

# STANDARD CARGO

SETTING THE STANDARD FOR SERVICE AND SECURITY

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## CARRIAGE OF SEEDCAKE



^ Seedcake cargo with water damage

### INTRODUCTION

The Standard Club loss prevention programme focuses on best practice to help avert those claims that are considered avoidable. This edition of *Standard Cargo* addresses the safe and correct carriage of seedcake cargo. Due to their oil and moisture content, this cargo can present a significant fire risk due to self-heating and spontaneous combustion therefore; the procedures described here should be followed in order to prevent such casualties.

Members should refer to the latest edition of the IMO International Maritime Solid Bulk Cargoes (IMSBC) Code, which provides the statutory requirements for carriage and which supersedes any advice given in this document. The IMSBC Code, which was mandatory from 1 January 2011, is a revision of the IMO BC Code and should be the first point of reference for guidance on the carriage of solid bulk cargo.

# WHAT IS SEEDCAKE?

Seedcake is the residue remaining after the removal of oil from any oil-bearing seeds, cereals and cereal products, and any other commodities with similar properties. This is achieved by mechanical crushing or by a process known as solvent extraction. Seedcake is a by-product of the production of vegetable oils from the oil-bearing seeds or grains, and is principally used as an animal feed or fertiliser.

With some exceptions (for example, solvent-extracted seedcake with low-residual oil and moisture, which is not regarded as hazardous), seedcake is a hazardous cargo that can self-heat owing to the presence of moisture, residual oil or both. Although the self-heating process is slow, it can cause the bulk temperature of the cargo to rise to the point at which it ignites spontaneously. The shipper is required, according to the provisions of the IMSBC Code, to provide a certificate from a person recognised by the competent authority of the country of shipment confirming the oil and moisture content of the shipment, on the basis of which the UN number of the cargo is determined.

The moisture content of a seedcake cargo is relevant since high moisture content promotes microbiological activity, which may be responsible for the initial rise in temperature up to about 70°C and deterioration in the quality of the seedcake. This activity alone will not cause the seedcake to ignite, but it will accelerate oxidation of the residual oil, which in turn can cause the temperature to rise sufficiently to the point at which the seedcake will spontaneously ignite.

According to the IMSBC Code, seedcake derived from solvent extraction has an additional hazard arising from residual flammable solvent mixed in the cargo. Seedcake determined to be non-hazardous, and certified as such, is non-combustible and has a low fire risk.

It is important to measure the cargo temperature before and after loading, and during carriage to ensure that incipient signs of self-heating are detected and appropriate action can be taken. Digital thermometers of the type shown below are employed for this purpose.



^ Temperature reading taken during self-heating leading to spontaneous combustion

# TYPES OF SEEDCAKE

There are four types of seedcake listed in the IMSBC Code defined by the oil and moisture content and the method of production. These are summarised below and a greater amount of detail on each of the types of seedcake, together with requirements for loading and carriage, are set out in Appendix 1:

- **UN 1386 (a)**  
Mechanically expelled seeds, containing more than 10% of oil or more than 20% of oil and moisture combined.
- **UN 1386 (b)**  
Solvent extractions and expelled seeds, containing not more than 10% of oil and when the amount of moisture is higher than 10%, not more than 20% of oil and moisture combined.
- **UN 2217**  
With not more than 1.5% oil and not more than 11% moisture.
- **NON-HAZARDOUS**  
Solvent-extracted rape seed meal, pellets, soya bean meal, cotton seed meal and sunflower seed meal, containing not more than 4% oil and 15% oil and moisture combined and being substantially free from flammable solvents.

Seedcake is usually transported as a dry bulk cargo, in the form of pulp, meal, cake, pellets and expellers. The cereals and cereal products carried as seedcake are those derived from:

Bakery materials	Barley malt pellets	Beet
Bran pellets	Brewers grain pellets	Citrus pulp pellets
Coconut	Copra	Corn gluten
Cotton seed	Expellers	Gluten pellets
Ground nuts, meal	Hominy chop	Linseed
Maize	Meal, oily	Mill feed pellets
Niger seed expellers	Oil cake	Palm kernel
Peanuts	Pellets, cereal	Pollard pellets
Rape seed	Rice bran	Rice broken
Safflower seed	Seed expellers, oily	Soya bean
Strussa pellets	Sunflower seed	Toasted meals (not included in UN 2217)

The main characteristics of the different grades of seedcake are summarised in the table below.

	UN 1386 (a)	UN 1386 (b)	UN 2217	Non-hazardous
Class	4.2	4.2	4.2	N/A
Group	B	B	B	C
Size	N/A	N/A	0.1mm–5mm	N/A

