



SUB-COMMITTEE ON DANGEROUS
GOODS, SOLID CARGOES AND
CONTAINERS
12th session
Agenda item 19

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REPORT TO THE MARITIME SAFETY COMMITTEE

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1 GENERAL

1.1 The Sub-Committee held its twelfth session from 17 to 21 September 2007 under the chairmanship of Mrs. Olga P. Lefèvre (France). The Vice-Chairman, Captain Juan P. Heusser (Chile), was also present.

1.2 The session was attended by delegations from the following Member States:

ANGOLA	LIBERIA
ARGENTINA	MALAYSIA
AUSTRALIA	MARSHALL ISLANDS
BAHAMAS	MEXICO
BELGIUM	MOROCCO
BOLIVIA	NETHERLANDS
BRAZIL	NEW ZEALAND
CANADA	NIGERIA
CHILE	NORWAY
CHINA	PANAMA
COLOMBIA	PAPUA NEW GUINEA
CÔTE D'IVOIRE	PERU
CUBA	PHILIPPINES
CYPRUS	POLAND
DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA	PORTUGAL
DENMARK	REPUBLIC OF KOREA
DOMINICAN REPUBLIC	RUSSIAN FEDERATION
ECUADOR	SAUDI ARABIA
EGYPT	SINGAPORE
ESTONIA	SOUTH AFRICA
FINLAND	SPAIN
FRANCE	SWEDEN
GERMANY	SWITZERLAND
GREECE	THAILAND
INDONESIA	TURKEY
IRAN (ISLAMIC REPUBLIC OF)	TUVALU
ISRAEL	UKRAINE
ITALY	UNITED KINGDOM
JAPAN	UNITED STATES
KENYA	URUGUAY
LATVIA	VANUATU
	VENEZUELA

the following Associate Member of IMO:

HONG KONG, CHINA

and the following State not Member of IMO:

COOK ISLANDS

1.3 The session was also attended by a representative from the following United Nations specialized agency:

INTERNATIONAL ATOMIC ENERGY AGENCY (IAEA)

observers from the following intergovernmental organizations:

EUROPEAN COMMISSION (EC)

MARITIME ORGANISATION FOR WEST AND CENTRAL AFRICA (MOWCA)

and by observers from the following non-governmental organizations in consultative status:

INTERNATIONAL CHAMBER OF SHIPPING (ICS)

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

INTERNATIONAL UNION OF MARINE INSURANCE (IUMI)

INTERNATIONAL CONFEDERATION OF FREE TRADE UNIONS (ICFTU)

BIMCO

INTERNATIONAL ASSOCIATION OF CLASSIFICATION SOCIETIES (IACS)

ICHCA INTERNATIONAL

EUROPEAN CHEMICAL INDUSTRY COUNCIL (CEFIC)

OIL COMPANIES INTERNATIONAL MARINE FORUM (OCIMF)

INSTITUTE OF INTERNATIONAL CONTAINER LESSORS (IICL)

INTERNATIONAL FEDERATION OF SHIPMASTERS' ASSOCIATIONS (IFSMA)

INTERNATIONAL ROAD TRANSPORT UNION (IRU)

DANGEROUS GOODS ADVISORY COUNCIL (DGAC)

INTERNATIONAL ASSOCIATION OF DRY CARGO SHIPOWNERS

(INTERCARGO)

THE INSTITUTE OF MARINE ENGINEERING, SCIENCE AND TECHNOLOGY

(IMarEST)

WORLD NUCLEAR TRANSPORT INSTITUTE (WNTI)

INTERNATIONAL BULK TERMINALS ASSOCIATION (IBTA)

VESSEL OPERATORS HAZARDOUS MATERIALS ASSOCIATION, INC.

(VOHMA)

Opening address

1.4 In welcoming participants, Mr. A. Petrov, Senior Deputy Director, Sub-Division for Marine Technology and Cargoes, observed, on behalf of the Secretary-General, that holding the session at the Central Hall, Westminster, while the IMO Headquarters building is undergoing refurbishment, would be a challenge to which the delegates would hopefully rise with a sense of good will and humour.

The Senior Deputy Director drew the Sub-Committee's attention to the theme for this year's World Maritime Day: **IMO's response to current environmental challenges**. He pointed out that this theme had provided the Organization with an excellent opportunity to increase awareness of the threat to the environment stemming from shipping operations and, by taking appropriate and preventative and, where necessary, remedial action, to show that the marine sector does care about it and is, indeed, already at the forefront of that challenge. He emphasized that the Sub-Committee's contribution to the protection of the marine environment – by permanently enhancing the safe carriage of cargoes through various measures,

thereby reducing the loss of cargoes and preventing accidental pollution – was duly appreciated and should continue unabated.

With regard to items of significance on the agenda, the Senior Deputy Director, referring to amendments to the IMDG Code noted with satisfaction the progress made by the Sub-Committee and its Group in harmonizing the provisions of the IMDG Code with those of the UN Recommendations on the Transport of Dangerous Goods. In this context he stressed that, while the harmonization exercise is important for multi-modal transport and the efficiency of world trade, it was equally important not to lose sight of the unique and specific requirements pertaining to the carriage of dangerous goods by sea. He, therefore, urged prudence and maximum care when preparing subsequent amendments to the IMDG Code.

Concerning the subject of reports received from Member States on inspection programmes for cargo transport units carrying dangerous goods, the Senior Deputy Director noted that there still remained a lack of general compliance with the applicable IMO standards and urged Member States to submit reports on inspection programmes for cargo transport units carrying dangerous goods so that a better picture of such lack of compliance may be established and appropriate actions taken. He further reiterated that a lack of compliance with the relevant provisions governing the general carriage of cargoes and dangerous cargoes in particular, could result in serious repercussions which Member States and industry, alike, could not afford to let happen.

Turning to the finalization of the mandatory BC Code, the Senior Deputy Director referred to the identification of mandatory and recommendatory parts thereof – an exercise, which will lead to the adoption of appropriate amendments to chapters VI and VII of SOLAS to make the Code obligatory and stated that in turn the expectation is that the mandatory status of the BC Code will, in due course, contribute to the enhancement of the safe, secure and efficient carriage of the solid bulk cargoes.

With respect to the work on guidance on providing safe working conditions for securing of containers, the Senior Deputy Director noted that the work, which will help to identify where improvements should, and can, be made in the design and operation of containerships, to the benefit of the safety of both shore workers and ship's crew, will result in revised guidelines for the preparation of the cargo securing manual that will ensure that cargo securing manuals cover all relevant aspects of cargo stowage and securing and provide a uniform approach to their preparation, layout and content as well as ensuring that securing devices meet acceptable functional and strength criteria applicable to the ship and its cargo.

The Senior Deputy Director referred to other important issues on the agenda, such as the Review of the SPS Code; Application of requirements for dangerous goods in packaged form in SOLAS and the 2000 HSC Code; casualty and incident reports and analysis; extension of the BLU Code to include grain; guidance on protective clothing; and the form and procedure for approval of the Cargo Securing Manual; all of which deserve meticulous and in-depth consideration and, noting the good progress made intersessionally, thanked correspondence groups, especially their co-ordinators and all the participating Governments and organizations, for providing their expertise, time and other resources.

On additional issues of a more general nature, the Senior Deputy Director referred to security at IMO meetings and stressed that complacency about security was not an option, and no compromise could be made on this critical issue.

Referring to the Voluntary IMO Member State Audit Scheme, the Senior Deputy Director reminded delegates that putting the scheme on a strong basis is one of the Organization's top priorities for this and the years to come and, once again, the Secretary-General seeks the support and co-operation of anyone in a position to contribute to its wide and effective implementation. He then informed delegates that audits of Member States commenced last September and to date 14 had been completed and from all indications, the process has been successful, with all the Member States audited so far having accepted the outcome of the audits. A total of 34 Member States had so far volunteered to be audited and, while encouraging all remaining Member States to consider offering themselves for audit, those that intend to do so were invited to notify the Organization as soon as possible; this will facilitate the planning of audits to be conducted during the remaining months of this and the next biennium.

Chairman's remarks

1.5 The Chairman, in thanking the Senior Deputy Director, stated that the Secretary-General's words of encouragement as well as the advice and requests would be given every consideration in the deliberation of the Sub-Committee.

Adoption of the agenda and related matters

1.6 The Sub-Committee adopted the agenda (DSC 12/1/Rev.1 and DSC 12/1/Rev.1/Corr.1) and a provisional timetable (DSC 12/1/1/Add.1), as amended, for guidance during the session. The agenda, as adopted, with a list of documents considered under each agenda item, is set out in document DSC 12/INF.10.

1.7 The Sub-Committee's decisions on the establishment of working and drafting groups are reflected under sections of this report covering corresponding agenda items.

2 DECISIONS OF OTHER IMO BODIES

2.1 The Sub-Committee noted the decisions and comments pertaining to its work made by MEPC 55, MSC 82, FP 51, DE 50, FAL 34, BLG 11, SLF 50, MEPC 56 and NAV 53, as reported in documents DSC 12/2 and DSC 12/2/1, and took them into account in its deliberations when dealing with relevant agenda items.

3 AMENDMENTS TO THE IMDG CODE AND SUPPLEMENTS, INCLUDING HARMONIZATION OF THE IMDG CODE WITH THE UN RECOMMENDATIONS ON THE TRANSPORT OF DANGEROUS GOODS

3.1 The Sub-Committee noted that sub-items .1 and .2 of this agenda item, concerning respectively the harmonization of the IMDG Code with the UN Recommendations on the Transport of Dangerous Goods, and amendments to the IMDG Code and supplements were closely associated with each other and decided to consider the submissions related to these two sub-items together.

REPORT OF THE EDITORIAL AND TECHNICAL GROUP

3.2 The Sub-Committee approved, in general, the report of the Editorial and Technical Group on its session, which was held from 28 May to 1 June 2007, and took decisions on actions requested of the Sub-Committee (DSC 12/3, paragraphs 34.1 to 34.12) as indicated in the following paragraphs.

Errata and corrigenda to the IMDG Code (amendment 33-06)

3.3 The Sub-Committee approved draft errata and corrigenda to the IMDG Code, amendment 33-06, and, subject to finalization by the E&T Group on the basis of decisions taken during plenary, requested the Secretariat to issue the finalized errata and corrigenda before 1 January 2008, the date from which amendment 33-06 of the IMDG Code would attain mandatory status.

Amendments to the IMDG Code

Packing instruction LP02

3.4 The Sub-Committee, having considered the observation of the E&T Group that the text of the Note below 4.1.1 from the UN Recommendations on the Transport of Dangerous Goods should be amended to include LP02 for class 2 as this packing instruction refers to waste aerosols and noting that the UN Sub-Committee of Experts had considered the outcomes of the E&T Group meeting at their 31st meeting from 2 to 6 July 2007 and agreed with the observation of the E&T Group, agreed to include packing instruction LP02 in the Note below 4.1.1 in the IMDG Code.

Consistency of label colouring

3.5 The Sub-Committee, having noted the observation of the E&T Group that there were some colour discrepancies between the published versions of the Code and the UN Recommendations, requested the Secretariat to take appropriate action so as to ensure consistency of labels between the published versions of the IMDG Code.

Specific provisions for the transport of excepted packages (class 7)

3.6 The Sub-Committee, having noted the consideration of the E&T Group on the intent of 1.5.1.5.1 and the group's observation that there may be potential for confusion caused by including the word "may" twice and other discrepancies in paragraph 2.7.2.4.1 as highlighted by the observer from IAEA, noted that the Secretariat anticipated attending the IAEA harmonization meeting in September 2007.

Special provisions 216, 217, 218 and 335

3.7 The Sub-Committee noted that the UN Sub-Committee of Experts had agreed to modify special provision 335 to indicate that, when free liquid is visible, the mixture should be classified under UN 3082 and further agreed to replace the term "bulk packaging" with "bulk container" in the second sentence and to insert a new third sentence to read "If free liquid is visible at the time the mixture is loaded or at the time the packaging or cargo transport unit is closed, the mixture shall be classified as UN 3082", and agreed to forward the text to the E&T Group for finalization.

Dangerous goods packed in excepted quantities

3.8 The Sub-Committee noted that the E&T Group, in considering the requirements for documentation for dangerous goods in excepted quantities noted, with the exception of one delegation, that the text of paragraph 3.5.6 of the UN Recommendations on the Transport of Dangerous Goods regarding documentation was inconsistent with the text of SOLAS

regulation VII/4 and regulation 4 of MARPOL Annex III and was not in line with the decisions made by the Sub-Committee at its ninth session (DSC 9/15, paragraph 3.9) had drafted two possible options for the text in paragraph 3.5.6.1 of document DSC 12/3, annex 4.

3.9 The Sub-Committee recalled that DSC 9 had agreed that in the interest of safety, the requirement for dangerous goods, transported in any quantities, to be documented was extremely important and any relaxation would not be suitable and that regarding the labelling and marking of packagings and cargo transport units, containing dangerous goods in any quantities, DSC 9 opined that the existing provisions in the IMDG Code were appropriate with regards to the maritime mode and it would not be prudent to permit any relaxations.

3.10 The Sub-Committee further recalled that MSC 80 endorsed the decisions of DSC 9 regarding transport of dangerous goods in limited quantities, excepted quantities and consumer quantities and, following detailed debate, during which the majority of the delegations were in favour of having a transport document for dangerous goods in excepted quantities and accepted the alternative text proposed for section 3.5.6.1, agreed to forward this text to the E&T Group for finalization and requested the secretariat to forward the decision to the UN Sub-Committee of experts.

3.11 The Sub-Committee noted the observation of the E&T Group that SOLAS regulation II-2/19.4 provided for exemptions from the document of compliance provisions for ships carrying dangerous goods in limited quantities, but that there were no provisions for dangerous goods packed in excepted quantities, and having decided that the exemption should also apply to dangerous goods in excepted quantities, forwarded the decision to the Working Group on Application of the requirements for dangerous goods in packaged form in SOLAS and the 2000 HSC Code with the instruction to prepare corresponding amendments to SOLAS and the 2000 HSC Code.

3.12 The Sub-Committee noted the view of the E&T Group that there might be a problem regarding the marking of the marine pollutant mark on cargo transport units transporting dangerous goods in excepted quantities which are marine pollutants; however, the Sub-Committee agreed not to require a marine pollutant mark on cargo transport units transporting dangerous goods in excepted quantities which are marine pollutants and forwarded this decision to the E&T Group take it into account when finalizing the draft amendment 34-08.

Title of chapter 2.9 of the IMDG Code

3.13 The Sub-Committee, noting the view of the E&T Group that the heading of chapter 2.9 would have to be consequentially amended to take account of the inclusion of environmentally hazardous substances provisions, agreed to consider the issue with consideration of document DSC 12/3/13.

Use of unpacked dry ice for cooling purposes in cargo transport units

3.14 The Sub-Committee, having noted that the E&T Group had agreed that paragraph 3 of special provision 297 should be amended to mirror the text of the UN Recommendations and that if 5.4.2.1.8 was consequentially amended to align with special provision 297 it would result in a reduction in the safety of the provision and also disharmony with the text of the UN Recommendations and the IMO/ILO/UNECE Guidelines, noted that the United Kingdom intended to submit a proposal on this issue to UNSCOE 32 and agreed to postpone discussion on the item, pending the outcome of consideration by the UN Sub-Committee.

Stowage and segregation provision for UN 3476

3.15 The Sub-Committee noted that the E&T Group, having inserted new entries, arising from amendments to the UN Recommendations, into the Dangerous Goods List, had identified additional provisions applicable to the IMDG Code and that for UN 3476 Category A or Category B stowage provisions could apply and, having agreed that Category A provisions should be applied, forwarded the decision to the E&T Group for finalization.

Provisions in the event of a class 1 incident

3.16 The Sub-Committee noted that the E&T Group, having considered a proposal to add a new general clause related to provisions in the event of a class 1 incident noted that:

- .1 the proposal should be amended to include a wider range of potential hazards;
- .2 the proposal may also be applicable to other classes; and
- .3 the sitting could not readily be agreed upon,

and that in the light of the above observations, the E&T Group had replaced the word “shall” with “should” in the proposed text and placed the proposal in square brackets.

3.17 The Sub-Committee agreed in principle that the proposal should apply to all classes of dangerous goods and forwarded it to the E&T Group for finalization.

Approval of draft amendment 34-08 to the IMDG Code

3.18 The Sub-Committee considered the request of the group (DSC 12/3, paragraph 34.9) to approve draft amendment 34-08 to the IMDG Code and took decisions as detailed in paragraphs 3.56 to 3.58.

Highlighting amendments between versions of the IMDG Code

3.19 The Sub-Committee, noting that as a result of the change in formatting of the IMDG Code to a bound version it is no longer possible to readily identify amendments to provisions between versions of the IMDG Code, requested the Secretariat to investigate options to highlight the amendments to provisions between versions of the IMDG Code.

