

The Carriage of Soya Beans in Bulk

Introduction

Soya beans are typically carried in bulk and are an occasional source of claims. Although this Loss Prevention Bulletin has been prepared with the soya bean trade from South America to the Far East in mind, the key provisions also apply to shipments of soya beans in general.

This cargo must be carried in accordance with the requirements of the latest edition of the IMO International Convention for the Safe Carriage of Grain in Bulk (the Grain Code).

Cargo Claims

Soya bean claims arising at the discharge port often involve allegations of deterioration and/or contamination. If correct, the condition of the cargo may have been affected by:

- Decomposition, self-heating, mould growth and/or caking due to the beans having an excessive moisture content
- Contamination with foreign matter prior to loading
- Contamination with the residues of previous cargoes, paint flakes and/or rust from the cargo holds
- Sweat (ie condensation) damage
- Water ingress from non-weathertight hatch covers, bilge lines and/or leaking ballast tanks
- Heat damage to cargo in the vicinity of the engine room bulkhead and/or tanks containing hot fuel oil
- Insect infestation

Given the potential for damage and shortage claims, Members may wish to consider appointing a cargo surveyor to attend the vessel during loading and discharge operations to protect their interests.

Moisture Content and Cargo Deterioration

Soya beans are normally harvested after the beans have matured and the plant foliage has dried. They can be loaded soon after being harvested providing they have been dried to a safe storage moisture content. Soya beans can be stored



for a significant length of time under appropriate conditions, although fixtures involving the carriage of beans harvested in earlier years should be avoided if possible to minimise the risk of cargo deterioration. However, even crops harvested in the year of shipment may deteriorate once on board if stored for a prolonged period beforehand.

The moisture content of the cargo is one of the most important factors affecting the carriage of this product. Although soya beans are hygroscopic and will absorb moisture, it is unusual for the average moisture content of the cargo to change appreciably during the voyage unless there has been some specific incidence of wetting such as water ingress or the development of sweat inside the cargo holds. Depending on the circumstances, moisture migration may also occur due to temperature gradients established across the stow as a result of the heating or cooling of steelwork. These scenarios will increase the moisture content of a proportion of the cargo within the affected area. If the soya beans had an inherently high moisture content at the time of loading or are wetted while on board, the oil within the beans may start to decompose during the voyage and cause the cargo to self-heat, promoting the growth of mould which can result in caking. This type of deterioration affects the quality of the product.



The risk of deterioration increases significantly if the moisture content of the beans exceeds 14%. Soya beans with a moisture content of between 13% and 14% may also deteriorate if exposed to warm climatic conditions throughout the voyage. Similarly, deterioration may occur if the moisture content of the beans differs widely. Soya beans with a moisture content below 10% are less likely to deteriorate but are more susceptible to handling damage.

The amount of time that soya beans can be stored before they start to deteriorate depends on temperature as well as the moisture content. The higher the figures, the less time the product can be stored without risk of deterioration. For example, based on a temperature of 26.7°C (80°F) it should be possible to store soya beans with a moisture content of 13% for approximately 40 days before they start to deteriorate. At the same temperature a moisture content of 14% will result in a storage time of around 20 days, whereas beans with a moisture content of 12% may be stored for approximately 70 days. At a temperature of 15.6°C (60°F) it may be possible to store soya beans with a moisture content of 13% for up to 120 days without significant loss of quality (Source: [North Dakota State University](#)).

Other factors may also affect the length of time that soya beans can remain in sound condition while on board. These include the variety of soya bean, growing conditions and the amount of handling and processing between harvesting and loading. However, such details and how they may affect the storage life of the product will often be unknown to the carrier.

It is generally accepted that the moisture content of soya bean cargoes should not exceed 13% when presented for loading. Cargo interests will usually provide a quality certificate declaring the moisture content of the soya beans to be 13% or slightly less, but this is likely to be an average figure. In practice the actual moisture content of some of the beans may be higher, making them more susceptible to deterioration.

Consequently the surveyor acting for the vessel should be instructed to check the moisture content of cargo samples taken throughout loading. Properly calibrated moisture meters may be used for this purpose but it should be borne in mind that the accuracy of such devices is usually around 0.5%. This tolerance should be taken into account when evaluating the results. In order to identify any cargo that may have started to self-heat, the surveyor should also be instructed to measure the temperature of the beans at regular intervals.