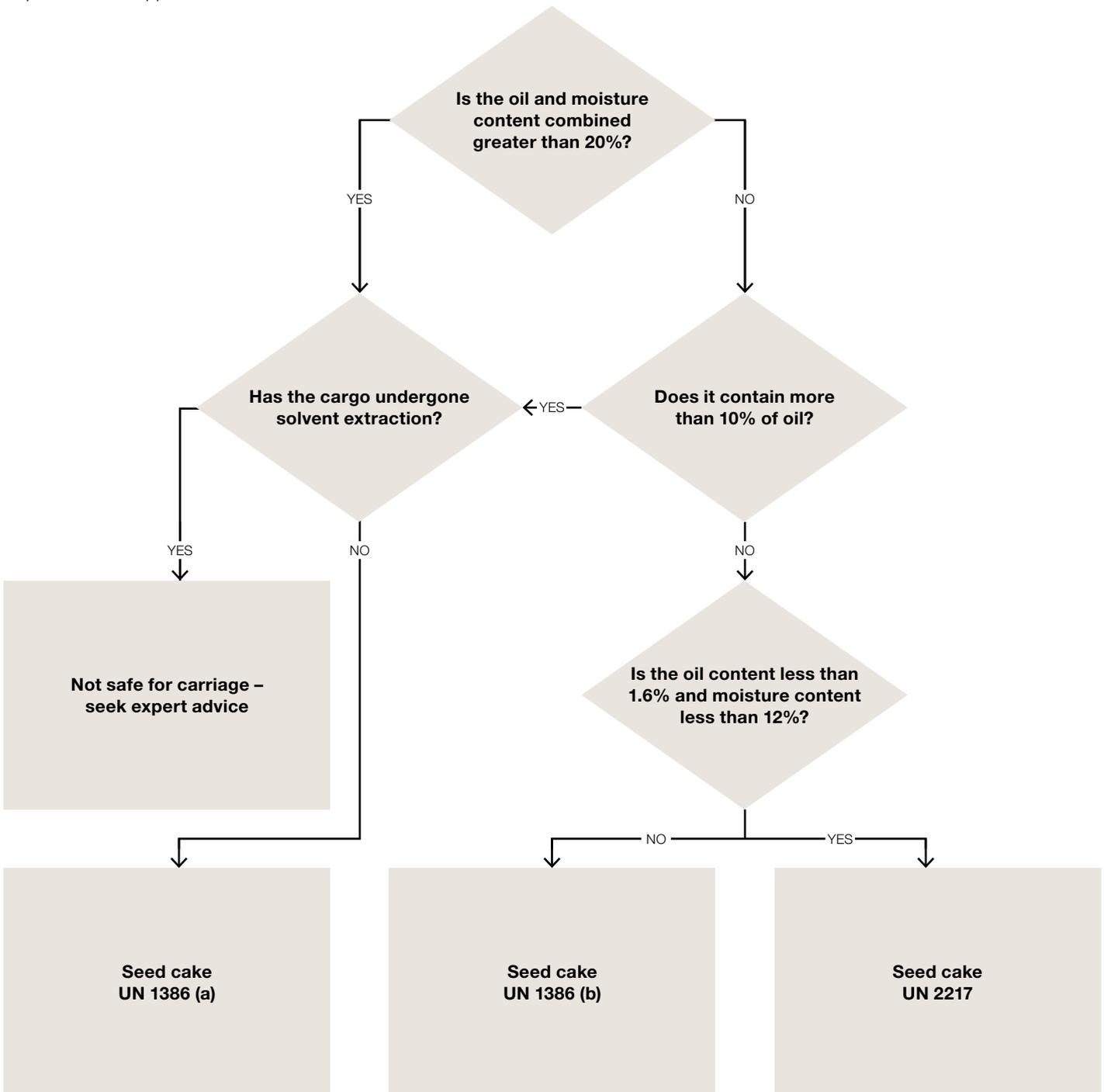
**Class** refers to hazard classification as per the IMDG Code. Class 4.2 represents cargoes liable to spontaneous combustion.

**Group** refers to the hazard groups of the IMSBC Code. Group B consists of cargo that possess a chemical hazard that could give rise to a dangerous situation on a ship. Group C consists of cargo that are neither liable to liquefy (Group A) nor to possess chemical hazards (Group B).

**The characteristics of bulk seedcake are:**

**Angle of repose:** Not applicable  
**Bulk density (kg/m<sup>3</sup>):** 478 to 719  
**Stowage factor (m<sup>3</sup>/t):** 1.39 to 2.09

The flow chart below is a useful tool for determining which category of seedcake a shipment falls under and the respective carriage requirement that applies.



# SELF-HEATING AND SPONTANEOUS COMBUSTION

The main hazard of seedcake cargo is the risk of self-heating and spontaneous combustion. Ships carrying hazardous cargo are required to have on board a valid document of compliance confirming the ship's suitability for carrying dangerous goods. The individual schedules for each of the types of seedcake are discussed in Appendix 1 and these also explain the fire-fighting requirements that must be in place.

Self-heating leading to spontaneous combustion in a cargo of seedcake can be triggered by microbiological activity or exposure to a source of elevated temperature in the hold or both. In respect of UN 1368 (a) seedcake (which presents the highest risk of self-heating), the cargo temperature shall not be greater than 10°C above ambient temperature or 55°C, whichever is the lower, prior to loading. There have been instances of 'non-hazardous' type seedcake self-heating and, in one case, the cargo was removed before it ignited.



^ Wet seedcake with mould, self heating

# SOURCES OF HEAT IN THE HOLD



^ Seedcake damage showing a broken temperature gauge

As with other dangerous goods, the IMSBC Code requires hazardous seedcakes to be kept as cool and dry as reasonably practicable, and stowed away from all sources of heat or ignition.

