



Chapter 50 – Seed Cake Cargoes

50.1 Carriage of Seed Cake Cargoes

Commodities such as soya bean meal, sunflower seed pellets, palm kernel expellers, and others have been shipped for many years in large volumes. These are the solid residues left behind when oil is removed from oil-bearing seeds. The amount of residual oil in these materials varies substantially depending on the technology used to extract the oil. Like all agricultural commodities, these materials have inherent moisture. They are used as ingredients in animal feed materials.

Although the oil level in these commodities is invariably much lower than the oil level in the original unprocessed seed or plant, the fact that these feed materials have been processed and the underlying plant cellular structure disrupted means that the residual oil is more prone to undergoing oxidation reactions with the air than is the case in unprocessed seeds. Because of the possibility of chemical oxidative reactions in the oil, these commodities have the capability of self-heating to much higher temperatures than do the seeds themselves.

For years, the universal name used to describe these commodities was simply 'seed cake'. Although it is a strange term to use for a group of commodities which are very widely traded and are well known under their individual names, until recently seed cake was the only recognised bulk cargo shipping name in use. The term seed cake can be found throughout the harmonised UN system for carriage of cargoes in bulk and

packaged forms with UN numbers 2217 and 1386 applying where these materials are Class 4.2 (spontaneously combustible) because the oil is sufficiently reactive to give rise to the risk of eventual spontaneous fire.



Figure 50.1: 'Seed cake' when not used to describe cargo.

50.2 New Schedules

Previous editions of the IMSBC Code have contained four schedules relevant to the carriage of seed cake cargoes in bulk. Three of these were Group B cargoes, being Class 4.2 spontaneously combustible, and one was a Group C cargo – seed cake (non-hazardous). With the introduction of the 2020 Edition of the IMSBC Code, which came into force in January 2021, there are several changes. The schedules which have UN numbers retain the name 'seed cake' – to give SEED CAKE UN 1386 (a), SEED CAKE UN 1386 (b), and SEED CAKE UN 2217. These categories are retained in the 2022 Edition of the Code.

As has been the case for many years, the schedules each contain an identical list of commodities to which they apply. These lists include the more common feedstuffs (soya bean meal, sunflower seed pellets, etc) but they also list materials such as citrus pulp pellets and bran pellets. The description in the Code says the seed cake schedules are for the *"residue remaining after oil has been extracted... from oil-bearing seeds"*. Commodities such as citrus pulp pellets and bran pellets are not actually produced in this fashion, but as plant-based materials with residual oil and moisture content they behave in a very similar way.

The potential for confusion arises because the 2020 Edition of the Code introduced two new schedules headed SEED CAKES AND OTHER RESIDUES OF PROCESSED OILY VEGETABLES. Although this title explicitly references other types of residues, the description only mentions residues produced after extraction of oil. No list of the commodities included appears in the two new schedules.

The naming of schedules in this way is thought to arise from the need to retain the description 'seed cake' for materials with a UN number. All five schedules in the IMSBC Code (three SEED CAKE schedules and two SEED CAKES AND OTHER RESIDUES OF PROCESSED OILY VEGETABLES) should be taken as encompassing any processed plant material with residual oil and moisture. The applicable schedule should be selected based on the properties of the material, not whether it happens to be produced by extraction of oil from seeds.

50.3 Hazard Categories and Testing

The two new schedules relate respectively to hazardous Group B cargoes, designated MHB (material hazardous only when in bulk) because they have self-heating properties (although not to the extent that would require them to be categorised as Class 4.2), and to Group C cargoes that are deemed not to have a chemical hazard because there is insufficient self-heating tendency. The relevant test is a UN standard test known as the N4 test in which a cube of the commodity in question is held at high temperature in an oven and its tendency to increase in temperature above the oven temperature is measured.

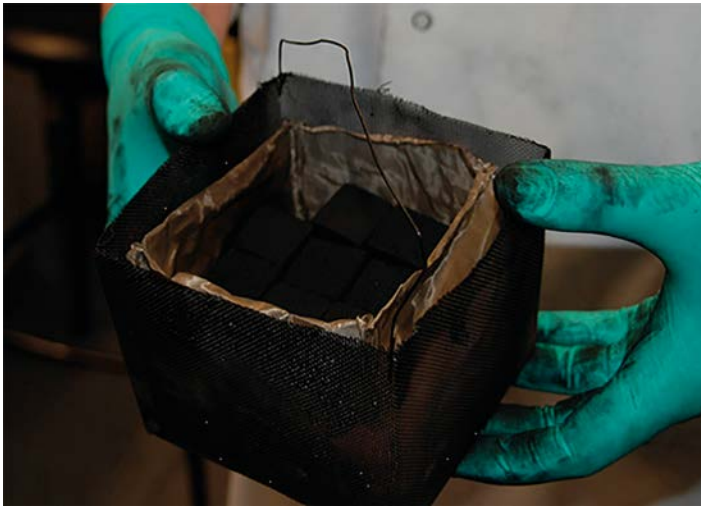


Figure 50.2: 100 mm sample cube used for N4 test.