Amendments to the Revised EmS Guide

3.20 The Sub-Committee agreed to the draft MSC circular on Carriage of dangerous goods, Amendments to the Revised Emergency Response Procedures for Ships Carrying Dangerous Goods (EmS Guide), as set out in annex 1, for submission to MSC 84 for approval.

UN RECOMMENDATIONS ON THE TRANSPORT OF DANGEROUS GOODS

Outcome of UNSCOE 31

3.21 The Sub-Committee noted that the UN Sub-Committee of Experts met from 2 to 6 July 2007 and that:

- .1 modal regulators were encouraged to immediately implement changes to Packing Instruction P804 (DSC 12/3/5, paragraph 2);
- .2 the Sub-Committee agreed on a transitional period for the application of the new criteria for the drop test on IBCs (DSC 12/3/5 paragraphs 3 and 4);
- .3 the Sub-Committee recognized that chapter 2.9 would benefit from improved presentation but took no action at that time (DSC 12/3/5 paragraph 5);
- .4 the Sub-Committee invited comments and a formal paper to be submitted to the next session to consider providing specific information related to fumigated transport units and transport units containing dry ice as a refrigerant; and
- .5 regarding the outcomes of the E&T Group meeting in May/June this year, the Sub-Committee agreed with the recommendations of the group (DSC 12/3/5, paragraphs 7 to 14),

and having considered the relevant outcome of the UNSCOE 31, as outlined above, agreed in principle with those decisions and instructed the E&T Group to incorporate the outstanding proposals in the draft amendment 34-08.

Outcome of the UNSCOE 31 Working Group on limited quantities (multimodal harmonization)

3.22 The Sub-Committee, having considered a document by the Secretariat (DSC 12/INF.9), reporting on the outcomes of the Working Group on limited quantities (multimodal harmonization) established by the UN Sub-Committee of Experts to analyse the provisions applicable to different modes of transport, which agreed that a wide consultation of the modal organizations concerned would be necessary and requested feedback from relevant international organizations to facilitate the development of further proposals at the next session, and, having considered the outcome of the discussion on the issue by the informal group, agreed:

- .1 with the proposal to combine the provisions applicable to limited quantities and consumer commodities. The result would be to delete paragraph 3.4.7 which removes the exemption for retail goods;
- .2 that the diamond shaped mark with no numbers that has been suggested by the UN TDG, given in page 4 of DSC 12/INF.9, was acceptable for the sea mode in order to identify packages containing limited quantities;
- .3 that the same mark as above but 250X250mm would also be required for marking CTUs containing limited quantities; and
- .4 that full documentation, as required by chapter 5.4 of the IMDG Code, would be necessary,

and further agreed to refer the above to the UNSCOE, while, with regard to the need for the Marine Pollutant Mark on CTUs containing limited quantities, noted an opinion that the Marine Pollutant Mark should not be necessary, but the information on Marine Pollutant in CTUs should be readily available.

Presentation of chapters 2.9 and 2.10 of the IMDG Code

3.23 The Sub-Committee, having considered a proposal by the United Kingdom (DSC 12/3/13) to present chapter 2.9 of the IMDG Code in a more user-friendly way and to make some editorial amendments to chapters 2.9 and 2.10:

- .1 did not support the proposed changes to the title of chapter 2.9, nor did it support the proposed changes to notes 1 and 2;
- .2 adopted the text of chapter 2.9 as drafted by the E&T Group and deleted the text in square brackets;
- .3 did not agree to insert special provision SP 179 as paragraph 2.9.2.1;
- .4 did not support the proposals to amend chapter 2.10, with the exception of the footnote; and
- .5 referred the footnote to the E&T Group for further consideration on where it should be placed for finalization.

However, the Sub-Committee noted that SP 179 was not assigned to any UN number in the IMDG Code and, therefore, instructed the E&T Group to consider the issue and to make the appropriate corrections to the Code.

MANDATORY TRAINING

3.24 The Sub-Committee recalled that MSC 82 considered document MSC 82/13/2 (United Kingdom) and a proposal for mandatory IMDG Code training for shore side personnel, noted that the proposal had merit and instructed the Sub-Committee to look further into the proposal, bearing in mind that making the recommendatory training provisions in the IMDG Code might not be the only solution and, therefore, in addition, explore other avenues, that would result in a better application of, and compliance with, the provisions of the Code ashore.

3.25 The Sub-Committee, having considered a document by the United Kingdom (DSC 12/3/3) on the issue of non-compliant dangerous goods cargoes being presented for carriage by sea, which observed that such cargoes may originate many miles from a marine environment due to a lack of awareness of the unique hazards of the ship environment and the requirements of the IMDG Code and a document by ICHCA (DSC 12/3/17) observing that there is widespread concern regarding the transport of dangerous goods by sea, that unilateral initiatives would not bring about a sustained improvement in the situation and that a legal requirement for suitable training of shore side staff should be reflected in the IMDG Code, agreed, in principle, that shore side staff should undergo appropriate training if they were to be applying the provisions of the IMDG Code and, furthermore, noted that a number of Member Governments had already mandated such training requirements in their national regulations.

3.26 While considering issues surrounding the mandatory application of training requirements for shore side personnel, some delegations were of the view that placing the complete text of the IMDG Code, in Print Document Format only, would assist in better accessibility and promotion of the provisions of the Code, noting that a similar provision existed whereby the complete text

of the UN Recommendations on the transport of dangerous goods was freely accessible and downloadable from the internet. However, the Sub-Committee recognized that that was not an issue which was under the purview of this Sub-Committee and invited the Committee to look into the possibility of making available the complete text of the IMDG Code freely downloadable from the internet.

3.27 In the course of considering how the provisions could be implemented, it was noted that national regulations already mandate compliance with the IMDG Code and perhaps these could be extended by analogy to mandatory training. It was also noted that several training packages are already available and that although training organizations would need some time to prepare for a mandatory requirement, this need not be too difficult.

3.28 Having deliberated the matter at length, the Sub-Committee agreed to making the provisions of the IMDG Code on training of shore-side personnel handling dangerous goods mandatory; forwarded the proposal set out in the annex to document DSC 12/3/3 (United Kingdom), as amended by the Sub-Committee and the comments made in plenary, to the E&T Group for finalization and inclusion in amendment 34-08 to the IMDG Code; and agreed that it had adequately considered the issue of alternatives to mandating the requirement for training of shore side personnel in the IMDG Code.

3.29 The Sub-Committee noted that even though there was a majority support in principle for the proposals, some delegations could not support the proposals, as, in their view, IMO did not have the jurisdiction to mandate proposals relevant to shore-side and as such reserved their position.

3.30 The delegation of Panama expressed the view that Panama is aware of the need for IMDG Code training of shore-side personnel in the interest of safety of shipboard personnel and the marine environment. That delegation expressed its appreciation for the documents submitted and for the information contained therein. However, the proposal to provide for mandatory training of shore-side personnel raised concerns that would have to be dealt with before a final decision could be reached on the subject, which is the competence of the Committee. In that delegation's view, the proposal should address various aspects relating to implementation within a maritime context as well as to IMO's mandate. The proposed certification, verification and auditing seem to be beyond the remit of maritime administrations, and may even be considered to be more relevant to other organizations such as ILO. Particular attention should be paid both to the proposals to make the IMDG Code freely available on the IMO website, and to the impact that this may have on IMO's Printing Fund. The matter should first be considered by IMO's relevant bodies. Before discussing the subject of mandatory IMDG Code training requirements and a date of entry when they would come into force, the Sub-Committee should consider that it was necessary to deal with, *inter alia*, the issues mentioned above and the technical co-operation requirements for an appropriate implementation that will allow for an improvement in safety, but not as a measure to determine the levels of liability and insurance relating to cargo.

3.31 The delegation of Cyprus shared the concerns and the intent of document DSC 12/3/3 and believed that training is necessary and essential to the improvement of safety and the reduction of marine casualties. That delegation added that Cyprus was inclined to believe that by mandating the training of shore-based personnel one might be entering the competence of other National Authorities than the Maritime Administration of a Member State. In that delegation's opinion, Cyprus observed that the problem identified in the paper, was a problem of awareness and could be easily rectified via a circular to all shore-based personnel for the provisions of the IMDG code in a non-mandatory manner. Regarding the proposal to include the IMDG Code on the website

of the IMO for free downloads, the delegation stated that selling IMO publications represented a financial lifeline not only to the Technical Co-operation Fund but also to the Organization as a whole. That delegation reserved the right to raise this issue at other bodies of the Organization including the Legal Committee and the Council.

3.32 The Chinese delegation, while supporting in principle the amendments concerning the mandatory training for shore side personnel in chapter 1.3 of the IMDG Code, was of the view that the training of shore side personnel involves co-ordination with different organizations and authorities and that Administrations need more time for preparation and co-ordination of the mandatory application of provisions. Therefore, the Chinese delegation proposed that mandatory training should not be included in amendment 34-08 to the IMDG Code.

MARINE POLLUTANTS

Requirements for declaration of Proper Shipping Name as distinct from Correct Technical Name

3.33 The Sub-Committee, having considered a proposal by Germany (DSC 12/3/7) to make editorial amendments to chapter 3 of the IMDG Code to clarify the requirements of a “proper shipping name” as required by the IMDG Code as distinct from the “correct technical name” as required by MARPOL Annex III, supported the proposal in principle and forwarded it to the E&T Group for finalization, taking into account the comments of the Sub-Committee.

DSC circular on Marine Pollutants

3.34 On the basis of a draft DSC circular by the United Kingdom (DSC 12/3/14) proposing a method to address how the IMDG Code (amendment 34-08) should provide for marine pollutant issues from 1 January 2008 to 1 January 2009 during the voluntary application period, the Sub-Committee approved DSC.1/Circ.54 on Information on the amendments to the marine pollutant provisions, subject to editorial improvement and alignment with MARPOL Annex III, where necessary, by the E&T Group, and invited the MSC and the MEPC to endorse the course of action taken by the Sub-Committee.

DSC circular on Guidance on the application of chapter 2.10 (Marine Pollutants) of the International Maritime Dangerous Goods (IMDG) Code (amendment 33-06)

3.35 Having considered a draft DSC circular prepared by the Secretariat, in consultation with the Chairman, (DSC 12/3/18) proposing a method for addressing the need to meet the requirements of chapter 2.10 of the IMDG Code, the Sub-Committee approved DSC.1/Circ.55 on Guidance on the application of chapter 2.10 (Marine Pollutants) of the International Maritime Dangerous Goods (IMDG) Code (amendment 33-06) subject to editorial improvement by the E&T Group, and invited the MSC and MEPC to endorse the course of action taken by the Sub-Committee.

SEGREGATION OF PERSULPHATES

3.36 The Sub-Committee, having considered documents by Germany (DSC 12/3/8) and the United States (DSC 12/3/15 and DSC 12/INF.8) regarding the segregation of persulphates and supported the intent of the proposals but had mixed views on which proposals were clearer and should therefore be adopted.

3.37 Following the debate, during which the delegation of Germany withdrew its proposal to amend column 16 for UN 3215 and its proposal to amend column 17 for UN 3215 and instead proposed a special provision assigned to UN 3215 taking care of the issue, the Sub-Committee agreed to forward the amended proposals to the E&T Group for finalization in light of the aforementioned comments.

MISCELLANEOUS PROPOSALS

3.38 The Sub-Committee considered other proposals relevant to the carriage of dangerous goods as detailed in the following paragraphs.

Guidance on providing additional information in the transport/shipping document

3.39 The Sub-Committee's attention was drawn to the relevant decision of MSC 82 which, following consideration of documents MSC 82/13/1 (United Kingdom) and MSC 82/13/3 (WNTI) instructed the Sub-Committee to:

- .1 prepare suitable amendments to the Code, which will avoid duplication of information already provided; and
- .2 to develop appropriate guidance for all classes of dangerous goods, in the form of amendments to the IMDG Code, on providing additional information in the transport/shipment document to ensure, amongst others, that additional information does not clutter the documents, thereby suppressing safety-related information.

3.40 Having considered the above decision of MSC 82, the Sub-Committee agreed to forward the documents to the E&T Group for further consideration and advice to DSC 13.

Exclusion of Tampico fibre from the IMDG Code

3.41 Having recalled that DSC 10 considered a proposal by Mexico (DSC 10/3/2) to exclude Tampico fibre from the IMDG Code and that the proposal was not supported on the basis that no supporting test report was provided, the Sub-Committee considered document DSC 12/3/2 (Mexico) containing the same proposal, accompanied by a test report, endorsed the proposal and instructed the E&T Group to finalize the matter, taking into account the need to amend SP299 following support of the Sub-Committee for option 1 proposed by Mexico.

Removal of practical obstacles in the use of exemptions

3.42 The Sub-Committee, having recalled that DSC 10 had considered a proposal by CEFIC (DSC 10/3/7) to remove the practical obstacles in the use of exemptions, to improve through voyage awareness of their existence and that the proposal was not adopted, whilst, nevertheless, Member Governments were urged to make best possible use of the available mechanisms to promulgate information, considered document DSC 12/3/4 (CEFIC) which observed that no significant improvements had been made and proposed that section 7.9.1.1 of the IMDG Code should be amended so that recipients of exemptions obtained formal acknowledgement of them from the competent authorities of the flag State and the port States of arrival and departure.

3.43 Following consideration of the proposal of CEFIC, the Sub-Committee expressed sympathy with the views of CEFIC and acknowledged that it was necessary to have an effective

notification process; however, the Sub-Committee, having also noted that there could be problems with positive acknowledgement procedures, tacit acknowledgement procedures and with tripartite agreements, forwarded the document to the E&T Group for further consideration and advice to DSC 13.

Updating of the Guidelines on Packing of Cargo Transport Units

3.44 The Sub-Committee considered document DSC 12/3/6 (Germany) and noted that although the IMDG Code is updated every two years the Guidelines on Packing of Cargo Transport Units have not been amended since the adoption of amendment 31-02 of the IMDG Code and that the Guidelines may benefit from improvements.

3.45 The Sub-Committee recalled that MSC 76 had approved MSC/Circ.787 on IMO/ILO/UNECE Guidelines for Packing of Cargo Transport Units, which were prepared in co-operation with the UNECE Working Party on Combined Transport (WP.24), and that these Guidelines were subsequently endorsed by the Inland Transport Committee of the UNECE in January 1997 and by the Governing Body of the ILO in March 1997, agreed that the proposal of Germany had merit and as such, prepared a justification for a new work programme item on the review of the aforementioned resolution for consideration by the Committee, set out in annex 2.

Fumigated containers

3.46 The Sub-Committee considered a proposal by Belgium (DSC 12/3/9), which observed that consideration of the transport of Container Transport Units (CTUs) under fumigation is growing substantially, and so is the demand for clarity in respect of the documentation as required under paragraph 5.4.4.2 and that the international shipping community and the local and/or port authorities understand that whenever reference is made to "Transport Document" by definition, this refers to the Multimodal Dangerous Goods Form (MDGF) as per paragraph 5.4.5 of the IMDG Code.

3.47 The Sub-Committee noted the view of Belgium that the MDGF is not the appropriate document for shipment of fumigated containers, containing no dangerous goods within the scope of the IMDG code and that the information required in this dangerous goods transport document specified in paragraph 5.4.1.6 on Certification and paragraph 5.4.2 on Container/vehicle packing certificate should not apply to fumigated containers which do not contain dangerous goods.

3.48 Furthermore, the Sub-Committee noted the view of Belgium that, because the aforementioned repeatedly results in those fumigated CTUs, containing no dangerous goods, being put on hold unnecessarily, which impedes commerce and also results in undue additional risks to already congested terminals and ports where they are held, introducing a more generic description commonly used throughout the shipping industry could prove beneficial and reduce present burden, therefore an alternative for the wording "transport document" is "shipping document"; defined as "a document listing the items in a shipment, and showing other supply and transportation information that is required by all parties concerned in the movement of material".

3.49 The Sub-Committee had mixed views on the effectiveness of the proposals by Belgium and, noting that UNSCOE 32 was going to consider the matter as it had a multimodal transport dimension, invited Belgium to submit a revised proposal to DSC 13, taking into account the relevant outcomes of UNSCOE 32.

UN 3028, Nickel-Hydride portable accumulators

3.50 The Sub-Committee, having considered a proposal by Germany (DSC 12/6/8) on the investigation report into the explosion and fire on board CMV **Punjab Senator** resulting from the carriage conditions for two containers filled with rechargeable batteries and a consequential proposal (DSC 12/3/10) that UN 3028 should be subject to a new special provision applying the regulations only when transported by sea, subject to certain conditions, noted that whilst 60°C could not be considered a cool temperature, it was possible that containerised cargoes could be subjected to temperatures in excess of 60°C when exposed to heat sources such as solar radiation in tropical climates.

