

# The carriage of seed cake cargoes under the IMSBC Code 2020 Edition

## Background

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 many years, the universal name used to describe these commodities was simply “seed cake”.

Perhaps that is a strange term to use for a group of commodities which are very widely traded and are well known under their individual names, but 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 cargos 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.



## 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 spontaneous combustible, and one was a Group C cargo – seed cake (non-hazardous). With the introduction of the 2020 Edition of the IMSBC Code, which takes over as the mandatory version of the Code in January 2021, there are several changes. The schedules which have UN Numbers retain the name “seed cake” – we have SEED CAKE UN 1386 (a), SEED CAKE UN 1386 (b), and there is SEED CAKE UN 2217. The IMSBC Code uses capital letters to denote a proper bulk cargo shipping name (BCSN) and that convention will be followed throughout this article.

As has been the case for many years, these 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, and so on) but they also list materials such as citrus pulp pellets, bran pellets, and so on. 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.

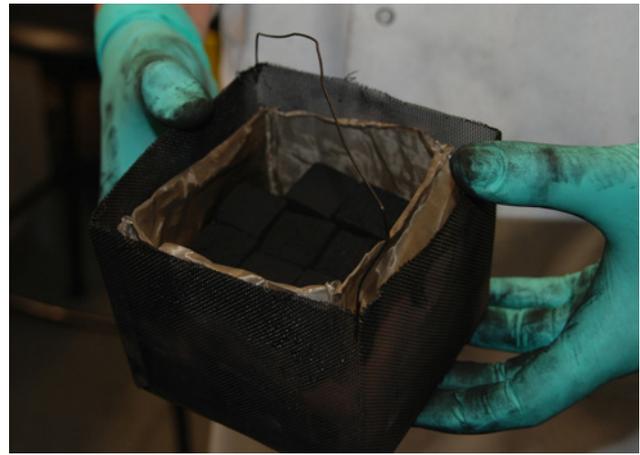
The potential for confusion arises because the new edition of the Code introduces two new schedules headed “SEED CAKES AND OTHER RESIDUES OF PROCESSED OILY VEGETABLES”. Although this title explicitly references other types of residues, the description just mentions residues produced after extraction of oil. No list of commodities covered appears in the two new schedules.

Our interpretation of this is that it arises because of the need to retain the description “seed cake” for materials with a UN Number. All five schedules in the 2020 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 a produced by extraction of oil from seeds.

