

WOOD PELLETS (MSDS)
Material Safety Data Sheet

Contents

1. IDENTIFICATION.....	
2. COMPOSITION INFORMATION	2
3. HEALTH HAZARD DATA.....	2
4. FIRST AID PROCEDURES.....	4
5. FIRE AND EXPLOSION DATA.....	5
7. SAFE HANDLING AND STORAGE	5
8. EXPOSURE CONTROL/ PERSONEL PROTECTION.....	6
9. PHYSICAL DATA.....	6
10. STABILITY AND REACTIVITY DATA	7
11. TOXICOLOGICAL INFORMATION.....	7
12. ENVIRONMENTAL DATA.....	8
13. SPILL/ LEAK CLEAN UP PROCEDURES	8
14. INFORMATION IN REGARD TO TRANSPORT.....	8
15. INFORMATION AND LABELLING	8
16. OTHER INFORMATION.....	8

1. IDENTIFICATION

Shipper: GRAANUL INVEST AS, HUMALA 2, 10617, TALLINN, ESTONIA

Brand name:

Wood Pellets

Describing name:

Milled and homogenized forestry harvest residues (thinnings), shavings, chips and sawdust from wood processing pressed into pellets.

Appearance:

Pellets (approx. 5-25 mm length and 6-12 mm diameter). Usually dark grey to dark blonde in color. Pieces of pellet and wood dust from broken pellets.

Product use:

Wood pellets are traded as non-fossil heating fuel.

Manufacturer: Graanul Invest AS, Humala 2, 10617, Tallinn, Estonia

Telephone number: + 372 6699 870

2. COMPOSITION INFORMATION

Ingredients:

Wood pellets have been manufactured from 100% forestry harvest residues (thinning), shavings, sawdust, chips. Material has been dried and milled into particles of about 2 mm in size and then densities under high temperature and pressure into pellets. No additives or binders have been used. Due to transport movements and physical handling some breakage of pellets will occur. The product presents itself in pellets, broken pellets; pieces of pellets and some wood dust with all material being dry and free flowing if in sound and undamaged condition. Wood pellets are composed of 100% organic material, originated from forestry products.

3. HEALTH HAZARD DATA

Wood dust from the pellets:

Pellet consists of wood particles of varying size and color, which depend upon the specific species of wood. The dust particles may be freed when the pellets break up during handling and transport or when the pellets are deliberately broken.

WARNING!

Health risk:

- ✓ Harmful if dust is inhaled.
- ✓ May cause eye and skin irritation.
- ✓ As a result of oxidation, the material produces carbon monoxide (CO) and carbon dioxide (CO₂) draws away oxygen (O₂) resulting in oxygen depletion when stored in closed spaces.

Preventive measures:

Use protective gear. Ventilate closed spaces and perform gas safety level measurements before entering and while in these areas.

WARNING!

Fire/explosion risk:

- ✓ Finely divided wood dust is a fire and explosion hazard (dust explosions) when Exposed to heat, sparks or flame.
- ✓ Heat, sparks and flame may ignite the pellets material.
- ✓ Stored bulk piles of pellet material may locally heat in areas of high moisture spots as a result of local decomposition and in the end self-combust. This is a slow process.

Fire extinguishing: Use water, sand or CO₂.

PRIMARY ROUTE(S) OF ENTRY

The primary risk:

To health is the dust of the pellets; inhalation (breathing), eye and skin contact.

Co-risk:

In enclosed spaces the material may cause oxygen depletion (including highCO₂ levels) and carbon monoxide (CO) may be formed. Inhaling the air in these areas may cause headache dizziness, resulting in unconsciousness and could cause death due to lack of oxygen in the bloodstream. This also applies to all spaces directly or indirectly communicating with the cargo/storage space.

SYMPTOMS OF EXPOSURE

Dust inhalation:

Irritation to the nose, throat and lungs. Sneezing, coughing, runny nose, nose bleeds, fever, muscular aches and pains, difficult breathing or wheezing depending upon the wood species.