If a sample of a seed cake type undergoes dangerous self-heating, it would be categorised as Class 4.2 and covered by one of the three SEED CAKE schedules (UN 1386 (a), UN 1386 (b) or UN 2217). If it does not exhibit dangerous self-heating but does increase in temperature by more than 10°C then it is a MHB (material hazardous in bulk), category SH (self-heating), and would be covered by the SEED CAKES AND OTHER RESIDUES OF PROCESSED OILY VEGETABLES, Group B MHB schedule. If it showed a rise in temperature of less than 10°C then it would not be either MHB or Class 4.2 and would come under the provisions of the SEED CAKES AND OTHER RESIDUES OF PROCESSED OILY VEGETABLES Group C schedule. This latter schedule is effectively the replacement for the previous SEED CAKE (non-hazardous) schedule that formed part of the more recent editions of the IMSBC Code prior to 2020.

50.4 Documentation and Certification

The criteria for determining which of the schedules is appropriate have, in the past, been based on the oil content, the moisture content, the process which was used to produce the cargo, and the type of plant involved. These criteria still apply to distinguish between the three SEED CAKE schedules and are set out in those schedules, the form being unchanged from previous editions.

However, the rules regarding whether one of the three SEED CAKE schedules applies, or one of the two new schedules (MHB or Group C SEED CAKES AND OTHER RESIDUES OF PROCESSED OILY VEGETABLES) are more complex and will place additional requirements on a shipper. There is therefore potential for confusion regarding what testing and documentation is required, and shipowners and Masters may be presented with conflicting information.

The Group B MHB schedule will apply to a cargo of this type (ie plant material with residual oil and moisture) which gives a temperature rise of more than 10°C when subjected to the UN N4 test described above, but for materials which are not considered Class 4.2 (ie would not be considered hazardous under the provisions of the IMDG Code).

There is no requirement in the Group B MHB schedule for any proof or other certification to be provided to the ship along with the cargo declaration. Therefore, a Master will have no means of verifying whether the cargo being presented is not one which should be considered a SEED CAKE under Class 4.2.

The provisions for exempting a cargo from the Class 4.2 SEED CAKE schedules focus on the material not exhibiting sufficient self-heating properties in the N4 test to merit that hazard class. The following cargoes qualify for exemption – solvent-extracted rape seed meal, sunflower seed extraction, soya bean meal, cotton seed meal, expelled citrus pulp pellets, corn gluten meal, corn gluten feed and beet pulp pellets under the criteria for oil and moisture listed in the SEED CAKE UN 1386 (b) and SEED CAKE UN 2217 schedules.

There is also potential for confusion regarding the extension of the provisions for exemption from Class 4.2 SEED CAKE to other types of commodities – such as palm kernel expellers. They have never been listed as a material which can be exempted from Class 4.2, and the text of SEED CAKE UN 1386 (b) states that it applies to all extracted and expelled seed cakes with oil and moisture below certain limits. Shippers may assume that a seed cake cargo of any plant or vegetable origin can be carried under one of the two new schedules provided it does not show Class 4.2 behaviour in the N4 heating test.

The Group C schedule for SEED CAKES AND OTHER RESIDUES OF PROCESSED OILY VEGETABLES, unlike the corresponding MHB Group B schedule, does place a requirement on shippers to provide a certificate indicating that the requirements for exclusion from SEED CAKE UN 1386 (b) or UN 2217 are met, and that the material does not meet the criteria to be classed as MHB. In practice this means that certification will be required to indicate that when the material is subjected to the UN standard N4 test, no temperature rise of more than 10°C is experienced.

The certification needs to be issued by a “*person recognised by the competent authority of the country of shipment*”. This phrase has formed part of the seed cake schedules for many years but can be problematic. Most countries do not have lists of approved persons or laboratories issued by the competent authority. In such countries, and in places where there may be no functioning competent authority, there appears to be no guidance to a ship's Master regarding which organisations are permitted to issue such documentation.



Figure 50.3: Heated and discoloured seed cake cargo (corn gluten feed).

50.5 Potential Confusion and Conflict

For a shipment of a parcel of solvent-extracted rape seed meal, sunflower seed extraction, soya bean meal, cotton seed meal, expelled citrus pulp pellets, corn gluten meal, corn gluten feed or beet pulp pellets, it would appear that these remain Group C cargoes but with the added requirement of provision of certification demonstrating that when subject to the self-heating N4 test, the material does not exhibit a rise in temperature of over 10°C and is therefore not to be considered MHB.

There is also scope for problems in relation to cargoes of commodities which have not previously been able to be considered Group C. These include materials such as palm kernel expellers. They are not listed in the SEED CAKE UN 1386 (b) schedule as being potentially exempt from the provisions of Class 4.2. It is possible that tests will be carried out on some such materials using the UN standard procedure which shows that they are insufficiently capable of self-heating and should therefore be considered Group C or MHB under the new SEED CAKES AND OTHER RESIDUES OF PROCESSED OILY VEGETABLES schedules.

