
Economic Commission for Europe**Inland Transport Committee****Working Party on the Transport of Dangerous Goods**

English

25 August 2017

Joint Meeting of Experts on the Regulations annexed to the European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN) (ADN Safety Committee)**Thirty-first session**

Geneva, 28-31 August 2017

Item 3 (c) of the provisional agenda

Implementation of the European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN): interpretation of the Regulations annexed to ADN

**Classification of Palm Kernel Expeller in relation to UN 1386
“SEED CAKE” class 4.2, PG III****Transmitted by EBU, ESO and ERSTU****Introduction**

1. Palm Kernel Expeller (“PKE”) is a by-product of the crushing and expelling of oil from palm kernel. PKE is known for its balanced energy and protein, high fibre, good level of residual oil and high palmitic acid, it is widely used in compound feeds for adult ruminant livestock such as dairy cow, beef cow and sheep.
2. PKE is mainly imported from Malaysia and Indonesia and transported in bulk by sea vessels to West-European ports. From there it is distributed by dry cargo barges to inland agricultural destinations. In Western Europe, each year 2 million tons of PKE is distributed to these inland destinations. PKE is considered as dangerous good and, therefore, has to be transported in ADN barges under UN 1386, “SEED CAKE”. Over the last 20 years the transport took mostly place by non-ADN-barges. Competent authorities noticed only recently that the stream of PKE is often transported in non-ADN barges. No incidents of self-heating PKE on board of barges are known.

**I. Dangerous goods Classification; different in IMSBC-code and ADN
(and ADR/RID)**

3. PKE is transported over sea in line with the IMSBC-code under UN 1386, SEED CAKES, group A, Class 4.2:

*SEED CAKE, containing vegetable oil UN 1386**(a) mechanically expelled seeds, containing more than 10% of oil or more than 20% of oil and moisture combined.*

4. The IMSBC-code includes for the carriage of UN 1386 special remarks which restricts the carriage if the loading temperature of the cargo, exceeds 55° C or is higher than 10° C above the ambient temperature.

5. The ADN foresees Class 4.2, PG III for “SEED CAKE with more than 1,5 % oil and not more than 11% moisture”, due to the possibility of self-heating properties of the substance:

(1)	(2)	(3a)	(3b)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)	(12)	(13)
	3.1.2	2.2	2.2	2.1.1.3	5.2.2	3.3	3.4	3.5.1.2	3.2.1	8.1.5	7.1.6	7.1.6	7.1.5	3.2.1
UN No. or ID No.	Name and description	Class	Classification code	Packing Group	Labels	Special Provisions	Limited Quantities	Exempt Quantities	Carriage permitted	Equipment required	Ventilation	Provisions concerning loading, unloading and carriage	Number of blue cones	Remarks
1386	SEED CAKE with more than 1,5% oil and not more than 11 % moisture	4.2	S2	III	4.2	800	0	E0	B	PP		IN01 IN02	0	IN01 and IN02 apply only when this substance is carried in bulk or without packaging

II. Properties of PKE and self-heating on board

6. Under product specialists/ surveyors it is common knowledge that the self-heating process of PKE can only take place if the temperature of the cargo is >55° C. Due to the combination of oil and moisture content, the static pressure of the cargo in the sea vessel (the cargo is usually piled up >15 meters in dry cargo bulk carriers) the temperature of the cargo and the length of the journey, self-heating can take place.

7. During the discharge of the sea vessels containing PKE, intensive temperature checks and quality inspections are standard procedure. In the very rare cases that self-heating has taken place on board of sea vessels, the cargo has not been shipped to the agricultural industry but has been discharged into storage barges for alternative purposes, e.g. as raw materials for bio mass power plants.

III. Testing results: 9 samples of PKE

8. For discussions regarding classification of PKE under the IMSBC-code, the OVID (Verband der Ölsaatenverarbeitenden Industrie in Deutschland) / J.Müller Agri & Break Bulk Terminals GmbH & Co/ KG have shared testing results of 3 random samples of PKE on board of incoming sea vessels in 2015 and 2016. The tests have been carried out according to the procedure prescribed in ADN 2.2.42.1, the Manual of Tests and Criteria, Part III, section 33.3. The tests have been executed by the IBExU Institut für Sicherheitstechnik GmbH, in Freiberg, Germany. In the attachment of this document, the summary of the test results are presented.

9. The test results confirm that these 3 samples of PKE do not fulfill the requirements of to ADN 2.2.42.1.5-1.8. The full test report can be found in Annex 1.

10. In addition to the above mentioned test results, 6 other N4-tests on PKE have been performed by the BAM (German Bundesanstalt für Materialforschung und –prüfung in Berlin). The test report is attached in annex 2.

11. These tests show that the 6 PKE samples do not fulfil the criteria of division 4.2 ‘Self-heating substances’ of the UN Recommendations on the Transport of dangerous Goods, because no self-heating occurred during the performed N4-tests.

IV. Conclusion of the tests results

12. The testing results, referred to in item IV stipulate the following:
- The tests performed by IBExU and BAM show that Palm Kernel Expeller does not fulfil the criteria of division 4.2 'Self heating substances' of the UN Recommendations on the Transport of Dangerous Goods.
 - Palm Kern Expeller should not be considered as a dangerous good.
 - According to the ADN position of Seed Cake; PKE should fall under the UN 1386 Position, however taking into account the criteria described in 2.2.42.1.7 ADN, it does not qualify as a dangerous good.

V. Proposal to clarify PKE transport out of ADN

13. To avoid unnecessary discussions and clarify the transport of PKE, EBU and ESO propose to discuss this matter further in the informal working group 'substances' of the ADN Safety Committee.

Annexes:

Annex 1: IBExU testing report of 3 PKE cargoes: Report IB-16-5-092 about the determination of safety characteristics of three samples 'Palmkerneexpeller(palm kernel oil expeller)'

Annex 2: BAM testing reports of 6 PKE cargoes: Report on testing of six samples of 'palmkernexpeller' according to the UN-test N.4 and IMP, Amdt 02-13 Circular letter No. 3317.9.2.3.3.

R E P O R T**IB-16-5-092**

**about the determination of safety characteristics of three samples
„ Palmkernexpeller [palm kernel oil expeller]“**

- Translation -

1 Order

- 1.1 Customer: J. Müller Agri + Breakbulk Terminals GmbH & Co. KG,
Germany
- 1.2 Order: Letter of 21 April 2016, sign schie-al, Mr Uwe Schiemann
- 1.3 Supplier: IBExU Institut für Sicherheitstechnik GmbH, Freiberg,
Germany
- 1.4 Date of sample-delivery: 25 April 2016

2 Description of the samples**2.1 Physico-chemical data**

- see annex 1 -

Sample designation	IBExU-sample-No.	Physical property	Drying loss	Ash content
<p><i>MV „Emerald“</i></p> <p>Indonesische Palmkernexpeller, Löschbeginn: 15.02.2016; Luke 1, Muster 1</p> <p>[Indonesian palm kernel oil expeller; begin of discharge: 15.02.2016; hatch 1, sample 1]</p>	IS 5961		7.4 %	4.4 %
<p><i>MV „Emerald“</i></p> <p>Malaysische Palmkernexpeller, Löschbeginn: 15.02.2016; Luke 4 unten, Muster 2</p> <p>[Malaysian palm kernel oil expeller; begin of discharge: 15.02.2016; hatch 4 below, sample 2]</p>	IS 5962	brown dust with soft agglomerates	10.1 %	4.1 %
<p><i>MV „Nm Cherry Blossom“</i></p> <p>Malaysische Palmkernexpeller, Löschbeginn: 02.04.2016; Luke 3 oben, Muster 3, Datum: 21.04.16</p> <p>[Malaysian palm kernel oil expeller; begin of discharge: 02.04.2016; hatch 3 above, sample 3, date: 21.04.16]</p>	IS 5963		9.1 %	4.6 %

2.2 Particle-size distribution determined by vibrating sieve analysis (tower-sieving) and by air-jet sieve analysis

Fraction in μm	Particle content in mass-% (condition "as delivered")		
	<i>MV „Emerald“</i>	<i>MV „Emerald“</i>	<i>MV „Nm Cherry Blossom“</i>
	Indonesische Palmkernexpeller, Löschbeginn: 15.02.2016; Luke 1, Muster 1 [Indonesian palm kernel oil expeller; begin of discharge: 15.02.2016; hatch 1, sample 1]	Malaysische Palmkernexpeller, Löschbeginn: 15.02.2016; Luke 4 unten, Muster 2 [Malaysian palm kernel oil expeller; begin of discharge: 15.02.2016; hatch 4 below, sample 2]	Malaysische Palmkernexpeller, Löschbeginn: 02.04.2016; Luke 3 oben, Muster 3, Datum: 21.04.16 [Malaysian palm kernel oil expeller; begin of discharge: 02.04.2016; hatch 3 above, sample 3, date: 21.04.16]
< 63	7	7	8
< 125	14	15	14
< 250	22	23	24
< 500	42	36	36
< 1000	52	53	52
< 1400	60	62	61
< 2000	67	70	68
< 2800	75	78	76
< 4000	82	85	83
< 8000	93	95	93
Average particle diameter as median in the RRSB-Net	875 μm	893 μm	923 μm

3 Test procedure

The determination of the safety characteristics was carried out according to “Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria, Fifth revised edition, United Nations, New York and Geneva, 2009: Section 33: Classification Procedure; Test Methods and Criteria Relating to Class 4” [1] and „Circular letter No.3317 Annex, „Draft Amendments (02-13) to the International Maritime Solid Bulk Cargos (IMSBC) Code” (MHB”-tests), respectively.