Sources of heat and ignition include:

- hot fuel oil tanks
- hot fuel oil lines
- hold lights left on
- poor electrical wiring
- carelessly discarded smokers' materials

In respect of smokers' materials, it is important to emphasise that live cigarette ends can be transferred from the shore side and buried in the cargo during loading operations. This is particularly hazardous if it comes into contact with extraneous combustible material in the cargo.

The IMSBC Code is quite particular about UN 1386 (b) and UN 2217 cargo, stating that if the bulkhead between the cargo space and the engine room is not insulated to class A-60 standard, solvent extraction seed shall be stowed 'away from' the bulkhead. This means that a 'false bulkhead' may have to be constructed if applicable.

However, it is not just hazardous cargo that requires such protection. The heating of fuel oil tanks and the warm machinery spaces adjacent to cargo holds are frequent causes of heat damage to solid bulk cargo, particularly grain cargo.

### CASE STUDY: CITRUS PULP PELLETS

The owners of a large bulk carrier were held liable for heat damage to a shipment of citrus pulp pellets when the cargo was found smouldering at the discharge port.

The damaged cargo was located against the warm engine room bulkhead in the after most cargo hold of the 70,000 dwt ship. There were no other heat sources and a survey confirmed that there were no bunker tanks or other heated tanks on the engine room side of the bulkhead.

Eight to 12 metres up an engine room escape trunk, heat could be felt radiating from inside the cargo space.

The cargo was a hazardous seedcake cargo: liable to self-heating and spontaneous combustion due to its oil and moisture content.

Barges loaded with the damaged cargo were ordered to shift to berths away from the city centre because of the smoke and foul smell.

A significant amount of the cargo was damaged, with losses in the thousands of dollars. Additional costs were incurred due to:

- survey fees
- barge rental
- shifting expenses
- destroying damaged cargo
- customs formalities

Loss of cargo was limited by segregating sound cargo from the damaged cargo when the ship arrived at the discharge port. Had the ship been delayed, or the voyage been longer, a fire could have started, with grave consequences.



^ Discharging specialised grain berth



^ Have a thermometer onboard in order to take cargo temperature

### CASE STUDY: HEATED SOYBEAN MEAL

A ship carried 55,000 tonnes of soybean meal from Brazil to Thailand. On discharge, it was found that some of the cargo against the engine room bulkhead in the after most hold was discoloured (dark brown), overheated and partly caked.



^ Self heating seedcake

The location of the fuel oil tanks within the engine room adjacent to the hold bulkhead could be seen from within the hold due to dark heat marks (paint discolouration) at either side of the bulkhead. Additionally, fuel tanks were also located under the tank top of this hold, increasing the amount of heat conducted to the cargo.



^ Smoking seedcake cargo. Double bottom fuel oil heating should be managed

The darker parts of the bulkhead were found to be hot when touched. If bulkheads in the holds are found to be hot when touched, and seedcake, grains or other heat sensitive cargo are to be loaded, the master should contact the ship owner/operator for advice. In practice, the surface temperature of the bulkhead should be measured by using infrared temperature guns, as the determination of temperature by touch is subjective.

# DOCUMENTATION

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

When the master is instructed to load a cargo that he is not familiar with, the master should request further information from the owner/operator or charterer.

Cargo information shall be confirmed in writing and by appropriate shipping documents prior to loading. Appendix 2 sets out what information the IMSBC Code requires for dry bulk cargo, particularly from shippers.

## DOCUMENTATION REQUIRED ONBOARD A SHIP CARRYING DANGEROUS GOODS

- **Stowage plan**  
Each ship carrying dangerous goods in solid form in bulk shall have a special list or manifest setting forth the dangerous goods onboard and the location thereof, in accordance with Safety of Life at Sea (SOLAS) regulation VII/7-2.2. A detailed stowage plan, which identifies by class and sets out the location of all dangerous goods onboard, may be used in place of such a special list or manifest.
- **Emergency response**  
When dangerous goods in solid form in bulk are carried, appropriate instructions on emergency response to incidents involving the cargo shall be onboard.
- **Certificate of fitness for ships carrying dangerous goods**  
Cargo ships of 500 gross tonnage and over, constructed on or after 1 September 1984, and cargo ships of less than 500 gross tonnage, constructed on or after 1 February 1992, subject to SOLAS regulation II-2/19.4 (or II-2/54.3), shall have a certificate of fitness when carrying dangerous goods in solid form in bulk, except for class 6.2 and class 7 goods.

## CASE STUDY: LOADING VIOLATION – PALM KERNEL EXPELLER (PKE)

Due to the combination of an error on the part of the master, an ambiguous agreement between the owner and charterer, and a misleading certificate provided by the shipper, a bulk consignment of PKE was loaded on a ship in violation of the SOLAS regulations and despite being specifically excluded in the charterparty.

The ship was not:

- designed or fitted for the carriage of this dangerous commodity
- in possession of the required certificates and proper documentation
- observing the necessary safety procedures for the cargo

The matter came to light only at the discharge port when the port state control inspector requested to see all the relevant documents and records.

Even though PKE was excluded in the charterparty, the owners agreed to load, subject to the shipper supporting his claim that the cargo was 'non-hazardous' seedcake as listed in the IMSBC Code, by providing a certificate from the competent authority. An independent surveyor was appointed by the owners to supervise the loading operation. The master was informed of these intentions and arrangements. As per the laboratory analysis results provided onboard, the consignment conformed to Seedcake UN 1386 seedcake (b) UN Class 4.2, and the attending owner's surveyor confirmed this. However, despite clear evidence that the cargo was dangerous, the shipper misdeclared it on his certificate by simply stating that it was 'non-hazardous'.

