

Carriage of Direct Reduced Iron - DRI

Background

Members will be aware of the general concerns that exist with regard to the carriage by sea of Direct Reduced Iron (DRI). These concerns have increased significantly since the loss of life arising from the incidents involving the carriage of DRI on board the "YTHAN" (2004) and the deliberate sinking by the French Authorities of the "ADAMANDAS" (2003) with her cargo and bunkers on board.

The explosion and accompanying tragic loss of life on the "YTHAN" resulted from the interaction between the vessel's cargo of "HBI Fines" and the fresh water (moisture) contained in the cargo at the time of loading. At the time of the incident the IMO Code of Safe Practice for Solid Bulk Cargo (the Code) categorized two types of DRI, namely hot moulded briquettes or hot briquetted iron (subsequently re-designated as DRI (A)), and pellets, lumps etc. (subsequently re-designated as DRI (B)). The DRI/HBI fines cargo could not in reality be categorized as either (A) or (B) under the Code and the expert advice was to treat it as the more dangerous and reactive type of DRI (B).

Changes to the IMO Code of Safe Practice for Solid bulk Cargo

Following the above mentioned incidents and their subsequent investigation, the IMO Sub-committee on Dangerous Goods, Solid Cargoes and Containers (DSC) considered amendments to the relevant Schedules of the Code as part of a



review of the Code. The Marshall Islands, Intercargo and the International Group proposed that DRI Fines should be individually classified and designated DRI (C) and both DRI (B) and (C) should be carried under an inert (nitrogen) atmosphere with a maximum, allowable moisture content of 0.3% in respect of DRI (C). It was recommended by the DSC at its 12th session held in September 2008 that these (and other minor) amendments be adopted by the IMO through the IMO Maritime Safety Committee (MSC). The MSC adopted the recommendations in November 2008 and the Code was renamed the International Maritime Solid Bulk Cargo Code (IMSBC Code).

The main changes to the Code in relation to the carriage of DRI (A), (B) and (C) can be summarised as follows:

DRI (A), Briquettes, hot moulded



- A maximum limit on the moisture content of 1%
- Cargo is to comprise essentially whole briquettes. Fines of less than 6.35mm and dust are limited to 5%
- Concentration of hydrogen to be measured throughout the voyage. If it exceeds 25% Lower Explosive Limit or LEL appropriate precautions to be taken
- Surface ventilation only shall be conducted as necessary. When mechanical ventilation is used, the fans shall be certified as explosion-proof and shall prevent spark generation

- Wire mesh guards shall be fitted over inlet and outlet ventilation openings.

DRI (B), Lumps, pellets, cold moulded briquettes



- Average particle size is limited to 6.35mm to 25mm. Fines of less than 6.35mm and dust are limited to 5%
- Loading conveyors are to be dry
- Prior to loading, an ultrasonic test or another equivalent method with a suitable instrument shall be conducted to ensure weather tightness of the hatch covers and closing arrangements
- Moisture content must be less than 0.3% and must be monitored during loading
- Any cargo that has already been loaded into a cargo space and which subsequently becomes wetted, or in which reactions have started, shall be discharged without delay
- Carriage is only permitted under an inert gas blanket
- The ship shall be provided with the means of reliably measuring the temperature at several points within the stow, and determining the concentrations of hydrogen and oxygen in the cargo space atmosphere on voyage whilst minimizing the loss of the inert atmosphere
- Oxygen concentration shall be maintained at less than 5% throughout duration of voyage

- The ship shall be provided with the means to ensure that the requirement to maintain the oxygen concentration below 5% can be achieved throughout the voyage. The ship's fixed CO2 fire-fighting system shall not be used for this purpose. Consideration must therefore be given to providing vessels with the means to top up the cargo spaces with additional supplies of inert gas having regard to the duration of the voyage

- The ship shall not sail until the Master and a competent person are satisfied that:

- All loaded cargo spaces are correctly sealed and inerted; and
- The cargo temperatures have stabilised at all measuring points and are less than 65°C; and
- Concentration of hydrogen in the free space has stabilised and is less than 0.2% by volume.
- Oxygen concentration shall be maintained at less than 5% throughout the duration of the voyage

DRI (C), By-Products, Fines



- Average particle size is less than 6.35mm, and there are to be no particles greater than 12mm in size.
- The reactivity of this cargo is

extremely difficult to assess due to the nature of the material that can be included in the category. A worst-case scenario should therefore be assumed at all times.

- Carriage requirements are largely identical to those for DRI (B), including the 0.3% limit on moisture and carriage under an inert gas blanket.

Conclusion

More detailed information about the carriage requirements for DRI can be found by consulting the IMSBC Code and it should be noted that it is necessary to comply with all of the relevant provisions of the Code.

In light of the above, Members, when carrying DRI (B) or (C), should satisfy themselves that the nominated vessel is capable of maintaining oxygen levels at a concentration of below 5% throughout the voyage.

These provisions of the IMSBC Code will become mandatory from 1st January 2011.

For further information on this or other Loss Prevention topics please contact the Loss Prevention Department, Steamship Insurance Management Services Ltd.

Tel: +44 20 7247 5490
 Email: loss.prevention@simsl.com

The photographs used within this Risk Alert are reproduced with kind permission of Dr J H Burgoyne & Partners LLP.