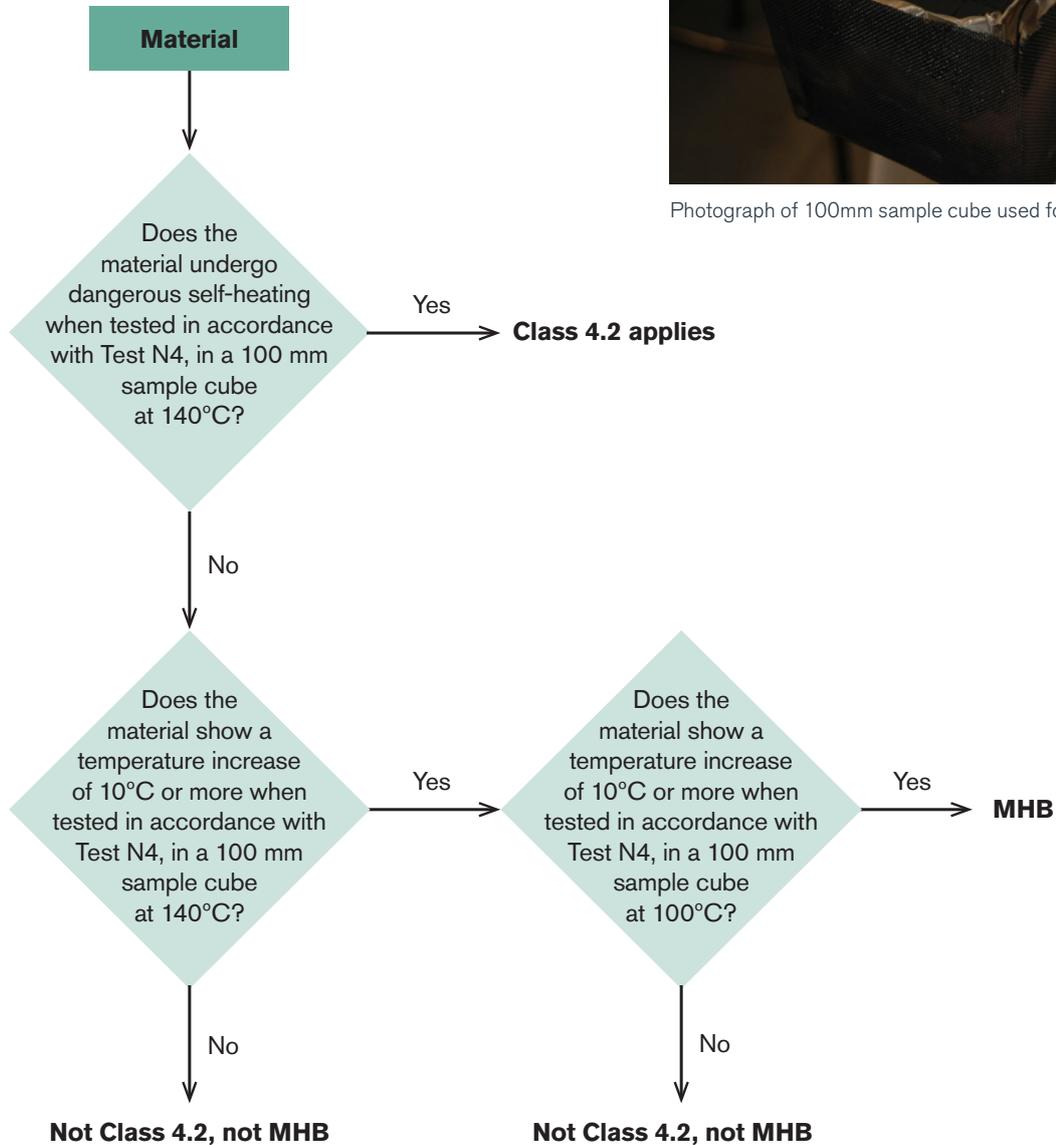
## Hazard categories and testing

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 albeit to a lesser extent than would be required for them to be Class 4.2, and to Group C cargoes which 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. The test is summarised in a flowchart in paragraph 9.2.3.5.2 of the 2020 Edition of the IMSBC Code which we reproduce below.

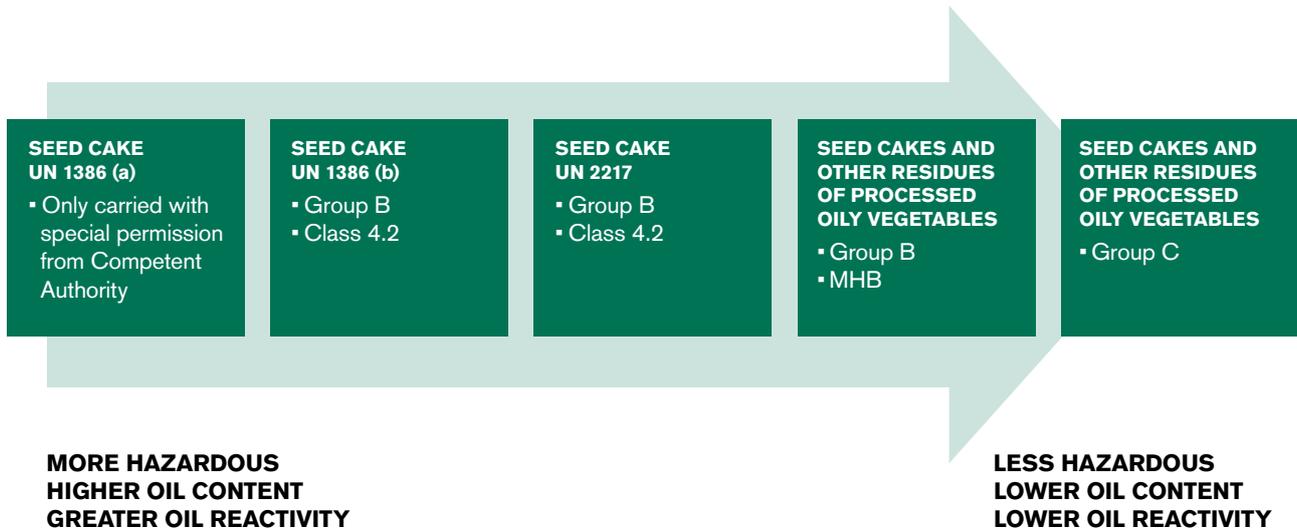


Photograph of 100mm sample cube used for N4 test



Thus, if a sample of a seed cake type undergoes dangerous self-heating, it would be 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 Celsius 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 Celsius 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 which has formed part of recent editions of the IMSBC Code.