The master failed to note the difference between the charterer's description of the cargo and the type of seedcake determined by laboratory analysis, and the significance of the different types of seedcake as listed in the IMSBC Code having regard to carriage conditions. He also failed to appreciate that the ship's certificate of fitness did not permit the ship to load the cargo being shipped. It was further observed that the crew had not properly documented hold temperature records, having written them on scrap pads and not in the deck logbooks.

It is the master's responsibility to verify that the ship is properly certified and equipped for carrying any intended cargo as soon as he is told about it by the charterers or owners. He should consult:

- International Maritime Solid Bulk Cargo Code
- International Maritime Dangerous Goods Code
- 'BLU Code' – the Code of Practice for the safe loading and unloading of bulk carriers
- the ship's certificate of fitness (document of compliance)
- charterparty
- company instructions (operations/cargo/manuals)
- ISM Code

Source: *The Nautical Institute Marine Accident Reporting Scheme (MARS)*

# HOLD CLEANLINESS

The IMSBC Code requires the holds to be clean, and dry for all types of seedcake cargo.

Cargo claims involving seedcake cargo are commonly the result of contamination – often by residues from previous cargo.

The images show cement from a previous cargo contaminating a cargo of soya bean meal. The bottom image shows one of a large number of pieces of cement found to be of substantial size.

In order that such claims are avoided, the ship is required to ensure that holds are suitably cleaned, with all traces of previous cargo removed.

In many claims, holds are rejected prior to loading due to the staining of the frames and bulkheads from previous cargo, particularly coal and petcoke.

Numerous claims involve cargo contaminated with dust, rust and scale from the tank top or bulkheads. Often, the amount of scale is considerable.

Hold preparation is an important part of the carriage and should not be underestimated. The master should seek proper guidance if he is unclear about the hold cleanliness requirements.

Cargo spaces are usually rejected due to remnants of previous cargo in upper parts of the hold, underside of hatch covers and on framing (where applicable).

## Contamination from previous cargo (cement)



^ Surveyor scraping cement from the bulkhead in the hold



^ Cement residues in less accessible parts of the hold



^ Large pieces of cement contaminating the cargo

# LOADING, STOWAGE AND SEGREGATION

## WEATHER PRECAUTIONS

The IMSBC Code makes it clear that seedcake cargo shall be kept as dry as practicable. The cargo should not be handled during precipitation. During loading and discharge, all non-working hatches of the cargo holds into which the cargo is loaded or to be loaded should be closed. Masters and cargo officers should be aware of the prevailing weather conditions and have obtained a weather forecast. Before loading commences, clear communication should be put in place with those in charge of the shore-side operations over the action to be taken in the event of rain.

## TRIMMING

Trimming a cargo reduces the likelihood of the cargo shifting and minimises the surface area available for air to enter the cargo. An increased air supply can promote spontaneous heating caused by oxidation of the residual oil in the cargo. To minimise these risks, cargo shall be trimmed reasonably level. The cargo should be trimmed in accordance with the relevant provisions of Sections 4 and 5 of the IMSBC Code, as follows:

*Due consideration shall be given to the amount of a solid bulk cargo in each cargo space, taking into account the possibility of shifting and longitudinal moments and forces of the ship. Cargo shall be stowed as widely as practicable to the boundary of the cargo space. Alternative hold-loading restrictions, as required by SOLAS chapter XII (additional safety measures for bulk carriers), may also need to be taken into account.*

The master has the right to require that the cargo be trimmed level, where there is any concern regarding stability based upon the information available, taking into account the characteristics of the ship and the intended voyage.

For more informed guidance on the trimming of cargo that flow, refer to the IMO International Code for the Safe Carriage of Grain in Bulk, according to which the term 'grain' covers wheat, maize (corn), oats, rye, barley, rice, pulses, seeds and processed forms thereof, whose behaviour is similar to that of grain in its natural state.



For further guidance, see the *Standard Cargo Bulk Cargoes – hold preparation and cleaning*.

# HATCH COVERS

Hatches of the cargo spaces carrying seedcake shall be weathertight to prevent the ingress of water. The majority of solid bulk cargo damage claims involve water in the holds, and seedcake is no exception.

The image below show seedcake with water damage, resulting in mould, caking and discolouration of the cargo. A ship with leaking hatch covers may be subjected to claims of 'unseaworthiness'.



^ Water-damaged seedcake

## HATCH COVER MAINTENANCE

Ongoing maintenance and inspection are necessary to ensure weathertight hatch covers. In order to prevent hatch covers from leaking, ensure that:

- rubber packing is in good order
- compression bars are in good order
- channels and drains are clear of cargo and debris
- securing devices are working efficiently
- the steel fabrication of the hatch covers and coaming are maintained and not holed
- welding of hatchways must not be carried out when they are loaded with cargo



^ Compression bar and drain channel in good condition

# VENTILATION

UN 1386 (a) cargo shall not be mechanically ventilated (except in an emergency) and caution is required when mechanically ventilating other hazardous seedcake cargo.

