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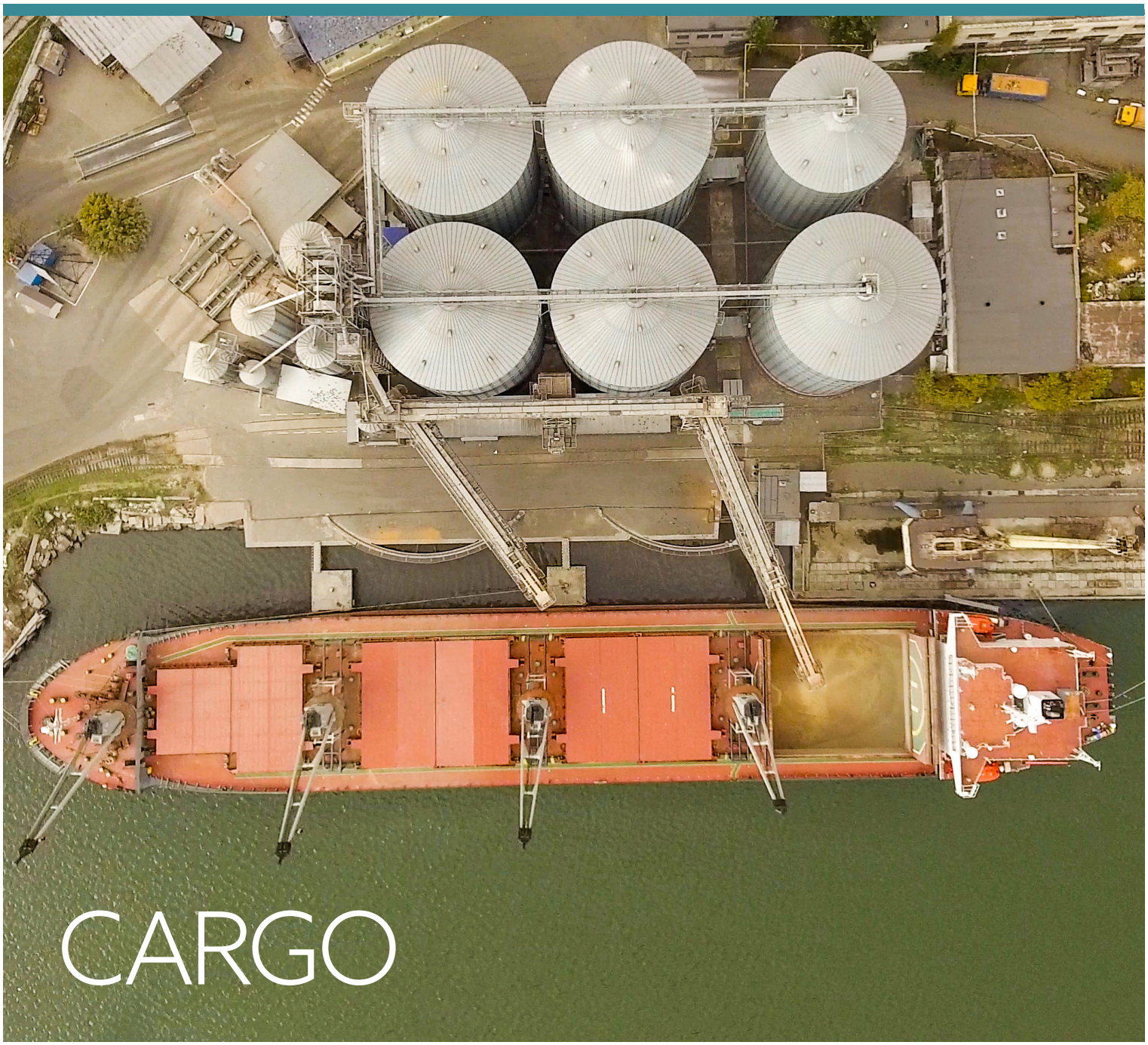
Carriage of Seed Cake and Other Residues of Processed Oily Vegetables



Carriage of Seed Cake and Other Residues of Processed Oily Vegetables

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Introduction

The carriage of seed cake cargoes in bulk has often caused confusion and therefore introduced a high risk of being declared incorrectly. The 2020 edition of the International Maritime Solid Bulk Cargoes (IMSBC) Code, which came into force in January 2021, made some fundamental changes to the seed cake schedules to try to address these issues.

