

MEMBER ALERT



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COAL CARGOES: SELF/OVER-HEATING AND EMISSION OF FLAMMABLE GASES

Reference is made to the Member Alert of June 1, 2010 entitled *Coal Shipments in Indonesia: Cases of Self/Over-Heating*. It has since come to the Managers' attention that recent incidents of the self-heating of coal, while loading and during shipment, have called into question the accuracy of shippers' declarations of this cargo as required under the International Maritime Solid Bulk Cargoes (IMSBC) Code.

This Alert provides general guidance to Members on precautions that should be taken in the loading and carriage of coal cargoes. In conjunction with the mandatory requirements set forth in the IMSBC Code for shippers (as coal is explicitly listed in Appendix 1), it is prudent for shipowners to consider implementing precautionary safety measures to protect their interests even in the event that the coal cargo may not have been declared as self-heating or methane emitting.

Requirements under the IMSBC Code on temperature readings and flammable gas emitting cargoes

Paragraph 4.2 of the International Maritime Solid Bulk Cargoes (IMSBC) Code states:

"The shipper shall provide the master or his representative with appropriate information on the cargo sufficiently in advance of loading to enable the precautions which may be necessary for proper stowage and safe carriage of the cargo to be put into effect."

Furthermore, paragraph 4.2.2.1.13 requires notification of the self-heating properties of such cargoes, and paragraph 4.2.2.1.14 requires notification of any cargo that might emit flammable gases upon contact with water.

Accuracy of shipper's declarations under the IMSBC Code

The IMSBC Code recommends that ships are provided with a means to measure the temperature of bulk cargoes between the ranges of 0 and 100 degrees Celsius without the need to enter cargo spaces during loading and during the voyage. However, the Code does not explicitly state any self-heating temperature limit such that, if a shipper does not declare a cargo as self-heating, the Master is obliged to take precautionary temperature readings.

With this in mind, shipowners should consider taking temperature readings of all coal cargoes during loading and, if the temperature of the cargo exceeds 55 degrees Celsius as specified in the IMSBC Code, cargo loading operations should be suspended until the true nature of the cargo can be investigated.

Relevant parties, including shippers, should be notified in writing and expert advice sought to determine if the coal is self-heating.

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Taking temperature and carbon monoxide (CO) readings

Prior to loading, Masters and crews should be aware that many terminal facilities are capable of loading thousands of tons of cargo per hour making it difficult to obtain accurate temperature readings while loading.

If temperature readings are allowed to be taken ashore by the ship's crew before the coal is loaded, it is recommended that this be done. However, the ship's crew may not be allowed access to shoreside coal stockpiles, or coal on barges, to take temperature readings.

Large coal terminals may have automatic temperature control systems for their loading systems and conveyor belts. These shoreside temperature control systems should not be relied upon by the Master. Consequently, it is recommended that the ship's crew take temperature readings in the cargo holds as often as possible at such times when there is a stoppage of loading or sequence changeover. Members should consider obtaining portable temperature scanners for the crew to scan the surface of the of the coal cargo when the hatch covers are open.

Also, Members are reminded that crew members entering cargo spaces or enclosed adjacent spaces in such instances must comply with the requirements contained in the "Coal — *Special precautions*" appendix to Appendix 1, paragraph 1.3 of the IMSBC Code.

All vessels carrying such cargoes are required under the IMSBC Code to carry on board instruments to measure methane, oxygen and CO in the cargo holds. The presence of carbon monoxide (CO) is also an indicator that a coal cargo may be self-heating if found in concentrations of 50 parts per million (ppm) or higher and if there is a steady rise in such concentrations over three successive days. If this is the case, the IMSBC Code requires that the Master to inform the shipper accordingly in writing with details in accordance with the "Coal — *Special precautions*" appendix to Appendix 1, paragraph 2.5 of the IMSBC Code.

