CCS Classification Information

No. 164
April. 28, 2011

To: Masters，Owners/Agents maybe concerned

Subject: Enhance safety measurements for carrying cargoes which may liquefy

Several incidents associated with cargo liquefying whilst onboard vessels are reported recently. Cargoes such as iron ore fines, nickel ore, fluorspar, iron ore concentrates and others have all given rise to liquefaction associated problems in recent years.

This Society released circular No.37 “Notice on Mandatory Implementation of Amendments to SOLAS Chapter VI and VII and the International Maritime Solid Bulk Cargoes (IMSBC) Code” in July 2010 to notify shipping company that the storage and operational requirement for transporting solid bulk cargoes stipulated in IMSBC Code have been mandatory upon IMSBC code coming into effect on 01.01.2011.

Group A cargoes, as defined in IMSBC Code, contain a certain proportion of small particles and a certain amount of moisture. Owing to the vessel’s motion and vibration during a voyage, the volume of the spaces between the particles reduces as the cargo is compacted, causing an increase in water pressure in the space. The increase in water pressure reduces the friction between cargo particles resulting in a reduction in the shear strength of the cargo, leading to cargo liquefaction. A cargo shift caused by liquefaction may occur when the moisture content exceeds the Transportable Moisture Limit (TML). Some cargoes are susceptible to moisture migration and may develop a dangerous wet base even if the average moisture content is less than the TML. Although the cargo surface may appear dry, undetected liquefaction may take place resulting in shifting of the cargo. Cargoes with high moisture content are prone to sliding, particularly when the cargo is shallow and subject to large heel angles. In the resulting viscous fluid state cargo may flow to one side of the ship with a roll but not completely return with a roll the other way. Consequently the ship may progressively reach a dangerous heel and capsize quite suddenly.

Figure 1 Cargoes liquefied and moisture migration

To ensure the safety of vessels and human life, this Society would like to bring to the attention of the Owners and Management Company, the risks associated with liquefaction and the necessary precautions to minimize the risk and to prevent incidents. Followings are some of the suggested measurements may be considered by the company.

1. A cargo with the moisture content shown to be more than the TML should not be accepted on board.

Reg.2/Chapter VI of the International Convention for the Safety of Life at Sea (SOLAS) requires the shipper to provide the master or his representative, with the appropriate cargo information sufficiently in advance of loading to enable the necessary precautions for safe carriage. Furthermore, for loading of cargoes which may liquefy, additional information to be supplied in the form of a certificate of moisture content and transportable moisture limit (TML) as specified in Section 4 of IMSBC Code.

The master should conform firstly before loading of receiving the appropriate documentation certifying the moisture content and TML of the cargo. The interval between sampling/testing and loading shall not be more than seven days. If there has been significant rain or snow between the time of testing and loading, check tests shall be conducted to ensure that the moisture content of the cargo is still less than its TML.

As specified in Reg.8.4 of IMSBC Code, the master may carry out a complementary test on board ship or at the dockside by a "Can Test" for approximately determining the possibility of flow and for verifying whether the certificates showing cargo's actual moisture content. The procedure of the test as follows: Half fill a cylindrical can or similar container (0.5 to 1 litre capacity) with a sample of the material. Take the can in one hand and bring it down sharply to strike a hard surface such as a solid table from a height of about 0.2 m. Repeat the procedure 25 times at one- or two-second intervals. Examine the surface for free moisture or fluid conditions. If free moisture or a fluid condition appears, arrangements should be made to have additional laboratory tests conducted on the material before it is accepted for loading.

Can Test

Before test After test

Figure 2 Complementary test for approximately determining the possibility of liquefaction

It should always bear in mind the possibility that the poor condition of storage piles, transportation before loading and bad weather condition such as raining etc. may cause the actual moisture content far beyond the figure, even the TML, contained within the shipper's declaration. Serious attention shall be paid to the signs of excess moisture content of the cargo. The master may conduct Can Test to the cargoes of each stock pile or each barge before loading and during the whole loading process. Attention should be paid to the position of sampling to reflect the real condition of the cargoes. If condition of the cargo coming onboard is not confirmed safe, the master may refuse or stop loading in order to take further arrangements such as informing the company and related parties, seeking expert advice and requesting independent cargo inspector etc.

Loading in raining should be refused and cargoes exposed to rain shall be tested again. Avoiding carrying those cargoes which may liquefy in raining season would apparently reduce the risks and incidents associated with liquefaction.

2. Cargo monitoring during voyages

Arrangement for sounding and draining, if necessary of bilge in cargo holds shall be made according to SMS or instruction stipulated in cargo data sheets.

Pictures of cargoes at each stage of loading and storage onboard, particularly upon completion of cargo, may be taken in order to make continuous monitoring. If practicable, regular visual examination to the cargoes in holds and taking photos of the cargo at specific intervals such would help reveal whether there's any changes or liquefaction of the cargoes.

3. Emergency response whist cargo liquefying

Section 8 of the ISM Code as amended require that potentially hazardous situations are risk assessed and have procedures in place to deal with the situation should it occur. Cargo

liquefaction will places the vessel in a hazardous situation and if not already in place, procedures to deal with liquefaction should be developed in SMS, instructing the crew to take appropriate measurements such as calculation of stability, avoiding turning with large rudder angle and seeking shore-based support whist cargo liquefying at sea.

4.Proper routine maintenance to ensure of weather tightness and sound structural condition of cargo holds

Weather tightness and structural condition of cargo holds is related not only to seaworthiness but also cargo worthiness. A proper maintenance is the key element for assuring weather tightness of cargo holds. Following list the guidelines to which routine maintenance may be referred.

