

SECTION 4. First aid measures

4.1. Description of first aid measures

General: Ensure that medical and/or rescue personnel are aware of the material(s) involved and take precautions to protect themselves.

Ingestion: Rinse mouth thoroughly with water, do not ingest water or induce vomiting. Wood pellets will expand about 3 or 4 times in volume when wet. No harmful effects, if there is a discomfort seek medical advice.

Inhalation: In case Wood Pellets are not handled or stored in accordance with recommendations in SECTION 7 the risk of harmful exposure increases, particularly exposure to dangerous concentrations of CO. Remove exposed persons to fresh air or a ventilated area and call emergency medical service. Give artificial respiration if victim is not breathing. Administer oxygen if breathing is difficult.

Skin Contact: Wash with soap and water and remove contaminated clothing. If a rash or persistent irritation or dermatitis occurs, seek medical advice.

Eye Contact: Flush with copious amounts of water for at least 10 minutes or use an eye wash solution. If irritation persists seek medical advice.

4.2. Most important symptoms and effects, both acute and delayed

Eye contact: Tearing, burning.

Skin contact: lrritation, redness, scaling, itching.

lngestion: Possible nausea and/or vomiting.

Dust inhalation: lrritation to the lungs and mucus membrane.

There are no known chronic effects of exposure to the product to date. Wood is not listed by NTP, IARC or regulated as a carcinogen by OSHA.

4.3. Indication of any immediate medical attention and special treatment needed

There are no other measures needed than mentioned in section 4.1.

SECTION 5. Firefighting measures

5.1. Extinguishing media

Foam, water, sand, carbon dioxide and nitrogen. Use inert gases to smother fires in enclosed spaces.

5.2. Special hazards arising from the substance or mixture

- Risk of dust explosion.
- The product may be subject to spontaneous heating.
- Burning might produce irritating and/or harmful fumes and smoke. Possible decomposition products are: carbon monoxide, carbon dioxide, and unburned hydrocarbons.
- When pneumatically transported, static discharge may occur.

5.3. Advice for firefighters

- General:
  - Respiratory, skin and eye protection are required for fire fighting personnel, except for small outdoor fires.
  - Full protective equipment (Bunker Gear) and self-contained breathing apparatus (SCBA) should be used for all indoor fires and any significant outdoor fires.
  - Restrict oxygen from entering the space where the wood pellets are stored.
  - Cover exposed pellets with foam or sand to limit exposure to air.
  - Be prepared for an extended period of extinguishing work. An industrial size silo may take a week to fully bring under control.

- Storage in enclosed spaces:
  - Seal openings, slots or cracks where wood pellets may be exposed to air.
  - Inject nitrogen (N_2) or carbon dioxide (CO_2) in gaseous form at the bottom of the storage or as close as possible to the fire if exposed. N_2 is preferred. The dosage of the injected gas depends on the severity of the fire. Recommended injection speed is 5 – 10 kg/m^2/hour (m^2 refers to the cross section of the storage containment such as a silo) with

a total injected volume throughout the extinguishing activity of 5 – 15 kg/m^3 for less severe fires and 30 – 40 kg/m^3 for more advanced fires[3].

- Open flat storage:
  - Cover the pile of wood pellets with foam or sand if available or spray water. Dig out the pile to reach the heart of the fire and remove effected material.
  - In case of concentrated airborne product, keep at distance.
  - Remove burned or wet product to an open area after fire is extinguished.

SECTION 6. Accidental release measures

Sweep or vacuum spills for recovery or disposal; avoiding creating dust conditions. Provide good ventilation where dusts conditions may occur. Place recovered dust in a container for disposal.

Wood pellets and wood dust on the floor present a slip and fall hazard.

6.1. Personal precautions, protective equipment and emergency procedures

- Respiratory, skin and eye protection are required for personnel.
- Remove all sources of ignition.
- In case of concentrated airborne product, keep at distance.
- Always measure carbon monoxide and oxygen in enclosed areas.

