



# Technical Circular

No.: 012/2018

Date: 7<sup>th</sup> February 2018

## To whomsoever it may concern

### **Subject: Fire Safety Hazards Associated with Wood Pellets.**

- The pellets are produced from sawdust and wood shavings and do not contain any additives or binders. The sawdust and shavings are dried, and milled into particles that are then compressed.
- There are two main types of wood pellets: Industrial Pellets, used for power and heating plants, and the so-called 'Prime Quality' pellets, which are used for heat production in private houses and small heating plants. The latter is normally transported in bags placed on wooden pallets and inside large bags.
- **The Hazards Associated with Wood Pellets:**
  - In addition to dust formation (which can cause fires and explosions), problems that can arise when handling large amounts of wood pellets are related to 'off-gassing' and 'self-heating'. Different problems can occur during handling and storage, depending on the quality of the pellets, which is subject to large variations. The quality depends on pellets' origin, size, composition and moisture content.
  - Pellets decompose over time and emit CO and CO<sub>2</sub>. In the process, O<sub>2</sub> is consumed in chemical oxidation reactions and microbiological decay. This release of toxic gases is called 'off-gassing'. The danger of off-gassing is present even at lower bulk temperatures during storage of wood pellets, although it can be accelerated by elevated temperatures.
  - Another important safety aspect for pellets related to the decomposition of pellet content is self-heating and self-ignition in bulk storages. Although this is not a fully understood phenomenon, technical research has shown that self-heating of wood pellets can occur either by chemical oxidation reactions and/or microbiological decay. The fresher the biomass and the higher the moisture content, the greater is the risk of self-heating and potential self-ignition.
  - Heat development due to microbiological decay depends, to large extent, on the moisture content and the surface area. Research trials, especially concerned with self-heating and self-ignition in pellet storages, showed that the growth of micro-



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organisms is normally limited by the low moisture content of the pellets. However, temperature rises on the basis of chemical oxidation processes, have been observed, especially in storages of freshly produced pellets.

- In some cases, temperature rises have led to self-ignition. Self-heating also appears to depend on the raw material used for the production of the pellets.
  
- Self-ignition of wood pellets depends on factors such as:
  - Moisture content;
  - Temperature of the biomass (which may increase during the transfer from storage to a transportation vessel due to friction and hence overheating);
  - Length of time in storage (longer time allowing longer period for development of microbiological decay and chemical oxidation);
  - Condensation heat; and
  - Age of the biomass.
  
- Specialists in the trade of bio fuels advise that when wood pellets are to be loaded on board a ship, a temperature of between 50 °C and 55 °C has to be regarded as critical and as such, the cargo should not be taken on board. It is also advised that if hot spots are observed in the cargo, loading should be stopped immediately, because these may ignite the cargo during the sea passage. Wet spots in the wood pellets cargo have to be treated with extreme caution as well. It is also cautioned that high moisture content in wood pellets may trigger an exothermic reaction and consequently, a fire during the voyage.
  
- Wood Pellets is included in the International Maritime Solid Bulk Cargoes (IMSBC) Code, which describes the safe stowage, carriage and the hazard associated with the shipment of wood pellets.
  
- All concerned are reminded that as per IMSBC Code and SOLAS Chapter VI, the responsibility in determining the hazards associated with the transport of cargoes rests primarily with the shipper. The master of a ship cannot be an expert in this respect and his practical ability to assess the safety of any given commodity is heavily reliant upon its description, as furnished by the shipper.
  
- Merchant Shipping Directorate of Transport Malta has issued Information Notice 28 (copy attached) containing Marine Safety Investigation Report No. 26/2017 on the self-combustion of wood pellets on board a Maltese registered bulk carrier.

- The Investigation Report highlights the potential fire safety hazards when carrying cargo in Bulk, particularly to hazards related to the carriage and handling of wood pellets.

Ship owners/ operators and masters are advised to be guided by above and follow the recommendations contained in the attached Investigation Report.

**Enclosure:**

1. Transport Malta Information Notice 28

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