- GUIDANCE TO SHIPS' CREWS AND TERMINAL PERSONNEL FOR BULK CARRIER INSPECTIONS (A.866(20))
- STANDARDS FOR OWNERS' INSPECTION AND MAINTENANCE OF BULK CARRIER HATCH COVERS (MSC.169(79))
- GUIDELINES FOR BULK CARRIER HATCH COVER SURVEYS AND OWNER'S INSPECTIONS AND MAINTENANCE (MSC/Circ.1071)
- CARE AND SURVEY OF HATCH COVERS OF DRY CARGO SHIPS –GUIDANCE TO OWNERS (IACS RECOMMENDATION NO.15)
- GUIDELINES FOR SURVEYS, ASSESSMENT AND REPAIR OF HULL STRUCTURE – BULK CARRIERS (IACS RECOMMENDATION NO.76)

4.1 Hatch coaming and hatch covers

1) Hatch coaming and hatch covers shall be examined regularly. Inspection hammer may be used in order to ascertain the real condition of the structural members with thick coatings and rust scales. A testing of the satisfactory operation of mechanically operated hatch covers together with inspection to the cover panels at their mostly opened and closed condition would be a good practice to reveal the condition of the hatch covers.

The below figure shows the defects most commonly found upon hatch coaming and hatch covers.

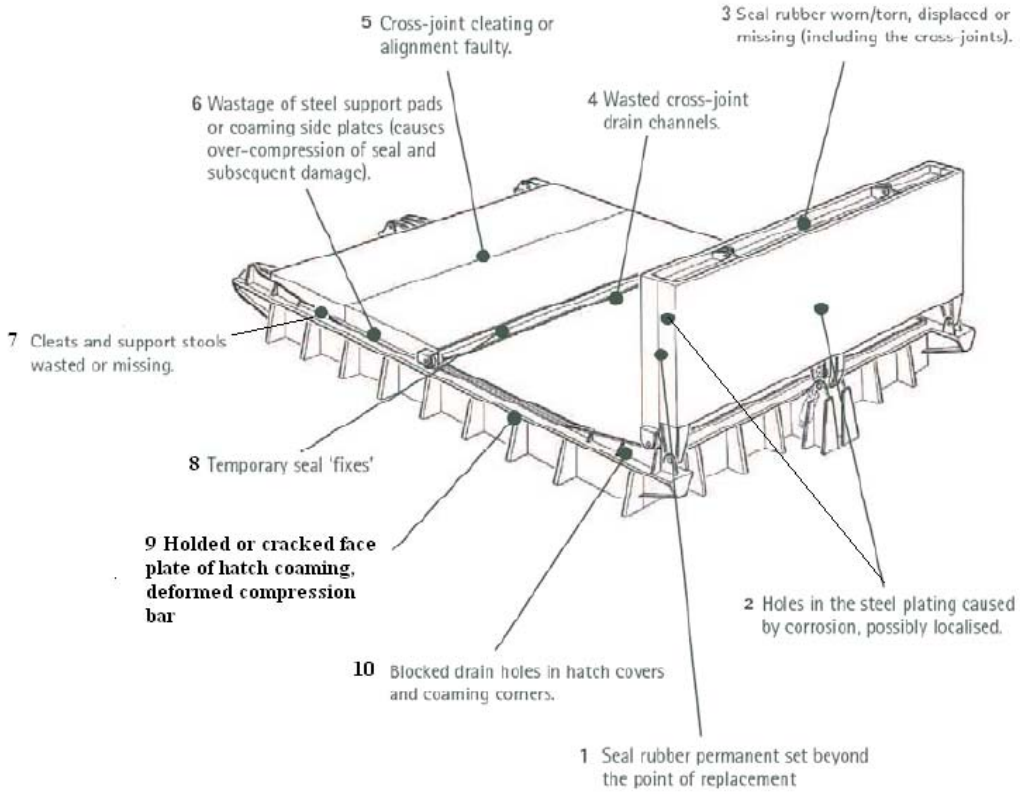

Figure 3 Hatch coaming and hatch covers related deficiencies

4-1 Holed hatch covers, attention to be paid to the lower part of the cover panels and the ventilators or cement holes in panel(if any)

4-2 Seriously corroded rubber channel and draining channel

4-3 Seriously corroded skirt plate

4-4 Holed face plate of hatch coaming

4-5 Holed face plate around cleat and over-compressed rubber

Figure 4 Typical defects of hatch covers and coaming

2) Where considered necessary, or after repair, the effectiveness of sealing arrangements may be proved by hose or ultrasonic test.

Figure 5 Tightness test to hatch covers（Ultrasonic Test and Hose Test）

4.2 Other structural members related to the weather tightness of cargo holds

1) Holed cargo hold ventilators, air pipes and sounding pipes penetrating cargo holds would lead to water ingress. They should be examined through not only visual inspection but also hammer test.

Figure 6 Holed ventilator and air pipe

2) Attention should be paid to the condition of access hatch coaming，covers, seal rubber and cleats. Additional chalk test should be carried out if necessary to confirm its weather tightness.

3) Bilge well should be examined to found out the condition of its coaming, bottom, especially the area right underneath the sounding pipe. Bilge well shall be kept clean with no waste or rubbish stuck. Function test to the bilge system and high lever alarm system, if fitted, may be carried out as far as possible.

Hereby notify the above.

Classed Ship in Service Department

China Classification Society