As previously discussed, a high moisture content of the cargo can cause self-heating through microbiological activity, producing temperatures in the region of 70°C. Such elevated temperatures can accelerate the heat, producing oxidation of oil in the seedcake and causing the temperature of the cargo to rise further, possibly leading to spontaneous combustion. Steam is usually produced before the cargo takes fire.

# HAZARDS OF OXYGEN DEPLETION

The oils in seedcake are liable to oxidise, causing a subsequent reduction of the concentration of oxygen in the air inside the cargo space. Additionally, carbon dioxide and carbon monoxide may be produced. Entry of personnel into cargo spaces for this cargo shall not be permitted until tests have been carried out and it has been established that the oxygen content has been restored to a normal level and carbon monoxide is absent, or at least at a concentration in which it is safe to work.

Even when the hatch covers have been open for some time, the ladder access trunkings may still not be properly ventilated. Treat these spaces as enclosed spaces and make use of personal gas meters calibrated for oxygen and carbon monoxide.

# DISCHARGE

As much as possible, prior to arrival at the discharge port, consideration shall be given to:

- the requirements of the receiving country
- the draught survey
- the cargo surveys where applicable
- the discharge method/sequence
- ballasting
- ISPS
- the ship/shore safety checklist
- monitoring of gangway and moorings
- weather conditions during discharge

Refer to the Nautical Institute Bulk Carrier Practice for more detailed guidance.

## CLEAN-UP

The level of cleaning undertaken in the holds following discharge of the cargo should be driven by the requirements of the next cargo to be loaded. Where the next cargo is unknown, holds should be cleaned to 'grain clean' standard (refer to *Standard Cargo Bulk Cargoes – hold preparation and cleaning* publication).

# EMERGENCY PROCEDURES

The temperature of this cargo shall be measured regularly at a number of depths in the cargo spaces and recorded during the voyage. If the temperature of the cargo reaches 55°C and continues to increase, the master should inform the owner/manager and seek expert guidance. Ventilation to the cargo space should be stopped and the hold should be sealed. Effective sealing of the hold may be sufficient to arrest the heat-producing oxidation reaction. This is because the oxygen is used up in the reaction faster than it can be replenished and the oxygen concentration in the hold then falls to a level at which the reaction can no longer be sustained. If, subsequently, ventilation of the cargo space is resumed, it is likely that the oxidation reaction will cause self-heating of the cargo also to resume. In the event that the cargo continues to self-heat after the hold has been sealed, the temperature within the hold should be assessed by any means available and the master will need to consider further fire-fighting measures, such as introducing carbon dioxide or inert gas to the cargo space.

# DUTIES OF THE CARGO OFFICER

The cargo officer, usually the chief officer, should familiarise himself with the properties, characteristics and hazards of the cargo prior to loading. He should understand what measures need to be in place to prevent deterioration of the cargo or a dangerous situation occurring, and what to do should it happen. As per normal cargo operations, he will be responsible for ensuring:

- holds are prepared prior to loading
- cargo gear is in good working order, suitable for the intended work and conforming to Safe Working Load (SWL) requirements
- documents are in order confirming that the shipment is safe for sea transport
- the recording of cargo condition and any pre-shipment damage
- removable hatch covers (where applicable) are stowed in such a place and fashion so as to not be damaged
- the ship's fitness for loading and carrying the cargo (including access, lighting, guard rails, scupper plugs, fire-fighting, etc. where applicable)
- monitoring the ballast operations
- safe conditions for the working of stevedores on board
- the confirmation of loading/discharging quantities and procedures with shore-side
- the prevention of cargo damage during loading (including the closing of hatch covers during precipitation where applicable)
- that hatches are secure on completion of loading
- the isolation and stowage of cargo gear on completion of cargo operations
- monitor draught surveys/cargo quantity measurements
- communications with respect to cargo operations
- no smoking
- hold lights off and electrically isolated
- holds sealed as appropriate



^ Grab loading shoreside hopper

# CARRIAGE IN CONTAINERS

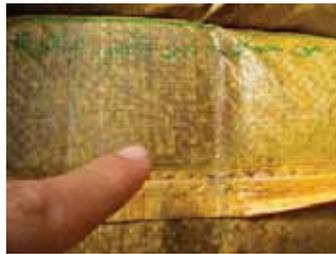
The International Maritime Dangerous Goods (IMDG) Code governs the carriage of dangerous goods in packaged form. The IMDG Code requirements for hazardous seedcake in containers follows the guidance for the carriage of hazardous seedcake in bulk, as required by the IMSBC Code described in this article:

- the cargo shall be kept dry
- surface ventilation is required (through ventilation is required for UN 1386 (a) and (b))
- the cargo shall be kept away from all sources of heat, which includes pipes and bulkheads, which are liable to become heated (e.g. engine-room bulkhead or heated fuel oil tanks)

The containers can be carried on or under deck, with the exception that **seedcake UN 1386 (a)** cannot be transported on passenger ships where the number of passengers is more than 25 or there is more than one passenger per 3m of overall length (IMDG Code 7.1.1.2.5 Stowage category E).