The determination of the safety characteristics of dust layers with the evaluation according to “MHB” is described in annex 2, 3 and 4, respectively. The samples were tested in condition “as received”.

The test reports about the oil- and hydrocarbon-contents are attached as annex 6.

4 Results

4.1 Test concerning “Readily Combustible Solids - Class 4.1” and “MHB”-test, respectively

Sample designation	Observations
<p><i>MV „Emerald“</i></p> <p>Indonesische Palmkernexpeller, Löschbeginn: 15.02.2016; Luke 1, Muster 1</p> <p>[Indonesian palm kernel oil expeller; begin of discharge: 15.02.2016; hatch 1, sample 1]</p>	<p>immediate ignition (flame and glowing) at contact with the ignition source; after removal of the ignition source: immediate extinction of the flame, locally limited glowing without propagation of the reaction</p> <p>A self-propagating reaction in/on the dust layer did not occur over a length of 100 and 200 mm, respectively.</p>
<p><i>MV „Emerald“</i></p> <p>Malaysische Palmkernexpeller, Löschbeginn: 15.02.2016; Luke 4 unten, Muster 2</p> <p>[Malaysian palm kernel oil expeller; begin of discharge: 15.02.2016; hatch 4 below, sample 2]</p>	<p>immediate ignition (flame and glowing) at contact with the ignition source; after removal of the ignition source: locally limited flame/glowing without propagation of the reaction</p> <p>A self-propagating reaction in/on the dust layer did not occur over a length of 100 and 200 mm, respectively.</p>
<p><i>MV „Nm Cherry Blossom“</i></p> <p>Malaysische Palmkernexpeller, Löschbeginn: 02.04.2016; Luke 3 oben, Muster 3, Datum: 21.04.16</p> <p>[Malaysian palm kernel oil expeller; begin of discharge: 02.04.2016; hatch 3 above, sample 3, date: 21.04.16]</p>	<p>immediate ignition (flame and glowing) at contact with the ignition source; after removal of the ignition source: locally limited flame/glowing without propagation of the reaction</p> <p>A self-propagating reaction in/on the dust layer did not occur over a length of 100 and 200 mm, respectively.</p>

Residue of each sample/test: surface at the spot of contact with the ignition source: black with partly light-grey ash-particles; inside the layer: brown

4.2 Results of the hot storage - “Testing as per Dangerous Goods Transport Ordinance, Division 4.2: Test method for Self-heating Substances” and “MHB”-test, respectively

Edge length of the wire gauze cube: 100 mm

Volume: 1000 cm³

4.2.1 Sample MV „Emerald“ Indonesische Palmkernexpeller, Löschbeginn: 15.02.2016; Luke 1, Muster 1 [Indonesian palm kernel oil expeller; begin of discharge: 15.02.2016; hatch 1, sample 1]”

Bulk density: 0.67 g/cm³

Storage temperature	Maximum sample temperature T_{max}	Temperature difference	Heating period until T_{max} was reached	Mass loss	Positive result acc. to [1]	Positive result acc. to „MHB“
°C	°C	K	hours	%		
140	145	5	25.15	11.3	no	no

Sample residue: dark-brown, visually unchanged; little volume loss

4.2.2 Sample “MV „Emerald“ Malaysische Palmkernexpeller, Löschbeginn: 15.02.2016; Luke 4 unten, Muster 2 [Malaysian palm kernel oil expeller; begin of discharge: 15.02.2016; hatch 4 below, sample 2]”

Bulk density: 0.60 g/cm³

Storage temperature	Maximum sample temperature T_{max}	Temperature difference	Heating period until T_{max} was reached	Mass loss	Positive result acc. to [1]	Positive result acc. to „MHB“
°C	°C	K	h	%		
140	145	5	16.3	13.9	no	no

Sample residue: dark-brown, visually unchanged; little volume loss

4.2.3 Sample “MV „Nm Cherry Blossom“ Malaysische Palmkernexpeller, Löschbeginn: 02.04.2016; Luke 3 oben, Muster 3, Datum: 21.04.16 [Malaysian palm kernel oil expeller; begin of discharge: 02.04.2016; hatch 3 above, sample 3, date: 21.04.16]

Bulk density: 0.65 g/cm³

Storage temperature	Maximum sample temperature T_{max}	Temperature difference	Heating period until T_{max} was reached	Mass loss	Positive result acc. to [1]	Positive result acc. to „MHB“
°C	°C	K	h	%		
140	144	4	5.5	12.7	no	no

Sample residue: dark-brown, visually unchanged; little volume loss

The temperature/time-diagrams of three tests are attached in annex 5.

5 Safety classification

The dust layers of the tested products

- * MV „Emerald“ Indonesische Palmkernexpeller, Löschbeginn: 15.02.2016; Luke 1, Muster 1 [Indonesian palm kernel oil expeller; begin of discharge: 15.02.2016; hatch 1, sample 1]
- * MV „Emerald“ Malaysische Palmkernexpeller, Löschbeginn: 15.02.2016; Luke 4 unten, Muster 2 [Malaysian palm kernel oil expeller; begin of discharge: 15.02.2016; hatch 4 below, sample 2]
- * MV „Nm Cherry Blossom“ Malaysische Palmkernexpeller, Löschbeginn: 02.04.2016; Luke 3 oben, Muster 3, Datum: 21.04.16 [Malaysian palm kernel oil expeller; begin of discharge: 02.04.2016; hatch 3 above, sample 3, date: 21.04.16]

are *not classified* into Class 4.1 “Readily Combustible Solid”, not classified into Class 4.2 “Self-heating Substances” and they are not classified as “MHB”.

Literature:

- [1] Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria, Fifth revised edition, United Nations, New York and Geneva, 2009: Section 33: Classification Procedure; Test Methods and Criteria Relating to Class 4 ST/SG/AC.10/11/Rev. 5

The test results presented here refer only to this product corresponding to the sample sent in for the determination of the safety characteristics. Deviations from the sample tested could lead to the assignment to a higher, but also a lower class of safety. IBExU declines all warranty claims, if the customer carried out a wrong sampling, wrong sample designation, or the like.

Drying loss, ash content und volatile matter as well as sieve analysis

These analyses serve to the physic-chemical characterization of a dust sample.

Unless nothing else is provided, the determination of the **drying loss**, the **ash content** and the **volatile matter** is carried out according to the standards for solid fuels:

- Water content (drying loss), determined in the drying oven: DIN 51718:2002
(respectively: pre-test / rapid test in the drying balance (IR-moisture measuring instrument))
- Ash content, determined in the assay furnace: DIN 51719:1997
- Volatile matter, determined in the assay furnace: DIN 51720:2001
(*Usually, this test is carried out only with coal or similar fuels.*)

Notes: If for certain substances separate standards for the determination of the drying loss or the ash content, exist, then the tests may also be carried out according to those standards.

Only a small subsample-amount of approximately 1 g is used for these gravimetric methods. A duplicate analysis is carried out in each case.

If necessary, coarse-grained dusts must be milled and/or sieved to smaller particle-size fractions to achieve reproducible analysis results.

The **sieve analysis** serves to the determination of the particle-size distribution of disperse solids (dusts, bulk material), e. g. by air-jet screening and/or vibration screening.

If the respective screen oversize (mass-%) is plotted versus the particle diameter in the Rosin-Rammler-Sperling-Bennet-(RRSB)-Net, a distribution curve is obtained and the *mean value* of the tested dust can be derived. The median value gives a value for the median particle size (50 mass-% of the dust are coarser and 50 mass-% are finer than the median value).

For the sieve analysis, a representative subsample-amount of the sample to be tested is used.

Furthermore, by means of the results of the sieve analysis can be determined whether the dust sample meets the requirements of the respective testing standard for the determination of safety characteristics of dusts or whether a sample preparation by milling and/or sieving is necessary.