Heavy rain can reduce the quality of the harvest, as may the drying process between harvesting and shipment. Since producers often blend superior beans with inferior product, the overall quality of soya bean cargoes may fall during years when the harvest has been affected by heavy rain and superior beans are in short supply.

Loading

The cargo holds should be prepared to the grain clean/high cleanliness standard. Charterers and/or cargo interests should also be consulted in case they have any particular hold preparation requirements. In all cases the holds should be thoroughly cleaned to remove any residues of previous cargo, loose rust scale, paint flakes, paint blisters, infestation and any other foreign matter. The holds should then be washed, carrying out a final rinse with fresh water to remove all traces of chlorides. Prior to loading the holds should be completely dry and odour free.

When presented for loading the beans should be inspected for discolouration, damp, caking, germination, mould, shrivelling, contamination, unpleasant odour and infestation. Any beans found to be in such condition should be rejected and replaced with sound product.

Soya beans are usually yellow or cream. However, black, purple, brown, green, mottled (ie black and brown) and a mixture of these colours may also be encountered. The accompanying cargo documentation will often provide details regarding the colour of the product and the year of harvest, for example “*Brazilian Yellow Soybeans, Crop 2015 in Bulk*”.

On some occasions receivers at the discharge port have rejected cargoes of soya beans on the grounds of them being an unusual red colour, alleging that the beans were contaminated with a fungicide. Any abnormal colouring should be investigated at the time of loading, particularly if it appears to differ from the colour stated in the cargo documentation.

Depending on the grade and contractual specification of the soya beans, a percentage of heat damaged, broken, split or different coloured beans may be permitted. There may also be an allowance for a certain proportion of foreign material such as stems, stones, shells and other types of beans. A high proportion of split beans can raise the likelihood of mould developing and may increase the possibility of deterioration.

As far as practicable the surveyor should be instructed to compare the properties of the cargo with the contractual specification throughout loading. In the event of any quality concerns the master should issue a Letter of Protest to cargo interests drawing attention to the apparent differences observed.

It is recommended that representative cargo samples are taken from each hold according to an internationally recognised sampling procedure, for example the [Federation of Oils, Seeds and Fats Associations \(FOSFA\)](#) sampling rules. Samples should be sealed in airtight plastic containers and be labelled with key details such as date, time and hold number. The samples should be retained on board for analysis should the cargo deteriorate on passage or in the event of a quality dispute.

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The cargo should be protected from rain at all times and all non-working hatch covers should be kept closed during loading operations. If rain is imminent, cargo work should be suspended and the working hatches should be closed without delay.

If the master or the surveyor has any doubts regarding the condition of the cargo during loading or its fitness for carriage, the Club should be contacted at the earliest opportunity as it may be necessary to obtain expert advice.

Carriage

Once the cargo has been loaded, and subject to any fumigation requirements, the holds should be ventilated in accordance with the Club's Loss Prevention Bulletin on [Cargo Ventilation and Precautions to Minimise Sweat](#).

Mechanical rather than natural ventilation of the holds is generally preferable for achieving efficient air circulation. However, as with any agricultural product shipped in bulk, air will fail to penetrate the body of the stow regardless of which method is used.

If it is intended to ventilate the cargo in accordance with the Three Degree Rule during the voyage, then the average temperature of the sub-surface cargo should be established after the completion of loading.

On a typical voyage from South America to the Far East via the Cape of Good Hope, ship sweat may develop once the vessel enters the colder waters off the South African coast. It is therefore essential that compliance with best ventilation practice is fully documented as any signs of deterioration due



Caked soya beans

Photo courtesy of: Haizheng Marine Surveyors & Consultants Co., Ltd.