Methane (CH₄) emitting coal

Methane is highly flammable and, since it is lighter than air, is likely to rise in the cargo hold and accumulate in the head spaces above the stow. Therefore, when a shipper has declared that the cargo is likely to emit methane, or the atmosphere in the cargo hold indicates methane is present in excess of 20% of the Lower Explosion Limit (LEL), additional precautions are to be taken including suspension of hot works and smoking during cargo operations. The detailed set of precautions for methane emitting coal are contained in detail in "Coal — *Special precautions*" appendix to Appendix 1, paragraph 1 of the IMSBC Code.

American Club e-Learning module on the IMSBC Code

Reference is made to Club Circular No. 39/13, *New e-Learning Module on Compliance with the International Maritime Solid Bulk Cargoes (IMSBC) Code*. All Members with owner entries in the Club have access to all of the its e-learning training programs including the IMSBC Code via the website <https://secure.idessonline.com/americanclub/facility/>, free of charge. Members who have not registered are encouraged to do so at the earliest opportunity to take advantage of all the e-learning tools available.

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Recommendations

In summary, your Managers recommend:

1. The Master should consider the cargo as self-heating or methane emitting until proven otherwise. All necessary precautions as set forth in the IMSBC Code should be taken when loading any coal cargoes regardless of the shipper's cargo declaration, as to whether the cargo is self-heating or has a high potential of emitting methane under the 20% LEL threshold.
2. Cargo should be loaded as quickly as possible. Delays in loading due to availability of cargo can create the problem of increasing the chance of self-heating of the cargo already loaded in the holds. Additionally, barges that bring cargo to vessels at anchorage are often uncovered. This allows for wind to increase the chance of self-heating.
3. Hatch covers need to be well sealed to prevent oxidation of the cargo, as this process can lead to self-heating. This means that checks should be made to ensure no gaps in the seal around the main cargo hold hatch covers and also access hatch covers and vent doors.
4. Ventilating cargo holds upon completion of cargo loading should preferably be avoided. The important fact to consider is the checking of the atmosphere within the cargo hold to determine if the gases present in the cargo hold contain carbon monoxide (indicative of potential self-heating) or methane (potential of explosion). If methane is present the cargo hold must be promptly ventilated as it is essential to get rid of the methane because of its explosive nature.
5. The vessel's fire-fighting systems should be checked and tested to ensure they are in a full state of readiness prior to the loading of cargo, the voyage and discharge of cargo. For vessels fitted with fixed carbon dioxide (CO₂) firefighting systems, these should be tested and checked and ensured that they can cover all relevant cargo holds and personnel are familiar with how to operate the CO₂ release system.
6. Members should ensure they give special consideration to coal cargoes that may self-heat as well as emit methane. As per the IMSBC Code, cargo hatches should be closed immediately upon completion of loading self-heating coal to limit the oxygen available in the space. However, the simultaneous presence of dangerous levels of methane may create an explosion risk. In this event, the IMSBC Code specifies that ventilation should take priority but should be limited to the absolute minimum time necessary to remove methane that may have accumulated. The detailed set of precautions for both self-heating and methane emitting coal are set forth in the "*Coal — Special precautions*" appendix to Appendix 1, paragraph 2.1 of the IMSBC Code.

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7. Furthermore, Members should note that as of July 1, 2016, as per SOLAS Chapter 11, regulation 1/7 – *Atmospheric Testing Instrument*, that all cargo ships over 500 GT are required to carry atmospheric testing instruments capable of measuring concentrations of oxygen, flammable gases and vapors, hydrogen sulfide (H₂S) and CO. In advance of the deadline, Members are encouraged to obtain and use such equipment as per manufacturer's specifications. Gas measurement equipment should be calibrated, replaceable spare parts should be obtained and kept onboard, as they can often be difficult to obtain at load ports.
8. Caution should be exercised as methane readings can be unreliable when oxygen levels are below 10%. Expert advice should be sought in such cases.
9. As previously mentioned, Members are recommended to obtain portable temperature scanners for use by personnel to scan the surface of the coal cargo.