6.2. Environmental precautions

Pick up and arrange disposal without creating dust.

6.3. Methods and material for containment and cleaning up

Any method and material used should avoid creating dust and ignition.

6.4. Reference to other sections

Not applicable

[3] Recommended values developed by SP Technical Research Institute of Sweden from "Fire extinguishing and preventive and preparatory measures" Swedish Civil Contingencies Agency (MSB), 2013

SECTION 7. Handling and storage

7.1. Precautions for safe handling

- Respiratory, skin and eye protection are required for personnel.
- Handle in accordance with good industrial hygiene and safety practice.
- Remove all sources of ignition.
- Always measure carbon monoxide and oxygen in enclosed areas.
- Avoid dust formation.
- Ensure adequate ventilation.
- Wash thoroughly after handling.
- Avoid breakage caused by dropping the wood pellets.
- Apparatus exposed to dust generated during the handling should be rated accorded to applicable safety standards, see ATEX directives.

7.2. Conditions for safe storage, including any incompatibilities

- Store in a well-ventilated area. Oxygen depletion and carbon monoxide emission can occur when material is stored in a confined space.
- Keep away from heat, sparks, flame or other sources of ignition and heat such as heat radiators, halogen lamps and exposed electrical circuitry.
- Keep away from strong oxidizing agents.
- Ventilate before entry.
- Always measure carbon monoxide and temperature in enclosed areas.
- Do not allow the product to become wet, water will expand and breakdown the pellets into wood particles.
- Sensors for heat and gas detection enhance the safety of storing wood pellets.
- Smoking shall be prohibited in the vicinity of wood pellets or wood dust.
- For large enclosed storage, warning signs at the points of entry to storage containment or communicating spaces containing wood pellets shall be placed which inform about the danger of low oxygen and the need for ventilation of the spaces.
- For large enclosed storage entry should be prohibited by means of secured lock. Entry shall only be possible after ventilation has been concluded and measurement with gas meter has confirmed safe atmosphere in the space. Backup personnel must be in the immediate vicinity to monitor the entry.

7.3. Specific end use(s)

See section 7.1 and 7.2. No other recommendations.

SECTION 8. Exposure controls/personal protection

8.1. Control parameters

Maximum Exposure Limit: TWA 5 mg/m³ Sen 8 hour(s) EH40 MEL (Softwood)

Because the product is new and still under development there are no national exposure limit values to date. Because of the fact that the main exposure problems might be expected from the exposure to the product dust, until reliable values for the product become available known values for general nuisance dust are given instead.

- Threshold limit value, time weighted average (TLV-TWA): 10 mg/m³ (general nuisance dust)
- Permissible Exposure Limit: 1.0 mg/m³ (as dust)
- European Union professional exposure limit: 3 mg/m³ (as dust).
- Oxygen level at sea level shall be 20.7 % in well ventilated space.
- Space with carbon monoxide level > 60 ppmv shall not be entered into without caution.

8.2. Exposure controls

- No exposure assessment has been performed to date, because the product is new and still under development
- If handling generates dust, use explosion proof ventilation equipment to assure airborne levels are below established exposure limits.
- Facilities storing or using the product should be equipped with an eyewash facility. Good personal hygiene practices should always be followed.
- The exposure to dust should be minimised by applying the measures as described in sections 5 (Fire fighting measures) and section 6 (Accidental release measures). Spilled product should be contained and disposed of as non-hazardous waste according to local waste treatment regulations.

Ventilation: Provide local exhaust ventilation, other engineering controls or adequate general ventilation to keep the airborne concentrations below the respective occupational exposure limit.

Eye protection: Wear safety glasses or vented safety goggles

Skin protection: Where contact is likely, wear protective gloves

Respiratory protection: Wear dusk mask (P3 filter) during handling.

Personal Protective Equipment: Goggles and approved dust respirators may be required depending upon dust conditions.