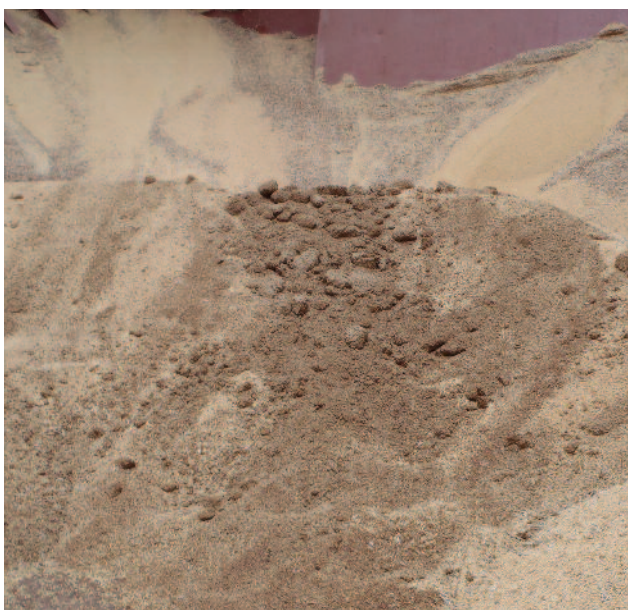
to unavoidable sweat or inherent vice will generally result in cargo interests claiming that the vessel failed to ventilate the cargo correctly, irrespective of the actual cause.

Detailed temperature records, as well as the times of starting and stopping ventilation should be maintained. If it is not possible to ventilate the cargo due to fumigation, heavy weather or any other reason, such details should also be recorded. In addition to taking temperature readings and adjusting the ventilation during the day, the crew should also follow the same routine at night. Again, failure to monitor and record such activities during the hours of darkness may make it difficult to defend any allegations of inadequate ventilation.

Any fuel oil tanks bordering the cargo holds should not be heated excessively as the hot steelwork may induce self-heating and, over time, scorch the beans in that area or trigger moisture migration. The fuel should only be heated to the minimum temperature necessary for use. Similarly, fuel which is overly hot should not be transferred to such tanks. In addition, the temperature of the engine room bulkhead should be considered as this may also result in heat damage and moisture migration.

Soya beans continue to respire after harvesting. The respiration process may result in less oxygen within the cargo holds and elevated levels of carbon dioxide, making the atmosphere unsafe to breathe. Deck houses may also be affected if they contain hold access hatches which are not gas tight. Enclosed space entry procedures should always be followed if it is necessary for anyone to enter such compartments.

All crew members should be briefed about these hazards and the necessary precautionary measures prior to loading,



Caking due to cargo being next to a heated double bottom fuel oil tank

Photo courtesy of: Haizheng Marine Surveyors & Consultants Co., Ltd.

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particularly the oxygen depletion risks. Ideally all cargo hold access hatches should be locked shut and suitable warning notices posted.

Discharge

All interested parties should be invited to attend the vessel when the hatch covers are opened to inspect the surface of the stow. The condition of the cargo should be recorded and photographed, paying particular attention to any areas which appear to be damaged.

Further photographs should be taken at regular intervals throughout discharge and the vessel should maintain written records throughout. The records should include remarks on how the cargo was handled and details of all spillages.

If any cargo damage is observed during discharge, the pattern, type and extent of the damage should be documented to assist those who may be appointed to investigate the cause. The Club should also be contacted immediately as it may be necessary to appoint a surveyor to investigate further.

It is recommended that representative samples of the cargo are taken from each hold during discharge, following the same process employed when loading. Again, these may be useful in the event of a subsequent quality dispute.

The cargo should only be discharged in favourable weather conditions and the hatch covers of all non-working holds

should remain shut. If rain is imminent, cargo operations should be suspended and the working hatches promptly closed.

Cargo Shortage

In common with many dry bulk cargoes, shortage claims may arise. Draft surveys should therefore be carried out by the vessel at all load and discharge ports. However, if the vessel is due to discharge at particular ports where shortage claims are endemic, it may be prudent to delegate this task to reputable independent surveyors. Members may also consider sealing and unsealing holds under survey at the load and discharge ports, inviting cargo interests to attend in each case. Arrangements should also be made to have empty hold certificates issued upon completion of discharge.

It should not be assumed that a fixed trade allowance for cargo shortages will always apply. In some countries the courts may not permit such a defence, and in others the trade allowance may vary depending on the province in which the discharge port is situated.

Members requiring further guidance should contact the [Loss Prevention Department](#).

The Club would like to thank [CWA International](#) for assisting with the preparation of this Bulletin.



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