Dust Eye Contact: Tearing, burning.

Dust Skin Contact: Irritation, redness, scaling, itching.

Chronic Effects Dust:

Wood dust, depending on species, may cause allergic dermatitis by prolonged, repetitive contact; may cause respiratory sensitization *and/or* irritation.

NTP includes wood dust in the Annual Report on Carcinogens. IARC classifies wood dust a carcinogen to humans (Group 1). This classification is based primarily on IARC's evaluation of increased risk in the occurrence of adenocarcinomas of the nasal cavities and par nasal sinuses associated with exposure to wood dust. IARC did not find sufficient evidence to associate hypo pharynx, lung, Lymphatic and

hematopoietic systems, stomach, colon or rectum with exposure to wood dust. The American Conference of Government all industrial Hygienists (ACGIH) has categorized wood dust (certain hardwoods) as a confirmed human carcinogen.

Dust Ingestion: Not applicable

CO Inhalation:

Inhaled carbon monoxide binds with blood hemoglobin to form carboxyhemoglobin. Carboxyhemoglobin cannot take part in normal oxygen transport, greatly reducing the blood's to transport oxygen. Depending on levels and duration of exposure, symptoms may include headache, dizziness, heart palpitations, weakness, confusion, nausea and even convulsions, eventual unconsciousness and death.

Inhalation of air with too low oxygen levels:

Depending on O₂ levels and duration of exposures, symptoms may include headache, dizziness, heart palpitations, weakness, confusion, nausea and even convulsions, eventual unconsciousness and death.

4. FIRST AID PROCEDURES

FIRST AID MEASURES

Dust in Eyes: Flush with water to remove dust particles. If irritation persists, *get* medical attention.

Dust Inhalation: Remove from area to fresh air. Seek medical attention if respiratory irritation develops or if breathing becomes difficult.

Dust Eye Contact: Immediately rinse eyes with water. Remove any contact lenses and continue flushing eyes with running water for at least 15 minutes. Hold eye lids apart to ensure rinsing of the entire surface of the eyes and lids with water. Get immediate medical attention.

Skin Contact: Wash affected areas with plenty of water and soap, if available, for several minutes. Remove and clean contaminated clothing and shoes. Seek medical attention if irritation develops or persists.

Note to physician: Chemical of exposure is wood dust, an eye, skin and respiratory tract irritant and potential respiratory and skin sensitizer.

Dust Ingestion: Not applicable.

CO Inhalation: Conscious persons should be assisted to an uncontaminated area and be treated with supplemental oxygen. Quick removal from the contaminated area is most important. Unconscious persons should be moved to an uncontaminated area and be given artificial respiration and oxygen at the same time. The administering of the oxygen at an elevated pressure (up to 2 to 2.5 atmospheres) has shown to be beneficial, as has treatment in a hyperbaric chamber. The physician should be informed that the patient has inhaled toxic quantities of carbon monoxide. Prompt medical attention is mandatory in all cases of overexposure to carbon monoxide. Rescue personnel should be equipped with self-contained breathing apparatus.

Inhalation of air with too low oxygen levels: Should be treated as CO inhalation.

5. FIRE AND EXPLOSION DATA

Testing was performed according to the United Nations Self-Heating Substances Test (HRL Test Method No. 1.12), for which HRL Technology Pty Ltd is NAT Accredited. This report provides details of the tests performed at the Solid Fuel Heater testing and research Laboratory of HRI, Technology, Morwell. The testing was conducted on November 28, 2007 by Mr. S. Marland. The self-heating classification of the Densities eucalypt fuel pellets (HRL Sample No. CMM/07/0868-01) supplied by Plantation Energy was assessed. The supplied Densities eucalypt fuel pellets sample had a moisture content of 8.7% (as received), an ash yield of 0.4% (db). When tested according to the UN Dangerous Goods Testing Criteria, the sample did not reach 200° when placed in a 140°C oven and should therefore not be classified as a hazardous good class 4.2 (self-heating solid, organic N.O.S.).