3.51 The Sub-Committee further noted that the range of cargoes that might be adversely affected by such heat sources and high temperatures could be quite wide and include a number of cargoes that were not classified as dangerous goods and that, therefore, it might not be appropriate to amend the IMDG Code provisions only in light of the unfortunate experience with the CMV **Punjab Senator**.

3.52 The Sub-Committee, in considering how to progress the matter, noted that similar discussions were currently ongoing at the UNSCOE and that, whilst it might be premature to issue a DSC Circular before the outcomes of the considerations at the UNSCOE were completed, it was appropriate to draw the attention of the Committee to the potentially serious consequences of exposing some containerized cargoes to elevated heat sources.

INF Code

3.53 The Sub-Committee, having considered a proposal by France (DSC 12/3/11) to reinstate a link to the INF Code in the IMDG Code directing users of the Code to the INF Code for those UN numbers under which INF Cargoes should be transported, agreed with the proposal and forwarded it to the E&T Group for finalization.

Stowage of goods of class 3

3.54 The Sub-Committee, having considered a submission by France (DSC 12/3/12), which observed that paragraphs 7.1.9.2 and 7.1.9.6 of the IMDG Code strictly apply particular stowage conditions to flammable substances with a flashpoint of 23°C c.c. of packing group III and that perhaps the wording should be amended so that the provisions are only applicable to those substances with a flashpoint less than 23°C c.c., agreed with the proposal and forwarded it to the E&T Group for finalization and inclusion in amendment (34-08) to the IMDG Code.

Packing Instruction P001

3.55 The Sub-Committee, having considered a proposal by the Republic of Korea (DSC 12/3/16), observed that the requirements of PP1 in packing instruction P001 for UN Nos. 1133, 1210, 1263 and 1866 are not similar to the requirements of paragraphs 3.4.2.1 and 3.4.2.2 of the IMDG Code and that PP1 in packing instruction P001 should not be deleted to avoid confusion. Having noted that this provision applied not just to the sea mode, the Sub-Committee was of the opinion that if an amendment were necessary it should also be raised at the UNSCOE.

Transport of peat in bulk

3.56 The Sub-Committee, having considered a report by Sweden (DSC 12/6/3) on an incident whereby a lorry load of peat in bulk that was not documented as a dangerous good was found glowing and smouldering *en route*, noted the information provided and invited Sweden to present further information to the Sub-Committee on measures that could be taken to prevent future incidents and how to provide information on such measures to the maritime community.

DRAFT AMENDMENT 34-08 TO THE IMDG CODE

3.57 On the basis of document DSC 12/3, annex 4, the Sub-Committee agreed to amendment 34-08 to the IMDG Code and authorized the E&T Group to finalize all the agreed texts and prepare a final text of draft amendment 34-08 to the IMDG Code taking into account the agreed in principle proposals, relevant decisions of the MSC and the MEPC and comments made during plenary. The Sub-Committee requested the Secretary-General to circulate them in accordance with SOLAS article VIII, for consideration and subsequent adoption at MSC 84.

3.58 In that context, the Sub-Committee recalled that MSC 75 (MSC 75/24, paragraph 7.36) approved the proposed procedure for the adoption of future amendments to the IMDG Code, including the proposed general authorization for circulation of the proposed amendments, which provides for the following:

- .1 amendments to the mandatory IMDG Code should be adopted at two-year intervals so that they may enter into force on the 1st January of even years, e.g., 1 January 2006, 1 January 2008 and so on;
- .2 the DSC Sub-Committee, at a session which takes place in an odd year, prepares and agrees to proposed amendments developed on the basis of the amendments approved by the UN Committee of Experts on the Transport of Dangerous Goods and those proposed by Member Governments;
- .3 the proposed amendments to the IMDG Code, so agreed by the DSC Sub-Committee, are circulated by the Secretary-General to all IMO Members and Contracting Governments to SOLAS in accordance with SOLAS article VIII(b)(i) for consideration and adoption by the expanded MSC at its first session thereafter;
- .4 proposed amendments, as may be adopted by the expanded MSC in accordance with SOLAS article VIII(vi)(2)(bb), will enter into force 18 months later, i.e., on the 1st January of even years;
- .5 one year prior to the date of entry into force of new amendments, Governments are invited to apply them on a voluntary basis. During that period, the carriage of dangerous goods in compliance with either the IMDG Code in force or the Code incorporating the new amendments should be acceptable; and
- .6 the MSC resolution on adoption of new amendments to the IMDG Code should include, in an operative paragraph, a clause on the above-mentioned treatment of the amended Code referred to in subparagraph .5.

3.59 In agreeing to the above amendments to the IMDG Code, the Sub-Committee authorized the Secretariat, when preparing the final texts thereof, to effect any editorial corrections that might be identified.

FUTURE SESSIONS OF THE E&T GROUP

3.60 The Sub-Committee noted that this issue would be dealt with under agenda item 16 (Work programme and agenda for DSC 13).

4 AMENDMENTS TO THE BC CODE, INCLUDING EVALUATION OF PROPERTIES OF SOLID BULK CARGOES

General

4.1 The Sub-Committee considered proposals submitted under this agenda item and relevant parts of document DSC 12/5 (Japan) as detailed in the following paragraphs.

Report of the working group established at DSC 11

4.2 The Sub-Committee recalled that at DSC 11 it had established the Working Group on the Amendments to the BC Code and its Mandatory Application, with the terms of reference outlined in paragraph 5.8 of document DSC 11/19 and that on the basis of the oral report of the chairman of the working group it had established the Correspondence Group on Amendments to the BC Code and its Mandatory Application, under the joint co-ordination of Australia and Japan, with the terms of reference indicated in paragraph 5.12 of document DSC 11/19. The Sub-Committee considered that the actions requested had been overtaken by the subsequent work of the correspondence group and approved, in general, those parts of the report related to agenda item 4.

Report of the correspondence group

4.3 The Sub-Committee following consideration of the 7 parts of the report of the correspondence group (DSC 12/4/4, DSC 12/4/5, DSC 12/4/6, DSC 12/4/7, DSC 12/4/8, DSC 12/4/9 and DSC 12/4/10) and relevant documents submitted to the session (DSC 12/4/17, DSC 12/4/18 and DSC 12/5), approved the report, in general, and took decisions as detailed below:

- .1 endorsed the view of the working group on the contents and supplements of the BC Code, removed the square brackets from the title of Section 1, and, having noted that Section 2 was also applicable to the carriage of solid bulk cargoes, forwarded the amended title to the working group for improvement, as appropriate (DSC 12/4/5, paragraphs 13, 14 and 18.1 and annex 3);
- .2 agreed that tripartite agreements are appropriate in the case of dangerous solid bulk cargoes not listed in the BC Code (DSC 12/4/5, paragraphs 6 to 8);
- .3 regarding non-dangerous solid bulk cargoes not listed in the BC Code, agreed that the possibility of having tripartite agreements should be further explored and, furthermore, noted the need to identify those cargoes; that in the absence of tripartite agreements, there might be safety concerns regarding MHB; and that

- entities concerned need to be made aware when the tripartite agreements are required (DSC 12/4/5, paragraphs 6 to 8);
- .4 noted that, although there would be an increased administrative burden, it might be necessary to include all solid bulk cargoes not listed in the BC Code until the majority of the hazardous cargoes had been identified. The Sub-Committee further noted the need for consistency in determinations and forwarded the matter to the working group for consideration and proposals on a way ahead (DSC 12/4/5, paragraphs 6 to 8);
 - .5 removed the square brackets and decided to retain the text in sub-section 1.7.22 (DSC 12/4/5, annex 5);
 - .6 deleted the text of sub-section 2.1.1 (DSC 12/4/5, annex 5);
 - .7 endorsed the view of the correspondence group that the word “effectively” should be retained in sub-section 3.4.2 (DSC 12/4/5, paragraph 23);
 - .8 noted the lack of definition of “effective ventilation” (DSC 12/4/5, paragraph 24);
 - .9 agreed to the revised text of sub-section 3.5.5 with the exception of the words “are not sufficiently rarefied by air”, which were forwarded to the working group for consideration and improvement (DSC 12/4/5, paragraph 26);
 - .10 forwarded the texts in the FOREWORD and sections 1 to 3 to the working group to include in the text of the mandatory BC Code, taking into account relevant proposals by Japan (DSC 12/4/5, paragraph 31.11);
 - .11 forwarded the draft form for cargo information for solid bulk cargoes to the working group for finalization (DSC 12/4/6, paragraph 2 and annex 1);
 - .12 considered that it might be useful to retain the list of standard sampling procedures as an example and forwarded it to the working group for further consideration (DSC 12/4/6, paragraph 6);
 - .13 noted the oral addition of paragraph 24.2*bis* to DSC 12/4/6 regarding the general requirement for trimming in sub-section 5.1.1 and forwarded it to the working group for further consideration (DSC 12/4/6, paragraphs 8 to 10);
 - .14 considered that it was necessary to retain some text indicating to the master that trimming might be necessary and forwarded the related text to the working group for further consideration (DSC 12/4/6, paragraph 10);
 - .15 forwarded the texts of sub-section 5.12 to the working group for finalization (DSC 12/4/6, paragraph 12);
 - .16 forwarded the texts of sub-section 5.4.4 to the working group to finalize (DSC 12/4/6, paragraph 13);

- .17 considered that it was necessary to maintain a reference to appendix 2 on Laboratory test procedures, associated apparatus and standards and decided to retain the text of sub-section 8.2 (DSC 12/4/6, paragraph 20);
- .18 instructed the working group to finalize the text of sections 4 to 8, based on the discussions in plenary (DSC 12/4/6, paragraph 24.7);
- .19 retained sub-sections 9.2.2.1 to 9.2.2.8 (DSC 12/4/7, paragraph 3);
- .20 considered the issue and agreed that the Sub-Committee had previously agreed to the text in sub-section 11 (DSC 12/4/7, paragraph 9);
- .21 forwarded the texts in sections 9 to 13 to the working group to finalize, noting that the working group may need to further consider the appropriateness of the reference to the IMDG Code in sub-section 9.3.4 (DSC 12/4/7, paragraph 14.3);
- .22 agreed to:
 - .1 retain the texts in square brackets in the proposed explanatory note for UN 1386 (b);
 - .2 endorse the proposed amendments to the texts in the section for DESCRIPTION in the individual schedule for SEED CAKE (non-hazardous); and
 - .3 included an explanatory note for UN 1386 (a);
- .23 endorsed the view of the group on Ilmenite Sand and forwarded the text to the working group for finalization (DSC 12/4/8, paragraph 8);
- .24 noted that Tapioca deletes oxygen, that the United States was working on a proposal based on the study of assignment of classification of cargoes for submission to DSC 13 and forwarded the matter to the working group for further consideration (DSC 12/4/8, paragraph 9);
- .25 approved the amendment to the emergency procedures for Calcium Nitrite UN 1454 and forwarded it to the working group for finalization (DSC 12/4/8, paragraphs 10 and 11);
- .26 noted the group's consideration on individual schedules for new cargoes and a proposal to change the word "discharge" to "unloading" to avoid negative connotations in the pollution context and forwarded it to the working group for finalization (DSC 12/4/8, paragraph 12);
- .27 agreed, in principle, to the texts in Description and forwarded it to the working group for finalization (DSC 12/4/8, paragraph 13 and annex 2);
- .28 agreed, in principle, to the texts in Characteristics and forwarded it to the working group for finalization (DSC 12/4/8, paragraph 14 and annex 3);

- .29 agreed, in principle, to the text in Hazard and forwarded it to the working group for finalization (DSC 12/4/8, paragraph 15 and annex 4);
- .30 agreed, in principle, to the texts in Stowage and Segregation and forwarded it to the working group for finalization (DSC 12/4/8, paragraph 17 and annex 5);
- .31 agreed to the texts on Hold cleanliness (DSC 12/4/8, paragraph 18);
- .32 agreed, in principle, to the texts in Hold cleanliness for mandatory application and forwarded it to the working group for finalization (DSC 12/4/8, paragraph 19 and annex 6);
- .33 agreed, in principle, to the texts in Weather precautions and forwarded it to the working group for finalization (DSC 12/4/8, paragraph 21 and annex 7);
- .34 considered that the texts on Loading should possibly refer to section 5 as well as section 4 and forwarded to the working group for further consideration, bearing in mind that information should not be omitted if it reduces safety (DSC 12/4/8, paragraph 22);
- .35 agreed, in principle, to the texts on Loading for mandatory application and forwarded it to the working group for finalization (DSC 12/4/8, paragraph 27 and annex 8);
- .36 approved the standard dust texts and forwarded the proposals by CEFIC to the working group for further consideration (DSC 12/4/9, paragraph 2 and DSC 12/4/17);
- .37 forwarded the proposed text on fixed gas fire extinguishing systems for Group C cargoes depending on the duration of the voyage to the working group for further consideration (DSC 12/4/9, paragraph 11);
- .38 forwarded the text on Peat Moss to the working group for further consideration (DSC 12/4/9, paragraph 18);
- .39 agreed, in principle, to the texts for Precautions and forwarded it to the working group for finalization (DSC 12/4/9, paragraph 27 and annex 12);
- .40 forwarded the texts for ventilation requirements and surface ventilation in particular to the working group to clarify which option should be adopted (DSC 12/4/9, paragraph 31);
- .41 agreed, in principle, to the texts on Ventilation, subject to the outcome of discussion on surface ventilation and forwarded it to the working group for finalization (DSC 12/4/9, paragraph 34 and annex 2);
- .42 agreed to the standard weathertightness text proposed by the correspondence group and forwarded it to the working group for finalization (DSC 12/4/10, paragraph 2);

- .43 forwarded the proposed text on temperature monitoring of ammonium nitrate based fertilizers to the working group for further clarification of the types of monitoring intended (DSC 12/4/10, paragraph 3);
- .44 endorsed the amendments to the requirements for checking the condition of Group A cargoes and forwarded them to the working group for finalization (DSC 12/4/10, paragraph 4);
- .45 agreed, in principle, to the texts on Carriage and forwarded them to the working group for finalization (DSC 12/4/10, paragraph 9 and annex 1);
- .46 adopted the text for Ferrous metal borings, shavings, turnings or cuttings UN 2793 (DSC 12/4/10, paragraph 13);
- .47 agreed to the texts on Discharge and forwarded them to the working group for finalization (DSC 12/4/10, paragraph 16 and annex 2);
- .48 agreed to the text for protection of bilge pumps and forwarded them to the working group for finalization (DSC 12/4/10, paragraph 17);
- .49 agreed to the texts on Clean up and forwarded them to the working group for finalization (DSC 12/4/10, paragraph 24 and annex 3);
- .50 agreed to the text of trimming requirements for Brown coal briquettes and forwarded it to the working group for finalization (DSC 12/4/10, paragraph 26); and
- .51 agreed, in principle, to the texts in the appendices to individual schedules, subject to the relevant decisions concerning DRI (A) and (B), and forwarded it to the working group for finalization (DSC 12/4/10, paragraph 32 and annex 4).

4.4 The Sub-Committee considered proposals by Japan (DSC 12/4/18) to make editorial changes to a number of BC Code schedules and forwarded the document to the working group for further consideration.

Direct Reduced Iron (DRI)

4.5 The Sub-Committee considered documents DSC 12/4/1 (Venezuela), DSC 12/4/2 (Venezuela), DSC 12/4/3 (Venezuela), DSC 12/4/11 (Canada), DSC 12/4/12 (United Kingdom), DSC 12/4/13 (France), DSC 12/4/14 (Marshall Islands, Malta and INTERCARGO), DSC 12/INF.4 (Venezuela), DSC 12/INF.5 (Venezuela) and DSC 12/INF.6 (Venezuela) and noted that the proposals fell under three main topics: revision of the DRI(A) schedule, revision of the DRI(B) schedule and the possibility of a new schedule for DRI(Fines).

4.6 Following considerable debate, the Sub-Committee, being in favour of a safety first approach and thus supporting the inerting of DRI (B) and DRI (Fines) cargoes, forwarded the above proposals to the working group for further consideration.

Amendments to the BC Code on requirements for coal carriage on self-unloader type vessels

4.7 The Sub-Committee, having considered a document by Canada (DSC 12/4/15), which recalled their offer at DSC 11, following discussions regarding document DSC 11/4/8, to provide a final proposal to address issues relevant to the carriage of coal cargoes on a self-unloader and which provided proposals for new schedules to be included in the BC Code to cover the requirements for the carriage of coal on self-unloader type vessels, supported the proposals in principle.

4.8 The Sub-Committee, noting that the term self-unloader applied to a wide variety of ships types but that as the proposals were specific to those ships with conveyor belts that penetrate transverse bulkheads, expressed the view that the title should possibly be amended and that further consideration needed to be given to the appropriate section of the BC Code in which the text should be placed, and forwarded the document to the working group for further consideration and advice.