^ A container load of bagged soya bean meal water-damaged due to high moisture and poor ventilation



^ Condition of wetted cargo in comparison with sound one

# DISTILLER'S DRIED GRAIN (DDG) AND DDG WITH SOLUBLES (DDGS)

## SHIPPER'S OFFERING HAZARDOUS CARGO AS HARMLESS

Some shippers, normally in the United States (US), are attempting to offer DDGS cargo as non-hazardous with respect to the IMSBC Code and thus exempt from classification as Class 4.2 hazardous cargo under the provisions for seedcake. In this regard, DDG and DDGS are not strictly seedcake as they are the residual materials from the industrial distillation of, principally, corn to produce ethanol as a bio-fuel; they are not the result of mechanical or solvent extraction processes. Having noted that, they are oil-containing vegetable matter and it is noted that the residual material from beverage distillation (Brewers' Grain Pellets) is listed as seedcake (see the list on page 2).

Indeed, due to the oil and moisture content, the cargo have traditionally been considered as hazardous and have been typically classified as Class 4.2 under Seedcake UN 1386 (a) and (b).

However, there is a difference of opinion concerning the hazards of distiller's dried grain. In June 2010, the US submitted to the IMO Sub-Committee on Dangerous Goods, Solid Cargo and Containers (DSC) a recommendation that DDG be carried as a grain and DDGS as non-hazardous cargo (Group C) in accordance with the provisions of the IMSBC Code. The 15th meeting of the DCS (DCS 15) was held in London in September 2010 and it considered the US submission. DSC 15 accepted the US proposal and that DDGS has been, for the present time, accepted as a non-hazardous material for the IMSBC, providing it has an oil content of not more than 11% and a moisture content of not more than 12%.

## Test results

In its submission to IMO DSC 15, the US committee commissioned to determine the products' self-heating characteristics in relation to the criteria relied on by IMO when classifying products as Class 4.2 'Substances liable to spontaneous combustion'.

The test involves heating specified amounts of materials at 140°C over a 24-hour period. A temperature increase of 60°C or more signifies dangerous self-heating and that the product shall be classified as liable to spontaneous combustion.

Twenty samples were submitted for analysis/assessment. The test results, however, showed only minor temperature increases of between 0°C and 18°C – well short of the 60°C that is required for inclusion as Class 4.2 cargo. The results of some further tests, using larger sample sizes, were also included in the submission to DSC 15.

While the submission focused on the generally low temperature rises seen in the first 20 tests, one of the further tests resulted in a temperature rise of 49°C. While this figure is still short of the 60°C temperature rise needed to result in a material being classified as a Class 4.2 material, it tends to indicate that with different material or different conditions, a greater temperature rise might be possible.

# P&I COVER

In this regard, some of the higher temperature rises were seen in samples of DDGS having lower moisture content. This might raise the possibility that moisture migration and heating due to microbiological activity in a parcel of DDGS cargo could lead to conditions in which significant self-heating might occur. It is also of note that DDGS is not a homogeneous cargo. The distribution of moisture and oil through the bulk of a parcel of the cargo will not be uniform and a question therefore remains as to whether, in some circumstances, conditions might arise in which some self-heating might occur.

In its submission to DSC 15, the US also pointed out that there had been no instances of fires arising from carriage of DDGS and it also pointed to the differences between the physical forms DDGS (granules or grains) and Brewers' Grain Pellets as being significant factors in its request to have DDGS 'down-graded' to non-hazardous cargo. However, P&I clubs and consultants have witnessed charred DDG cargo at out-turn; therefore, the risk of dangerous self-heating is evident and there is little technical information available to confirm whether or not the difference in mean particle size between Brewers' Grain Pellets and DDGS or DDG is significant in the self-heating process.

The ruling by the IMO is understood to be provisional and due for review in December 2011.



^ Grab discharging seedcake

Ships are expected to carefully load, handle, stow, carry, keep, care for and discharge the goods carried. Those onboard and those managing ships should be aware that the carriage of seedcake can present certain dangers, and the ships should take these into account.

A member's P&I insurance is subject to the warranties, conditions, exceptions, limitations and other terms set out in the rules and the certificate of entry.

According to the club rules, cover does not exist for unlawful and hazardous trades. No claim is recoverable if it arises out of or is consequent upon the ship being employed in an unlawful trade, or if the board determines that the carriage, trade or voyage was imprudent, unsafe, unduly hazardous or improper. The phrase 'unsafe, unduly hazardous or improper' includes the carriage of hazardous cargo and may exclude recovery of a claim involving the carriage of IMO hazardous cargo on a ship not classed to carry IMO hazardous cargo.



^ Grain being discharged into shore hopper

# APPENDIX 1

## DETAILS OF THE PROPERTIES LOADING AND CARRIAGE REQUIREMENTS FOR EACH TYPE OF SEEDCAKE

### Non-hazardous seedcake

Non-hazardous seedcake is regarded as non-combustible or a material having a low fire risk. However, there have been incidents of allegedly 'non-hazardous' seedcake self-heating to temperatures as high as 80°C during loading, requiring the cargo to be discharged to avoid the risk of a fire in the hold. Furthermore, there are reports of fire incidents involving this category of seedcake.

The IMSBC Code provides that the following seedcake cargo can be carried as non-hazardous when substantially free from flammable solvents and containing not more than 4% oil and 15% of oil and moisture combined:

- solvent-extracted rape seed meal or pellets
- soya bean meal
- cotton seed meal
- sunflower seed meal

A certificate from a person recognised by the competent authority of the country of shipment shall be provided by the shipper, prior to loading, stating that the requirements for exemption from the conditions of carriage for UN 1386 (b) and UN 2217 material are met and that the consignment should not be carried as hazardous seedcake.