This briefing outlines the different types of seed cake, their carriage requirements, the hazards these cargoes present and the documentation required.

The briefing deals with cargoes falling under all the seed cake schedules of the IMSBC Code. Cargoes falling under the International Code for the Safe Carriage of Grain in Bulk (Grain Code) such as soya beans or sunflower seeds are not included.

Example of a seed cake cargo in meal form

What is Seed Cake?

Seed cake is described in the IMSBC Code as the residue remaining after the oil has been extracted from oil-bearing seeds, cereals or commodities with similar properties. However, a more accurate description may be the residue remaining after processing plant matter which contains a certain amount of moisture and oil that is capable of oxidizing during carriage.

Oil is extracted either by mechanically crushing the seeds (known as expelling) or using a solvent. The method of extraction, the percentage of oil and moisture remaining alongside the testing regime outlined in the code will determine which IMSBC Code schedule the seed cake will fall under.

Seed cake can be shipped in the form of pulp, meals, cake, pellets and expellers.

An extensive (but non-exhaustive) list of the cereals and cereal products from which seed cake can be derived is listed in the seed cake schedules of the IMSBC Code.

IMSBC Code Schedules

There are five schedules for seed cake in the IMSBC Code. The schedules define seed cake on the basis of the method of extraction, the oil and moisture content and on the results of specific testing laid out in the Code.

Citrus Pulp Pellets, Corn Gluten Meal, Corn Gluten Feed Pellets and Beet Pulp Pellets are described in the IMSBC Code as a mechanically expelled cargo. However, these are typically by-products of other types of processing and the raw materials typically have a very low oil content.

See Annex 1 for further details of the IMSBC code Seed Cake schedules.

Testing & Hazards

In addition to providing details on the method of extraction and remaining oil and moisture content, the material must be tested to see if it has IMDG Code Class 4.2 (substances liable to spontaneous combustion) properties or, in some cases, it is a material hazardous in bulk due to self-heating (MHB SH).

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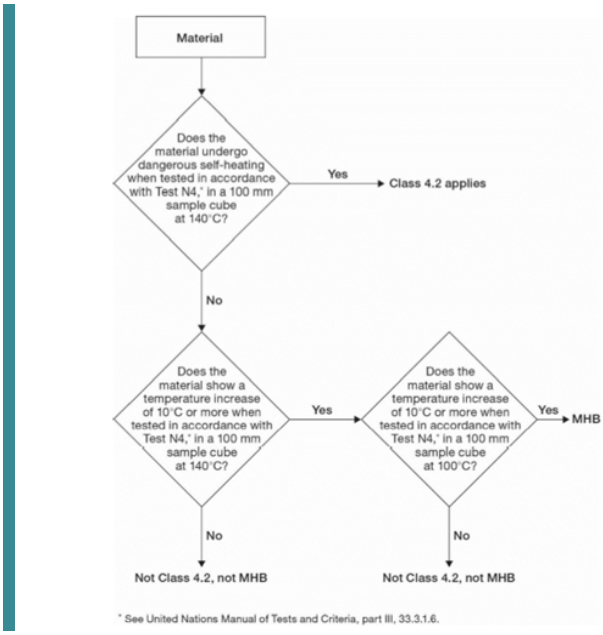
This is determined by the following process detailed in the Code:



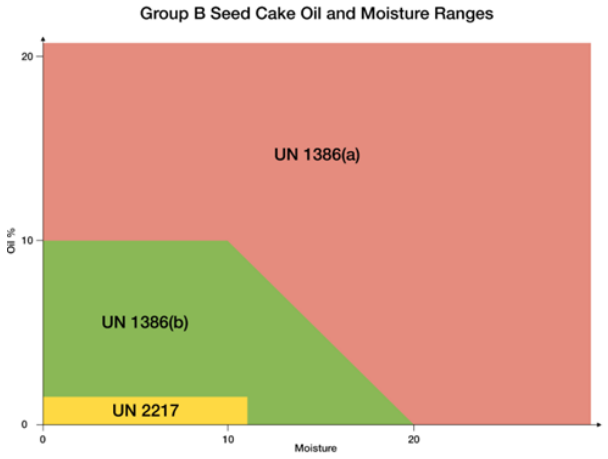
If the cargo is determined to have Class 4.2 properties, it will be either UN1386 (a), UN1386 (b) or UN2217, depending on the form of the cargo, the method of extraction and the oil and moisture content.

SEED CAKES AND OTHER RESIDUES OF PROCESSED OILY VEGETABLES - GROUP B is not a class 4.2 cargo. However, it is a 'material hazardous in bulk self-heating' and should be stowed in accordance with the requirements for a Class 4.2 cargo.

These seed cakes are categorized as Group B cargoes, which possess a chemical hazard.

Due to the additional risks associated with Group B cargoes, a vessel may only carry them if they are specifically listed on the Document of Compliance. Where they are not listed, permission should be obtained from the vessel's Flag State. Permission may depend on the vessel's firefighting capabilities and systems.

The below graph shows the oil and moisture limits for Group B seed cake cargoes:



Self-heating and Spontaneous Combustion

The presence of oil and moisture in seed cake cargoes can, through a combination of microbiological activity and oil oxidation, cause self-heating within the bulk of the stow.

Microbiological self-heating, driven by the inherent moisture content, can raise the temperature of the cargo to a point where oxidization of the residual oil occurs. This oxidation can result in further self-heating occurring.

While microbiological self-heating is usually slow, oxidative self-heating can be much faster and may raise the temperature high enough for the cargo to spontaneously ignite. Therefore, the higher the moisture content the higher the risk of self-heating and spontaneous ignition.

Example of a seed cake cargo where there has been microbiological activity resulting in mould growth and self-heating

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The cargo temperature should be regularly monitored both during loading and throughout the voyage at a number of depths within the stow. The use of sounding pipes for obtaining readings is the most common method but is likely to be ineffective at providing a representative temperature reading of the bulk of the stow.

In order to avoid potential problems when carrying seed cake cargoes, no cargo with a temperature at or over 55°C, should be accepted for loading. In the case of UN1386 (b) and Seed Cakes and Other Residues of Processed Oily Vegetables - Group B it should not be accepted for loading if the temperature is 10°C above the ambient or over 55°C, whichever is lower.

Should the temperature of any seed cake cargo reach 55°C during the voyage then ventilation should be stopped. If self-heating continues then carbon dioxide (CO_2) or inert gas shall be introduced to the cargo space.

If the seedcake is solvent extracted, then CO_2 or inert gas should only be introduced to the cargo space when fire is apparent.

Example of a seed cake cargo which has been charred

Should self-heating of a seed cake cargo be suspected then expert advice should be sought.

Oxygen Depletion

The oxidation of residual oils in the cargo can result in a reduction in the oxygen content of the atmosphere within the cargo hold and adjacent spaces.

Carbon dioxide and carbon monoxide may also be produced as the oils oxidise.

Personnel should therefore not enter any space loaded with seed cake until the atmosphere has been properly ventilated, tested and has been confirmed as safe. Care should be taken to ensure that not only are cargo spaces tested but also that all spaces open to the holds are tested and confirmed as safe for entry.

This is also the case for Seed Cake and Other Residues of Processed Oily Vegetables Group C.

Flammable Solvents

Depending on the type of seed cake being loaded, the oil may have been extracted from the oil-bearing seeds, cereals or commodities using solvents.

This creates an additional hazard of flammable solvents remaining within the cargo. However, current recovery methods usually mean that minimal quantities of residual solvents remain in the cargo.

Cargo Damage

Exposure to external sources of heat can cause localized heating and damage to the cargo in the areas where there is direct contact.

Possible external sources of localized heat damage can include the following:

- Cargo loaded in holds over heated fuel tanks
- Cargo stowed in holds against hot engine room bulkheads
- Hold lighting being left on when the vessel is loaded

Documentation

As with any IMSBC Code cargo, the Master must be provided with a cargo declaration prior to commencing loading.

The cargo declaration, provided by the shippers, should contain sufficient information, as detailed in Section 4 of the Code, to ensure that the cargo can be handled, stowed and carried safely.

This declaration should state:

- Which schedule the seed cake cargo will fall under.
- The method of extraction.
- Where applicable, confirmation that the cargo is substantially free from flammable solvents. Whilst the schedules in the Code are not specific about this point, if it is not provided then it is advised that such confirmation should be sought.

For **SEED CAKE, UN 1386 (b)** or **SEED CAKE, UN 2217,** certification, issued by a person recognised by the competent authority of the country of shipment, must be provided which specifies the oil and moisture content. UN1386 (a) and UN1386 (b) cargo should also be properly aged dependant on the oil content.

