

# LP BULLETIN

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## Bulletin 604 - 10/08 - Carriage of DRI - Worldwide

**In recognising the hazards associated with the carriage of direct reduced iron (DRI), and current industry practice, the International Maritime Organization (IMO) is amending the entry for DRI in the BC Code.**

Cliff Mullins, chairman of Minton, Treharne & Davies Group and chair of the UK P&I Club's Carefully to Carry sub-committee on hazardous cargoes, explains the update as follows:

"The International Maritime Organization sub-committee on Dangerous Goods, Solid Bulk Cargoes and Containers has been discussing the Code entry for the forms of DRI since DSC 10 in September 2005. Previous entries, as illustrated in the 2001 and 2004 editions of the Code, related to the following:

**Direct Reduced Iron** *such as lumps, pellets and cold moulded briquettes*

Instructions for carriage stated either:

1. Maintenance throughout the voyage of cargo spaces under an inert atmosphere containing less than 5% oxygen. The hydrogen content of the atmosphere should be maintained less than 1% by volume; or
2. The DRI is manufactured or treated with an oxidation and corrosion inhibiting process, approved to the satisfaction of the competent authority, to provide effective protection against dangerous reaction with sea water or air under shipping conditions.

**Direct Reduced Iron** *briquettes, hot-moulded*

The Code advises that the briquettes may slowly evolve hydrogen in contact with water, and states adequate surface ventilation should be provided.

In the period between the two Codes there were several incidents involving the carriage of DRI Fines, unfortunately with the loss of life in some cases. Problems relating to the safe carriage of DRI were first discussed in DSC 10 but unfortunately no agreement could be reached. Further, agreement could not be reached in DSC 11 and DSC 12.

Briefly, the problems relate to the emission of hydrogen from the finely divided DRI particles following reaction with air and water (particularly seawater). One State with manufacturing facilities for DRI Fines insisted upon a ventilation procedure for the removal of hydrogen generated in the holds of the carrying vessel.

This State provided a stream of documentation covering various test methods relating to the safe transportation of DRI Fines. Throughout the documentation there is reference to the fact that DRI Fines react with salt water to produce hydrogen - a flammable gas - creating an explosive atmosphere. Two technical publications included in the documentation also state that DRI Fines and sea water will react to produce hydrogen.

Despite all these warnings, the State's method of carriage suggests the continuous ventilation of the hold spaces. Unfortunately, the extraction of hydrogen in the hold by ventilation is a process which permits moist sea air to enter the hold space. The moist sea air condenses on the steel

surfaces (such as deck heads and bulkheads, etc) before falling on the DRI beneath to produce the flammable explosive hydrogen in air mixes.

### **DRI in the new BC Code**

Following several days of discussion by a working group at IMO in September 2008, DRI will now have 3 categories in the new version of the BC Code:

1. DRI (A) Hot Moulded Briquettes/Hot Briquetted iron (HBI)
2. DRI (B) DRI pellets or lumps and cold moulded briquettes
3. DRI (C) New category for by-product fines. These can be produced from both the pelletising and briquetting process routes.

The new category DRI(C) has been introduced to give recommendations for the carriage of the by-product materials because of the increasing number of shipments of this material. As it is a by-product, it is very difficult to assess what will be the true risks for shipment. As such, DRI(C) material needs to be carried under a number of stringent conditions. The material must:

- have a moisture content less than 0.3%
- be carried under an inert atmosphere (usually in a hold filled with nitrogen)
- have been aged for at least 30 days in order to reduce the reactivity of the material.

It should however be noted that at this time the BC Code is not mandatory. Furthermore, when the BC Code does become mandatory, the new edition includes an option (under Section 1.5 "Exemptions and Equivalent measures") for a shipper to move solid bulk cargoes without the need for the safety measures described, provided measures taken are at least as effective and safe as that required by the Code. These bulk cargoes could include DRI."

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