

## Common dangers to be occurred during carriage of bulk cargoes

Marine transport has been a significant part of international trade in consideration that the most suitable and often the only way of transportation for large volumes of cargo and finished products. Given the fact %85 of transportation is made by sea and also this proportion has been increased to %90 on the current crisis conditions, the importance of the same may be understood clearer. Bulk cargoes constitute an important part of Sea Transportation. Solid bulk cargoes cover a wide range of products. Some of the most commonly carried solid bulk cargoes are coal, cement, grain, sulfur, fertilizer, iron ore and sugar. These type of cargo does not often packaged separately, they are carried in the ship holds in large tonnages.



Many dry bulk cargoes are classified as “dangerous goods” in consideration of the fact that they require special care and attention throughout loading, transport and discharge operations. The solid bulk cargo consists potential danger and thus it needs safe and sensitive handling and shipment.

The most common dangers which arise from bulk cargo carriage may be classified as below:

- **Shifting:** This must be referred as the greatest danger of all times in bulk carriers. This risk is encountered more often in carriers with grain cargoes, as this type of cargo settles in the ratio of %2 of its volume and this creates a free surface in the holds for this slippery and almost liquid cargo type. Therefore, such cargo is always likely to carry the shifting risks due to heavy rolls during the voyage at sea. This potential danger turns into a real and very serious one as it can even cause capsizing of the vessel. In order to avoid this risk, trimming must be made accordingly.
- **Falling down from height:** Iron ore, quartz and coil cargoes are the ones with high density and heaviness which may cause personal injury, even death in case where they fall down to the deck during their loading operation by conveyors. Especially, during the first loading the cargo which are loaded from the height can damage tanktop of the holds. Therefore, the loading operations must be duly monitored at all times by the duty officers to ensure that no crew is located on deck or cargo operation area. The crew must also be equipped as needed with the special helmets, safety shoes and phosphoric jackets. Another caution that may be taken would be placing wooden pallets on hold tanktops prior to loading in order not to damage tanktop structure.



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- **Cargo dust:** Dust is one of the most common hazards in bulk carriers. Many solid bulk cargoes are dusty by nature. The small dust particles can easily be inhaled and have adverse effects on health. The crew and or other personnel to carry out the cargo operation might be exposed to high dust content which would cause sneezing and eye scratchiness and therefore avoiding dust, wearing appropriate masks and respirators would protect the crew who are present on the deck during cargo operations. The mask filters must be renewed when they gets dirty and the electronic/mechanical parts of the vessel must also be duly protected against such hazard to arise from the cargo dust.
- **Liquefaction of cargo:** Liquefaction could be defined as a condition wherein a solid bulk cargo are turned into an almost fluid level. The most common cargo types which highly carry such risk can be exemplified as iron ore fines, nickel ore and concentrated minerals. Liquefaction could take place due to vessel's movements (rolling, pitching and pounding) caused by the impact of sea/waves, which compact the cargo and constitutes a free surface which may have negative effect on the vessel's GM by decreasing her stability. The type of bulk cargoes must be widely researched by the C/O's prior to loading. It must be ensured that the rate of moisture/humidity does not exceed the allowable limits. This could be also checked during the voyage regularly in the holds.
- **Structural damage:** Over time, heavy cargoes place heavy loads on the ship's structure and can cause structural damage. As the heavy cargoes have low stowage factor, these cargoes occupy a small area and thus the tank top has a sufficient strength and be suitable to carry heavy cargoes like iron ore, nickel ore, bauxite and other heavy cargo types. The capacity of tank top strength can be found in the stability book. In case where the cargo is loaded above allowable limits, it cause a high stress ( excessive bending and shearing forces) which would lead capsizing of the vessel in time due to heavy structural damage.
- **Oxygen depletion:** In the carriage of some types of organic cargo, such as wood, paper pulp and agricultural products may cause serious oxygen depletion and forming of carbon dioxide in the holds and other closed areas where the cargo is loaded. Therefore, these cargoes which are innocent in the first appearance may cause life threatening circumstances. As these holds and places are not ventilated accordingly, some fatal dangers may occur. In the content of The IMSBC code lists, following cargoes are specified to be oxygen depleting: coal, direct reduced iron, sponge iron, sulphide concentrates, ammonium nitrate and linted cotton seed. Different kind of hazardous gasses such as carbon monoxide, carbon dioxide, hydrogen sulphide and hydro carbons may come out of these cargo types. Thus, crew's entrance to closed spaces must be allowed only if these areas are duly ventilated and measurements in this regards are made through regularly calibrated equipment. Emergency entrances may be carried out with SCBA.
- **Corrosion:** Some cargo types such as coal and Sulphur may lead serious damage due to corrosion. Bulk coal cargoes are usually stored outdoors and their rate of humidity increased by encountered adverse air conditions. Wet Sulphur is highly corrosive and although the accumulated water in the holds are soaked through the bilges, the remaining water could still shows reaction and release sulphuric acids. The coal cargo consists high humidity and sulfur even though after the same is washed with fresh water and it may release acids that might corrode parts of the ship.
- **Contamination:** Preparation of cargo holds for the next carriage can be classified as an essential stage for bulk carriers. Any neglect in such preparation may lead contamination, water ingress and loss of cargo. The remaining/dusts of prior cargo can contaminate with the present one and that may not be acceptable by the receivers. For instance, cement cargo may concrete and unrefined sugar may turn into syrup. The possible leakage from the hatch covers and bilge systems as well as manhole leaks located in the ballast tanks in the holds must be regularly checked. In addition, unreturned check valves of the bilges in the holds and tank sounding and air ventilation pipes must also be checked on regular basis.
- **Fire:** Bulk cargoes are generally accepted to carry a great risk of fire as many bulk cargoes such as coal, Sulphur, cotton and fishmeal are likely to heat automatically as a result of oxidation during the voyage. Coal specifically spreads methane gas which is highly flammable when mixed with air and that may cause explosion. Also, the heat can be produced when the cotton cargoes are subject to friction. The security rules to prevent fire on board shall be strictly obeyed.

As established by international law, including the international liability regime of Hague-Visby Rules, the sea Carriers are contractually obliged to care the Cargo and liable to ensure the Cargo is delivered on the same condition (as quantity and quality) as it has been loaded. Within this frame, The IMSBC code must be applied strictly for the safety of solid bulk cargoes as well as for the application of good marine manners.