Miscellaneous proposals

Classification of formed solid sulphur

4.9 The Sub-Committee, having considered a document by Germany and Canada (DSC 12/4/16), which noted that, although the BC Code makes provision for lump and coarse grained sulphur, sulphur formed to a specific shape is currently excluded from the IMDG Code and is not listed in the BC Code and provided a schedule for consideration and inclusion as appropriate in the BC Code, noted that further consideration was needed to ensure that the requirements of the mandatory BC Code did not exceed those of SOLAS and that in certain situations, where cargoes were dropped directly into empty holds, there might be a significant dust hazard; and forwarded the document to the working group for further consideration and advice.

Establishment of the working group and its report

4.10 The Sub-Committee established a Working Group on Amendments to the BC Code and its Mandatory Application after having considered agenda item 5 (Mandatory application of the BC Code), and its decisions relevant to agenda item 4 are outlined in paragraph 5.8.

5 MANDATORY APPLICATION OF THE BC CODE

General

5.1 The Sub-Committee recalled that MSC 79 had endorsed the timetable (DSC 9/15, annex 1) on the envisaged sequence of events leading to the mandatory application of the BC Code, which could be subject to revision depending upon the progress made over the years and that under this agenda item, the following two sub-items needed consideration, namely:

- .1 identification of mandatory and recommendatory parts of the BC Code, including consequential amendments; and
- .2 amendments to SOLAS chapters VI and VII on making the BC Code mandatory.

Report of the working group established at DSC 11

5.2 The Sub-Committee recalled that at DSC 11 it had established the Working Group on the Amendments to the BC Code and its Mandatory Application, with the terms of reference outlined in paragraph 5.8 of document DSC 11/19 and that, on the basis of the oral report of the chairman of the working group, it had established the Correspondence Group on Amendments to the BC Code and its Mandatory Application, under the joint co-ordination of Australia and Japan, with the terms of reference indicated in paragraph 5.12 of document DSC 11/19. The Sub-Committee considered that the actions requested had been overtaken by the subsequent work of the correspondence group and approved, in general, those parts of the report related to agenda item 5.

Report of the correspondence group

5.3 The Sub-Committee, having considered the parts of the report of the correspondence group (DSC 12/4/4, paragraphs 15.1, 15.2 and 15.4 and DSC 12/4/5, paragraphs 31.5 and 31.6), took action as detailed below:

- .1 endorsed the group's view on renumber the regulations in SOLAS chapters VI and VII (DSC 12/4/4, paragraph 5);
- .2 agreed to the draft amendments to SOLAS, noting that if the text relating to trimming was deleted this would need to be adequately covered in the text of the BC Code, and instructed the working group to ensure that the provisions in the BC Code were clear in that respect (DSC 12/4/4, paragraph 7 and annex 1);
- .3 agreed to the draft amendments to the INF Code and forwarded them to the working group for finalization (DSC 12/4/4, paragraph 9 and annex 2);
- .4 instructed the Secretariat to consider footnotes to SOLAS and other IMO instruments as necessary (DSC 12/4/4, paragraphs 10 and 11);
- .5 endorsed the view of the group on ventilation requirements in SOLAS and the BC Code (DSC 12/4/5, paragraph 21); and
- .6 considered the amendment to the heading of SOLAS regulation II-2/19.3.4 and forwarded it to the working group for further consideration and advice (DSC 12/4/4, paragraph 22).

5.4 Having recalled that it was agreed at MSC 82 that the draft text of the mandatory Code is expected to be approved at MSC 84 in May 2008 with the view to its adoption at MSC 85, which is scheduled to take place in November 2008, the Sub-Committee agreed that it would be appropriate to recommend to the Committee that Contracting Governments to the Convention may apply the BC Code in whole or in part on a voluntary basis as from 1 January 2009 as, amongst others, the proposed voluntary application date will be the same as that of the IMDG Code (amendment 34-08).

5.5 The Sub-Committee, having considered proposals submitted under this agenda item and agenda item 4, referred to the need to finalize the text of the mandatory BC Code whilst also requiring a mechanism to facilitate ongoing amendments in light of experiences with the carriage

of solid bulk cargoes, and agreed that the mandatory BC Code should be amended by a similar amendment procedure to that used for amending the IMDG Code.

Establishment of the working group

5.6 The Sub-Committee established the Working Group on Amendments to the BC Code and its Mandatory Application, under the chairmanship of Captain J-D. Troyat (France), and instructed the group, taking into account the relevant decisions taken and comments made in plenary to:

- .1 deliberate the issues under two separate agenda items;
- .2 taking into account documents DSC 12/4/4, DSC 12/4/5, DSC 12/4/6, DSC 12/4/7, DSC 12/4/8, DSC 12/4/9, DSC 12/4/10, DSC 12/4/17, DSC 12/4/18 and DSC 12/5, finalize the draft text of the mandatory BC Code;
- .3 finalize the draft amendments to SOLAS Chapters VI and VII and the INF Code, in the standard format and the appropriate resolutions;
- .4 consider document DSC 12/4/15, regarding the requirements for coal carriage on self-unloader type vessels;
- .5 consider document DSC 12/4/16, which proposes a new schedule for SULPHUR (formed solid);
- .6 consider documents DSC 12/4/1, DSC 12/4/2, DSC 12/4/3, DSC 12/4/11, DSC 12/4/12, DSC 12/4/13, DSC 12/4/14, DSC 12/INF.4, DSC 12/INF.5 and DSC 12/INF.6 and draw up new schedules for the shipment of Direct Reduced Iron (A) and (B) and of DRI Fines, and consider the best way to inform industry on the requirements for safe carriage of DRI;
- .7 give priority to the finalization of the draft text of the mandatory BC Code; and
- .8 submit a written report to plenary on Friday, 21 September 2007.

Report of the working group

5.7 The Sub-Committee, having considered the report of the Working Group on Amendments to the BC Code and its Mandatory Application (DSC 12/WP.3), approved the report in general, and took action as detailed in the following paragraphs.

Amendments to the BC Code (agenda item 4)

5.8 The Sub-Committee having considered the actions requested of the Sub-Committee relevant to this subject took decisions as follows:

- .1 agreed, in principle, to a supplement, associated with the IMSBC Code, pending further consideration and authorized the Secretariat to include in the supplement existing DSC circulars relevant to solid bulk cargoes;
- .2 agreed to the new draft text of sub-section 1.3;

- .3 noted the deletion of the definition of “effective ventilation”;
- .4 noted that the working group had agreed an amended text for the Pig Iron schedule, which was not included in document DSC 12/WP.3/Add.1, and requested the Secretariat to insert the amended text;
- .5 agreed the draft text of the IMSBC Code, subject to further revision of DRI (A), DRI (B) and DRI Fines schedules;
- .6 agreed to invite Administrations to provide relevant data and information on criteria to change classifications of cargoes;
- .7 agreed to the draft appendices 2 and 4 to the IMSBC Code;
- .8 noted that further consideration may be given to clarify the expression “away from”;
- .9 agreed that the draft revised IMSBC Code remains a “living document”; and
- .10 noted that, subject to the progress made by the correspondence group and comments received, it might be necessary to establish a working group during MSC 84/85.

Mandatory application of the BC Code (agenda item 5)

5.9 The Sub-Committee agreed to the draft amendments to the 1974 SOLAS Convention to make the BC Code mandatory, set out in annex 3, for submission to MSC 84 for approval with a view to adoption at MSC 85.

5.10 The Sub-Committee agreed to the draft text of the mandatory Code of Safe Practice for Solid Bulk Cargoes (BC Code) and the associated draft MSC resolution, set out in annex 4, for submission to MSC 84 for approval with a view to adoption at MSC 85. To reflect the mandatory status of the Code, the Sub-Committee agreed to name it as International Maritime Solid Bulk Cargoes (IMSBC) Code.

Consequential amendments to the INF Code

5.11 Having considered the need to make consequential amendments to the INF Code in view of the envisaged IMSBC Code, the Sub-Committee agreed to the draft amendments to the INF Code and the associated draft MSC resolution, set out in annex 5, for submission to MSC 84 for approval with a view to adoption at MSC 85.

Establishment of a working group at MSC 84/85

5.12 In view of the need to finalize remaining documents and other issues that may be raised relating to the draft IMSBC Code due for approval at MSC 84, the Sub-Committee requested the Chairman to consult the Chairman of the Committee and explore the possibility of establishing a working group on amendments to the IMSBC Code at MSC 84/85.

Periodicity of amendments to the IMSBC Code

5.13 The Sub-Committee agreed that the envisaged IMSBC Code would remain a living document, that there would be a consequential need for continuous revisions at intervals of about two years, and recalled its earlier decision that the Code should be amended by a similar amendment procedure to that used for amending the IMDG Code.

Editorial changes to the draft IMSBC Code

5.14 The Sub-Committee authorized the Secretariat to effect necessary editorial changes and to verify any references made to SOLAS in the draft mandatory Code.

Establishment of the correspondence group

5.15 Having considered the text of the draft revised IMSBC Code, a number of delegations expressed a view that further work was necessary on the schedules for DRI (A), DRI (B), Coal and Brown coal briquettes, that new schedules were required for DRI Fines and formed solid sulphur, and that it may be necessary to spend more time considering the draft revised text of the BC Code before it could be adopted by MSC 85.

5.16 The delegation of Greece considered that more time was needed for consideration and evaluation of documents DSC 12/WP.3, DSC 12/WP.3/Add.1 and DSC 12/WP.3/Add.3 for the following reasons:

- .1 the limited time available to the working group to consider such a large amount of work;
- .2 the need to consider outstanding issues related to the requirements for coal carriage on self-unloader type vessels, a new schedule for formed solid sulphur and DRI (A), DRI (B) and DRI Fines (DSC 12/WP.3, paragraph 43); and
- .3 a lot of amendments on the initial proposed amendments were considered during the limited time available to the working group.

5.17 The Sub-Committee recalled its earlier decision that the IMSBC Code would be a living document, noted that the amendment process would enable the revision of existing schedules and inclusion of new schedules, agreed that there was time for Member Governments and organizations to adequately review the draft mandatory text prior to its adoption at MSC 85, and agreed that there remained an urgent need to resolve the issues related to the DRI schedules.

5.18 The Sub-Committee noted that due to time constraints the working group had been unable to consider documents DSC 12/4/15 (Canada) and DSC 12/4/16 (Canada) in depth, further noted that Canada intended to submit revised proposals to DSC 13 and invited interested delegations to contact Canada with their input.

5.19 Having agreed that there remained an urgent need to resolve issues related to DRI schedules, the Sub-Committee agreed to establish the Correspondence Group on DRI schedules, under the co-ordination of the Marshall Islands*, and instructed it, taking into account the relevant decisions taken in the working group and comments made in plenary, to:

- .1 finalize draft schedules for DRI (A), DRI (B) and DRI (Fines); and
- .2 submit a written report to DSC 13.

6 CASUALTY AND INCIDENT REPORTS AND ANALYSIS

General

6.1 The Sub-Committee considered submissions relevant to this agenda item, recalling that documents DSC 12/6/3 (Sweden), concerning the transport of peat and DSC 12/6/8 (Germany), concerning the explosion and fire on board **CMV Punjab Senator**, had been considered under agenda item 3 and that document DSC 12/6/5 (Canada), concerning maintenance requirements for freight containers had been considered under agenda item 18, and took decisions on the remaining proposals as detailed in the following paragraphs.

Inspection programmes for cargo transport units (CTUs) carrying dangerous goods

6.2 The Sub-Committee noted the results of container inspection programmes as submitted by Belgium (DSC 12/6/4), Canada (DSC 12/6/2), Chile (DSC 12/6/10), Germany (DSC 12/6/7), Lithuania (DSC 12/6), the Netherlands (DSC 12/6/6), the Republic of Korea (DSC 12/6/11), Sweden (DSC 12/6/1) and the United States (DSC 12/6/9).

6.3 The Sub-Committee recalled that, according to the 2006 consolidated report on container inspection programmes (DSC 11/6/10), a total of 25,284 cargo transport units had been inspected and 7,979 cargo transport units were found with deficiencies, that is about 32% of the cargo transport units inspected had deficiencies. A total of 8,574 deficiencies were found, that is a deficiency rate of 34%.

6.4 The Sub-Committee considered the results of the 2007 consolidated report on container inspection programmes (DSC 12/6/12, Secretariat), which was prepared on the basis of the reports referred to in paragraph 6.2 above, whereby a total of 34,416 cargo transport units were inspected and 8,319 cargo transport units were found with deficiencies, that is about 24% of the cargo transport units inspected had deficiencies. A total of 10,606 deficiencies were found, that is a deficiency rate of 30.8%.

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6.5 The Sub-Committee noted that it would be appropriate to develop a research methodology for an effective in-depth analysis of the results of inspection programmes, that where a targeted inspection programme was in place the results indicated much higher deficiency rates as compared with random inspection programmes and observed that this could preclude meaningful comparison of the statistics.

6.6 The Sub-Committee expressed its appreciation to those Member Governments that had submitted results of container inspection programmes and its concern about the high rate of deficiencies and the lack of adherence to the provisions of the IMDG Code, especially in the areas of placarding and marking which is 40%, followed by stowage/securing of cargoes inside units, which is 19%.

6.7 The Sub-Committee agreed that the mandatory training of shore side personnel and future work on revision of the CSC in the context of container examination programmes were both positive measures that would improve the situation and that it would be also helpful, for analysis purposes, if Member Governments would indicate whether or not their inspections were targeted or random when submitting reports in accordance with MSC.1/Circ.1202.

6.8 The Sub-Committee thanked Member Governments which had submitted the reports, requested them to continue to submit such reports and urged Member Governments, which had not yet carried out container inspection programmes, to do so and to submit the relevant information to the Sub-Committee in accordance with MSC.1/Circ.1202.

7 REVIEW OF THE SPS CODE

7.1 The Sub-Committee recalled that MSC 78 had considered the need to update the Code of Safety for Special Purpose Ships (SPS Code) to reflect amendments to SOLAS chapter III and the adoption of the LSA Code and further recalled that since the SPS Code was adopted in 1983, many requirements of the SOLAS Convention had been amended and that considerable experience had been gained in the Code's application.

7.2 The Sub-Committee further recalled that MSC 82 had noted that DE 49, following consideration of the item, had established a correspondence group and instructed it to develop draft amendments to the SPS Code and to submit a report to DE 50 (MSC 82/24, paragraph 7.3).

7.3 The Sub-Committee further recalled that MSC 82 noted the progress made by the SLF Sub-Committee on the review of the SPS Code, in particular the referral of document SLF 49/11 and the outcome of its discussion thereon to the DE Sub-Committee for co-ordination purposes (MSC 82/24, paragraph 12.13).

7.4 The Sub-Committee noted that the Editorial and Technical Group at its May 2007 meeting noted that the review of the SPS Code may not be restricted to dangerous goods of class 1 and that even if the dangerous goods are ship's stores and not cargo, the provisions of the IMDG Code may also need to be taken into account.

7.5 Having noted the relevant outcomes of MSC 82, DE 50 and SLF 50, the Sub-Committee considered a proposal by the United Kingdom (DSC 12/7), which provided text for inclusion in chapter 7 of the SPS Code to address all classes of dangerous goods carried on Special Purpose Ships, agreed to the text and requested the Secretariat to forward it to the DE Sub-Committee for inclusion in the SPS Code.

7.6 The Secretariat was requested to inform the DE Sub-Committee (co-ordinator) of the above outcome.

Completion of the items

7.7 Having considered that work on the item had been completed, the Sub-Committee invited the Committee to delete the item from its work programme.

8 AMENDMENTS TO THE CSS CODE

Draft MSC circular on specialized cargoes and regional trade

8.1 The Sub-Committee recalled that DSC 10, having considered the report of the correspondence group and noting that the information contained in the report of the group was relevant to specialized cargoes and regional trade, and thus it was not appropriate to amend the CSS Code, had agreed that the information should be brought to the attention of Member Governments by means of an MSC circular. In light of this development, the Committee agreed to extend the target completion date of the item to 2007.

8.2 The Sub-Committee, having considered a document by the Russian Federation (DSC 12/8) containing a draft MSC circular on the Russian rules for safe carriage of cargoes by sea, form for cargo information and method of calculation of non-shift criterion for structurizing cargoes, relevant to specialized cargoes and regional trade, agreed that it might not be appropriate to disseminate information on local regulations via MSC circulars and forwarded the document to the working group for further consideration on how to disseminate such information.

Establishment of the working group

8.3 The Sub-Committee established the working group on providing safe working conditions for securing of containers and the CSS Code, after having considered proposals under agenda items 15 and 18.

