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MSC.1/Circ.1454/Rev.2  
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**GUIDELINES FOR DEVELOPING AND APPROVING PROCEDURES FOR SAMPLING,  
TESTING AND CONTROLLING THE MOISTURE CONTENT FOR SOLID BULK  
CARGOES WHICH MAY LIQUEFY OR UNDERGO DYNAMIC SEPARATION**

1 The Maritime Safety Committee, at its 107th session (31 May to 9 June 2023), following the adoption of resolution MSC.500(105) on *Amendments to the International Maritime Solid Bulk Cargoes (IMSBC) Code* and considering the proposal by the Sub-Committee on Carriage of Cargoes and Containers, at its eighth session, with regard to implementation of section 8 of the IMSBC Code, approved a revision of the *Guidelines for developing and approving procedures for sampling, testing and controlling the moisture content for solid bulk cargoes which may liquefy* (MSC.1/Circ.1454/Rev.1), as set out in the annex.

2 Member Governments are invited to bring the annexed Guidelines to the attention of all concerned, taking into account the voluntary application date of 1 January 2023 for amendment 06-21 of the IMSBC Code, pending its envisaged mandatory entry-into-force date of 1 December 2023.

3 This circular supersedes MSC.1/Circ.1454/Rev.1.

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## ANNEX

### **GUIDELINES FOR DEVELOPING AND APPROVING PROCEDURES FOR SAMPLING, TESTING AND CONTROLLING THE MOISTURE CONTENT FOR SOLID BULK CARGOES WHICH MAY LIQUEFY OR UNDERGO DYNAMIC SEPARATION**

#### **Foreword**

These Guidelines, prepared by the Maritime Safety Committee of the International Maritime Organization (IMO), contain guidance on the preparation, approval and implementation of procedures for sampling, testing and controlling moisture content for solid bulk cargoes which may liquefy or undergo dynamic separation. These Guidelines were developed as part of the work to ensure safe transport of such cargoes and to complement the provisions of the International Maritime Solid Bulk Cargoes (IMSBC) Code related to the assessment of acceptability of consignments (see section 4 of the IMSBC Code).

The main objectives of the Guidelines are:

- to assist shippers in preparing procedures for sampling, testing and controlling moisture content as required by 4.3.3 of the IMSBC Code; and
- to assist competent authorities of ports of loading when approving and checking the implementation of such procedures in accordance with 4.3.3 of the IMSBC Code.

#### **1 Introduction**

1.1 The IMSBC Code establishes international provisions for the safe loading, trimming, carriage and discharge of solid bulk cargoes when transported by sea, ensuring compliance with the provisions of the SOLAS Convention and identifies the risks associated with such cargoes with the aim of taking measures to minimize and to control them.

1.2 One of the risks identified is the risk associated with liquefaction or with dynamic separation of certain cargoes which may contain sufficient moisture to become fluid under the stimulus of compaction and the vibration which occurs during a voyage. Such cargoes are identified as group A cargoes in the IMSBC Code.

1.3 Liquefaction or dynamic separation may occur when the moisture content of the cargo exceeds the transportable moisture limit (TML). Therefore, except for ships complying with the requirements in 7.3.2 of the IMSBC Code, it is particularly important to ensure that the moisture content is less than the TML of the cargo and to control its moisture content until it is on board the ship.

1.4 For this purpose, it is required by the IMSBC Code to determine by a test the acceptability of consignments for safe shipment. Considering that the determination of the acceptability is fundamental to avoid liquefaction or dynamic separation during transport, the shipper should establish procedures for sampling, testing and controlling moisture content. These procedures should be approved and their implementation checked by the competent authority of the port of loading.

1.5 Sections 2, 3 and 4 of these Guidelines contain guidance to develop such procedures for sampling, testing and the control of moisture content respectively.