### Seedcake, containing vegetable oil UN 1386 (a)

Mechanically expelled seeds, containing more than 10% of oil or more than 20% of oil and moisture combined.

- **To be carried in bulk only with permission from the competent authority from the country of shipment.**  
Contact names and addresses of the offices of designated competent authorities responsible for the safe carriage of grain and solid bulk cargo is listed in the IMO International Maritime Solid Bulk Cargo (IMSBC) Code.
- This cargo shall only be accepted for loading when the temperature of the cargo is not higher than the ambient temperature plus 10°C, or 55°C, whichever is lower.
- Before shipment, this cargo shall be properly aged; the duration of ageing required varies with the oil content. Ageing refers to the period of storage of the cargo prior to loading.
- The temperature of this cargo shall be measured regularly at a number of depths in the cargo spaces and recorded during the voyage. If the temperature of the cargo reaches 55°C and continues to increase, ventilation to the cargo shall be stopped. If self-heating continues, then carbon dioxide or inert gas shall be introduced to the cargo space.
- The cargo spaces carrying this cargo shall not be mechanically ventilated during voyage to prevent self-heating of the cargo, except in case of emergency.

The competent authority may permit seedcakes described in this schedule to be carried under conditions governing Seedcake (b), when satisfied, as a result of tests, that such relaxation is justified. Certificates from the competent authority giving such permission shall state the oil content and moisture content.

### Seedcake, containing vegetable oil UN 1386 (b)

Solvent extractions and expelled seeds, containing not more than 10% of oil, and when the amount of moisture is higher than 10%, not more than 20% of oil and moisture combined.

This entry covers the following:

1. All solvent-extracted and expelled seedcake containing not more than 10% oil, and not more than 10% moisture; and
2. All solvent-extracted and expelled seedcake containing not more than 10% oil and a moisture content higher than 10%, in which case the oil and moisture combined must not exceed 20%.

The provisions of this schedule do not apply to solvent-extracted rape seed meal, pellets, soya bean meal, cotton seed meal and sunflower seed meal containing not more than 4% oil and 15% oil and moisture combined. A certificate from a person recognised by the competent authority of the country of shipment should be provided by the shipper, prior to loading, stating that the provisions for the exemption are met.

When, in solvent-extracted seedcake, the oil or oil and moisture content exceeds the percentages stated above, guidance should be sought from the competent authority.

- If the bulkhead between the cargo space and the engine room is not insulated to class A-60 standard, solvent extraction seedcake shall be stowed 'away from' the bulkhead.
- This cargo shall only be accepted for loading when the cargo is substantially free from flammable solvent and a certificate from a person recognised by the competent authority of the country of shipment specifying the oil content and moisture content is issued.
- Before shipment, this cargo shall be properly aged; the duration of ageing required varies with the oil content. Ageing refers to the period of storage of the cargo prior to loading.
- The temperature of this cargo shall be measured regularly at a number of depths in the cargo spaces and recorded during the voyage. If the temperature of the cargo reaches 55°C and continues to increase, ventilation to the cargo shall be stopped. If self-heating continues, then carbon dioxide (CO<sub>2</sub>) or inert gas should be introduced to the cargo space.
- In the case of solvent-extracted seedcake, the use of carbon dioxide or inert gas shall be withheld until it becomes apparent that fire is not liable to take place in the cargo space, to avoid the possibility of ignition of solvent vapours.

- When the planned interval between the commencement of loading and the completion of discharge of this cargo exceeds five days, the cargo shall not be accepted for loading unless the cargo is to be carried in a cargo space equipped with facilities for introducing carbon dioxide or inert gas into the space.
- Smoking and the use of naked lights shall be prohibited in the vicinity of the cargo space during loading and unloading and on entry into the cargo spaces at any other time.
- Electrical circuits for equipment in cargo spaces that is unsuitable for use in an explosive atmosphere shall be isolated by removal of links in the system other than fuses.
- Spark-arresting screens shall be fitted to ventilators to the cargo spaces containing this cargo.
- Surface ventilation, either natural or mechanical, should be conducted as necessary, for removing any residual solvent vapour. To prevent self-heating of the cargo, caution is required when using mechanical ventilation.
- In the case of solvent-extracted seedcake, the use of CO<sub>2</sub> should be withheld until fire is apparent. The use of CO<sub>2</sub> is limited to controlling the fire and further amounts may need to be injected from time to time during the sea passage to reduce the oxygen content in the hold. On arrival in port, the cargo will need to be dug out to reach the seat of the fire.

#### **Seedcake UN 2217**

With not more than 1.5% oil and not more than 11% moisture.

The provisions of this entry do not apply to solvent-extracted rape seed meal pellets, soya bean meal, cotton seed meal and sunflower seed meal containing not more than 1.5% oil and not more than 11% moisture, and being substantially free from flammable solvent. A certificate from a person recognised by the competent authority of the country of shipment should be provided by the shipper, prior to loading, stating that the provisions for the exemption are met.