Report of the working group

8.4 Having considered the report of the working group (DSC 12/WP.4) in part relating to the item, the Sub-Committee took decisions as follows:

- .1 the Sub-Committee noted the group's views on the best way to disseminate information on local regulations, particularly the Russian Federation rules for safe carriage of cargoes by sea, form for cargo information and method of calculation of non-shift criterion for structurizing cargoes, relevant to specialized cargoes and regional trade, contained in document DSC 12/8 (Russian Federation), and that it could not reach an agreement on this issue and decided to request the Secretariat to consider the options suggested by the group (see DSC 12/WP.4, paragraph 5) and advise DSC 13 accordingly;
- .2 the Sub-Committee agreed to the deletion of proposed amendments to the CSS Code contained in the sections 7.2 (Container stowage) and 7.3 (Containership condition report) of the proposed amendments to the CSS Code contained in the annex to the report of the correspondence group

(DSC 12/10/1). However, it also agreed that matters on container stowage should be taken into account when the Guidelines for the preparation of the cargo securing manual (MSC/Circ.745) is further considered for amendment. Additionally, the Sub-Committee noted the group's opinion that the proposal on the Containership condition report (see document DSC 12/10/1, annex, section 7.3) had merit;

- .3 the Sub-Committee noted the progress made on the draft amendments to the new annex to the CSS Code, as set out in annex 6 prepared by the group, and further noted that, due to time constraints, the group was not able to finalize the draft amendments to the CSS Code and agreed to invite the Committee to extend the target completion date of this agenda item to 2008; and
- .4 in considering the above, if the working group is established at the next session, the Sub-Committee agreed to issue the draft terms of reference of the working group at the beginning of the session, providing clear instructions to the group to begin work on Monday morning, without prior consideration of the related agenda item in plenary (see document MSC 81/25, paragraphs 22.10 to 22.12).

9 EXTENSION OF THE BLU CODE TO INCLUDE GRAIN

Consequential amendments to the BLU Code (resolution A.862(20)) in light of the mandatory BC Code

9.1 The Sub-Committee recalled that at DSC 11, recognizing the importance of the Form for Cargo information, appendix 5 of the BLU Code, and the part it plays in the safety of cargo loadings (DSC 11/12, paragraph 4), had decided to consider the matter further when the mandatory BC Code had been finalized.

9.2 The Sub-Committee further recalled that it had considered a proposal for consequential amendments to the BLU Code in the light of the 2004 BC Code (resolution MSC.193(79)) (DSC 11/12, paragraph 5), agreed that it would be prudent to prepare the consequential amendments to the BLU Code once the IMSBC Code had been finalized and invited the Committee to extend the target completion date of this item to 2008, which it did.

9.3 The Sub-Committee noted that in light of the above comments and the finalization of the 2008 IMSBC Code at DSC 12, no documents had been submitted under this agenda item and invited interested delegations to submit proposals to DSC 13 for consideration.

10 GUIDANCE ON PROVIDING SAFE WORKING CONDITIONS FOR SECURING OF CONTAINERS

General

10.1 The Sub-Committee recalled that MSC 80 had considered document MSC 80/21/7 (United Kingdom), proposing incorporation, in the Code of Safe Practice for Cargo Stowage and Securing, guidance on providing a safe working platform for the securing of containers, to ensure that ship designers, builders and owners take account of the need to provide adequate arrangements to enable safe lashing and securing operations to take place so that no person is exposed to unnecessary risks to their safety and health whilst undertaking lashing and securing tasks in compliance with the ship's approved cargo securing plan and that the Committee had

included in the Sub-Committee's work programme a high priority item on "Guidance on providing safe working conditions for securing of containers".

10.2 The Sub-Committee noted that SLF 50, having considered the request of DSC 11 which requested the SLF Sub-Committee to review the 1969 TM Convention to encourage ship designers, builders and owners to reduce stack heights of containers so that the need for lashing on ships can be reduced, and having noted that if the "maritime real estate" principles (length x breadth x summer draught) are introduced it may have an effect of reducing the above-deck stacking of containers through increased utilization of open-top containerships with full-height cell guides.

10.3 The Sub-Committee further noted that NAV 53 observed that with respect to the draft Guidance on providing safe working conditions for securing of containers and the terms of reference of the correspondence group on that subject (DSC 11/13), there were no items of relevance relating to navigational and operational matters and that NAV 53 had no comments for the consideration of DSC 12.

10.4 The Sub-Committee recalled that DSC 11 had established a working group to progress with the issue, with the terms of reference listed in document DSC 11/19, paragraph 13.9, considered the report of the working group (DSC 12/10) and took actions as reflected in the paragraphs below.

Report of the working groups established at DSC 11

10.5 Following consideration of the documents above the Sub-Committee took action as follows:

Revision of the guidelines for the preparation of the cargo securing manual (MSC/Circ.745)

- .1 agreed to the draft MSC circular regarding the Revised Guidelines for the preparation of the Cargo Securing Manual and invited the Committee to approve it (DSC 12/10, paragraphs 5 to 7 and annex 1);
- .2 noted the group's view that the provision of safe working conditions for securing of containers should be made mandatory under the SOLAS Convention and invited interested delegations to submit proposals for a new work programme item to the Committee (DSC 12/10, paragraph 7);

Draft amendments to the CSS Code (resolution A.714(17))

- .3 noted that the draft amendments to the CSS Code were affected by the outcomes of the correspondence group and forwarded the amendments to the working group for further consideration (DSC 12/10, paragraphs 8 to 10 and annex 2);
- .4 endorsed the view of the group that the term 'calculation strength' was the correct text from MSC/Circ.664 and that the term 'calculated strength' was a historical typing error (DSC 12/10, paragraph 10);
- .5 endorsed the view of the working group that a new annex to the CSS Code should be adopted and urged all relevant parties to reflect it in their national provisions;

Draft revised Recommendations on the safety of personnel during container securing operations (MSC/Circ.886)

- .6 agreed to the draft revised Recommendations on safety of personnel during container securing operations and forwarded the associated draft MSC circular to MSC 84 for approval, set out in annex 7.

Report of the correspondence group

10.6 The Sub-Committee considered the report of the correspondence group (DSC 12/10/1) and a related document by ICHCA (DSC 12/10/2) on the results of a research project on “Container Vessel Risk Assessment for the Safety of Persons” and forwarded the documents to the working group for further consideration and finalization of the draft amendments to the CSS Code.

Establishment of the working group

10.7 The Sub-Committee agreed to establish the Working Group on providing safe working conditions for securing of containers and the CSS Code, after submissions under agenda items 15 and 18 had been considered (see paragraphs 15.1 to 15.6 and 18.1 to 18.4).

Report of the working group

10.8 Having considered the report of the working group (DSC 12/WP.4) in part relating to the item, the Sub-Committee agreed:

- .1 to delay the submission to the Committee of the agreed Revised Guidelines for the preparation of the Cargo Securing Manual and the associated draft MSC circular, as contained in annex 1 to document DSC 12/10, until the work on the draft amendments to the CSS Code is finalized (see paragraph 8.4 above) in order to ensure that they that are approved at the same session of the Committee;
- .2 to the additional draft amendments to the Revised Guidelines for the preparation of Cargo Securing Manual, as contained in annex 1 to document DSC 12/10, prepared by the group; and in order to make it clear that Cargo Safe Access Plan (CSAP) is only required for container ships, as set out in annex 8; and
- .3 that a consolidated text of the draft Revised Guidelines, containing the draft amendments referred to in subparagraphs .1 and .2 above, be prepared by the Secretariat for submission to MSC 85.

11 REVIEW OF THE RECOMMENDATIONS ON THE SAFE USE OF PESTICIDES IN SHIPS

11.1 The Sub-Committee recalled that at DSC 10 Germany had submitted proposals (DSC 10/3/15 and DSC 10/4/4 which, noting that Recommendations on the safe use of pesticides in ships cover three aspects of the use of pesticides on board ships (the fumigation of freight containers and cargo transport units subject to the IMDG Code, the fumigation of cargo holds containing dry cargo, subject to the IMSBC Code, and the control of rodent pests on board all kinds of ships) and that the provisions governing them are interspersed in the existing version of

the Recommendations, thus making it difficult to identify the provisions of relevance and posing significant health risks, proposed to review the existing Recommendations under three separate topics.

11.2 The Sub-Committee further recalled that DSC 10 had agreed that the proposal by Germany had merit and had prepared a relevant justification for a new item in the Sub-Committee's work programme, in accordance with the Guidelines on the organization and method of work for consideration by the Committee.

11.3 The Sub-Committee recalled that DSC 11 had considered document DSC 11/14 (United Kingdom) which, with a view to facilitating timely revision of the Recommendations on the safe use of pesticides in ships, provided:

- .1 a comprehensive guidance document to minimize the risks of personnel and assist in the operational issues involved in the transport supply chain of fumigated containerized cargoes; and
- .2 an *aide-memoire* summarizing the key points for distribution to those involved in fumigating containers.

11.4 The Sub-Committee also recalled that DSC 11, following a general discussion of the document and noting that some of the proposed obligations placed on the master are, perhaps, excessive, had agreed to the offer of the delegation of Germany to submit, to DSC 12, taking into consideration document DSC 11/14, draft revised Recommendations.

11.5 The Sub-Committee, having considered a proposal by Germany (DSC 12/11 and DSC 12/INF.3) to revise the text in the IMSBC Code regarding the Recommendations on the safe use of pesticides in ships and to limit it to fumigation of cargoes subject to the IMSBC Code, noted that some Member Governments use methyl bromide for fumigation where no suitable alternatives were available and that it might be premature to remove all reference to methyl bromide from the Recommendations.

11.6 The Sub-Committee agreed that the Recommendations on the safe use of pesticides in ships should be revised with information provided separately, as applicable to the carriage of solid bulk cargoes and the carriage of packaged dangerous goods; and further agreed that in the wider context of health and safety these issues may be more appropriately considered in cooperation with the WHO, ILO and the FAO.

Establishment of the drafting group

11.7 Having deliberated the item, the Sub-Committee established the Drafting Group on the Review of the Recommendations on the safe use of pesticides in ships under the chairmanship of Dr. Thomas Hofer (Germany), and instructed the group, taking into account documents DSC 12/11, DSC 12/INF.3, DSC 10/3/15, DSC 104/4 and DSC 11/14 and the relevant decisions taken and comments made in plenary, to:

- .1 develop a draft MSC circular on the safe use of pesticides in ships, as applicable to the carriage of solid bulk cargoes, based on document DSC 12/11;

- .2 develop a draft MSC circular on the safe use of pesticides in ships, as applicable to the carriage of packaged dangerous goods, based on document DSC 11/14; and
- .3 submit a written report to the plenary on Thursday, 20 September 2007.

Report of the drafting group

11.8 Upon receiving the report of the drafting group (DSC 12/WP.6), the Sub-Committee approved the report, in general, and took decisions as detailed in the following paragraphs.

Recommendations on the safe use of pesticides in ships applicable to the fumigation of cargo holds

11.9 The Sub-Committee noted that, as agreed in plenary, the requirements relating to Methyl Bromide (paragraphs 4.5 and 4.13 of document DSC 12/11) were not deleted from the draft Recommendations and that requirements relating to the control of rodent pests outside cargo spaces were deleted.

11.10 The Sub-Committee noted that the group, having identified that MSC-MEPC.2/Circ.1 (Disposal of fumigant material) is of relevance for the draft Recommendations, introduced the wording of paragraphs 2 and 5 of the circular into appendix 1 of the draft Recommendations.

11.11 The Sub-Committee agreed to the draft Recommendations on the safe use of pesticides in ships applicable to the fumigation of cargo holds and the associated draft MSC circular, for submission to MSC 84 for approval, set out in annex 9.

11.12 The Sub-Committee endorsed the recommendation of the group that the draft Recommendations on the safe use of pesticides in ships applicable to the fumigation of cargo holds, after its approval by the Committee, should supplement the IMSBC Code and the Grain Code, as appropriate.

Recommendations on the safe use of pesticides in ships applicable to the fumigation of cargo transport units

11.13 The Sub-Committee agreed to the draft Recommendations on the safe use of pesticides in ships applicable to the fumigation of cargo transport units and the associated draft MSC circular, set out in annex 10, for submission to MSC 84 for approval. The Sub-Committee also agreed that the appendix to the Recommendations be available via the IMO website, after its approval by the Committee.

11.14 The Sub-Committee endorsed the recommendation of the group that the draft Recommendations on the safe use of pesticides in ships applicable to the fumigation of cargo transport units, after its approval by the Committee, should supplement the IMDG Code, as appropriate.

Fresh food produce under controlled atmosphere

11.15 The Sub-Committee, having discussed the situation on the carriage of fresh food produce under controlled atmosphere, agreed that these Recommendations should not apply to the carriage of fresh food produce under controlled atmosphere.

Consequential amendments to SOLAS chapter VI, the IMDG Code and the IMSBC Code

11.16 The Sub-Committee endorsed the recommendation of the group that references to the Recommendations on the safe use of pesticides in ships applicable to the fumigation of cargo holds and the Recommendations on the safe use of pesticides in ships applicable to the fumigation of cargo transport units within SOLAS chapter VI, the IMDG Code and the IMSBC Code should be amended to show the correct references to those Recommendations and requested the Secretariat to act accordingly.

Extension of the target completion date

11.17 The Sub-Committee, recognizing the need to review, in a holistic manner, the Recommendations on the Safe use of pesticides in ships applicable to the fumigation of cargo transport units agreed to invite the Committee to extend the target completion date of the item to 2008.

12 APPLICATION OF REQUIREMENTS FOR DANGEROUS GOODS IN PACKAGED FORM IN SOLAS AND THE 2000 HSC CODE

General

12.1 The Sub-Committee recalled that MSC 80 in considering document MSC 80/23/3 (Japan) noted the possible errors contained in table 19.3 in SOLAS chapter II-2 regarding the application of the requirements to various classes of dangerous goods and the invitation to rectify the table and the relevant IMO instruments.

12.2 The Sub-Committee also recalled that MSC 80 had agreed, in principle, with the proposal and invited Japan to consider submitting an appropriate proposal to MSC 81 for a new work programme item for the DSC and the FP Sub-Committees.

12.3 The Sub-Committee recalled that MSC 81 considered document MSC 81/23/5 (Japan) and decided to include, in the FP and DSC Sub-Committees' work programmes and the provisional agendas for FP 51 and DSC 11, a high priority item on "Application of requirements for dangerous goods in packaged form in SOLAS and the 2000 HSC Code", with a target completion date of 2007.

Report of the correspondence group

12.4 The Sub-Committee recalled that DSC 11 had established the Correspondence Group on Application of requirements for dangerous goods in packaged form in SOLAS and the 2000 HSC Code, under the co-ordination of Japan, with the terms of reference indicated in paragraph 15.3 of document DSC 11/19. Having considered the report of the correspondence group (DSC 12/12) and document DSC 12/12/1 (United Kingdom), the Sub-Committee took decisions as detailed in the following paragraphs:

- .1 endorsed the view of the correspondence group on the style of the tables, agreed to align the flashpoints with those in the IMDG Code in the light of document DSC 12/12/1 (United Kingdom), noted that it may not be appropriate to include reference to flashpoints greater than 60°C in the tables, and forwarded annex 1 of DSC 12/12 to the working group for finalization (DSC 12/12, paragraphs 6 to 8);

- .2 endorsed the view of the correspondence group that the flashpoint criteria in table 19.3 should be amended from 61°C to 60°C;
- .3 agreed that mention of specific UN numbers in SOLAS was not desirable because the UN numbers may be updated every two years, which may produce a consequential need to amend SOLAS accordingly, and forwarded the matter to the working group for further consideration;
- .4 referred the draft revised tables set out in annexes 1 and 2 to the working group for further consideration and finalization, taking into account that the comments related to annex 1 are relevant to annex 2 as well (DSC 12/12, paragraphs 13, 14 and 33 to 35);
- .5 agreed with the view of the correspondence group on the application of the revised tables to existing ships (DSC 12/12, paragraphs 15 to 19);
- .6 noted that annex 4 might require consequential amendment in the light of future debate at DSC 12 on excepted quantities and forwarded annex 4 to the working group for finalization, subject to such future amendment (DSC 12/12, paragraphs 20 to 22 and annex 4);
- .7 noted that annex 6 would be affected by changes to the preceding annexes and forwarded it to the working group for finalization (DSC 12/12, paragraphs 23 to 26 and annex 6); and
- .8 forwarded consideration of the application of the requirements in SOLAS regulation II-2/19.3.4.2 and section 7.17.3.4.2 of the 2000 HSC Code to class 4.1 substances to the working group, bearing in mind earlier comments on the inclusion of UN numbers in SOLAS (DSC 12/12, paragraphs 27 to 32).