Flash Point: Not applicable.

Auto ignition Temperature: Variable, *Typically* >200 °C

Special auto ignition: Stored bulk piles of pellet material may locally heat in areas of high moisture spots as a result of local decomposition and in the end self-combust. This is a slow process.

6. ACCIDENTAL RELEASE MEASURES

Measures against accidental release:

Material is being shipped as bulk material. Wear appropriate protective equipment. (See 8. EXPOSURE CONTROU PERSONAL PROTECTION)

Avoid dust: Careful handling will reduce the wear and damage to the pellets, the amount of wood dust produced and wood dust in the air.

Other measures: Avoid open flame and oxidizing agents.

7. SAFE HANDLING AND STORAGE

Potential Hazard:

- ✓ Swelling if exposed to water.
- ✓ Oxygen depleting, CO₂/CO forming.
- ✓ Ignitable, segregation as required for IMO Class 4.1 cargo.
- ✓ Heating and decomposition over time if exposed to moisture, generates flammable and asphyxiating gas could self-combust.
- ✓ Risk for explosion at high dust concentrations.

Safety Precautions:

- ✓ Avoid moisture ingress during voyage/storage.
- ✓ Remove wet material, if un-removable, secure ventilation of wet material.
- ✓ Due to oxygen depletion, high CO₂ levels, and the possible presence of CO, ventilate all spaces to be accessed by personnel prior to entry (all spaces directly or indirectly communicating with the cargo/storage space).

- ✓ Avoid generating high concentration of dust during handling of material.
- ✓ Label accesses to spaces of entry with "Low Oxygen Risk Area" or equivalent.
- ✓ Obtain entry permit (IMO-260E, Appendix F) and perform gas safety level measurements and monitors whilst entering and operating in enclosed cargo space.
- ✓ Self-contained breathing apparatus shall be used if entering space without ventilation.
- ✓ Gas safety level measurements have to be performed and monitored whilst entering and operating in all spaces directly or indirectly communicating with the cargo/storage space without self-contained breathing apparatus.
- ✓ Inform stevedores, inspection and other occasional personnel of safety precautions.

8. EXPOSURE CONTROL/ PERSONEL PROTECTION

Provide ventilation: Due to oxygen depletion/CO forming, ventilate all spaces to be accessed by personnel prior to entry (all spaces directly or indirectly communicating with the cargo/storage space).

Provide and wear safety equipment: Goggles or safety glasses. Other protective equipment such as gloves and approved dust respirators may be needed depending upon dust conditions. Perform gas safety level measurements and monitor whilst entering and operating in enclosed cargo space. Self-contained breathing apparatus shall be used if entering space without ventilation.

Avoid fire: Avoid open flame. No smoking.

EXPOSURE CONTROL

Name CAS# Exposure Limits

OSHA PEL-TWA 5 *mg/m³* (a)

ACGIH TLV-TWA 5 *mg/m³*(b)

ACGIH TLV-STEL 10 *mg/m³*(c)

Wood dust(from wood pellets)None

ACGIH TLV-TWA 1 *mg/m³* (d)

- a) Alder, aspen, beech, cotton wood, tar, gum hemlock, hickory, maple, oak, pines, poplar, spruce, and/or western red cedar.
- b) Softwood dust 8-hour TWA
- c) Selected hardwoods (oak, beech) 8-hour TWA
- d) Softwood total dust 15-minute STEL

OSHA = Occupational Safety and Health Administration

ACGHI = American Conference of Governmental Industrial Hygienists

PEL = Permissible Exposure Limit

TWA = Time Weighted Average

TLV = Threshold Limit Value

STEL = Short Term Exposure Limit

Also see: 3. HEALTH HAZARD DATA

9. PHYSICAL DATA

Boiling Point: Not Applicable.