SECTION 9. Physical and chemical properties

Wood Pellets are manufactured from lingo-cellulosic saw dust and wood chips by means of one or a combination of the following operations; drying, size reduction, densification, cooling and dust removal. The chemical composition of wood pellets varies between species of raw material, components of the wood, soil conditions and the age of the tree.

9.1. Information on basic physical and chemical properties

Appearance: Solid, blond / brown coloured, 6 to 8 mm in diameter. Approximately 3.15 mm to 40 mm long with some wood dust.

Odour: In bulk wood pellets might smell like aldehydes in poorly ventilated space and more like fresh softwood in ventilated spaces.

Odour threshold: Not determined

pH: Not applicable, solid in normal use

Melting/freezing point: Not applicable, solid in normal use

Initial boiling point/range: Not applicable, solid in normal use

Flash point: Not applicable, solid in normal use

Evaporation rate: Not applicable, solid in normal use

Flammability: Not determined

Lower explosion limit: 60 g/m^3 (DIN EN 14034-3)

Vapour pressure: Not applicable, solid in normal use

Vapour density: Not applicable, solid in normal use

Relative density: 1000-1200 kg/m^3

Solubility (water): insoluble

Partition coefficient: Not applicable, solid in normal use

Auto-ignition temperature: 727°C (DIN EN 15188)

Decomposition temperature: Not applicable, solid in normal use

Viscosity: Not applicable, solid in normal use

Explosive properties:

- Maximum explosion pressure: 8.9 bar (DIN EN 14034-1)
- Max. rate of explosion press. rise: 135 bar.m/s (DIN EN 14034-2)

Oxidising properties: Not applicable, solid in normal use

Minimum Ignition Temperature (MIT):

- Pellets Non Applicable
- Dust Cloud 480°C
- Dust Layer 260°C

Auto Ignition Temperature: +260°C in the presence of oxygen.

Energy Content: Min 4.8 – 4.9 MWh / tonne, effective heat content.

Ash Content: ≤ 0.7%

Moisture: ≤ 10%

Solubility: Insoluble. Water will expand and breakdown the pellets into wood particles.

9.2. Other information

Bulk density: 600-800 kg/m³

Glowing temperature: 250°C (DIN EN 50287-2-1)

SECTION 10. Stability and reactivity

10.1. Reactivity

In contact with air, the product absorbs oxygen and emits carbon monoxide

10.2. Chemical stability

The product is stable under normal ambient conditions of temperature and pressure.

Stable under normal conditions

10.3. Possibility of hazardous reactions

Higher temperature accelerates product decomposition. Moisture content could accelerate product decomposition.

10.4. Conditions to avoid

Avoid dust formation, heat, flames, and sparks.

Avoid open flame; product may ignite at temperatures in excess of 260°C. Avoid contact with water; decomposition will occur.

10.5. Incompatible materials

Strong oxidizing agents.

Avoid contact with oxidizing agents and drying oils.

10.6. Hazardous decomposition products

Carbon monoxide, carbon dioxide, small levels of methane, and other hydrocarbons.

Thermal-oxidative degradation of wood produces irritating and toxic fumes and gases, including carbon monoxide, terpenes and polycyclic aromatic hydrocarbons.

SECTION 11. Toxicological information

11.1. Information on toxicological effects

Acute toxicity: There is no evidence to date that the product is of acute toxicological nature.

Skin corrosion/irritation: May cause skin irritation.

Serious eye damage/irritation: May cause eye irritation.

Respiratory or skin sensitisation: Is possible.

Germ cell mutagenicity: There is no evidence to date that the product is of acute toxicological nature.

Carcinogenicity: There is no evidence to date that the product is of acute toxicological nature.

Reproductive toxicity: There is no evidence to date that the product is of acute toxicological nature.

SECTION 12. Ecological information

Eco toxicity: The product is not expected to be hazardous to the environment.

12.1. Toxicity

There are no experimental ecological data on the toxicity of the product available to date

12.2. Persistence and degradability

The persistence of the product in the environment is limited due to the biodegradable nature of the product.