Establishment of the working group

12.5 The Sub-Committee, having considered the report of the correspondence group established at DSC 11 and following discussions on the application of requirements for dangerous goods in packaged form in SOLAS and the 2000 HSC Code, agreed to establish a Working Group on the Application of requirements for dangerous goods in packaged form in SOLAS and the 2000 HSC Code, under the chairmanship of Dr. Sasuma Ota (Japan), and instructed the group, taking into account documents DSC 12/12 and DSC 12/12/1, the comments made and decisions taken in plenary, to:

- .1 finalize the draft amendments to SOLAS and the appropriate resolutions;
- .2 finalize the appropriate amendments to the 2000 HSC Code;
- .3 finalize the revised MSC circular related to the document of compliance; and
- .4 submit a written report to the plenary on Thursday, 20 September 2007.

Report of the working group

12.6 Upon receiving the report of the working group (DSC 12/WP.5), the Sub-Committee approved the report, in general, and took decisions as detailed in the following paragraphs.

12.7 Having considered the view of the group regarding application of the requirements concerning explosion proof mechanical ventilation (DSC 12/WP.5, paragraphs 4 to 6), the Sub-Committee agreed to the deletion of 'X' in the row relevant to SOLAS regulation II-2/19.3.4.2 in table 19.3, in the columns "class 4.3 liquids", "class 6.1 liquids $FP \geq 23^{\circ}C$ to $\leq 60^{\circ}C$ " and "class 8 liquids $FP \geq 23^{\circ}C$ to $\leq 60^{\circ}C$ ", where "FP" denotes the flashpoint, and invited the FP Sub-Committee to examine, in the context of the aforementioned decision, the application of the requirements for explosion proof mechanical ventilation.

12.8 The Sub-Committee, having agreed with the opinion of the group to prohibit under deck stowage of UN 1082 and UN 3399 PG I and II, expressed the view that appropriate amendments need to be included in the IMDG Code to ensure that the aforementioned products are not allowed under deck stowage, and, in addition noting that any products, identified in the future, belonging to class 2.3 with subsidiary risk 2.1, and class 4.3 with subsidiary risk 3 and a flashpoint of less than $23^{\circ}C$ c.c. would also have that restriction, instructed the E&T Group to prepare corresponding amendments to the IMDG Code and to bear that aspect in mind when preparing any potential related amendments.

12.9 Having considered the amendments to stowage categories, the Sub-Committee agreed to the set of the draft amendments to SOLAS regulation II-2/1 and II-2/19, including draft revised tables 19.1 and 19.3, along with the associated draft MSC resolution, set out in annex 11.

12.10 The Sub-Committee, having agreed to the amendments to the stowage categories referred to in paragraph 12.9 above, agreed to the corresponding set of draft amendments to the 2000 HSC Code, including the draft revised tables 7.17-1 and 7.17-3, along with the associated draft MSC resolution, set out in annex 12.

12.11 In light of the amendments agreed in paragraphs 12.9 and 12.10 above, the Sub-Committee agreed to the draft MSC circular on Document of compliance with the special requirements for ships carrying dangerous goods under the provisions of regulation II-2/19 of the 1974 SOLAS Convention, as amended and of regulation 7.17 of HSC Code 2000, as amended, set out in annex 13.

12.12 Regarding the entry into force dates of the amendments the Secretariat highlighted that there were two options:

- .1 that if the amendments were intimately related to the amendments to the IMDG Code they could go forward as part of the package of amendments associated with amendment 34-08 to the IMDG Code for adoption at MSC 84; or
- .2 if the amendments were not considered to be intimately related to those of the IMDG Code they would follow the normal amendment procedure, noting that this would create a discord with the entry into force dates of the IMDG Code related amendments.

The Sub-Committee, noting the close proximity of MSC 83 to DSC 12, recalled the earlier decision of MSC 82 not to consider the outcome of DSC 12 at MSC 83, agreed that due to time

constraints it was not possible to identify those parts of the amendments that could be sent straight for adoption, and further agreed that it would be appropriate to forward amendment 34-08 to the IMDG Code for adoption at MSC 84, along with the amendments to SOLAS, with a view to adopting those amendments at MSC 85.

12.13 Regarding SOLAS regulation II-2/19.3.8 on requirement for insulation of machinery space boundaries, the Sub-Committee noted the view of the group that the aforementioned regulation should apply to class 5.2.

12.14 The Secretariat was requested to inform the FP Sub-Committee (co-ordinator) of the above outcome.

Completion of the item

12.15 Having considered that work on the item had been completed, the Sub-Committee invited the Committee to delete the item from its work programme.

13 GUIDANCE ON PROTECTIVE CLOTHING

13.1 The Sub-Committee recalled that in considering the proposed draft amendment to paragraph 7.17.3.6.1 of the 2000 HSC Code prepared by FP 49, DSC 10 noted that this new provision would require that the chemical protective clothing carried on board be selected “taking into account the danger of the chemicals according to the class and liquid or gaseous”. In this regard, DSC 10 also noted a lack of corresponding requirement in SOLAS chapter II-2 and, if approved, the HSC Code would provide a higher level of safety than SOLAS ships even though such ships face a similar hazard.

13.2 The Sub-Committee also recalled that notwithstanding the above points, DSC 10 endorsed the proposed amendment to paragraph 7.17.3.6.1 of the 2000 HSC Code prepared by FP 49, as modified, from an operational safety standpoint, and expressed the view that, if the relevant amendments to SOLAS and the HSC Code were approved by the Committee, the Sub-Committee’s work programme should include an item on the development of the associated guidance concerning protective clothing.

13.3 The Sub-Committee further recalled that MSC 81, endorsing proposals by DSC 10, decided to include, in the Sub-Committee’s work programme and the provisional agenda for DSC 11, a high priority item on “Guidance on protective clothing”, with two sessions needed to complete the item.

13.4 The Sub-Committee noted that no documents had been submitted for consideration at DSC 12 and invited interested delegations to submit proposals for consideration at DSC 13.

14 REVISION OF THE CODE OF SAFE PRACTICE FOR SHIPS CARRYING TIMBER DECK CARGOES

14.1 The Sub-Committee recalled that, following consideration of document MSC 82/21/14 (Sweden) proposing to revise the Code on Safe Practice for Ships Carrying Timber Deck Cargoes (resolution A.715(17)) to replace outdated methods for securing timber deck cargoes with new methods for safe, rational and efficient securing of such cargoes, MSC 82 agreed to include, in the Sub-Committee’s work programme and the provisional agenda for DSC 12, a high priority

item on “Revision of the Code of Safe Practice for Ships Carrying Timber Deck Cargoes”, with a target completion date of 2010.

14.2 The Sub-Committee considered document DSC 12/14 (Sweden), which provided a framework and a schedule for the revision of resolution A.715(17) on the Code of Safe Practice for ships carrying timber deck cargoes, and agreed that this was an important topic and that Sweden had provided a useful way forward.

Establishment of the correspondence group

14.3 Having noted the comments above, the Sub-Committee established a Correspondence Group on the Revision of the Code of Safe Practice for Ships Carrying Timber Deck Cargoes, under the co-ordination of Sweden^{*}, with the following terms of reference:

The correspondence group is instructed, taking into account the relevant decisions taken and comments made in plenary, to:

- .1 review the Code of Safe Practice for Ships Carrying Timber Deck Cargoes, paying particular attention to updating the requirements for safe and efficient securing;
- .2 identify the associated circulars and resolutions that may require consequential amendments;
- .3 provide a draft Revised Code for consideration at DSC 13; and
- .4 submit a written report to DSC 13.

15 FORM AND PROCEDURE FOR APPROVAL OF THE CARGO SECURING MANUAL

15.1 The Sub-Committee recalled that MSC 82 had considered a proposal by the Russian Federation (MSC 82/21/16) to amend SOLAS regulations VI/5 and VII/5 to require the Cargo Securing Manual to be also provided in the English language and every sheet of the Manual to be marked by symbol of approval acceptable to the Administration, and included in the Sub-Committee’s work programme and provisional agenda for DSC 12, a high priority item on “Form and procedure for approval of the Cargo Securing Manual”, with a target completion date of 2008. In this context, the Committee noted a view that rather than amending the appropriate SOLAS regulation, respective modifications to MSC/Circ.745 could be developed to address the issue.

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15.2 The Sub-Committee considered document DSC 12/15 (IACS) which supports the proposal that the cargo securing manual should be written in the ship's working language and that, if this language is not English, a translation of the manual into English should be provided.

15.3 Furthermore, with respect to proposals for measures to prevent falsification of the cargo securing manual the Sub-Committee was advised by IACS that IACS members are not aware that falsification of documents is a problem and have no cases that they can trace, therefore, IACS suggested that, before embarking on any changes that would require a change to the cargo securing manual approval procedures, or any other manual required by SOLAS, MARPOL or their associated Codes, Administrations provide evidence that falsification is widespread and frequent enough to support such changes.

15.4 The Sub-Committee agreed that, whilst there did not appear to be widespread evidence of falsification of Cargo Securing Manuals, the text of MSC/Circ.745 on Guidelines for the preparation of the Cargo Securing Manual would benefit from amendments to require Cargo Securing Manuals to be written in clear and unambiguous text, further noted that the Cargo Securing Manual was a "living document" and having concurred with the view that, whilst it was not appropriate to mark every page of the manual, agreed that appropriate records should be maintained of changes to dynamic parts of the manual and forwarded documents DSC 12/15 and MSC 82/21/16 to the working group to prepare draft amendments to MSC/Circ.745.

15.5 The Sub-Committee, having noted a view that the Cargo Securing Manual is primarily used by the ship's staff and, therefore, only needs to be produced in the working language of the ship, further noted that most Manuals are approved by recognized organizations that might not speak the working language of the ship and, as a result, it was advisable to reproduce the Cargo Securing Manuals in the working language of the ship, and, where that language was not English, French or Spanish, in one of those languages as well.

Establishment of the Working Group

15.6 The Sub-Committee established the Working Group on providing safe working conditions for securing of containers and the CSS Code, after having considered proposals under agenda item 18.

Report of the working group

15.7 Having considered the part of the report of the working group (DSC 12/WP.4) relating to the item, the Sub-Committee noted the group's consideration of document DSC 12/15 (IACS), which comments on document MSC 82/21/16 (Russian Federation), containing a proposal for amending SOLAS regulations VI/5 and VII/5, to require the Cargo Securing Manual (CSM) to be also provided in the English language, and a recommendation that the CSM be provided in the working language of the vessel, and if the working language is not English, a translation into English should be provided. However, the Sub-Committee recalled its decision taken earlier in plenary (see paragraph 15.5) and agreed to progress the matter at DSC 13 as the final decision would need to be included in an amendment to MSC/Circ.745.

15.8 With respect to the amendments to the CSS Code, the Chinese delegation voiced its concern that adding the translation of the cargo securing manual into one of the three IMO working languages would not prevent falsification of the manuals. Furthermore, they considered some cargoes are secured by seafarers on board whilst some may require assistance from ashore. Therefore, it is not certain that the shore personnel use English to communicate. There is no

mandatory requirement in the relevant IMO conventions for this language requirement and the necessary translation would impose an unnecessary burden on shipowners.

16 WORK PROGRAMME AND AGENDA FOR DSC 13

16.1 Taking into account the progress made at this session and the provisions of the agenda management procedure contained in paragraphs 3.14 to 3.27 of the Guidelines on the organization and method of work (MSC-MEPC.1/Circ.1), the Sub-Committee revised its work programme (DSC 12/WP.2) based on that approved by MSC 82, taking into account relevant decisions of MEPC 56, and prepared the revised Sub-Committee's work programme and provisional agenda for DSC 12. While reviewing the work programme, the Sub-Committee agreed to invite the MSC, and the MEPC as far as environment-related items are concerned, to:

- .1 delete the following work programme items, as work on them has been completed:
 - .1.1 item H.2 - Mandatory application of the BC Code;
 - .1.2 item H.3 - Review of the SPS Code;
 - .1.3 item H.8 - Application of requirements for dangerous goods in packaged form in SOLAS and the 2000 HSC Code;
- .2 extend the target completion date of the following work programme items:
 - .2.1 item H.4 - Amendments to the CSS Code, to 2008;
 - .2.2 item H.6 - Guidance on providing safe working conditions for securing of containers, to 2008;
 - .2.3 item H.7 - Review of the Recommendations on the safe use of pesticides in ships, to 2008;
- .3 amend the title and extend the target completion date of the work programme item H.1 as follows:
 - .3.1 item H.1 - Amendment (35-10) to the IMDG Code and supplements; 2009
- .4 include the following new work programme items in the Sub-Committee's work programme, taking into account the justification provided:
 - .4.1 item H.9 - Amendments to the International Convention for Safe Containers, 1972; 2009
 - .4.2 item H.10 - Review of the Guidelines for packing of cargo transport units; 2009
- .5 renumber the work programme items accordingly; and
- .6 approve the proposed revised work programme of the Sub-Committee together with the proposed revised target completion dates and other editorial changes.

Arrangements for the next session

16.2 The Sub-Committee agreed to establish, as DSC 13, working and drafting groups on the following subjects:

- .1 Amendments to the BC Code;
- .2 Review of the Recommendations on the safe use of pesticides in ships;
- .3 Revision of the Code of safe practice for ships carrying timber deck cargoes;
- .4 Guidance on protective clothing; and
- .5 Review of Guidelines for packing of cargo transport units.

Date of next session

16.3 The Sub-Committee noted that the date of the thirteenth session is tentatively scheduled to take place from 22 to 26 September 2008.

Future sessions of the Editorial and Technical (E&T) Group

16.4 The Sub-Committee noted that, as no major amendments to the IMDG Code need to be prepared or finalized in 2008, there is no need to hold any E&T Group meetings next year and invited the Committee to approve two meetings of the Editorial and Technical Group in 2009, with the first meeting in April or May and the second meeting back-to-back with DSC 14.

17 ELECTION OF CHAIRMAN AND VICE-CHAIRMAN FOR 2008

17.1 In accordance with the Rules of Procedure of the Maritime Safety Committee, the Sub-Committee unanimously re-elected Mrs. Olga P. Lefèvre (France) as Chairman and Captain Juan. P. Heusser (Chile) as Vice-Chairman, both for the year 2008.

18 ANY OTHER BUSINESS

18.1 The Sub-Committee noted that there were, primarily, five issues that needed to be considered or noted, as appropriate, under this agenda item, namely:

- .1 clarification of the CSC provisions relating to the capacity to examine containers, that is document DSC 12/18 (Russian Federation);
- .2 preparation of recommendations on the scope and principles of continuous examination programmes, that is documents DSC 12/18/1 (Russian Federation) and DSC 12/6/5 (Canada);
- .3 an update on the status of courses on the implementation of the IMDG Code, document DSC 12/1/1;

- .4 natural gas hydrate pellet (NGHP) carriers, document BLG 11/16; and
- .5 revision of the Code on Alarms and Indicators, document DSC 12/2.

Clarification of the CSC provisions relating to the capacity to examine containers

18.2 The Sub-Committee, having considered document DSC 12/18 (Russian Federation) and a proposal to amend regulation 2 of the International Convention for Safe Containers, 1972 to prohibit owners of approved containers from conducting their own examinations, unless permitted to do so by the Administration, agreed that the current industry practices were satisfactory and that more evidence was needed to support the proposals.

Preparation of recommendations on the scope and principles of examination programmes

18.3 The Sub-Committee, having considered a proposal by the Russian Federation (DSC 12/18/1) to standardize the scope and principles of continuous examination programmes and a proposal by Canada (DSC 12/6/5) to review the requirements of the periodic and continuous examination programmes in light of a recent incident, agreed that the proposals had merit and forwarded them to the working group to develop a justification for a new work programme item in accordance with the Guidelines on the Organization and method of work.

Establishment of the working group

18.4 The Sub-Committee, after consideration of proposals submitted under this agenda item and agenda items 8, 10 and 15, established the Working Group on Guidance on providing safe working conditions for securing of containers and the CSS Code, under the chairmanship of Captain Colin Thomas (United Kingdom), and instructed the group, taking into account the relevant decisions taken and comments made in plenary, to:

- .1 deliberate on the issue under four separate agenda items;
- .2 consider the best way to disseminate information on local regulations (DSC 12/8);
- .3 finalize the draft amendments, including those related to the new Annex to the CSS Code (DSC 12/10, DSC 12/10/1, appendix 2 and DSC 12/10/2) and prepare an associated MSC circular;
- .4 prepare draft amendments to the Guidelines for the preparation of Cargo Securing Manual (MSC/Circ.745) and associated MSC circular (DSC 12/15 and MSC 82/21/16);
- .5 develop a justification for a work programme item on the need to amend the CSC provisions relating to the capacity to examine containers for forwarding to the Committee (DSC 12/18/1 and DSC 12/6/5); and
- .6 deliver a written report on progress made to plenary on Thursday, 20 September 2007.

Report of the working group

18.5 The Sub-Committee, having received the report of the working group (DSC 12/WP.4), approved it in general and agreed to the justification for the proposal of a new work programme item, prepared by the group, on the need to amend the CSC provisions relating to the capacity to examine containers, as set out in annex 14, taking into account the Guidelines on the organization and method of work (MSC-MEPC.1/Circ.1).

