



Ocean Shipping of Hot Briquetted Iron

An Extraordinary Record

Editor's note:

Recently, there has been much discussion and subsequent misunderstanding regarding the shipping and handling of DRI. Midrex has run articles in 4Q 2006 and 4Q 2007 issues of DFM on various aspects of DRI and HBI handling. This article examines additional aspects of the subject.

Hot briquetting of DRI has been practiced on an industrial scale for more than three decades and is the preferred method of preparing DRI for storage and ocean shipping.

Unfortunately, over the past three or four years, there have been a few incidents involving ocean shipping of fines and other by-products of DRI plants. In these cases, the materials caused problems during shipping and handling. The incidents have cast a shadow over an otherwise remarkable record.

None of these incidents involved HBI; however, they did attract the attention of insurance companies, property and indemnity clubs, and the International Maritime Organization.

Prior to the increase in the price of iron and scrap steel that began in 2003-2004, there was rarely any reason to ship DR plant fines and other by-products. The value of the material was less than freight costs, but after prices increased, there was a surge in shipments of these materials, including product and oxide dusts, fines, clarifier slurry, etc.

In that there is no official name or designation for such materials, various names were placed on bills of lading, often confusing the shippers who would see a name such as "HBI fines" and assume that it was a shipment of HBI and therefore treated as such. It should be noted that there have also been a few incidents involving cargoes of DRI.



The frequency of the incidents, as well as the severity of some of them, was sufficient to cause the International Maritime Organization to revisit its guidelines concerning the shipment of HBI, DRI and fines. The revision process is currently underway.

WHAT IS THE DIFFERENCE?

HBI

HBI is typically 50 percent denser than DRI pellets and lump, which significantly reduces the tendency for reoxidation. DRI is compressed at high temperatures into pillow-shaped briquettes with a typical size of 30 x 50 x 110 mm. This enables HBI to be stored and handled without special precautions as recognized by the International Maritime Organization (IMO).

DRI

Direct Reduced Iron (DRI) is iron that has been reduced (the oxygen removed) from iron oxide pellets, lump ores or fines without melting. Its physical appearance remains as pellets, lump or fines.

FINES

Fines are iron-bearing materials, very small in size and weight. Generally, fines are classified as material less than four or six millimeters in size. Fines and other by-products absorb much more water than HBI and standard pellet and lump DRI, making fines more prone to problems during shipping and handling. There are no IMO-approved guidelines for shipping fines as of yet.

EXCELLENT SHIPPING RECORD OF HBI

When it's really HBI, as defined by the IMO, there have been NO incidents of over-heating. The inset box contains the official descriptions of HBI and DRI.

Exact records are not kept, but reasonably accurate estimates can be made from existing data...

- HBI shipped as ocean freight, to date, is well over 60 million tons; ton-kilometers to date are approximately 450 billion.
- Based upon typical shipments being in vessels of about 30,000 tons, there have been over 1,800 ocean shipments of HBI.

WHAT IS DRI?

Definition of DRI listed in IMO* as:

Direct Reduced Iron (B) (not to be confused with IRON SPONGE, SPENT) such as lumps, pellets and cold-moulded briquettes

IMO defines DRI as: "a metallic material of a manufacturing process formed by the reduction (removal of oxygen) of iron oxide at temperatures below the fusion point of iron. Cold-moulded briquettes should be defined as those which have been moulded at a temperature of under 650° C or which have a density of less than 5.0 g/cm³."

WHAT IS HBI?

HBI is a compacted form of Direct Reduced Iron (DRI), a metallic material manufactured by processes that reduce (i.e., remove oxygen from) iron oxide fines, lump, and pellets at temperatures below the melting point of iron.

Definition of HBI Listed in IMO* as:

Direct Reduced Iron (A) Briquettes, hot-moulded

IMO defines HBI as: "A material emanating from a densification process whereby the direct reduced iron (DRI) feed material is at a temperature greater than 650° C at time of moulding and has a density greater than 5.0 g/cm³. Fines (under 4mm) not to exceed 5%."

Courtesy of Hot Briquetted Iron Association Ltd. Web Site

* Code of Safe Practice For Solid Bulk Cargoes (BC Code), 1994 Edition, International Maritime Organization (IMO), London, 1994.



Only three incidents of cargo over-heating are known. In all three cases, upon closer investigation (inspection of photos of the hot material), it was found that the cargo (or at least the portion of the cargo that over-heated) did not fulfill the IMO specification of HBI. In each of the three shipments, the concentration of fines exceeded the limitation mandated by the BC code of no more than five percent of minus four millimeters. We would also like to emphasize that **none of the three cargoes** consisted of MIDREX® HBI.

In other words...

- No known cargo of HBI meeting IMO specifications has ever had an incident.
- No known vessel loaded with MIDREX® HBI has ever had an incident.
- If HBI is properly prepared and transported, there will be no problems. It is a safe material with a proven record.
- Also, among the latest 90 percent of these shipments (over 55 million tons), there has been only one incident.

CONCLUSION

Over simplifying issues and incorrectly defining iron products has led to misconceptions about HBI in general. For more than a third of a century, HBI has safely and successfully allowed for storage and ocean shipping of direct reduced product. HBI will continue to be the preferred product for merchant supply of DRI, even after the forthcoming revision of the IMO Code of Safe Practices for Solid Bulk Cargoes (also known as the BC Code).