Testing as per Dangerous Goods Transport Ordinance, Division 4.1: Test method for Readily Combustible Solids

(Respectively according to EC-Regulation No. 1272/2008 / Globally Harmonised System of Classification and Labelling of Chemicals-GHS)

The flammable solids of Division 4.1 comprise:

- readily combustible solids, and solids which may be ignited through spark fly or cause to a fire through friction
- self-reactive substances
- substances related to self-reactive substances
- desensitized explosives

The test method is explained in:

Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria, Fifth revised edition, United Nations, New York and Geneva, 2009: Section 33: Classification Procedure; Test Methods and Criteria Relating to Class 4, ST/SG/AC.10/11/Rev.5

Preliminary screening test: The substance in its commercial condition is formed into an unbroken strip or powder train about 250 mm long by 20 mm wide by 10 mm high on a cool, impervious, low heat-conducting base plate. A hot flame (minimum temperature 1000 °C) by a gas burner (minimum diameter 5 mm) is applied to one end of the powder train until the powder ignites or for a maximum of 2 minutes (or 20 minutes for powders of metal or metal-alloys). It should be noted whether combustion propagates along 200 mm of the train within the 2 minute test period (or 20 minutes for metal powders). If the substance does not ignite and propagate combustion either by burning with flame or smouldering along 200 mm of the powder train within the 2 minute- (or 20 minute-) test period, then the substance should not be classified as a flammable solid and no further testing is required. If the substance propagates burning of a 200 mm length of the powder train in less than 2 minutes or less than 20 minutes for metal powders, then the full test programme (**Burning rate test** with partial wetting of the pile) should be carried out.

With a special metal form whose dimensions are standardized a definite strip is formed on a cool, impervious, low heat-conducting base plate.

The strip is 250 mm long and has a triangular cross-section (width: 20 mm; height: 10 mm). This strip has to be positioned under a fume hood in such a way, that it is protected against wind. On substances, except metal powders, 1 ml wetting solution (water) has to be added to the pile 30 to 40 mm behind the 100 mm-timing-zone.

The pile is ignited at one end with an appropriate ignition source (e. g. a small flame or a hot wire with a minimum temperature of 1000 °C). After a combustion of the pile over a length of 80 mm, the burning time over the following 100 mm has to be measured (metal dusts: measurement of the burning time over the whole strip length).

The test has to be carried out six times, in each case with a clean, cold base plate (unless, a positive result has been determined before).

Assessment of the results:

Powdered, granular or pasty substances should be classified in Division 4.1 when the time of burning of one or more of the test runs, in accordance with the above described test method is less than 45 s or the rate of burning is more than 2.2 mm/s. Powders of metals or metal alloys should be classified when they can be ignited and the reaction spreads over the whole length of the sample in 10 minutes or less.

Classification to Packaging Group II of Division 4.1 and/or Category 1 of combustible solids (acc. to EC-Regulation / GHS) :

* Readily combustible solids (*other than metal powders*): The Packing Group II should be assigned if the burning time is less than 45 s and the flame passes the wetted zone. Packing Group II should be assigned to powders of metal or metal alloys if the zone of reaction spreads over the whole length of the sample in 5 minutes or less.

Classification to Packaging Group III of Division 4.1 and/or Category 2 of combustible solids (acc. to EC-Regulation / GHS) :

* Readily combustible solids (*other than metal powders*): The Packing Group III should be assigned if the burning time is less than 45 s and the wetted zone stops the flame propagation for at least 4 minutes. Packing Group III should be assigned to metal powders if the reaction zone spreads over the whole length of the sample in more than 5 minutes but not more than 10 minutes.

Testing as per Dangerous Goods Transport Ordinance, Division 4.2: Test method for Self-heating Substances

(Respectively according to EC-Regulation No. 1272/2008 / Globally Harmonised System of Classification and Labelling of Chemicals-GHS)

The test methods are explained in:

Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria, Fifth revised edition, United Nations, New York and Geneva, 2009: Section 33: Classification Procedure; Test Methods and Criteria Relating to Class 4, ST/SG/AC.10/11/Rev.5

Pyrophoric solids are substances which ignite during dropping (1 to 2 cm³) of the powdery substance from about 1 m height or within 5 minutes of settling.

These pyrophoric substances are classified as follows:

- Class 4.2, Packing Group I and/or Category 1 (acc. to EC-Regulation / GHS)

The test method for self-heating substances is a modified version of the Bowes-Cameron cage test which is a self-heating test method for charcoal.

The substance to be tested is kept at a constant temperature of 140 °C for 24 hours in particular wire gauze cubes of an edge length of 10 cm and 2.5 cm, respectively. The temperature in the centre of the sample and between the sample basket and the oven wall is measured continuously. The cubic wire mesh sample basket is placed in a protective housing wire cube. In order to avoid the effect of air circulation, a further wire gauze cube is installed to house the baskets.

A positive result is obtained if spontaneous ignition occurs or the temperature of the sample exceeds the oven temperature by 60 °C. If a positive result is obtained in the first test using the cube with 10 cm edge length, sample a second test is conducted with a cube of 2.5 cm edge length.

On the basis of the obtained results the following classification is made:

- Positive result at the test in the wire gauze cube with edge length of 10 cm and 2.5 cm at 140 °C:
- Division 4.2 Packing Group II (self-heating substances) and/or Category 1 of self-heating substances (acc. to EC-Regulation / GHS)

Further tests should be carried out if a *positive result* exists in the 10-cm-(1000 cm³)-cube and a *negative result* was obtained in the *cube with 2.5 cm edge length (15.6 cm³)*. The following classifications are made:

- a) Test in the wire gauze cube with 10 cm edge length at 120 °C:

Negative result → no Division 4.2 (i.e. "exempted") if the transport will be carried out in packages with a volume of maximum 3 m³

b) Test in the wire gauze cube with 10 cm edge length at 100 °C:

Negative result → no Division 4.2 (i.e. “exempted”) if the transport will be carried out with a volume of maximum 450 litres

- If at b) a positive result is determined and/or at packages with higher volumes than specified in a) and b):
- Classification in Division 4.2, Packing Group III (less self-heating substances) and/or Category 2 of self-heating substances (acc. to EC-Regulation / GHS)

Section 9 – Materials possessing chemical hazards

9.2 Hazard classification

9.2.3 Materials hazardous only in bulk (MHB)

20 In paragraph 9.2.3, replace the existing text by the following:

"9.2.3.1 General

9.2.3.1.1 These are materials which possess chemical hazards when transported in bulk other than materials classified as packaged dangerous goods in the IMDG Code. These materials present a significant risk when carried in bulk and require special precautions.

9.2.3.1.2 A material shall be classified as MHB if the material possesses one or more of the chemical hazards as defined below. When a test method is prescribed, representative samples of the cargo to be carried shall be used for testing. Samples shall be taken 200 to 360 mm inward from the surface at 3 m intervals over the length of a stockpile.

9.2.3.1.3 A material may also be classified as MHB by analogy with similar cargoes with known hazardous properties or by records of accidents.

9.2.3.2 Combustible Solids

9.2.3.2.1 These are materials which are readily combustible or easily ignitable when transported in bulk and do not meet the established criteria for inclusion in class 4.1 (see 9.2.2.1 of the IMSBC Code).