18.6 The Sub-Committee expressed the view that Administrations may wish to consider carrying out a review of ACEP schemes that they have approved, in addition to the container checks carried out according to Inspection programmes for cargo transport units (CTUs) carrying dangerous goods (MSC.1/Circ.1202) and report back to DSC 13.

Courses on the implementation of the IMDG Code

18.7 The Sub-Committee noted that, under the Organization's programme on enhancement of maritime safety, since DSC 11, one national course on the implementation of the IMDG Code had been delivered and 33 participants benefited from the event.

Natural gas hydrate pellet (NGHP) carriers

18.8 The Sub-Committee noted that BLG 11, having considered a proposal by Japan on the development of appropriate safety requirements for NGHP carriers to be developed by the Organization, had invited Japan to submit a definitive version of the proposal, including a detailed plan of action on the work to be undertaken by BLG (as co-ordinator), in co-operation with other sub-committees, including DSC, subject to the relevant decisions of MSC 83.

Revision of the Code on Alarms and Indicators

18.9 The Sub-Committee recalled that DE 50, having considered document DE 50/10/2/Rev.1 (IACS), containing a proposal for a draft revision of the Code on Alarms and Indicators and, noting that there was general agreement on the revised Code as proposed by IACS, recalling that MSC 79 had instructed it to co-operate on this item with appropriate sub-committees, as necessary and when requested by the DE Sub-Committee, agreed to refer the draft revised Code (DE 50/10/2/Rev.1) to NAV 53, DSC 12, FP 52 and BLG 12 for comments on issues under these Sub-Committees' purview and, noting that the references to the IMDG Code may require updating, forwarded document DE 50/10/2/Rev.1 to the E&T Group for consideration and requested the Secretariat to transmit the outcome of its deliberations directly to the DE Sub-Committee.

Expressions of appreciation

18.10 The Sub-Committee expressed appreciation to Captain Jan Erhardt from the Federal Ministry of Transport, Building and Urban Affairs, who had been with the German Delegation since 1988 and had participated in the DSC Sub-Committee since its inception and had been an active participant with the work of the BC Code, and wished him a long and happy retirement for next spring.

18.11 The Sub-Committee, having noted that Mr. I. Rahim, the former Secretary of the Sub-Committee has been assigned increased responsibilities within the Maritime Safety Division and will no longer be available to serve as the Secretary of the Sub-Committee, expressed its

deep appreciation for the assistance rendered and the outstanding contribution he made over the years to the work of this Sub-Committee.

19 ACTION REQUESTED OF THE COMMITTEES

19.1 The Maritime Safety Committee, at its eighty-fourth session, is invited to:

- .1 approve the draft MSC circular on Amendments to the Revised Emergency Response Procedures for Ships Carrying Dangerous Goods (EmS Guide) (paragraph 3.20 and annex 1);
- .2 consider exploring the possibility of making available the complete text of the IMDG Code freely downloadable from the internet (paragraph 3.26);
- .3 endorse the course of action taken by the Sub-Committee, which was to approve DSC.1/Circ.54 on Information on the amendments to the marine pollutant provisions, which will take effect through amendment 34-08 to the IMDG Code (paragraph 3.34);
- .4 endorse the course of action taken by the Sub-Committee, which was to approve DSC.1/Circ.55 on Guidance on the application of chapter 2.10 (Marine Pollutants) of the International Maritime Dangerous Goods (IMDG Code) (amendment 33-06) (paragraph 3.35);
- .5 note the potentially serious consequences of exposing some containerized cargoes to elevated heat sources and note that similar discussions are currently ongoing at the UN Sub-Committee of experts on the transport of dangerous goods (UNSCOE) and that it might be premature to issue a DSC Circular before the outcomes of the considerations at that UN Sub-Committee are completed (paragraph 3.52);
- .6 note that the Sub-Committee agreed to amendment (34-08) to the IMDG Code and consider the amendment with the view to adoption (paragraph 3.57 and Circular letter No.2820);
- .7 note the recommendation of the Sub-Committee that Contracting Governments to the Convention may apply the International Maritime Solid Bulk Cargoes (IMSBC) Code in whole or in part on a voluntary basis as from 1 January 2009 as, amongst others, the proposed voluntary application date will be the same as that of the IMDG Code (amendment 34-08) (paragraph 5.4);
- .8 approve the draft amendments to the International Convention for the safety of life at sea, 1974 (SOLAS), as amended (paragraph 5.9 and annex 3);
- .9 approve the draft text of the International Maritime Solid Bulk Cargoes (IMSBC) Code with the view to adoption at MSC 85 (paragraph 5.10 and annex 4);
- .10 approve the draft amendments to the International code for the safe carriage of packaged irradiated nuclear fuel, plutonium and high-level radioactive wastes on board ships (INF Code), as amended with the view to adoption at MSC 85 (paragraph 5.11 and annex 5);

- .11 note that the Sub-Committee agreed to text for inclusion in chapter 7 of the Code of Safety for Special Purpose Ships (SPS Code) and requested the Secretariat to forward the text to the DE Sub-Committee (co-ordinator) for inclusion in the SPS Code (paragraph 7.5);
 - .12 approve the draft MSC circular on revised Recommendations on safety of personnel during container securing operations (paragraph 10.5.6 and annex 7);
 - .13 note that the Sub-Committee agreed: to delay the submission to the Committee of the agreed Revised Guidelines for the preparation of the Cargo Securing Manual and the associated draft MSC circular until the work on the draft amendments to the CSS Code is finalized, in order to ensure that they are approved at the same session of the Committee; to the additional draft amendments to the Revised Guidelines for the preparation of Cargo Securing Manual and in order to make it clear that Cargo Safe Access Plan (CSAP) is only required for container ships; and that a consolidated text of the draft Revised Guidelines, containing the draft amendments referred to above, be prepared by the Secretariat for submission to MSC 85 (paragraph 10.8 and annex 8);
 - .14 approve the draft MSC circular on Recommendations on the safe use of pesticides in ships applicable to the fumigation of cargo holds (paragraph 11.11 and annex 9);
 - .15 approve the draft MSC circular on Recommendations on the safe use of pesticides in ships applicable to the fumigation of cargo transport units (paragraph 11.13 and annex 10);
 - .16 note that the Sub-Committee finalized amendments to the International Convention for the safety of life at sea, 1974 (SOLAS), as amended with respect to matters falling under its purview and forwarded them to the FP Sub-Committee (co-ordinator) (paragraph 12.9 and annex 11);
 - .17 note that the Sub-Committee finalized amendments to the International code of safety for high-speed craft, 2000 (2000 HSC Code) with respect to matters falling under its purview and forwarded them to the FP Sub-Committee (co-ordinator) (paragraph 12.10 and annex 12);
 - .18 approve the draft MSC circular on Document of compliance with the special requirements for ships carrying dangerous goods under the provisions of regulation II-2/19 of the 1974 SOLAS Convention, as amended and of regulation 7.17 of HSC Code 2000, as amended (paragraph 12.11 and annex 13); and
 - .19 approve the report in general.
- 19.2 The Marine Environment Protection Committee, at its fifty-seventh session, is invited to:
- .1 note the Sub-Committee's decision in principle to amend chapter 3 of the IMDG Code to clarify the requirements of a "proper shipping name" as required by the IMDG Code as distinct from the "correct technical name" as required by MARPOL Annex III (paragraph 3.33);

- .2 endorse the course of action taken by the Sub-Committee, which was to approve, in principle, DSC.1/Circ.54 on Information on the amendments to the marine pollutant provisions, which will take effect through amendment 34-08 to the IMDG Code (paragraph 3.34); and
- .3 endorse the course of action taken by the Sub-Committee, which was to approve, in principle, DSC.1/Circ.55 on Guidance on the application of chapter 2.10 (Marine Pollutants) of the International Maritime Dangerous Goods (IMDG Code) (amendment 33-06) (paragraph 3.35).

ANNEX 1

DRAFT MSC CIRCULAR

CARRIAGE OF DANGEROUS GOODS

INTERNATIONAL MARITIME DANGEROUS GOODS (IMDG) CODE

ANNEXES AND SUPPLEMENTS

Amendments to the Revised Emergency Response Procedures for Ships Carrying Dangerous Goods (EmS Guide)

1 The Maritime Safety Committee, at its eighty-fourth session ([...]), approved amendments to the revised Emergency Response Procedures for Ships Carrying Dangerous Goods (EmS Guide), set out in the annex.

2 Member Governments are invited to bring the annexed amendments to the revised EmS Guide to the attention of all concerned noting that amendment 34-08 (resolution MSC.[...]) is expected to enter into force on 1 January 2010; however, its provisions may be applied on a voluntary basis from 1 January 2009, as agreed to by MSC 75.

ANNEX

**AMENDMENTS TO REVISED EMERGENCY RESPONSE PROCEDURES FOR SHIPS
CARRYING DANGEROUS GOODS (EMS GUIDE) (MSC/CIRC.1025)**

1 In the index, the following entries in numerical order are added:

UN No.	EmS Fire	EmS Spill
0505	F-B	S-X
0506	F-B	S-X
0507	F-B	S-X
0508	F-B	S-Y
2031*	F-A	S-Q
2031**	F-A	S-B
3474	F-B	S-J
3475	F-E	S-E
3476	F-G	S-P
3477	F-A	S-B
2478	F-D	S-U
3479	F-D	S-U
3480	F-A	S-I
3481	F-A	S-I

* Applies to NITRIC ACID other than red fuming, with at least 65% but with not more than 70% nitric acid.

** Applies to NITRIC ACID other than red fuming, with less than 65% nitric acid.

ANNEX 2

JUSTIFICATION FOR A PROPOSED NEW WORK PROGRAMME ITEM (In accordance with MSC-MEPC.1/Circ.1)

REVIEW OF THE GUIDELINES FOR PACKING OF CARGO TRANSPORT UNITS

1 Scope of the proposal

The Guidelines for Packing Cargo Transport Units (CTU), amongst other instruments, supplement the IMDG Code. Section 4 of these Guidelines gives additional advice for packing and securing of dangerous cargoes and contains various references to the IMDG Code. To avoid confusion and misinterpretation these references should conform with the latest amendment of the IMDG Code.

2 Compelling need

The Guidelines for Packing Cargo Transport Units include references to the IMDG Code and therefore provide important information for the Guidelines' users with regard to the packing of dangerous goods. To keep this information aligned with the IMDG Code it is necessary to update the references.

3 Analysis of the issues involved, having regard to the costs to the maritime industry and global legislative and administrative burdens

Both instruments are linked. The CTU Packing Certificate is mandatory under the regime of the IMDG Code. Therefore deviating versions with respect to classification, marking and labelling of dangerous goods may lead to misinterpretation.

4 Benefits

Harmonization between different IMO instruments.
Increased level of safety.
Better acceptance of provisions of instruments.
Assist in the application of relevant instruments.

5 Priority and target completion dates

High priority, with the target completion date of 2008.

6 Specific indication of the action required

The Guidelines were approved by MSC 67 and, after endorsement by UNECE and ILO, were circulated as MSC/Circ.787 and were included in the Supplement to the IMDG Code as well. The first version was based on Amendment (28-96) of the IMDG Code.

In light of the amendments to the mandatory IMDG Code over the years, the Guidelines need to be aligned with the amended IMDG Code particularly annex 2 of the Guidelines relating to label/placard for class 5.2 and the fumigation warning sign which does not conform with the actual symbols required by the IMDG Code.

Future amendments of the IMDG Code should also be reflected in the Guidelines.

7 Remarks on the criteria for general acceptance

The subject of the proposal lies within the scope of IMO's objectives and relevant provisions of the strategic plan for the Organization and the High-level action plan. It is a matter of harmonization between different IMO instruments. Adequate industry standards do not exist. The benefits justify the proposed action.

8 Identification of which subsidiary bodies are essential to complete the work

The work can be accomplished by the Sub-Committee on Dangerous Goods, Solid Cargoes and Containers.

ANNEX 3**DRAFT RESOLUTION MSC...(85)
(adopted on ...)****ADOPTION OF AMENDMENTS TO THE INTERNATIONAL CONVENTION FOR
THE SAFETY OF LIFE AT SEA, 1974, AS AMENDED**

THE MARITIME SAFETY COMMITTEE,

RECALLING Article 28(b) of the Convention on the International Maritime Organization concerning the functions of the Committee,

RECALLING FURTHER article VIII(b) of the International Convention for the Safety of Life at Sea (SOLAS), 1974 (hereinafter referred to as “the Convention”), concerning the amendment procedure applicable to the Annex to the Convention, other than the provisions of chapter I thereof,

RECOGNIZING the need to provide a mandatory application of the agreed International standards for the Carriage of Solid Bulk Cargoes by Sea,

HAVING CONSIDERED, at its [eighty-fifth] session, amendments to the Convention, proposed and circulated in accordance with article VIII(b)(i) thereof,

1. ADOPTS, in accordance with article VIII(b)(iv) of the Convention, amendments to the Convention, the text of which is set out in the annex to the present resolution;
2. DETERMINES, in accordance with article VIII(b)(vi)(2)(bb) of the Convention, that the said amendments shall be deemed to have been accepted on [1 July 2010], unless, prior to that date, more than one third of the Contracting Governments to the Convention or Contracting Governments the combined merchant fleets of which constitute no less than 50% of the gross tonnage of the world’s merchant fleet have notified their objections to the amendments;
3. INVITES SOLAS Contracting Governments to note that, in accordance with article VIII(b)(vii)(2) of the Convention, the amendments shall enter into force on [1 January 2011] upon their acceptance in accordance with paragraph 2 above;
4. REQUESTS the Secretary-General, in conformity with article VIII(b)(v) of the Convention, to transmit certified copies of the present resolution and the text of the amendments contained in the annex to all Contracting Governments to the Convention;
5. FURTHER REQUESTS the Secretary-General to transmit copies of this resolution and its annex to members of the Organization, which are not Contracting Governments to the Convention.

ANNEX

**DRAFT AMENDMENTS TO THE INTERNATIONAL CONVENTION FOR THE
SAFETY OF LIFE AT SEA, 1974, AS AMENDED**

CHAPTER II-1

Construction – Structure, subdivision and stability, machinery and electrical installations

- 1 In regulation 3-3, the words “VII/8.2” and “VII/11.2” are replaced by “VII/13.2” and “VII/16.2”, respectively.

CHAPTER II-2

Construction – Fire Protection, fire detection and fire extinction

- 2 In regulation 1.6.2, the words “VII/8.1” and “VII/11.1” are replaced by “VII/13.1” and “VII/16.1”, respectively.
- 3 In regulation 3.11, the word “VII/8.1” is replaced by “VII/13.1”.
- 4 In regulation 3.25, the word “VII/11.1” is replaced by “VII/16.1”.
- 5 In regulation 19, note 10 of table 19.2, the text “A.434(XI)” is replaced with the text “[MSC...(85)]”.
- 6 In regulation II-2/19.3.4, revise the title to read “Ventilation arrangement”

CHAPTER VI

Carriage of cargoes

Part A

General provisions

- 7 A new regulation 1 is inserted and the following regulations renumbered.

“Regulation 1

Definitions

For the purpose of this chapter, unless expressly provided otherwise:

- 1 *BC Code* means the Code of Safe Practice for Solid Bulk Cargoes adopted by the Maritime Safety Committee of the Organization by resolution [MSC...(85)], as may be amended by the Organization, provided that such amendments are adopted, brought into force and take effect in accordance with the provisions of article VIII of the present Convention concerning the amendment procedures applicable to the annex other than chapter I.

2 *Solid bulk cargo* means any cargo, other than liquid or gas, consisting of a combination of particles, granules or any larger pieces of material generally uniform in composition, which is loaded directly into the cargo spaces of a ship without any intermediate form of containment.”

8 A new regulation 3 is inserted and the following regulations renumbered.

“Regulation 3

Requirements for the carriage of solid bulk cargoes other than grain

The carriage of solid bulk cargoes other than grain shall be in compliance with the relevant provisions of the BC Code.”

9 Regulation 4.2.2 is replaced by the following text:

“.2 in the case of solid bulk cargo, information as required by section 4 of the BC Code.”

10 Regulation 4.2.3 is deleted.

11 In regulation 5.1, the word “solid” is inserted in the first sentence after the words “When transporting a”.

Part B

Special provisions for bulk cargoes other than grain

12 In the heading of this part, the word “solid” is inserted after “Special provisions for” and the text “other than grain” is deleted.