There is therefore in broad terms a hierarchy of hazard across the five schedules as per the diagram below.



### Getting the right schedule – documentation and certification

The criteria for determining which schedule was 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 between the three SEED CAKE schedules and are set out in those schedules a form 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. We anticipate that there will be widespread confusion regarding what testing and documentation is required, and shipowners and vessel Masters may be presented with conflicting information.

The Group B MHB schedule will apply to a cargo of this type (i.e. plant material with residual oil and moisture) which gives a temperature rise of more than 10 Celsius when subjected to the UN N4 test described above, but for materials which are not considered Class 4.2 (i.e. 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 vessel along with the cargo declaration. Thus a Master will have no means of verifying whether the cargo being presented is indeed not one which should be considered a SEED CAKE under Class 4.2.



Heated soya bean meal cargo



Heated and discoloured seed cake cargo (corn gluten feed)

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 potential for confusion regarding the extension of the provisions for exemption from Class 4.2 SEED CAKE to other types of commodity – 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. We believe it likely that shippers will assume that a seed cake cargo of any plant/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.

We will now turn to the Group C schedule for “SEED CAKES AND OTHER RESIDUES OF PROCESSED OILY VEGETABLES”. Unlike the corresponding MHB Group B schedule, this 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 MHB. In practice this means that certification will be required to indicate that when subjected to the UN standard N4 test, no temperature rise in excess of 10 Celsius is experienced.

The certification in this respect 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 is problematic in itself. Many if not most countries do not have lists of approved persons/laboratories issued by the competent authority. In such a country, and in places where there may be no functioning competent authority, there appears to be no guidance to a vessel’s Master regarding which organisations are permitted to issue such documentation. We would suggest that in the absence of guidance on this point, a certificate issued by a well-known reputable laboratory or certification organisation should be considered suitable.

#### **Potential confusion and conflict**

We anticipate that much of the volume in this type of cargo will be carried under declarations identifying it as Group C or MHB. 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 Celsius and is thus not to be considered MHB. This certification requirement is new. In our experience any change in regulations which gives rise to new requirements for documentation is likely to lead to problems especially when those requirements first become mandatory.

We believe 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 test 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 sets out documentation required to be presented for the schedule to 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 (say) palm kernel expeller under the “SEED CAKES AND OTHER RESIDUES OF PROCESSED OILY VEGETABLES” MHB (Group B) schedule should, in our view, 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. Whilst such a request would, in our view, be entirely justified, there is no requirement in the IMSBC Code for such proof to be given, and this may give rise to disputes. It is not yet clear how many real-world cargoes are likely to come under the provisions of the new MHB schedule.

#### **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 MHB “SEED CAKES AND OTHER RESIDUES OF PROCESSED OILY VEGETABLES” schedule contains a requirement that the cargo should only be accepted for loading when it is at a temperature below ambient plus 10 Celsius or 55 Celsius 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 Celsius during a voyage and continuing to increase in temperature has always been the criteria set out

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generally in the SEED CAKE schedules for taking emergency action, and that is also in the new schedules. As far as we are aware, all competent experts have always recommended that seed cake cargoes are not loaded at elevated temperatures, and so the new provision of “at most 10 degrees above ambient or 55 degrees, 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. This provision has existed in the SEED CAKE schedules for many years and would be good practice if possible. It is unfortunately very difficult to achieve in any meaningful fashion – the most which is usually achieved is to lower thermometers down sounding pipes, and that does not take actual bulk cargo measurements.

Both of the two 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 (this is to prevent explosions) and 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 requirement to provide documentation in respect of the amount of time the cargo has been allowed to age.

#### **Overall comments**

There is clearly scope for confusion regarding the new schedules and requirements. We recommend 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, our experience shows that they can still self-heat on board ships and cargo damage can 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 as a consequence. Fires tend to be slow-burning and do not spread readily, but they can be challenging to extinguish.

We would finally remind all involved in the carriage of these materials that all seed cake cargoes can cause oxygen depletion in enclosed spaces. No entry into enclosed space containing any seed cake cargo should take place without thorough checks having been carried out that the atmosphere within is safe for breathing.



Fire in corn gluten feed

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