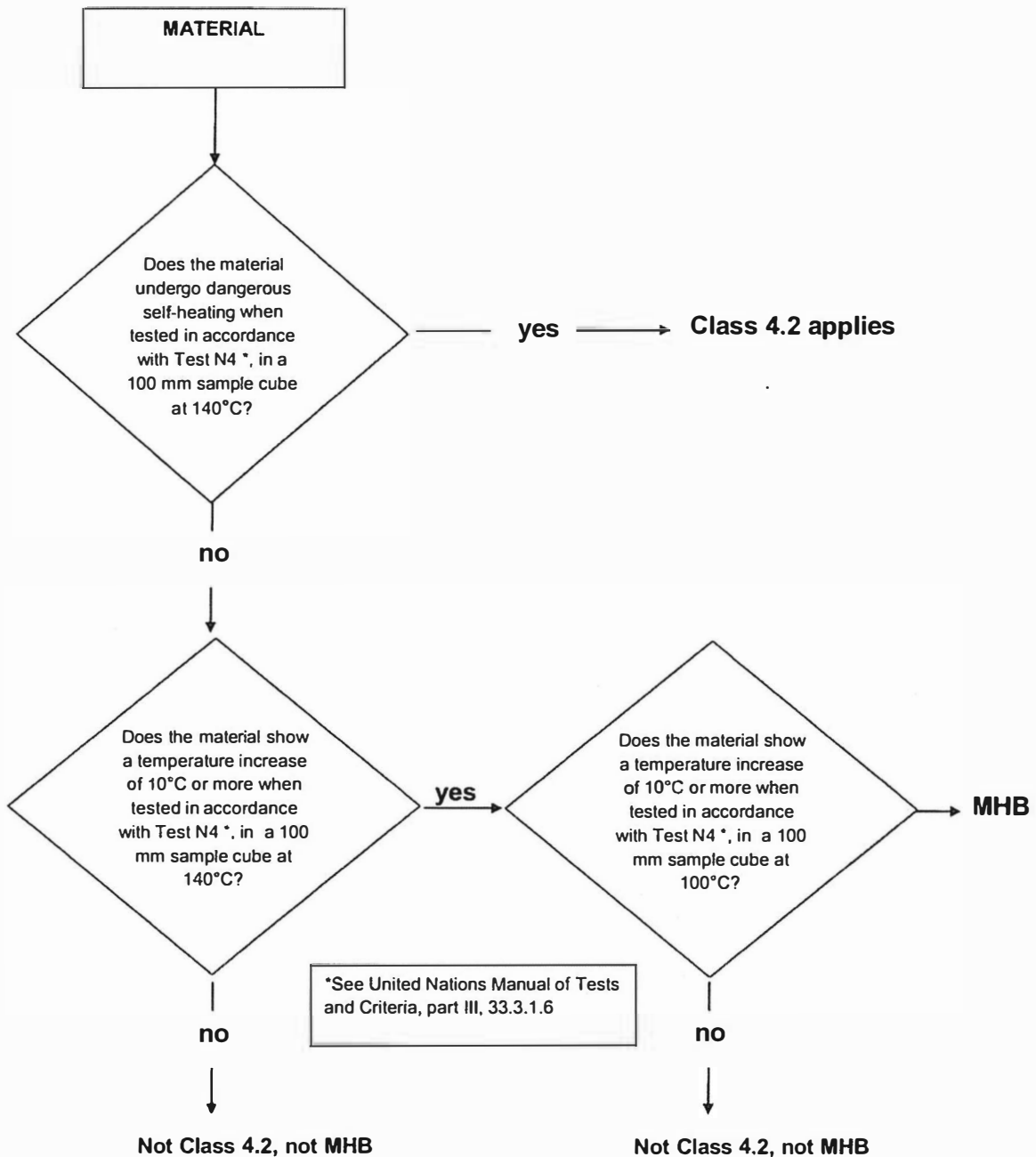
9.2.3.2.2 Powdered, granular or pasty materials shall be classified as MHB when the time of burning of one or more of the test runs, performed in accordance with the preliminary screening test method described in the United Nations Manual of Tests and Criteria, part III, 33.2.1.4.3.1, is less than 2 minutes. Powders of metals or metal alloys shall be classified as MHB when they can be ignited and the reaction spreads over the whole length of the sample in 20 minutes or less. The test sample in the preliminary screening test is 200 mm in length. A summary of this approach is presented in the table below:

Solid Cargo	Hazard Class 4.1, PG III Burn time, Burn distance	MHB Burn time, Burn distance
Powdered Metal	more than 5 minutes but not more than 10 minutes, 250 mm	≤20 minutes, 200 mm
Solid Material	<45 seconds, 100 mm	≤2 minutes, 200 mm

9.2.3.3 Self-heating Solids

9.2.3.3.1 These are materials that self-heat when transported in bulk and do not meet the established criteria for inclusion in class 4.2 (see 9.2.2.2).

9.2.3.3.2 A material shall be classified as MHB if, in the tests performed in accordance with the test method given in the United Nations Manual of Tests and Criteria, part III, 33.3.1.6, the temperature of the test sample rises by more than 10°C when using a 100 mm cube sample at 140°C and at 100°C. The flow chart below illustrates the test procedure.



9.2.3.3.3 In addition, a material shall be classified as MHB if a temperature rise of 10°C or more over ambient temperature is observed during any portion of the test performed in accordance with the test method described in United Nations Manual of Tests and Criteria, part III, 33.4.1.4.3.5. When performing this test, the temperature of the sample should be measured continuously over 48 hours. If at the end of the 48-hour period the temperature is increasing, the test period shall be extended in accordance with the test method.

9.2.3.4 Solids that evolve into flammable gas when wet

9.2.3.4.1 These are materials that emit flammable gases when in contact with water when transported in bulk and do not meet established criteria for inclusion in class 4.3 (see 9.2.2.3).

9.2.3.4.2 A material shall be classified as MHB if, in tests performed in accordance with the test method given in the United Nations Manual of Tests and Criteria, part III, 33.4.1, the flammable gas evolution rate is greater than zero. When performing this test, the rate of evolution of gas shall be calculated over 48 hours at one-hour intervals. If at the end of the 48-hour period the rate of evolution is increasing, the test period shall be extended in accordance with the test method.

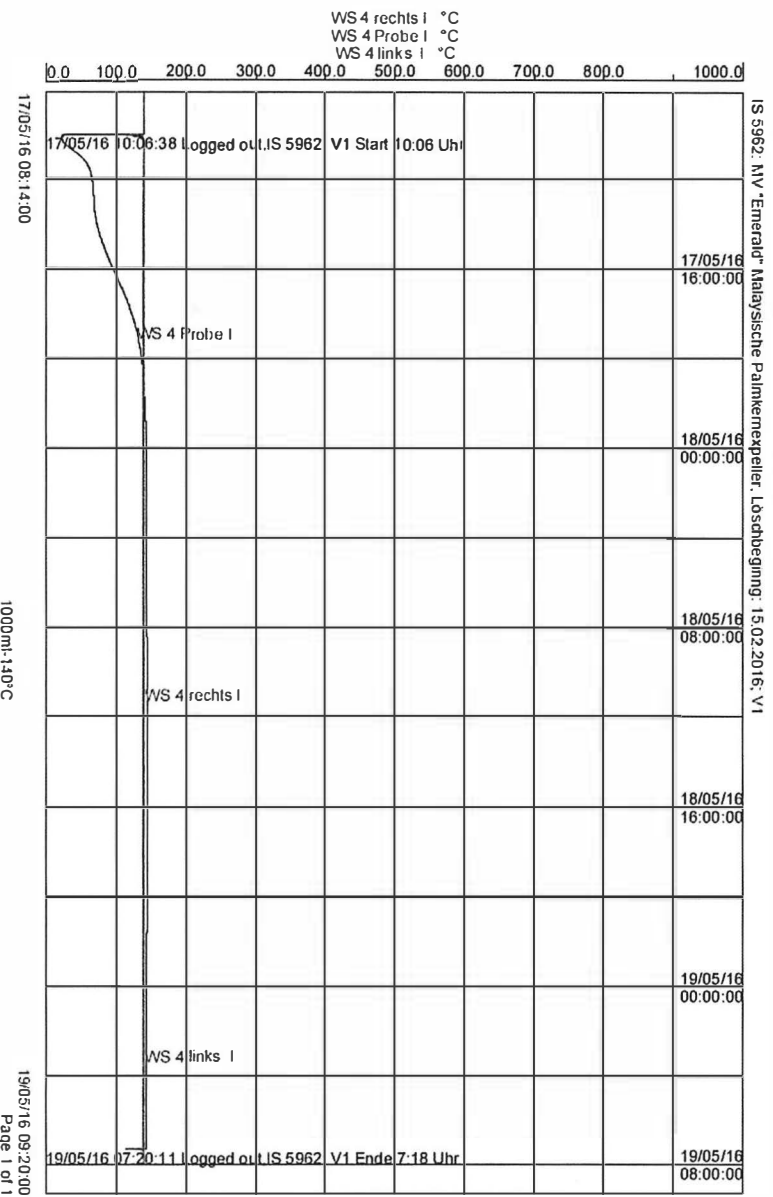
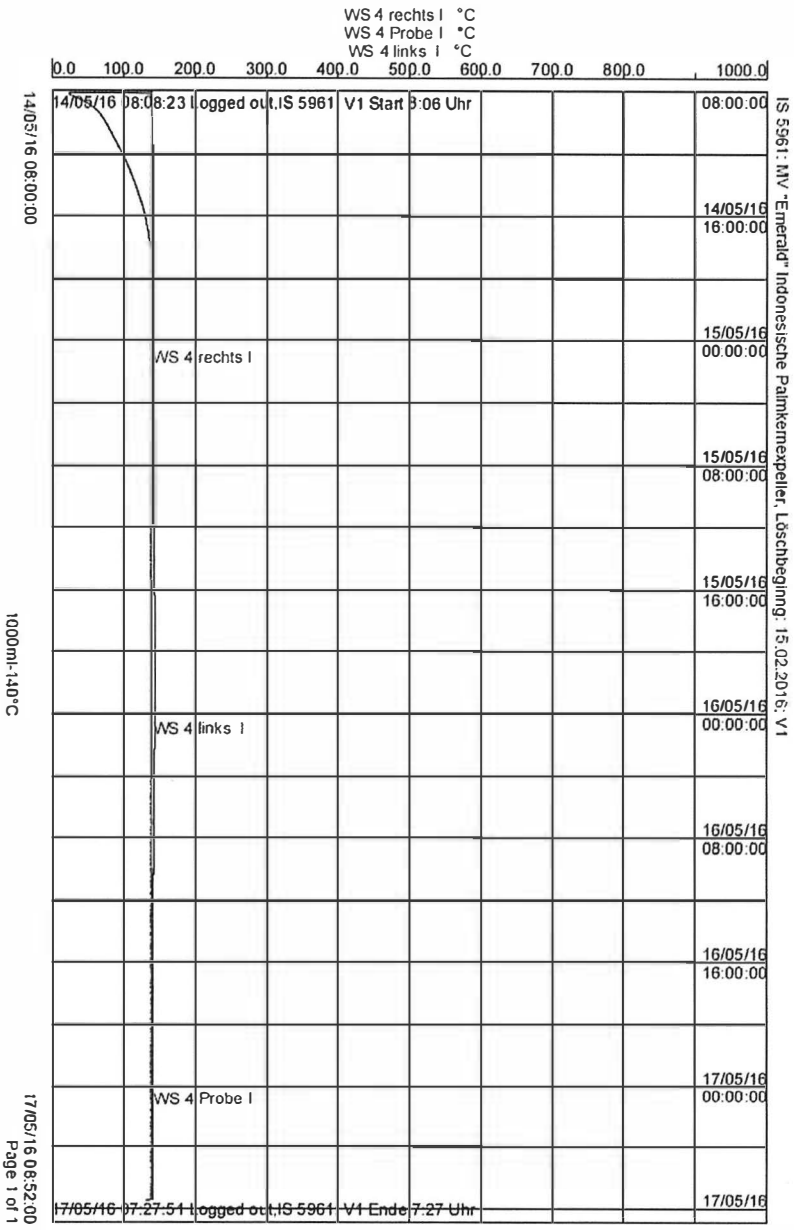
9.2.3.5 Solids that evolve toxic gas when wet

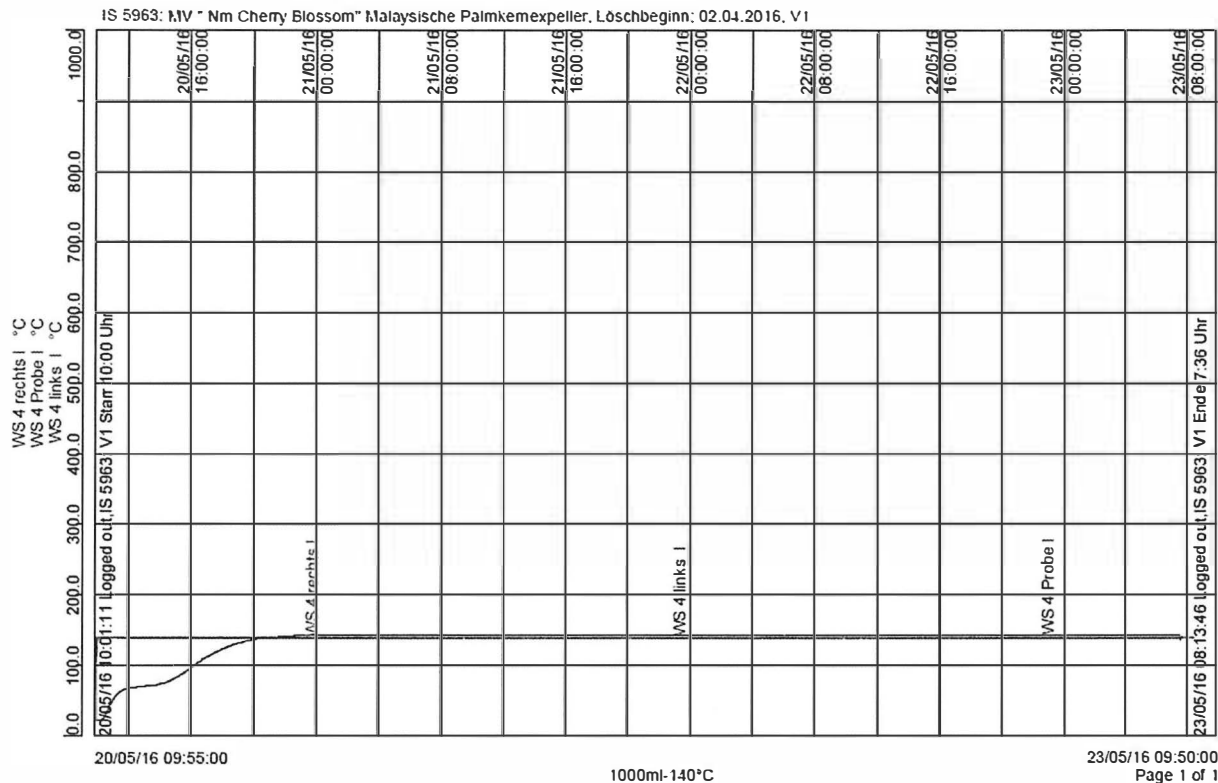
9.2.3.5.1 These are materials that emit toxic gases when in contact with water when transported in bulk.

9.2.3.5.2 A material shall be classified as MHB if, in tests performed in accordance with the test method given in the United Nations Manual of Tests and Criteria, part III, 33.4.1, the toxic gas evolution rate is greater than zero. Toxic gas evolution shall be measured using the same test procedure for flammable gas evolution as prescribed in the test method. When performing this test, the rate of evolution of gas shall be calculated over 48 hours at 1-hour intervals. If at the end of the 48-hour period the rate of evolution is increasing, the test period shall be extended in accordance with the test method.

9.2.3.5.3 The gas shall be collected over the test period prescribed above. The gas shall be chemically analysed and tested for toxicity if the gas is unknown and no acute inhalation toxicity data is available. If the gas is known, inhalation toxicity shall be assessed based on all information available, using testing as a last resort option for concluding this hazard. Toxic gases in this respect are gases showing acute inhalation toxicity (LC50) of or below 20,000 ppmV or 20 mg/l by 4 hours testing (GHS Acute Toxicity Gases/Vapours Category 4).

Temperature/time-courses of the „Class 4.2“-tests





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IB-16-5-092, Annex 6, Page 1/6

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Datum 26.05.2016

Kundennr. 27011607

PRÜFBERICHT 874141 - 380451

Auftrag	874141 Bestellung 2016 215 (IB-16-5-092/ Lieferschein 094/16)
Analysennr.	380451
Probeneingang	19.05.2016
Probenahme	18.05.2016
Probenehmer	Auftraggeber
Kunden-Probenbezeichnung	IS 5961 MV "Emerald"

	Einheit	Ergebnis	Best.-Gr.	Parameter	Methode
Feststoff					
Trockensubstanz	%	* 94,7	0,1	23146	DIN ISO 11465 / DIN EN 14346:2007
Wassergehalt	%	* 5,33	0,1	3109	Berechnung
Kohlenwasserstoffe (GC)	mg/kg	12000	50	9347	DIN EN ISO 16703 / DIN EN 14039
Alkane					
n-Alkane C 6	mg/kg	<2,0 ^{pe)}	2	24878	DIN ISO 22155 n)
n-Alkane C 7	mg/kg	<2,0 ^{pe)}	2	24882	DIN ISO 22155 n)
n-Alkane C 8	mg/kg	<2,0 ^{pe)}	2	24883	DIN ISO 22155 n)
n-Alkane C 9	mg/kg	<2,0 ^{pe)}	2	24884	DIN ISO 22155 n)
n-Alkane C 10	mg/kg	2,4^{pe)}	2	33432	DIN ISO 22155 n)

pe) Die Nachweis-, bzw. Bestimmungsgrenze musste erhöht werden, da Matrixeffekte eine Veränderung des Verhältnisses von Probenmenge zum Extraktionsmittel erforderten.

Erläuterung: Das Zeichen "<" oder n.b. in der Spalte Ergebnis bedeutet, der betreffende Stoff ist bei nebenstehender Bestimmungsgrenze nicht quantifizierbar.

Die Analysenwerte der Feststoffparameter beziehen sich auf die Trockensubstanz, bei den mit * gekennzeichneten Parametern auf die Originalsubstanz.

n) Nicht akkreditiert

AWV Daniela Kucharski, Tel. 03741/55076-2
Kundenbetreuung

Beginn der Prüfungen: 19.05.2016
Ende der Prüfungen: 26.05.2016

Die Prüfergebnisse beziehen sich ausschließlich auf die Prüfgegenstände. Bei Proben unbekanntem Ursprungs ist eine Plausibilitätsprüfung nur bedingt möglich. Die auszugsweise Vervielfältigung des Berichts ohne unsere schriftliche Genehmigung ist nicht zulässig.





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Datum 18.06.2016

Kundennr. 41012298

PRÜFBERICHT 284776 / 2 - 590859 / 2

Der Schrägstrich hinter der Auftrags- und/oder Analysennummer entspricht der aktuellen Version des Prüfberichts. Diese Version ersetzt alle vorherigen Versionen dieses Prüfberichts.

Auftrag	284776 / 2
Analysennr.	590859 / 2
Probeneingang	10.06.2016
Probenahme	10.06.2016
Probenart	Sonstige
Bezeichnung/Sorte	Indonesische Palmkernexpeller
Empfangsschein	IBExU-Proben-Nr. IS 5961
Verpackung	Plastiktüte
Fahrzeug	MV "EMERALD"
Lieferdatum	15.02.2016

Einheit	Ergebnis	Methode
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Untersuchungsparameter

Ölgehalt in OS	%	8,3			ISO 659 (Extraktionsverfahren mit Hexan)
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Sachbearbeiter

Beginn der Prüfungen: 13.06.2016

Ende der Prüfungen: 15.06.2016

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Datum 26.05.2016

Kundennr. 27011607

PRÜFBERICHT 874141 - 380452

Auftrag **874141 Bestellung 2016 215 (IB-16-5-092/ Lieferschein 094/16)**
Analysennr. **380452**
Probeneingang **19.05.2016**
Probenahme **18.05.2016**
Probenehmer **Auftraggeber**
Kunden-Probenbezeichnung **IS 5962 MV "Emerald"**

	Einheit	Ergebnis	Best.-Gr.	Parameter	Methode
Feststoff					
Trockensubstanz	%	* 91,1	0,1	23146	DIN ISO 11465 / DIN EN 14346:2007
Wassergehalt	%	* 8,88	0,1	3109	Berechnung
Kohlenwasserstoffe (GC)	mg/kg	9080	50	9347	DIN EN ISO 16703 / DIN EN 14039
Alkane					
n-Alkane C 6	mg/kg	<2,0 ^{pe)}	2	24878	DIN ISO 22155 n)
n-Alkane C 7	mg/kg	<2,0 ^{pe)}	2	24882	DIN ISO 22155 n)
n-Alkane C 8	mg/kg	<2,0 ^{pe)}	2	24883	DIN ISO 22155 n)
n-Alkane C 9	mg/kg	<2,0 ^{pe)}	2	24884	DIN ISO 22155 n)
n-Alkane C 10	mg/kg	3,3^{pe)}	2	33432	DIN ISO 22155 n)

pe) Die Nachweis-, bzw. Bestimmungsgrenze musste erhöht werden, da Matrixeffekte eine Veränderung des Verhältnisses von Probenmenge zum Extraktionsmittel erforderten.

Erläuterung: Das Zeichen "<" oder n.b. in der Spalte Ergebnis bedeutet, der betreffende Stoff ist bei nebenstehender Bestimmungsgrenze nicht quantifizierbar.

Die Analysenwerte der Feststoffparameter beziehen sich auf die Trockensubstanz, bei den mit * gekennzeichneten Parametern auf die Originalsubstanz.

n) Nicht akkreditiert

AWV Daniela Kucharski, Tel. 03741/55076-2
Kundenbetreuung

Beginn der Prüfungen: 19.05.2016
Ende der Prüfungen: 26.05.2016

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Datum 18.06.2016
Kundenr. 41012298

PRÜFBERICHT 284776 / 2 - 590860 / 2

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Auftrag	284776 / 2
Analysenr.	590860 / 2
Probeneingang	10.06.2016
Probenahme	10.06.2016
Probenart	Sonstige
Bezeichnung/Sorte	Malaysische Palmkernexpeller
Empfangsschein	IBExU-Proben-Nr. IS 5962
Verpackung	Plastiktüte
Fahrzeug	MV "EMERALD"
Lieferdatum	15.02.2016

Einheit	Ergebnis	Methode
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Untersuchungsparameter

Einheit	Ergebnis	Methode
Ölgehalt in OS	6,0	ISO 659 (Extraktionsverfahren mit Hexan)

AGROLAB Oberdorla Fr. Bang, Tel. 03601/751710

Sachbearbeiter

Beginn der Prüfungen: 13.06.2016

Ende der Prüfungen: 15.06.2016

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Datum 26.05.2016

Kundennr. 27011607

PRÜFBERICHT 874141 - 380453

Auftrag **874141 Bestellung 2016 215 (IB-16-5-092/ Lieferschein 094/16)**
Analysenr. **380453**
Probeneingang **19.05.2016**
Probenahme **18.05.2016**
Probenehmer **Auftraggeber**
Kunden-Probenbezeichnung **IS 5963 MV "Nm Cherry Blossom"**

	Einheit	Ergebnis	Best.-Gr.	Parameter	Methode
Feststoff					
Trockensubstanz	%	* 91,7	0,1	23146	DIN ISO 11465 / DIN EN 14346:2007
Wassergehalt	%	* 8,30	0,1	3109	Berechnung
Kohlenwasserstoffe (GC)	mg/kg	8040	50	9347	DIN EN ISO 16703 / DIN EN 14039

Alkane					
n-Alkane C 6	mg/kg	<2,0 ^{pe)}	2	24878	DIN ISO 22155 n)
n-Alkane C 7	mg/kg	<2,0 ^{pe)}	2	24882	DIN ISO 22155 n)
n-Alkane C 8	mg/kg	<2,0 ^{pe)}	2	24883	DIN ISO 22155 n)
n-Alkane C 9	mg/kg	<2,0 ^{pe)}	2	24884	DIN ISO 22155 n)
n-Alkane C 10	mg/kg	3,2 ^{pe)}	2	33432	DIN ISO 22155 n)

pe) Die Nachweis-, bzw. Bestimmungsgrenze musste erhöht werden, da Matrixeffekte eine Veränderung des Verhältnisses von Probenmenge zum Extraktionsmittel erforderten.

Erläuterung: Das Zeichen "<" oder n.b. in der Spalte Ergebnis bedeutet, der betreffende Stoff ist bei nebenstehender Bestimmungsgrenze nicht quantifizierbar.

Die Analysenwerte der Feststoffparameter beziehen sich auf die Trockensubstanz, bei den mit * gekennzeichneten Parametern auf die Originalsubstanz.

n) Nicht akkreditiert

AWV Daniela Kucharski, Tel. 03741/55076-2
Kundenbetreuung

Beginn der Prüfungen: 19.05.2016
Ende der Prüfungen: 26.05.2016

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Datum 18.06.2016
Kundennr. 41012298

PRÜFBERICHT 284776 / 2 - 590861 / 2

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Auftrag	284776 / 2
Analysennr.	590861 / 2
Probeneingang	10.06.2016
Probenahme	10.06.2016
Probenart	Sonstige
Bezeichnung/Sorte	Malaysische Palmkernexpeller
Empfangsschein	IBExU-Proben-Nr. IS 5963
Verpackung	Plastiktüte
Fahrzeug	MV "NM CHERRY BLOSSOM"
Lieferdatum	02.04.2016

Einheit	Ergebnis	Methode
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Untersuchungsparameter

Ölgehalt in OS	%	5,7			ISO 659 (Extraktionsverfahren mit Hexan)
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AGROLAB Oberdorla Fr. Bang, Tel. 03601/751710

Sachbearbeiter

Beginn der Prüfungen: 13.06.2016
Ende der Prüfungen: 15.06.2016

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Report

on testing of six samples of "Palmkernexpeller"
according to the UN-Test N.4 and IMO, Amdt 02-13 Circular letter No. 3317, 9.2.3.3

12200 Berlin, Germany
P: +49 30 8104-0
F: +49 30 8104-7 2222

BAM-reference	170038743-E
Copy	1 st copy of 2
Customer	Verein der Getreidehändler der Hamburger Börse e.V. Adolphsplatz 1 20457 Gelsenkirchen
Order date	14.03.2017
Reference	-
Receipt of order	21.03.2017
Test samples	„Probe 1a“ (2.23/190417/06), 3 x 1 kg „Probe 2a“ (2.23/190417/07), 3 x 1 kg „Probe 3a“ (2.23/190417/03), 3 x 1 kg „Probe 4a“ (2.23/190417/02), 3 x 1 kg „Probe 5a“ (2.23/190417/05), 3 x 1 kg „Probe 6a“ (2.23/190417/04), 3 x 1 kg
Receipt of samples	19.04.2017
Test date	April/May 2017
Test location	Bundesanstalt für Materialforschung und -prüfung (BAM) Unter den Eichen 87 12005 Berlin
Test procedure according to	UN Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria, Sixth Revised Edition, 2015.

This Test Report consists of page 1 to 8 and an annex with 1 page.

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The German version is legally binding, except an English version is issued exclusively.

1 Introduction

At the request of Verein der Getreidehändler der Hamburger Börse e.V. (VdG) the Bundesanstalt für Materialforschung und -prüfung (BAM), Berlin, Germany, carried out an investigation of six samples of palm kernel expeller according to UN-Test N.4 for classification as dangerous good of Division 4.2 "Self-heating Substances" and according the CLP-/GHS-Regulations as Hazard Class "Self-heating substances and Mixtures".

Furthermore, the samples should be tested in accordance with the International Maritime Organization (IMO), Amdt 02-13 Circular letter No. 3317 whether they are MHB substances¹.

The transport classification is based on the United Nations Recommendations on the Transport of Dangerous Goods, Model Regulations, nineteenth revised edition 2015 (TDG).
The GHS classification is based on the Globally Harmonized System of Classification and Labelling of Chemicals (GHS), sixth revised edition 2015 and the Regulation (EC) No 1272/2008 (CLP).

Three samples of palm kernel expeller were tested by the IBExU Institut für Sicherheitstechnik GmbH (see report: IB-16-5-092, 2016-05-26) and did not fulfil the Criteria for classification as Division 4.2 "Self-heating Substances" and also not the criteria for classification as Hazard Class "Self-heating substances and Mixtures" according to the CLP-/GHS-Regulations.
The three samples were also not MHB substances according the International Maritime Organization (IMO), Amdt 02-13 Circular letter No. 3317.

The three samples, tested by IBExU (see report: IB-16-5-092, 2016-05-26) did not fulfil the criteria for classification as Division 4.1 "Flammable Solids" or Hazard Class "Flammable Solids" of the Regulation (EC) No 1272/2008 (CLP) and GHS.

The six samples, each 3 kg, received at BAM on 19.04.2017.

The customer divided the samples in A- and B-samples. The A-samples were sent to BAM and the B-samples to the LKS (Landwirtschaftliche Kommunikations- und Service-GmbH).

The samples have the following names and BAM-codes:

Sample number customer	Sample identification customer	BAM-Code
„Probe 1a“	Indonesische Palmkernexpeller ex MV „Alberta“	2.23/190407/06
„Probe 2a“	Malaysische Palmkernexpeller ex MV „Molat“	2.23/190407/07
„Probe 3a“	Malaysische Palmkernexpeller ex MV „GH Black Caviar“	2.23/190407/03
„Probe 4a“	Indonesische Palmkernexpeller ex MV „Loch Nevis“	2.23/190407/02
„Probe 5a“	Indonesische Palmkernexpeller ex MV „Teal Bulker“	2.23/190407/05
„Probe 6a“	Malaysische Palmkernexpeller ex MV „Loch Nevis“	2.23/190407/04

¹ Materials hazardous only in bulk (MHB)

The content of fat (crude fat) of the test samples was analyzed at LKS in Lichtenwalde².

Sample number customer	Sample identification customer	Analytical result		
			in kg feed	in kg TS
„Probe 1b“	Indonesische Palmkernexpeller ex MV „Alberta“	TS	922 g	1000 g
		Crude fat	77 g	84 g
„Probe 2b“	Malaysische Palmkernexpeller ex MV „Molat“	TS	903 g	1000 g
		Crude fat	44 g	49 g
„Probe 3b“	Malaysische Palmkernexpeller ex MV „GH Black Caviar“	TS	899 g	1000 g
		Crude fat	53 g	59 g
„Probe 4b“	Indonesische Palmkernexpeller ex MV „Loch Nevis“	TS	923 g	1000 g
		Crude fat	81 g	88 g
„Probe 5b“	Indonesische Palmkernexpeller ex MV „Teal Bulker“	TS	887 g	1000 g
		Crude fat	71 g	80 g
„Probe 6b“	Malaysische Palmkernexpeller ex MV „Loch Nevis“	TS	871 g	1000 g
		Crude fat	49 g	56 g

TS = Dry Substance

2 Sample description

Based on the information of the customer the six samples are of palm kernel expellers. The samples were not chemically analysed but the water content was determined using the coulometric Karl-Fisher titration.

3 Test method

The used test method UN-Test N.4 is described at the UN Test Manual (UN Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria, sixth revised edition, 2015).

4 Test results

3.1 Determination of water according to Karl-Fischer

The samples have the following mass-percentage of water.

Test sample	Content of water (average from three relevant tests) [%]	Standard deviation [%]
„Probe 1a“	9.2	± 0.05
„Probe 2a“	11.3	± 0.18
„Probe 3a“	12.1	± 0.21
„Probe 4a“	8.0	± 0.05
„Probe 5a“	13.5	± 0.45
„Probe 6a“	16.6	± 0.37

² August-Bebel-Straße 6, 09577 Lichtenwalde, Germany

4.2 UN-Test N.4

The UN-Test N.4 is performed to determine whether a substance in a 25 mm or 100 mm sample cube, at temperatures of 100 °C, 120 °C or 140 °C undergoes spontaneous ignition or dangerous self-heating, which is indicated by a 60 °C rise in temperature over the oven temperature within 24 hours. Otherwise the result is considered negative.

The criteria are based on the self-ignition temperature of charcoal, which is 50 °C for a volume of 27 m³.

The sample „Probe 1a“ (2.23/190417/06) was tested as received.

Test no.	Sample cube Edge length [mm]	Oven temperature [°C]	Max. temperature T _{max} of the sample [°C]	Self-ignition/ Self-heating
1	100	140	154	No
2	25	140	-*	-*
3	100	120	-*	-*
4**	100	100	102	No

* Based on clear result further testing was not necessary.

** According to the International Maritime Organization (IMO), Amdt 02-13 Circular letter No. 3317.

The sample „Probe 2a“ (2.23/190417/07) was tested as received.

Test no.	Sample cube Edge length [mm]	Oven temperature [°C]	Max. temperature T _{max} of the sample [°C]	Self-ignition/ Self-heating
1	100	140	146	No
2	25	140	-*	-*
3	100	120	-*	-*

* Based on clear result further testing was not necessary.

The sample „Probe 3a“ (2.23/190417/03) was tested as received.

Test no.	Sample cube Edge length [mm]	Oven temperature [°C]	Max. temperature T _{max} of the sample [°C]	Self-ignition/ Self-heating
1	100	140	148	No
2	25	140	-*	-*
3	100	120	-*	-*

* Based on clear result further testing was not necessary.

The sample „Probe 4a“ (2.23/190417/02) was tested as received.

Test no.	Sample cube Edge length [mm]	Oven temperature [°C]	Max. temperature T _{max} of the sample [°C]	Self-ignition/ Self-heating
1	100	140	143	No
2	25	140	-*	-*
3	100	120	-*	-*

* Based on clear result further testing was not necessary.

The sample „Probe 5a“ (2.23/190417/05) was tested as received.

Test no.	Sample cube Edge length [mm]	Oven temperature [°C]	Max. temperature T _{max} of the sample [°C]	Self-ignition/ Self-heating
1	100	140	151	No
2	25	140	-*	-*
3	100	120	-*	-*
4**	100	100	102	No

* Based on clear result further testing was not necessary.

** According to the International Maritime Organization (IMO), Amdt 02-13 Circular letter No. 3317.

The sample „Probe 6a“ (2.23/190417/04) was tested as received.

Test no.	Sample cube Edge length [mm]	Oven temperature [°C]	Max. temperature T _{max} of the sample [°C]	Self ignition/ Self-heating
1	100	140	144	No
2	25	140	-*	-*
3	100	120	-*	-*

* Based on clear result further testing was not necessary.