## **2 Development of sampling procedures**

- 2.1 The shipper should establish a sampling procedure to ensure that test samples used to determine the acceptability of consignments for safe shipment are representative of the consignments to be transported. Methods of sampling may vary since the character of the cargo and the form in which it is available will affect the method to be used. It is, therefore, of the utmost importance to describe accurately the sampling procedures.
- 2.2 The procedures should take into account the appropriate provisions of 4.4 to 4.7 of the IMSBC Code.
- 2.3 The procedure should, at least, include provisions:
- to identify the consignment to be sampled;
  - to identify the material (type, particle size distribution, composition) and to ensure that the consignment corresponds to the description of the material;
  - to identify the appropriate time, frequency and place to take samples;
  - to describe the method of sampling, including:
    - the number of subsamples or increments which are required;
    - the quantity of material to be taken (subsample or increment size);
    - the location where the subsamples or increments have to be taken in the consignment;
    - the method of combining the subsamples or increments to arrive at a representative sample;
    - the method to ensure that the moisture content of the representative sample will not be subject to variation; and
    - the method to ensure the traceability of the subsamples or increments and of the representative samples;
  - on the equipment used for sampling and procedures for its maintenance, when necessary;
  - to identify persons responsible for sampling and the description of their training to fulfil their responsibilities; and
  - to identify a technical supervisor responsible for the implementation of the sampling procedures and the description of its training commensurate with its role and responsibilities.

- 2.4 Records of the following activities addressed in the procedure for testing should be kept and made available to the competent authority of the port of loading upon request:
- training;
  - internal review to ensure that the procedure is applied correctly;
  - forms where the traceability of the subsample and representative sample is ensured;
  - maintenance of equipment for sampling, when necessary; and
  - any modification to the procedure for testing.

Records should be kept for a period of time established by the competent authority of the port of loading in the working language of the shipper. If the language or languages used are not English, French or Spanish, a translation into one of these languages should be included.

### **3 Development of testing procedures**

3.1 The shipper should establish a test procedure to determine the acceptability of its consignments for safe shipment.

3.2 The procedure should, at least, include:

- the description of the test method for determining the moisture content.

Recognized international and national methods for determining moisture content for various materials are referred to in 1.1.4.4 of appendix 2 of the IMSBC Code;

- the description of the test method for determining the acceptability of consignments.

Recommended methods for determining transportable moisture limit (TML) are given in appendix 2 of the IMSBC Code. However, it is recognized that, in some instances and taking into account the scope of each of the methods, they may not be suitable for the cargo to be transported.

If the recommended methods are not suitable for the material in question, any alternative method for this material should be approved by the competent authority of the port of loading. When approving such method, the competent authority should make sure that this method gives reliable results data in order to characterize the risk of liquefaction or dynamic separation of the cargo on board the ship. It should also be established that:

- the method can easily be carried out and is reproducible;
- the method gives compatible results at the ship level;
- the method is consistent with feedback;
- the method is capable of providing a safety margin with respect to the risk of liquefaction or dynamic separation;
- the method and its related transportability criteria to ensure that the moisture content of the consignment is less than the TML;

- the protocol to implement the test method:

The protocol should be written in the working language of the persons responsible for testing. If the language or languages used is not English, French or Spanish, a translation into one of these languages should be included.

The protocol should also include a periodic internal control procedure to ensure that the protocol is applied correctly:

- an example of the form where the consignment has to be identified and where the results to the test have to be reported;
- the list of the equipment to conduct the tests, the procedure to ensure the accurate calibration and maintenance of the equipment and the location(s) where the test is conducted;
- the list of persons responsible for testing and the description of their training to fulfil their responsibilities; and
- the name of the technical supervisor designated to be responsible for the implementation of the test procedure and the description of its training commensurate with its role and responsibilities.

3.3 Records of the following activities addressed in the procedure for testing should be kept and made available to the competent authority of the port of loading upon request:

- training;
- internal review to ensure that the protocol is applied correctly;
- forms where the consignments and results are reported;
- maintenance, calibration and testing of any testing equipment; and
- any modification of the procedure for testing.

Records should be kept for a period of time established by the competent authority of the port of loading in the working language of the shipper. If the language or languages used are not English, French or Spanish, a translation into one of these languages should be included.

#### **4 Development of procedures for controlling moisture content**

4.1 The shipper should establish a procedure for controlling moisture content to ensure that the moisture content is less than the TML when it is on board the ship. Once the moisture content has been measured, it is important to ensure that the moisture content remains below the TML. This procedure should be based on an analysis of all factors that may influence the moisture content between the production/extraction area and the ship.