Specific Gravity (H2O=1): 0.55-0.65
Vapor Density: Not Applicable
Melting Point: Not Applicable
Vapor Pressure: Not Applicable
Solubility in H2O (% by wt):<0.1 %, pellets swell and deform with water
Evaporation Rate(Butyl Acetate = 1): Not Applicable
pH: Not Applicable
Appearance and Odor: Pellets (approx. 5-25 mm length and 6-12mm diameter). Usually dark blonde in color. Wood dust from broken pellets. Odor of fresh sawed Wood.
Auto ignition Temperature: Variable *Typically*>200 °C
Total Moisture: 7-10%
Ash: 0.2-5%
Oxygenated compounds(indicative): Cellulose 30-40% (*m/m*). Hemicelluloses 25-30% (*m/m*), Lignin 30-45%(*m/m*),Extractives (terpenes, fat, phenols) 3-5% (*m/m*)
Bulk density: 650-750 kg/m³
Angle of repose: 55

10. STABILITY AND REACTIVITY DATA

Stability: Stable

Conditions to avoid: Avoid open flame. Product may ignite at temperatures in excess of 200 °C.

Incompatibility (Materials to avoid): Avoid contact with oxidizing agents. Avoid open flame. Product may ignite at temperatures in excess of 200 °C.

Avoid contact with water: Pellets will swell if exposed to droplets and water, increasing the volume of the material. Material may locally heat over time in areas of high moisture spots as a result of local decomposition and in the end self-combust.

Hazardous Decomposition or By-Products: Thermal decomposition products Include carbone monoxyde, carbone dioxyde.

Conditions to avoid: Dust generation, source of ignition.

11. TOXICOLOGICAL INFORMATION

For Wood Dust:

RTECS ZC9850000 IARC Cancer Review Group 1 (Sufficient evidence human carcinogen).

For Beech Wood Dust, Extract:

RTECS CT3200000 Dermal TDIO (mouse) 3,900gm/kg. Effect: tumorigenic, tumorsat site of application. The Furniture and Cabinet Making Wood Industries have been identified by the International Agency for Research on Cancer (IARC) as a positive human carcinogen. An excess risk of nasa,1 adenocarcinoma has been reported mainly in those workers in this industry exposed to wood dusts. Some studies have suggested that workers in the lumber and Sawmill, Pulp and Paper Industries and in the Carpentry and Joinery Trades may have an increased incidence in nasal cancers and Hodgkin's Disease. However, IARC concluded that the epidemiological data do not permit a definite assessment.

Also see: 8. EXPOSURE CONTROUPERSONAL PROTECTION

12. ENVIRONMENTAL DATA

Effects on environment: Very low. Organic forest product. No non-organic additives.

13. SPILL/ LEAK CLEAN UP PROCEDURES

Clean up: Sweep up or vacuum spills for recovery or disposal; avoid creating dusty conditions.

14. INFORMATION IN REGARD TO TRANSPORT

Transport: See 7. SAFE HANDLING AND STORAGE

15. INFORMATION AND LABELLING

Labels: label accesses to spaces of entry with "Low Oxygen Risk Area" or equivalent. Label areas (or terrain) where the material is being handled or stores as no smoking/no fire area.

16. OTHER INFORMATION

User's Responsibility: The information contained in this Material Safety Data Sheet is based on experience of occupational health and safety professionals and comes from sources believed to be accurate or otherwise technically correct. It is the user's to determine if this information is suitable for their applications and to follow safety precautions as may be necessary. The user has the responsibility to make sure that this sheet is the most up-to-date issue.

17. Declaration:

The undersigned declare that they have read the safety information document and that they shall comply with and respect the points for consideration described herein and pass these on to all persons associated with this agreement.

Signature, date and personally write read and approved.

Give date, function, name & address of responsible supplier & logistical partner(s).

SIGNATURE: