



# **Guidelines for the Carriage of Seed Cake (including Seed Meal) in Containers**

**A Joint Publication of CINS (the Cargo Incident Notification System) and  
the International Group of P&I Clubs**

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# INTRODUCTION

## Background

Seed Cake is the term used for pulp, meals, cake, pellets, expellers and other similar cargo where edible vegetable oils have been removed from oil-bearing seeds, cereals or commodities with similar properties<sup>1</sup>.

These Guidelines for the carriage of Seed Cake in containers have been prepared by Working Groups of CINS (Cargo Incident Notification System).

The practices set out in this document are intended to improve safety during the carriage of Seed Cake and to ensure that it is properly declared, packaged and carried.

Seed Cake shall be transported in compliance with the requirements set out in the International Maritime Dangerous Goods Code (IMDG Code)<sup>2</sup>. The practices set out below include selected provisions from the IMDG Code plus additional precautions to enhance its safe carriage.

## CINS – Cargo Incident Notification System

CINS is a shipping line initiative, launched in September 2011, to improve safety in the supply chain, reduce the number of cargo incidents on-board ships and on land, and highlight the risks caused by certain cargoes and/or packing failures. Membership of CINS comprises over 85 percent of the world's container slot capacity.

CINS provides analysis of operational information on cargo and container incidents which lead to injury or loss of life, loss of or serious damage to assets and environmental concerns. Data relating to any cargo incident on-board a ship, in terminals etc. may be uploaded to the CINS database. The data includes information on cargo type, nature, packaging, weight, journey (load and discharge ports), type of incident and root cause analysis.

## International Group of P&I Clubs

The thirteen principal underwriting associations which comprise the International Group, between them provide liability cover (protection and indemnity) for approximately 90% of the world's ocean-going tonnage. Each Group Club is an independent, non-profit making mutual insurance association, providing cover for its shipowner and charterer members against third party liabilities relating to the use and operation of ships. Each Club is controlled by its members through a board of directors, or committee, elected from the membership.

Clubs cover a wide range of liabilities, including loss of life and personal injury to crew, passengers and others on board, cargo loss and damage, pollution by oil and other hazardous substances, wreck removal, collision and damage to property.

## Acknowledgements

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- CMA CGM
- Evergreen Marine Corporation
- EXIS Technologies
- Hapag Lloyd
- International Group of P&I Clubs
- Maersk Line
- Mediterranean Shipping Company
- TT Club

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<sup>1</sup> See Section 1 of these Guidelines.

<sup>2</sup> This Code is mandatory and contains requirements for the safe carriage of packaged dangerous goods. It is published by the International Maritime Organization (IMO) and revised biennially.

# **GUIDELINES FOR THE CARRIAGE OF SEED CAKE IN CONTAINERS**

## **1 DEFINITION OF SEED CAKE**

Seed Cake is described in the IMDG Code as the residue remaining after oil has been extracted by a solvent process or expelled mechanically from oil-bearing seeds. The term Seed Cake used in these Guidelines includes any type of pulp, meals, cake, pellets, expellers or other cargo where oil has been removed from oil-bearing seeds, cereals or commodities with similar properties.

It should be noted that the term Seed Cake includes any type of seed meal that falls under the above definition.

Trade names under which Seed Cake may be presented for shipment include, but are not limited to, those listed below.

- Animal feed
- Copra extraction pellets
- Groundnut meals
- Palm kernel expellers
- Peanut (oil) cake
- Peanut meal
- Seed meal, oily
- Soya bean meal
- Sunflower (seed) meal.

## **2 CARGO ISSUES**

### **2.1 Hazardous Properties of Seed Cake**

Seed Cake is principally used as an ingredient in animal feeds. Seed Cake is a solid residue that remains after edible vegetable oils have been removed from oil-bearing seeds, cereals or commodities with similar properties.

The two ways of removing oils and fats from plant material are by mechanically crushing the seeds (known as expelling) or extracting the oil by the use of a solvent. Neither method removes all of the oil and it is the reactivity of the residual oil which gives rise to the hazardous properties of Seed Cakes. Seed Cake can be shipped in the form of pulp, meals, cake and pellets but the physical form does not affect the proper cargo declaration and UN Number.

The method of oil removal and the percentage of oil and moisture remaining will determine which UN Number the Seed Cake will fall under in the IMDG Code. In general, solvent extracted Seed Cake cargoes can be anticipated to have an oil content around 1% or lower whereas mechanically expelled Seed Cakes will have a higher residual oil content.

The presence of oil and moisture in Seed Cake cargoes can, through a combination of microbiological activity and oxidation, cause self-heating. Microbiological self-heating, driven by the inherent moisture content, can raise the temperature of the cargo to a point where oxidation of the residual oil occurs. This oil oxidation can result in further self-heating occurring.

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

Seed Cake derived from solvent extraction may have an additional hazard arising from residual flammable solvent mixed in the cargo. However, in most instances, the manufacturing processes the Seed Cakes are subjected to will mean that most if not all solvent will have been recovered and recycled.

The carriage of Seed Cake cargoes continues to cause confusion and the potential for mis-declaration remains high.

## 2.2 Seed Cake Categories - UN Numbers 1386 and 2217

Seed Cake that has a designated UN Number falls under IMDG Code Class 4.2: substances liable to spontaneous combustion.

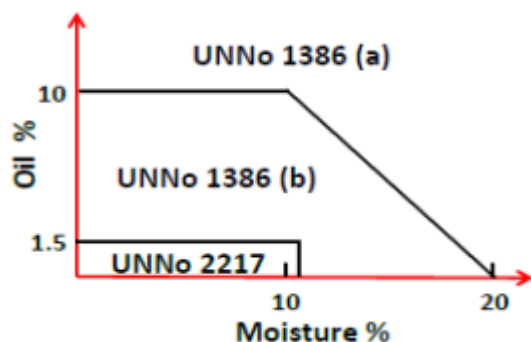
The critical factors used to determine the category of Seed Cake are:

- The method of oil removal used.
- The oil content and moisture content according to the oil and moisture limits shown in the table below.

IMDG Class	UN Number	Description
Class 4.2	UN 1386(a)	<ul style="list-style-type: none"> <li>• <b>Mechanically</b> expelled seeds.</li> <li>• Containing more than 10% of oil or more than 20% of oil and moisture combined.</li> </ul>
		Residue remaining after oil has been expelled mechanically from oil-bearing seeds. Used mainly as animal feed or fertilizer. The most common seed cakes include those derived from coconut (copra), cottonseed, groundnut (peanut), linseed, maize (hominy chop) niger seed, palm kernel, rape seed, rice bran, soya bean and sunflower seed and they may be shipped in the form of cake, flakes, pellets, meal, etc. May self-heat slowly and, if wet or containing an excessive proportion of unoxidized oil, ignite spontaneously. Before shipment this cargo should be properly aged. The duration of ageing varies with the oil content. Smoking and the use of naked lights should be prohibited during loading and unloading and an entry to the cargo space(s) at any time.
Class 4.2	UN 1386(b)	<ul style="list-style-type: none"> <li>• <b>Solvent</b> extracted <b>or mechanically</b> expelled seeds.</li> <li>• 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.</li> </ul>
		Residue remaining after oil has been extracted by a solvent process or expelled mechanically from oil-bearing seeds. Used mainly as animal feed or fertilizer. The most common seed cakes include those derived from coconut (copra), cottonseed, groundnut (peanut), linseed, maize (hominy chop), niger seed, palm kernel, rape seed, rice bran, soya bean and sunflower seed and they may be shipped in the form of cake, flakes, pellets, meal etc. May self-heat slowly and, if wet or containing an excessive proportion of unoxidized oil, ignite spontaneously. The seed cake should be substantially free from flammable solvent. Before shipment this cargo should be properly aged. The duration of ageing varies with the oil content. Smoking and the use of naked lights should be prohibited during loading and unloading and on entry to the cargo space(s) at any other time.
Class 4.2	UN 2217	<ul style="list-style-type: none"> <li>• <b>Solvent</b> extracted seeds.</li> <li>• Containing not more than 1.5% of oil and not more than 11% moisture.</li> </ul>
		Residue remaining after oil has been extracted by a solvent process from oil-bearing seeds. Used mainly as an animal feed or fertilizer. The most common seed cakes include those derived from coconut (copra), cottonseed, groundnut (peanut), linseed, maize (hominy chop), niger seed, palm kernel, rape seed, rice bran, soya bean and sunflower seed and they may be shipped in the form of cake, flakes, pellets, meal etc. May self-heat slowly if wet and ignite spontaneously. Before shipment, this cargo should be properly aged. The duration of aging varies with the oil content. The seed cake should be substantially free from flammable solvent. Smoking and the use of naked lights should not be allowed during loading and unloading, and on entry to cargo spaces at any other time.

UN 1386(b) includes both those seeds which have been mechanically expelled and those which have been solvent extracted.

The chart below illustrates the oil and moisture limits for the Seed Cake cargoes described above:



The shipper should ensure that the correct certification accompanies the cargo and is provided to the carrier in accordance with the oil content and moisture content of the Seed Cake and that the Seed Cake has been properly aged and where appropriate is substantially free from flammable solvents.

The IMDG Code does not specify what 'properly aged' means. In practice, as the duration of ageing varies with the oil content, 'properly aged' means that the Seed Cake should be sufficiently mature for oil content that can oxidize at ambient temperatures to have done so.

Non-declaration of Seed Cake as dangerous goods leads to unsafe stowage and dramatically increases the risk of fire, potentially leading to loss of life, assets and damage to the environment.

### 2.3 Seed Cake Categories - UN Number 2969

In addition to the above UN Numbers, Castor Beans and other Castor cargoes may be presented for shipment under UN 2969 which falls under IMDG Code Class 9. Such commodities are the residue remaining after oil has been removed from the seeds and contain a powerful allergen which can give rise to severe irritation of the skin, eyes and mucous membranes and are also toxic by ingestion.

IMDG Class	UN Number	Description
Class 9	UN 2969	Castor Beans, Castor Meal, Castor Pomace or Castor Flake. Residue remaining after the oil has been extracted from the seeds.

It is strongly recommended under these Guidelines that cargoes carried under UN 2969 should meet the same requirements for container selection, packing, inspection, stowage and segregation as set out in the Guidelines below for Seed Cake.

### 2.4 Changes to Applicable UN Number

The appropriate competent authority may permit Seed Cake categorised as **UN 1386(a) to be transported under the conditions governing UN 1386(b)** in accordance with IMDG Code Special Provision 929 (see Appendix to these Guidelines).

The competent authority may also permit Seed Cake categorised as **UN 1386(b) to be transported under the conditions governing UN 2217** in accordance with IMDG Code Special Provision 929 (see Appendix to these Guidelines).

It may be possible to present soya bean meal for shipment under UN 2217, Special Provision 142, as not subject to the provisions of the IMDG Code (see Section 3 of these Guidelines).

### 3 SEED CAKE NOT SUBJECT TO THE PROVISIONS OF THE IMDG CODE

#### 3.1 Soya Bean Meal Not Subject to the Provisions of the IMDG Code

In accordance with Part 3, Chapter 3.3, of the IMDG Code, only soya bean meal carried as Seed Cake under UN 2217 that has been solvent extracted and has suitably low oil and moisture content may not be subject to the provisions of the IMDG Code if it meets the requirements of IMDG Code Special Provision 142 (see Appendix to these Guidelines) and is accompanied by a certificate from the shipper stating the oil and moisture content (which should be not more than 1.5% oil and 11% moisture) and that the soya bean meal is substantially free of flammable solvents.

**It is vital that soya bean meal that is not subject to the provisions of the IMDG Code should be declared by the shipper to the receiving carrier and appropriate certification provided to show that the soya bean meal as offered for shipment meets the requirements of IMDG Code Special Provision 142 and is substantially free of flammable solvents.**

**It is strongly recommended under these Guidelines that soya bean meal not subject to the provisions of the IMDG Code (under IMDG Code Special Provision 142) should meet the same requirements for container selection, packing, inspection, stowage and segregation as set out in the Guidelines below for Seed Cake that is classified as dangerous goods.**

#### 3.2 Seed Cake not Classified as a Self-Heating Substance

Under the general provisions of the IMDG Code for the carriage of Class 4.2 substances, a substance may not be classified in Class 4.2 and not be subject to the provisions of the IMDG Code, if it does not meet the criteria for a self-heating substance in accordance with Part 2, Chapter 2.4, section 2.4.3, of the Code<sup>3</sup>.

It is possible for a substance that meets all the specific criteria for Seed Cake set out in Part 3, Chapters 3.2 and 3.3, of the IMDG Code, to nevertheless be allowed under the general provisions of Part 2, Chapter 2.4, of the Code to be offered for shipment not under the provisions of the IMDG Code.

**It is vital that Seed Cake that is not classified in Class 4.2 of the IMDG Code should be declared by the shipper to the receiving carrier and appropriate documentation provided to show that the Seed Cake as offered for shipment has been tested in accordance with the provisions of the IMDG Code<sup>3</sup>.**

**It is strongly recommended under these Guidelines that Seed Cake not classified in Class 4.2 of the IMDG Code should meet the same requirements for container selection, packing, inspection, stowage and segregation as set out in the Guidelines below for Seed Cake that is classified as dangerous goods.**

It should be noted that the provisions of the IMSBC Code, including the individual schedules of solid bulk cargoes, are not applicable to Seed Cake shipped in containers (see Section 5.1 of these Guidelines).

### 4 CONTAINER SELECTION

Dry 20ft or 40ft containers can be used. Containers should be in a good condition and clean.

Cargo Transport Units used for the carriage of Seed Cake in bulk must comply with the test requirement of ISO 1496-4:1991.

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<sup>3</sup> The IMDG Code Part 2, Chapter 2.4, section 2.4.3.2.3.2, sets out test methods and results for a self-heating substance not to be classified in Class 4.2 when performed in accordance with *Test N4: Test method for self-heating substances* in Part III, section 33.3.1.6, of the Manual of Tests and Criteria (Revision 6). Note: In Revision 7 of the Manual of Tests and Criteria, *Test N4: Test method for self-heating substances* is set out in Part III, section 33.4.6.

Non-operating reefer containers are susceptible to damage and should not be used for the carriage of Seed Cake in bulk<sup>4</sup>. Non-operating reefer containers may be used for the carriage of packaged Seed Cake providing the packaging is suitable (see Section 5 of these Guidelines).

## **5 CONTAINER PACKING**

### **5.1 Packaging and Quantity**

For Seed Cake carried in packaged form, the packaging of cargo within the container should be in accordance with the requirements of Chapter 4.1 of the IMDG Code.

It should be noted that there is some confusion between 'bulk shipments' and shipments that use 'bulk containers'. In case of shipment of Seed Cake carried in bulk in closed bulk containers, the IMDG Code applies on the basis that such are packaged goods, BK2, under Chapter 4.3. The IMSBC Code is not applicable to such shipments.

Under Special Packing Provision PP20, any sift-proof, tear-proof receptacle may be used for Seed Cake UN 1386 and UN 2217.

For Seed Cake UN 1386 or UN 2217 carried in bulk in closed bulk containers, the containers should be suitably lined to prevent spillage.

Packs of silica gel may be used to influence condensation within the container. It should be noted that in a container carrying, for example, 20 tonnes of bulk Seed Cake with a moisture content of 10%, there will be two tonnes of water in the cargo.

**It is recommended under these Guidelines that shippers presenting Seed Cake for carriage ensure that the temperature of the Seed Cake to be placed inside the container should not exceed 55°C<sup>5</sup> at the time of stuffing.**

### **5.2 Inspection of Containers Prior to Carriage**

It is recommended that, prior to carriage, carriers satisfy themselves by means of a photo story or container inspection, for example, that the cargo has been packed and secured with a method that allows proper ventilation and safe transportation.

## **6 SHIP LOADING**

Seed Cake shall be transported in compliance with the stowage and segregation requirements set out in the IMDG Code. These requirements vary in detail for Seed Cake presented for shipment under UN 1386(a), UN 1386(b) or UN 2217.

**In all cases containers of Seed Cake should be protected from sources of heat and kept dry.**

**It is recommended under these Guidelines to stow containers of Seed Cake ON DECK ONLY<sup>6</sup> where they are accessible to allow fire-fighting procedures to be carried out.**

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<sup>4</sup> See CINS *Guidelines for the Carriage of Cargo in Non-Operating Reefer Containers*.

<sup>5</sup> The temperature limit of 55°C is recommended for the carriage of Seed cake in containers as under the requirements of the IMSBC Code for the carriage of Seed Cake in bulk, if the temperature of the Seed Cake during the transit reaches or exceeds 55°C, expert advice should be sought, and potential fire-fighting procedures enacted.

<sup>6</sup> See CINS *Safety Considerations for Ship Operators Relating to Risk Based Stowage of Dangerous Goods on Containerships*. UN 1386 and UN 2217 are allocated to Risk Zone 4 and UN 2969 is allocated to Risk Zone 3 under the CINS risk-based model provided in these Safety Considerations.

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## APPENDIX - IMDG CODE SPECIAL PROVISIONS

The competent authority may permit Seed Cake categorised as UN 1386(a) to be transported under the conditions governing UN 1386(b) in accordance with IMDG Code Special Provision 929 (see below), under Part 3, Chapter 3.3, of the Code.

IMDG Code Special Provision 929
<p>If satisfied, as a result of tests, that such relaxation is justified, the competent authority may permit:</p> <p>the seed cakes described as “SEED CAKE, containing vegetable oil (a) mechanically expelled seeds, containing more than 10% of oil or more than 20% of oil and moisture combined” to be transported under conditions governing “SEED CAKE, containing vegetable oil (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 water combined”</p> <p>Certificates from the shipper shall state oil content and moisture content and shall accompany the shipment.</p>

The competent authority may also permit Seed Cake categorised as UN 1386(b) to be transported under the conditions governing UN 2217 in accordance with IMDG Code Special Provision 929 (see below), under Part 3, Chapter 3.3, of the Code:

IMDG Code Special Provision 929
<p>If satisfied, as a result of tests, that such relaxation is justified, the competent authority may permit:</p> <p>the seed cakes described as “SEED CAKE, containing vegetable oil (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 water combined” to be transported under conditions governing SEED CAKE, UN 2217.</p> <p>Certificates from the shipper shall state oil content and moisture content and shall accompany the shipment.</p>

Soya bean meal carried as Seed Cake under UN 2217 that has been solvent extracted and has suitably low oil and moisture content may not be subject to the provisions of the IMDG Code if it meets the requirements of IMDG Code Special Provision 142 (see below), under Part 3, Chapter 3.3, and is accompanied by a certificate from the shipper.

IMDG Code Special Provision 142
<p>Solvent-extracted soya bean meal containing not more than 1.5% oil and 11% moisture, being substantially free from flammable solvents, which is accompanied by a certificate from the shipper stating that the substance, as offered for shipment, meets this requirement is not subject to the provisions of this Code.</p>