4.2 The procedure should, at least, include:

- a description of the geographic configuration of the production/extraction area;
- a description of the location of the stockpiling/storage area, when applicable;

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- a description of the method(s) to transport the consignment from the production/extraction area to the stockpiling/storage area or to the ship and, when applicable, from the stockpiling area to the ship and a description of the precautions taken during these transport operations to control moisture content of the consignment (such as: use of closed vehicles, suspension of certain operations and conveyor belts sloped and covered during rainfall);
  - a description of the stockpiling/storage method(s), when applicable and of the precautions taken during stockpiling/storage (such as configuration of the pile to allow rain to run off) to control moisture content of the consignment;
  - a description of the method(s) to load the cargo from shore to ship and precautions to protect the cargo from precipitation and water ingress (see 4.3.4 when loaded from barges);
  - a description of the sampling operations between the production/extraction area and the ship to measure and report moisture content at different stages before being on board the ship (such as during stockpiling, conveyor transport, loading);
  - a description of the conditions when the cargo is not authorized to be loaded and when the loading should be suspended on board the ship (moisture content greater than the TML, weather conditions);
  - a description of the periodic internal control procedures to ensure that the procedure for controlling moisture content is applied; and
  - a description of the human and material resources and of the awareness and training activities of the personnel involved to implement the procedure.

4.3 Records of the following activities addressed in the procedure for controlling moisture content should be kept and made available to the competent authority of the port of loading upon request:

- training;
- internal review to ensure that the procedure for controlling moisture content is applied correctly;
- weather conditions during which the procedure is applied; and
- any modification of the procedure for testing.

Records should be kept for a period of time established by the competent authority of the port of loading in the working language of the shipper. If the language or languages used are not English, French or Spanish, a translation into one of these languages should be included.

## **5 Approval of the procedures by the competent authority**

5.1 According to 4.3.3 of the IMSBC Code, the procedures for sampling, testing and controlling moisture content should be approved and their implementation checked by the competent authority of the port of loading.

5.2 Before any transport of group A cargoes, the shipper should establish the required procedures as described in sections 2 to 4 of these Guidelines and should provide them well in advance to the competent authority of the port of loading for approval.

5.3 As defined in 1.7 of the IMSBC Code, the competent authority means any national regulatory body or authority designated or otherwise recognized as such for any purpose in connection with the IMSBC Code. Contracting Governments are invited to inform the Organization of the name and address of competent authorities in their country authorized to approve the procedures for dissemination through the GISIS database.

5.4 The procedures are subject to:

- .1 an initial verification by the competent authority of the port of loading before the document required in 4.3.3 of the IMSBC Code is issued. This verification should ensure that the procedures comply with the provisions of the IMSBC Code and of these Guidelines, the personnel involved have received appropriate training and the required equipment is available and in conformity with the description in the procedures;
- .2 a renewal verification at intervals specified by the competent authority of the port of loading, but not exceeding five years. This verification should ensure that the approved procedures still comply with the applicable provisions of the IMSBC Code in force at the time of the renewal verification and are implemented by the shipper; and
- .3 at least one intermediate verification. If only one intermediate verification is carried out, it should take place before the first anniversary date of the document required in 4.3.3 of the IMSBC Code. The intermediate verification should ensure that the procedures are implemented by the shipper.

5.5 The competent authority of the port of loading should determine which changes to approved procedures should not be implemented unless the relevant changes are approved.

5.6 A document should be issued after the initial and renewal verification in accordance with 4.3.3 of the IMSBC Code by the competent authority of the port of loading. It should be issued for a period specified by the competent authority of the port of loading, which should not exceed five years.

5.7 The document should clearly identify the procedures involved and should include a statement to the effect that the competent authority has approved the procedures. It should be drawn up in a form corresponding to the model given in the appendix to these Guidelines.

5.8 A copy of the document should be provided to the master or their representative in accordance with 4.3.3 of the IMSBC Code.



**APPENDIX**

(Identification of the competent authority)

(State)

Approval number:

Approval issued under 4.3.3 of the  
International Maritime Solid Bulk Cargoes (IMSBC) Code

Name and address of the shipper: .....

Port of loading: .....

Bulk cargo shipping name: .....

Reference of the procedure for sampling: .....

Reference of the procedure for testing: .....

Reference of the procedure for controlling moisture content: .....

Date of initial/renewal verification on which this approval is based: .....

This is to approve the procedures mentioned above and that they have been verified in accordance with MSC.1/Circ.1454/Rev.2 on *Guidelines for developing and approving procedures for sampling, testing and controlling the moisture content for solid bulk cargoes which may liquefy or undergo dynamic separation*

Specific remarks: .....

This approval is valid until ..... subject to verifications in accordance with MSC.1/Circ.1454/Rev.2 on *Guidelines for developing and approving procedures for sampling, testing and controlling the moisture content for solid bulk cargoes which may liquefy or undergo dynamic separation*

Issued at: .....

Date of issue: .....

(Signature of the competent authority issuing the approval)

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