Although the Group C schedule specifies the documentation required for presentation so that the schedule can be applied, the MHB schedule does not. The latter simply says it applies to cargoes which do not meet the criteria required to be Class 4.2 under the IMDG Code.

A Master presented with a cargo declaration for, eg palm kernel expeller, under the SEED CAKES AND OTHER RESIDUES OF PROCESSED OILY VEGETABLES MHB (Group B) schedule should request proof that the cargo has indeed been tested according to the UN N4 test and it does not have sufficient self-heating properties to be Class 4.2. While such a request would be justified, there is no requirement in the IMSBC Code for such proof to be supplied, and this may give rise to disputes. It is not yet clear how many cargoes are likely to come under the provisions of the new MHB schedule.



Figure 50.4: Fire in corn gluten feed.

50.6 New Loading and Handling Provisions

The provisions covering loading and carriage for the three SEED CAKE Class 4.2 schedules are unchanged from previous editions of the Code.

The new SEED CAKES AND OTHER RESIDUES OF PROCESSED OILY VEGETABLES MHB schedule contains a requirement that the cargo should only be accepted for loading when it is at a temperature which is either (at most) 10°C above ambient, or 55°C, whichever is lower. This provision has been a part of the SEED CAKE UN 1386 (a) schedule but as that relates to a cargo which requires special permission, is rarely referenced. However, a cargo reaching a temperature of 55°C during a voyage and continuing to increase in temperature has always been the criteria set out generally in the SEED CAKE schedules for taking emergency action, and that is also in the new schedules. Experts recommend that seed cake cargoes are not loaded at elevated temperatures, and so the new provision of *“at most 10 degrees above ambient or 55°C, whichever is lower”* reflects good practice.

The MHB schedule also contains the requirement to take temperature measurements at depths in the cargo on a regular basis. Unfortunately, in practice this is very difficult to achieve – the simplest method is to lower thermometers down sounding pipes; however, this does not take measurements of the actual bulk cargo itself.

Both new schedules (MHB and Group C SEED CAKES AND OTHER RESIDUES OF PROCESSED OILY VEGETABLES) contain requirements that cargo needs to be substantially free from flammable solvent residues and that the cargoes need to be aged. No guidance is given as to what length of ageing is likely to be required and there is no necessity to provide documentation in respect of the amount of time the cargo has been allowed to age.

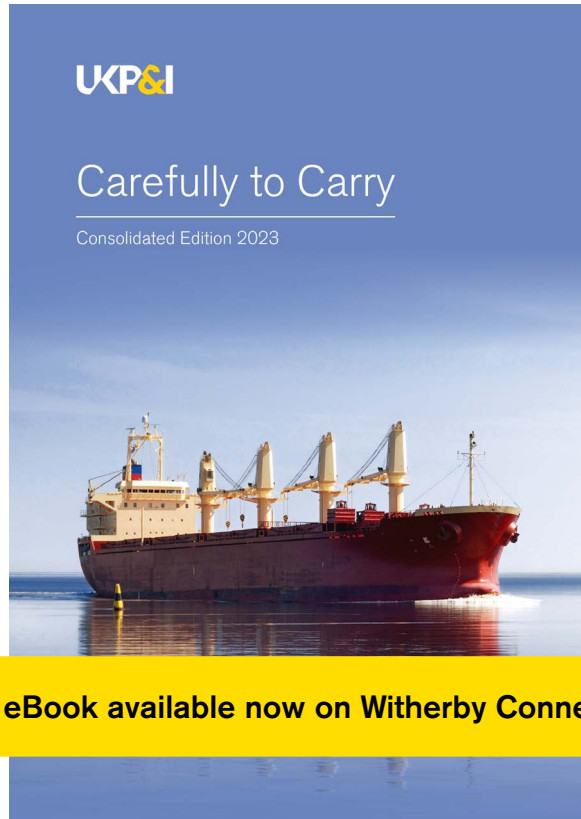
50.7 General Comments

It is recommended that Masters carrying any of these cargoes exercise caution during carriage, even if the cargo is being shipped under one of the two new schedules. Although these include cargoes in the Group C category, experience shows that they can still self-heat on board ships and damage cargo as a result. It is also worth remembering that if fuel oil tanks immediately adjacent to such cargoes are overheated, any of these commodities can be ignited. Fires tend to be slow-burning and do not spread readily, but they can be challenging to extinguish.

Carriage of all seed cake cargoes can also cause oxygen depletion in enclosed spaces. No entry into enclosed spaces containing any seed cake cargo should take place without thorough atmosphere testing and the appropriate permits to work put in place.



Price: £95



Full eBook available now on Witherby Connect

This comprehensive publication, compiled by the UK P&I Club, details best practice for the carriage, loading and storage requirements of a wide range of cargoes. It also contains essential information on draught surveys and preparing cargo plans.

Outlining and expanding on all major international cargo regulations and guidelines, it also includes detailed checklists, information on draught surveys and guides to preparing cargo plans. Cargoes covered include timber, gas, grain, steel and other metals, bulk goods and refrigerated goods.