- If the bulkhead between the cargo space and the engine room is not insulated to class A-60 standard, solvent extraction seed shall be stowed 'away from' the bulkhead.
- This cargo shall only be accepted for loading when the cargo is substantially free from flammable solvent and a certificate from a person recognised by the competent authority of the country of shipment specifying the oil content and moisture content is issued.
- The temperature of this cargo shall be measured regularly at a number of depths in the cargo spaces and recorded during the voyage. If the temperature of the cargo reaches 55°C and continues to increase, ventilation to the cargo shall be stopped.

- If self-heating continues, then carbon dioxide or inert gas shall be introduced to the cargo space. The use of carbon dioxide or inert gas shall be withheld until it becomes apparent that fire is not liable to take place in the cargo space, to avoid the possibility of ignition of solvent vapours.
- When the planned interval between the commencement of loading and the completion of discharge of this cargo exceeds five days, the cargo shall not be accepted for loading unless the cargo is to be carried in a cargo space equipped with facilities for introducing carbon dioxide or inert gas into the space.
- Smoking and the use of naked lights shall be prohibited in the vicinity of the cargo space during loading and unloading, and on entry into the cargo spaces at any other time.
- Electrical circuits for equipment in cargo spaces that is unsuitable for use in an explosive atmosphere shall be isolated by removal of links in the system other than fuses.
- Spark-arresting screens shall be fitted to ventilators in the cargo spaces containing this cargo.
- Surface ventilation, either natural or mechanical, should be conducted as necessary for removing any residual solvent vapour. To prevent self-heating of the cargo, caution is required when using mechanical ventilation.
- For solvent-extracted seedcake, the use of CO<sub>2</sub> should be withheld until fire is apparent. The use of CO<sub>2</sub> is limited to controlling the fire, and further amounts may need to be injected from time to time during passage to reduce the oxygen content in the hold. On arrival in port, the cargo will need to be dug out to reach the seat of the fire.

*This information was taken from IMSBC Code.*



^ Working grain alongside

# APPENDIX 2

## REQUIREMENTS OF THE IMSBC CODE FOR THE LOADING OF DRY BULK CARGO

The following information is to be included where applicable:

1. The BCSN (bulk cargo shipping name) when the cargo is listed in the Code. (Secondary names may be used in addition to the BCSN)
2. The cargo group (IMO IMSBC Code Group A, B, C or both A & B)
3. The IMO Class of the cargo
4. The UN number, preceded by letters 'UN' for the cargo
5. The total quantity of cargo offered
6. The stowage factor
7. Self-heating properties of the cargo and the need for trimming and the trimming procedures, as necessary
8. The likelihood of shifting, including angle of repose
9. Additional information in the form of a certificate on the moisture content of the cargo and its transportable moisture limit in the case of a concentrate or other cargo that may liquefy
10. Likelihood of formation of a wet base
11. Toxic or flammable gases that may be generated by cargo
12. Flammability, toxicity, corrosiveness and propensity to oxygen depletion of the cargo
13. Properties on emission of flammable gases in contact with water
14. Radioactive properties (where applicable)
15. Any other information required by national authorities

Information provided by the shipper shall be accompanied by a cargo declaration form an example is on page 15.



^ Seedcake in hold on completion of loading



^ Maize discharging

## ACKNOWLEDGEMENTS



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# FORM FOR CARGO INFORMATION FOR SOLID BULK CARGO

BCSN	
Shipper	Transport document number
Consignee	Carrier
Name/means of transport	Instructions or other matters
Port/place of departure	
Port/place of destination	
General description of the cargo (Type of material/particle size)	Gross mass (kg/tonnes)
<p>Specifications of bulk cargo, if applicable:</p> <p>Stowage factor:</p> <p>Angle of repose, if applicable:</p> <p>Trimming procedures:</p> <p>Chemical properties if potential hazard*:</p> <p>*e.g., Class &amp; UN No. or 'MHB'</p>	
<p>Group of the cargo</p> <p><input type="checkbox"/> Group A and B*</p> <p><input type="checkbox"/> Group A*</p> <p><input type="checkbox"/> Group B</p> <p><input type="checkbox"/> Group C</p> <p>* For cargo which may liquefy (Group A and Group A &amp; B cargo)</p>	<p>Transportable moisture limit</p> <p>Moisture content at shipment</p>
<p>Relevant special properties of the cargo (e.g. highly soluble in water)</p>	<p>Additional certificate(s)*</p> <p><input type="checkbox"/> Certificate of moisture content and transportable moisture limit</p> <p><input type="checkbox"/> Weathering certificate</p> <p><input type="checkbox"/> Exemption certificate</p> <p><input type="checkbox"/> Other (specify)</p> <p>*If required</p>
<p><b>DECLARATION</b></p> <p>I hereby declare that the consignment is fully and accurately described and that the given test results and other specifications are correct to the best of my knowledge and belief and can be considered as representative for the cargo to be loaded.</p>	<p>Name/status, company/organisation of signatory</p> <p>Place and date</p> <p>Signature on behalf of shipper</p>

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## Standard Cargo Bulk Cargoes – hold preparation and cleaning March 2011

- SMS
- Maintenance
- Hold cleaning, washing down and drying equipment
- Requirements for cargoes
- Case studies



## Standard Cargo Bulk Cargo: Liquefaction (Iron Ore Fines and Nickel Ore) February 2011

- Shipper's responsibilities
- Appointment of an independent surveyor
- Transportable moisture limit and flow moisture point
- Flow table and the can test
- Trimming
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## Standard Cargo General cargo on cellular ships August 2010

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