5 Evaluation of test results

Criteria for division 4.2 "Self-heating Substances" of UN-TDG and the Hazard Class "Substances and Mixtures which in contact with water emit flammable gases" of the Regulation (EC) No 1272/2008 (CLP-Regulation) respectively UN-GHS:

Trial No.	Results of Self heating*	Cube size [mm] / temperature [°C]	UN TDG - Packing Group	UN-GHS / CLP-Category
1 2	Yes Yes	100 / 140 25 / 140	II	1
1 2 3 4	Yes No Yes Yes	100 / 140 25 / 140 100 / 120 100 / 100	III	2
1 2 3 4	Yes No Yes No	100 / 140 25 / 140 100 / 120 100 / 100	Exempted if transported in packages of not more than 450 l volume	Not classified if packaged in a volume of not more than 450 l
1 2 3	Yes No No	100 / 140 25 / 140 100 / 120	Exempted if transported in packages of not more than 3 m ³ volume	Not classified if packaged in a volume of not more than 3 m ³
1	No	100 / 140	Not Class 4.2	Not Hazard Class "Self-heating Substances and Mixtures"

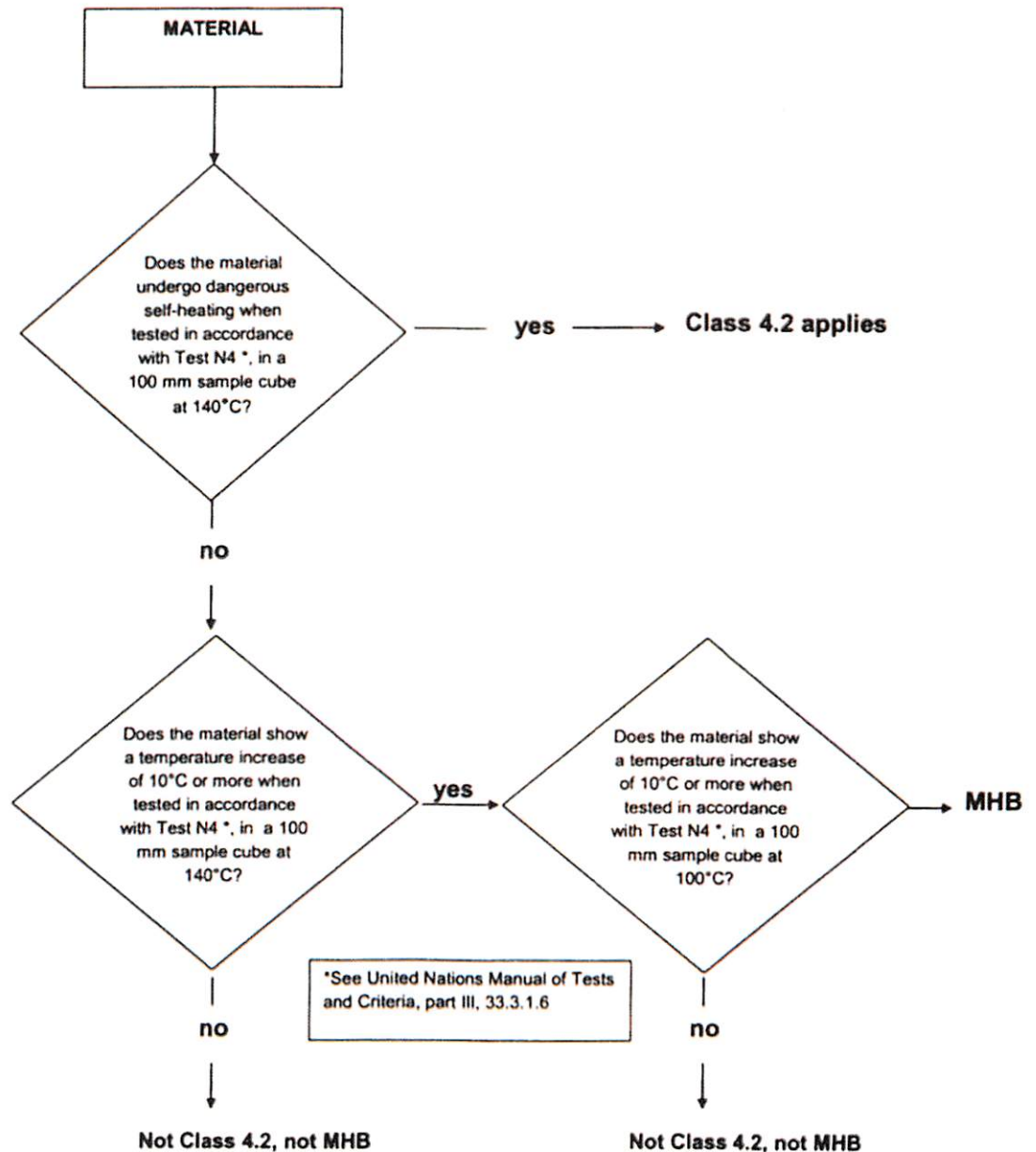
* The temperature rise minimum 60 °C or self-ignition occurs.

The six samples „Probe 1a“ (2.23/190417/06), „Probe 2a“ (2.23/190417/07), „Probe 3a“ (2.23/190417/03), „Probe 4a“ (2.23/190417/02), „Probe 5a“ (2.23/190417/05) and „Probe 6a“ (2.23/190417/04) do not fulfill the criteria of division 4.2 "Self-heating Substances" of the UN Recommendations on the Transport of Dangerous Goods, because no self-heating occurred in a 100 mm size cube at 140 °C.

On the basis of the test results and according to the criteria specified in the Regulation (EC) No 1272/2008 (CLP-Regulation) and GHS the samples „Probe 1a“ (2.23/190417/06), „Probe 2a“ (2.23/190417/07), „Probe 3a“ (2.23/190417/03), „Probe 4a“ (2.23/190417/02), „Probe 5a“ (2.23/190417/05) and „Probe 6a“ (2.23/190417/04) also not substances/mixtures of the Hazard Class "Self-heating substances and mixtures".

The samples „Probe 2a“ (2.23/190417/07), „Probe 3a“ (2.23/190417/03), „Probe 4a“ (2.23/190417/02) and „Probe 6a“ (2.23/190417/04) showed no temperature rise ≥ 10 °C in the 100 mm sample cube at 140 °C; they are not MHB-substances.

Criteria for MHB-substances (bulk cargo) according to the International Maritime Organization (IMO), Amdt 02-13 Circular letter No. 3317, 9.2.3.3:



* Test duration 48 h

The samples „Probe 1a“ (2.23/190417/06) und „Probe 5a“ (2.23/190417/05) showed at the UN-Test N.4 in a 100 mm sample cube at 140 °C a temperature rise of ≥ 10 °C.

Based on the criteria of the International Maritime Organization (IMO), Amdt 02-13 Circular letter No. 3317 they might be MHB-substances³.

³ Materials hazardous only in bulk (MHB)

The samples „Probe 1a“ (2.23/190417/06) and „Probe 5a“ (2.23/190417/05) are not MHB-substances because the temperature rise in a 100 mm sample cube at 100 °C is less than 10 °C (test duration 48 h).

According to the International Maritime Organization (IMO), Amdt 02-13 Circular letter No. 3317 they do not fulfil the criteria of MHB-substances (see flow chart).

Hazardous properties that may lead to a classification of the tested sample to another class have to be taken into account by the customer.


Bundesanstalt für Materialforschung und -prüfung (BAM)

12200 Berlin

Berlin, 14.07.2017

Division 2.2 “Reactive Substances and Systems”

by order


Dr. Heike Michael-Schulz
Regierungsdirektorin
Explosive Substances of the
Chemical Industries



Distribution list: 1st copy: Customer
2nd copy: BAM

Annex

Summary of test results

No.	Sample	Content of dry substance of kg feed ¹ [g/kg]	Moisture content of kg feed [%]	Crude fat content of kg feed ² [%]	Sum moisture+fat [%]	Classification based on test results ³	
						4.2	MHB
1	Indonesische Palmkernexpeller ex MV "Alberta" „Probe 1a" (223/190401/06)	922	7,8	7,7	15,5	No	No
2	Malaysische Palmkernexpeller ex MV "Molat" „Probe 2a" (223/190407/07)	903	9,7	4,4	14,1	No	No
3	Malaysische Palmkernexpeller ex MV "GH Black Caviar" „Probe 3a" (223/190417/03)	899	10,1	5,3	15,4	No	No
4	Indonesische Palmkernexpeller ex MV "Loch Nevis" „Probe 4a" (223/190407/02)	923	7,7	8,1	15,8	No	No
5	Indonesische Palmkernexpeller ex MV "Teal Bulker" „Probe 5a" (223/190417/05)	887	11,3	7,1	18,4	No	No
6	Malaysische Palmkernexpeller ex MV "Loch Nevis" „Probe 6a" (223/190407/04)	871	12,9	4,9	17,8	No	No

¹ LKS Lichtenwalde, VDLUFA III, 3.1; (accredit.)

² LKS Lichtenwalde, VDLUFA III, 5.1.1 (accredit.)

³ Gemäß UN-Test N 4 und IMO, Amdt. 02-13 Circular letter No. 3317, 9.2.3.3