For **SEED CAKE, UN 1386 (a),** a special permission from the competent authority of the country of shipment must also be provided, without which the cargo must not be carried.

A list of contact details for designated competent authorities can be found in the supplement to the IMSBC Code.

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When loading a cargo that falls under **SEED CAKES AND OTHER RESIDUES OF PROCESSED OILY VEGETABLES – GROUP B,** cit should be substantially free from flammable solvents and chemicals and properly aged dependant on the oil content.

However, some shippers may interpret this to mean that they do not need to declare this on any documentation. We recommend that if it is not supplied, then request confirmation.

It is also a requirement that the cargo has been tested in accordance with section 9 of the Code and that it is not Class 4.2. We also recommend that the vessel receives such a declaration from the shipper.

SEED CAKES AND OTHER RESIDUES OF PROCESSED OILY VEGETABLES - GROUP C

The Master must be provided with a certificate stating the requirements for exclusion from UN 1386 (b) or UN 2217 have been met. The certificate must also state the material does not meet the criteria for self-heating in bulk or for inclusion in Class 4.2.

Solvent-extracted cargo must only be loaded if it is substantially free from flammable solvents and we recommend confirmation of this fact is sought.

Given the confusion between cargoes such as Soya Beans (cargo subject to the IMO Grain Code) and Soya Bean Meal (subject to the relevant schedule for seed cake in the IMSBC Code), the Master should ensure that appropriate information on the cargo has been provided prior to commencing loading.

If the cargo is in a natural state - such as beans - then it is likely that the Grain Code will apply. If the cargo has undergone any form of processing, then the IMSBC Code may apply.

Further Information

Should further information be required please contact the loss prevention department **loss.prevention@nepia.com**

With thanks to **CWA International** for providing assistance with this briefing.

Disclaimer

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Carriage of Seed Cake and Other Residues of Processed Oily Vegetables (cont.)

ANNEX 1: IMSBC CODE SEED CAKE SCHEDULES

Seed Cake Schedule (Cargo)	Mechanically Expelled	Solvent Extracted	MHB	Class 4.2	Carriage Requirements
SEED CAKE, containing vegetable oil UN 1386 (a)	X			X	Mechanically expelled seeds, containing more than 10% of oil or more than 20% of oil and moisture combined. May only be carried in bulk when special permission has been granted by the competent authority.
SEED CAKE, containing vegetable oil UN 1386 (b)	X	X		X	Not more than 10% oil and when amount of moisture is higher than 10% not more than 20% oil and moisture combined. Master must have certificate stating oil and moisture content and a statement saying the cargo is substantially free from flammable solvents.
SEED CAKE UN 2217		X		X	Applies to solvent-extracted seeds with not more than 1.5% oil and not more than 11% moisture. Master must have certificate stating oil and moisture content and a statement saying the cargo is substantially free from flammable solvents
SEED CAKES AND OTHER RESIDUES OF PROCESSED OILY VEGETABLES – GROUP B	X	X	Self-heating		Applies to seed cakes and other residues of processed oily vegetables that meet the criteria in section 9.2.3.3 for a self-heating solid but does not meet the criteria of a dangerous good as per section 9.2.2 of the Code. Should still be segregated and stowed as a class 4.2 cargo.
SEED CAKES AND OTHER RESIDUES OF PROCESSED OILY VEGETABLES - GROUP C	X	X			Applies to seed cakes and other residues of processed oily vegetables that do not meet the criteria for materials hazardous in bulk or to be considered class 4.2 as per sections 9.2.2 and 9.2.3 of the Code. Must come with a certificate outlining the exemptions of UN 1386 (b) and UN 2217 have been met. Applies only to some cargoes as listed below.
Rape seed meal, rape seed pellets, soya bean meal, cotton seed meal and sunflower seed meal,		X			Containing not more than 4% oil and 15% oil and moisture combined.
Citrus pulp pellets	X				Containing not more than 2.5% oil and 14% oil and moisture combined.
Corn gluten meal	X				Containing not more than 11% oil and 23.6% oil and moisture combined.
Corn gluten feed pellets	X				Containing not more than 5.2% oil and 17.8% oil and moisture combined.
Beet pulp pellets	X				Containing not more than 2.8% oil and 15.0% oil and moisture combined.
Rape seed meal, rape seed pellets, soya bean meal, cotton seed meal and sunflower seed meal		X			Containing not more than 1.5% oil and not more than 11% moisture.