12.3. Bio accumulative potential

There are no experimental ecological data on the bio accumulative potential of the product available to date.

12.4. Mobility in soil

Because of the solid nature of the product the mobility will be limited.

12.5. Results of PBT and vPvB assessment

Not applicable.

12.6. Other adverse effects

Not applicable.

SECTION 13. Disposal considerations

13.1. Waste treatment methods

Dispose of waste at an appropriate waste disposal facility according to current applicable laws and regulations. Appropriate waste treatment methods are filling, composting and incineration.

Normal Waste: Normal waste from wood pellets is not environmentally hazardous, dispose of in accordance with local regulations.

Contaminated Waste: Contaminated products should be disposed of as hazardous waste, by a registered Waste Disposal Contractor.

SECTION 14. Transport information

This material is classified under IMO dangerous goods as Material Hazardous in Bulk (MHB) .

SECTION 15. Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

Not applicable

15.2. Chemical safety assessment

Not applicable

SECTION 16. Other information

Revision: This Safety Data Sheet is a draft version for the product

Abbreviations:

ADNR:	European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways.
ADR:	European Agreement concerning the International Carriage of Dangerous Goods by Road.
ARC:	International Agency for Research on Cancer.
ATA:	International Air Transport Association.
CAO:	Technical Instructions for the Safe Transport of Dangerous Goods by Air.
IMDG:	International Maritime Dangerous Goods.
IMO:	International Maritime Organization.
NTP:	National Toxicology Program.
OSHA:	Occupational Safety and Health Administration.
PBT:	Persistent, Bio accumulative and Toxic substance.
RID:	Regulations concerning the International Carriage of Dangerous Goods by Rail.
SCBA:	Self-Contained Breathing Apparatus.
STOT:	Specific Target Organ Toxicity.
TLV-TWA:	Threshold Limit Value, Time Weighted Average.
vPvB:	Very Persistent and Very Bio accumulative substance.

H-phrases (hazard statements) and P-phrases (Precautionary Statements):

Information, recommendations and suggestions appearing herein concerning this product are to date and taken from sources or based upon data believed to be reliable and reasonable care has been taken in the preparation of this information.

Wood pellets for boilers are normally stored in large sealed hoppers/tanks or storage rooms. Due to the enclosed nature of theses storage facilities, the atmosphere inside can become oxygen depleted and a toxic atmosphere containing carbon monoxide can accumulate.

Carbon monoxide, what is it?

Carbon monoxide (CO) is a colourless, odourless, tasteless, poisonous gas produced by an auto-oxidation process, especially oxidation of the fatty acids contained in the wood.

Oxygen depletion may occur in concert with CO formation. The oxygen depletion ratio is a function of temperature, pressure, bulk density and void in wood pellets, relative humidity in air (if ventilated) as well as the age and composition of the raw material.

The figures below are from measurements of gas generated within the space of wood pellets at approximately constant pressure.

Temperature °C	(±10 %) Depletion of oxygen in %/24h
+20	0.7 – 1.2
+40	1.5 – 2.5

Carbon monoxide poisoning, the symptoms

When CO enters the body, it prevents the blood from bringing oxygen to cells, tissues, and organs.

Early symptoms of carbon monoxide (CO) poisoning can mimic many common ailments and may easily be confused with food poisoning, viral infections, flu or simple tiredness. Symptoms to look out for include:

- Headaches or dizziness
- Breathlessness
- Nausea
- Loss of consciousness
- Tiredness
- Pains in the chest or stomach
- Erratic behaviour
- Visual problems

Further Information:

- http://www.hse.gov.uk/safetybulletins/co-wood-pellets.htm
- http://www.hse.gov.uk/gas/domestic/co.htm

Legal Disclaimer:

The purpose of the above information is to describe the product only in terms of Health and Safety requirements. The information given should not, therefore, be construed as guaranteeing specific properties or as specification. Customers should satisfy themselves as to the suitability and completeness of such information for their own particular use.