13 In regulation 8.1, the word “solid” is inserted in the first sentence after “Prior to loading a”.

14 Regulations 8.2 and 8.3 are deleted.

15 In regulation 9, the text “solid” is inserted in the heading after the words “*Loading, unloading and stowage of*”.

15 *Regulations 9.4 and 9.5 are deleted and the subsequent regulations renumbered.*

CHAPTER VII

Carriage of dangerous goods

- 16 Parts A-1 to D are re-lettered Parts B to E
- 17 Regulations 7-1, 7-2, 7-3 and 7-4 are renumbered to regulations 8, 10, 11 and 12, respectively, and the remaining regulations are renumbered.
- 18 In regulation 8.3 the text “detailed instructions on the safe carriage of dangerous goods in solid form in bulk which shall include” is deleted.
- 19 The following new regulation 9 is inserted after renumbered regulation 8.

“Regulation 9

Requirements for the carriage of dangerous goods in solid form in bulk

The carriage of dangerous goods in solid form in bulk shall be in compliance with the relevant provisions of the BC Code, as defined in regulation VI/1.1.”

CHAPTER IX

Management for the safe operation of ships

- 20 In regulation 1.4, the word “VII/8.2” is replaced by “VII/13.2”.
- 21 In regulation 1.5, the word “VII/11.2” is replaced by “VII/16.2”.

CHAPTER XI-2

Special measures to enhance maritime security

- 22 In regulation 1.1.2, the word “VII/8.2” is replaced by “VII/13.2”.
- 23 In regulation 1.1.3, the word “VII/11.2” is replaced by “VII/16.2”.

CHAPTER XII

Additional safety measures for bulk carriers

- 24 In regulation 8.1, the words “VI/7.2” are replaced by “VI/9.2”.
- 25 In regulation 10.1, the words “VI/2” are replaced by “VI/4”.

ANNEX 4

**DRAFT RESOLUTION MSC.[...(85)]
(adopted on [... November 2008])****ADOPTION OF THE MANDATORY INTERNATIONAL MARITIME
SOLID BULK CARGOES (IMSBC) CODE**

THE MARITIME SAFETY COMMITTEE,

RECALLING Article 28(b) of the Convention on the International Maritime Organization concerning the functions of the Committee,

NOTING the adoption by the Committee of resolution MSC.193(79) on the Code of Safe Practice for Solid Bulk Cargoes (BC Code),

RECOGNIZING the need to provide a mandatory application of the agreed international standards for the carriage of solid bulk cargoes by sea,

NOTING ALSO resolution MSC.[...(85)] by which it adopted amendments to chapters VI and VII of the International Convention for the Safety of Life at Sea (SOLAS) 1974, as amended (hereinafter referred to as “the Convention”), to make the provisions of the BC Code, mandatory under the Convention,

HAVING CONSIDERED, at its [eighty-fifth] session, the text of the proposed BC Code,

1. ADOPTS the International Maritime Solid Bulk Cargoes (IMSBC) Code, as prepared by the Sub-Committee on Dangerous Goods, Solid Cargoes at its twelfth session, the text of which is set out in the Annex to the present resolution;
2. NOTES that, under the aforementioned amendments to chapter VI of the Convention, future amendments to the IMSBC Code shall be adopted, brought into force and shall take effect in accordance with the provisions of article VIII of the Convention concerning the amendments procedures applicable to the Annex to the Convention other than chapter I thereof;
3. INVITES Contracting Governments to the Convention to note that the IMSBC Code will take effect on [1 January 2011] upon entry into force of amendments to chapters VI and VII of the Convention;
4. AGREES that Contracting Governments to the Convention may apply the IMSBC Code in whole or in part on a voluntary basis as from [1 January 2009];
5. REQUESTS the Secretary-General to transmit certified copies of this resolution and its Annex to all Contracting Governments to the Convention;
6. FURTHER REQUESTS the Secretary-General to transmit copies of this resolution and its Annex to all Members of the Organization which are not Contracting Governments to the Convention;
7. NOTES that the annexed IMSBC Code supersedes the existing Code adopted by resolution MSC.193(79).

ANNEX

**DRAFT TEXT OF THE MANDATORY INTERNATIONAL MARITIME SOLID BULK
CARGOES (IMSBC) CODE**

(Draft text of the mandatory IMSBC Code may be found in document DSC 12/19/Add.1)

ANNEX 5

**DRAFT RESOLUTION MSC...(85)
(adopted on ...)****ADOPTION OF AMENDMENTS TO THE INTERNATIONAL CODE FOR THE SAFE
CARRIAGE OF PACKAGED IRRADIATED NUCLEAR FUEL, PLUTONIUM AND
HIGH-LEVEL RADIOACTIVE WASTES ON BOARD SHIPS, AS AMENDED**

THE MARITIME SAFETY COMMITTEE,

RECALLING Article 28(b) of the Convention on the International Maritime Organization concerning the functions of the Committee,

NOTING resolution MSC.88(71), by which it adopted the International Code for the Safe Carriage of Packaged Irradiated Nuclear Fuel, Plutonium and High-Level Radioactive Wastes on Board Ships (hereinafter referred to as “the INF Code”), which has become mandatory under chapter VII of the International Convention for the Safety of Life at Sea (SOLAS), 1974 (hereinafter referred to as “the Convention”),

NOTING ALSO article VIII(b) and regulation VII/14.1 of the Convention concerning the procedure for amending the INF Code,

HAVING CONSIDERED, at its eighty-fifth session, amendments to the INF Code proposed and circulated in accordance with article VIII(b)(i) of the Convention,

1. ADOPTS, in accordance with article VIII(b)(iv) of the Convention, amendments to the INF Code, the text of which is set out in the Annex to the present resolution;
2. DETERMINES, in accordance with article VIII(b)(vi)(2)(bb) of the Convention, that the amendments shall be deemed to have been accepted on [1 July 2010] unless, prior to that date, more than one third of the Contracting Governments to the Convention or Contracting Governments the combined merchant fleets of which constitute not less than 50% of the gross tonnage of the world’s merchant fleet, have notified their objections to the amendments;
3. INVITES Contracting Governments to note that, in accordance with article VIII(b)(vii)(2) of the Convention, the amendments shall enter into force on [1 January 2011] upon their acceptance in accordance with paragraph 2 above;
4. REQUESTS the Secretary-General, in conformity with article VIII(b)(v) of the Convention, to transmit certified copies of the present resolution and the text of the amendments contained in the Annex to all Contracting Governments to the Convention;
5. FURTHER REQUESTS the Secretary-General to transmit copies of this resolution and its Annex to Members of the Organization, which are not Contracting Governments to the Convention.

ANNEX

**DRAFT AMENDMENTS TO THE INTERNATIONAL CODE FOR THE SAFE
CARRIAGE OF PACKAGED IRRADIATED NUCLEAR FUEL, PLUTONIUM AND
HIGH-LEVEL RADIOACTIVE WASTES ON BOARD SHIPS**

Chapter 1 – General

- 1 In regulation 1.1.1.8, the text “VII/8.1” is replaced by the text “VII/13.1”.
- 2 In regulation 1.2.1, the text “VII/15” is replaced by the text “VII/20”.

Chapter 11 – Notification in the event of an incident involving INF cargo

- 3 In regulation 11.1, the text “VII/7-1” is replaced by the text “VII/8”.

ANNEX 6**DRAFT AMENDMENTS TO THE CODE OF SAFE PRACTICE
FOR CARGO STOWAGE AND SECURING (CSS CODE)**

DRAFT NEW ANNEX [...]

**GUIDANCE ON PROVIDING SAFE WORKING CONDITIONS
FOR SECURING OF CONTAINERS****1 AIM**

To ensure that persons engaged in carrying out container securing operations have safe working conditions and, in particular safe access, appropriate securing equipment and safe places of work. These requirements should be taken into account at the design stage when securing systems are devised. These guidelines provide ship-owners, ship builders, classification societies, Administrations and ship designers with guidance on producing or authorizing a Cargo Safe Access Plan (CSAP).

2 SCOPE

Ships which are specifically designed and fitted for the purpose of carrying containers.

3 DEFINITIONS

3.1 *Administration* means the Government of the State whose flag the ship is entitled to fly.

3.2 *Securing* includes unsecuring.

3.3 *Fencing* is a generic term for guardrails safety rails, safety barriers and similar structures that provide protection against the falls of persons.

3.4 *Stringers* are the uprights or sides of a ladder.

4 GENERAL**4.1 Introduction**

4.1.1 Injuries to dockworkers onboard visiting ships account for the majority of accidents that occur within container ports, with the most common activity that involves such injuries being the lashing/unlashing of deck containers. Ships crew engaged in securing operations face similar dangers.

4.1.2 During the design and construction of container ships the provision of a safe place of work for the crew and dockworkers should be considered as of equal importance to the container capacity.

4.1.3 Container shipowners and designers are reminded of the dangers associated with container securing operations and urged to develop and use container securing systems which are safe by design. The aim should be to eliminate the need for:

- .1 container top work;
- .2 work in other equally hazardous locations; and
- .3 the handling by crew or dockworkers of heavy and unwieldy securing equipment.

4.1.4 It should be borne in mind that providing safe working conditions for securing containers deals with matters relating to design, operation, and maintenance, and that the problems on large container ships are not the same as on smaller ones.

4.2 Recommendations on safety of personnel during container securing operations (MSC/Circ.886)

4.2.1 Shipowners, ship designers and Administrations should take into account the recommendations on safe design of securing arrangements contained in these guidelines, and in the Recommendations on safety of personnel during container securing operations (MSC/Circ.886).

4.3 Cargo Safe Access Plan (CSAP)

4.3.1 The CSS Code requires ships which are specifically designed and fitted for the purpose of carrying containers to have an approved Cargo Safe Access Plan (CSAP) on board, for all areas where containers are secured.

4.3.2 Stakeholders, including, but not limited to shipowners, ship designers, ship builders, administrations and classification societies, should be involved at an early stage in the design of securing arrangements on containerships and in the development of the CSAP.

4.3.3 The CSAP should be developed at the design stage in accordance with chapter 5 of annex to the circular MSC/Circ.[...].

4.3.4 Designers should incorporate the requirements of this annex into the CSAP so that safe working conditions can be maintained during all anticipated configurations of container stowage.

4.4 Training

4.4.1 Personnel engaged in cargo securing operations should be trained in the lashing/unlashing of containers as necessary to complete their duties in a safe manner.

4.4.2 Personnel engaged in cargo securing operations should be fully trained to develop the knowledge, psychomotor and attitude skills that they require to do their job safely and efficiently, as well as to develop general safety awareness¹, and to recognize and avoid potential dangers.

¹ Safety and health in ports, ILO Code of Practice, section 2.6.2.

4.4.3 Training should include situational awareness to identify and avoid hazards.

4.4.4 Personnel should be suitably trained in lashing operations using the different types of lashing equipment that they will be expected to use.

4.4.5 Personnel should be trained in safe systems of work. Where personnel are involved in working at heights, they should be trained in the use of fall restraint equipment.

5 SAFE ACCESS AND CARGO SECURING REQUIREMENTS

5.1 Administrations should ensure that:

- .1 lashing plans contained within the approved Cargo Securing Manual are compatible with the current design of the ship and the intended container securing method is both safe and physically possible;
- .2 the Cargo Securing Manual, lashing plans and the Cargo Safe Access Plan (CSAP) are kept up to date; and
- .3 lashing plans are compatible with the design of the vessel and the equipment available.

5.2 Shipowners and operators should ensure that:

- .1 portable cargo securing devices should be certified and assigned with an MSL. The MSL should be documented in the cargo securing manual as required by the CSS Code; and
- .2 the operational requirements of this annex are complied with.

5.3 Container ship terminal operators should ensure that the requirements of section 6.3 of this annex are complied with.

6 RESPONSIBILITIES

6.1 Designers

Should follow design requirements of these guidelines.

6.2 Shipbuilders

Should follow design requirements of these guidelines.

7 DESIGN

7.0 General design considerations

7.0.1 Risk assessments should be performed at the design stage taking into account the requirements of this annex to ensure that securing operations can be safely carried out in all anticipated container configurations. This assessment should be conducted with a view toward developing the Cargo Safe Access Plan (CSAP). Hazards to be assessed should include:

- .1 slips, trips and falls;
- .2 falls from height;
- .3 injuries whilst manually handling lashing gear;
- .4 being struck by falling lashing gear or other objects; and
- .5 identification of areas subject to a high risk of damage due to container operations.

7.0.2 Shipbuilders should collaborate with designers of securing equipment in conducting risk assessments and ensure that the following basic criteria are adhered to when building container ships.

7.0.3 Ship designers should ensure that container securing operations performed in outer positions can be accomplished safely.

7.0.4 The space provided between the container stows for workers to carry out lashing operations should provide:

- .1 a firm and level working surface;
- .2 a working area, excluding lashings in place, preferably 1 m, but not less than 750 mm wide, to provide a clear sight of twist lock handles and allow for the manipulation of lashing gear;
- .3 sufficient space to permit the lashing gear and other equipment to be stowed without causing a tripping hazard;
- .4 sufficient space between the fixing points of the lashing bars on deck, or on the hatch covers, to tighten the turnbuckles;
- .5 access in the form of ladders on hatch coamings;
- .6 safe access to lashing platforms;
- .7 protective fencing on lashing platforms²; and
- .8 adequate lighting in line with these guidelines.

7.1 Provisions for safe access

7.1.1 General provisions

7.1.1.1 The minimum clearance for transit areas should be 2 m high and 600 mm wide.

² An appropriate design is given in Safety and health in ports, ILO Code of Practice, section 3.3.4.

7.1.1.2 All relevant deck surfaces used for movement about the ship and all passageways and stairs should have non-slip surfaces.

7.1.1.3 Where necessary for safety, walkways on deck should be delineated by painted lines or otherwise marked by pictorial signs.

7.1.2 *Lashing platform design*

7.1.2.1 Platforms designed to eliminate or greatly reduce the use of three high lashing bars and provide efficient vertical stowage of the bars along the platform are preferred. Platforms should be designed to provide a clear work area, unencumbered by deck piping and other obstructions and take into consideration:

- .1 containers must be capable of being stowed within safe reach of the workers using the platform; and
- .2 the work area size and the size of the securing components used.

7.1.2.2 Permanent lashing platforms should be at least 1 m, but not less than 750 mm, wide.

7.1.2.3 Portable or removable lashing platforms should be at least 1 m, but no less than 750 mm wide, taking into account whether one, two or three high lashings are required and sufficiently strengthened to prevent springing or warping. These removable sections should be capable of being temporarily secured into position with fall protection.

7.1.2.4 Appropriate toe boards (or kick plates) should be provided around the sides of all platforms to prevent securing equipment from falling and injuring people.

7.1.2.5 Access to working areas should be designed to ensure there are no gaps through which people can fall.

7.1.2.6 There should be no obstructions, such as lashing bar storage bins or guides to land hatch lids, on working platforms.

7.1.3 *Fencing design*

7.1.3.1 Elevated platforms, where appropriate, should be fenced. As a minimum, fencing design should take into consideration:

- .1 the strength and height of the rails should be designed to prevent workers from falling;
- [.2 the flexibility of the fencing placement gaps within specified parameters based on the containers expected to be stowed in the adjacent locations; [to be clarified]
- .3 provisions for locking and removal of fencing as operational situations change based on stowage anticipated for that area]; and
- .4 damage to fencing and how to prevent failure due to that damage.

7.1.3.2 As a minimum, the top rail of fencing should be 1 m high from the base, with an intermediate rail at 500 mm.

7.1.3.3 Where possible fences and handrails should be highlighted with a contrasting colour to the background.

7.1.3.4 Athwartships cargo securing walkways should be protected by adequate fencing if an unguarded edge exists when the hatch cover is removed.

7.1.4 *Ladder and manhole design*

7.1.4.1 Where a fixed ladder gives access to the outside of a platform, the stringers should be connected at their extremities to the guardrails of the platform, irrespective of whether the ladder is sloping or vertical.

7.1.4.2 Where a fixed ladder gives access to a platform through an opening in the platform, the opening shall be protected with either a fixed grate with a lock back mechanism, which can be closed after access, or fencing. Grabrails should be provided to ensure safe access through the opening.

7.1.4.3 Where a fixed ladder gives access to a platform from the outside of the platform, the stringers of the ladder should be opened above the platform level to give a clear width of 700 to 750 mm to enable a person to pass through the stringers.

7.1.4.4 A fixed ladder should not slope at an angle greater than 25° from the vertical. Where the slope of a ladder exceeds 15° from the vertical, the ladder should be provided with suitable handrails not less than 540 mm apart, measured horizontally.

7.1.4.5 A fixed vertical ladder of a height exceeding 3 m, and any fixed ladder less than 3 m high, from which a person may fall into a hold should be fitted with guard hoops, which should be constructed as follows:

7.1.4.6 The ladder hoops should be uniformly spaced at intervals not exceeding 900 mm and should have a clearance of 750 mm from the rung to the back of the hoop and be connected by longitudinal strips secured to the inside of the hoops, each equally spaced round the circumference of the hoop.

7.1.4.7 The stringers should be carried above the floor level of the platform by at least 1 m and the ends of the stringers should be given lateral support and the top step or rung should be level with the floor of the platform unless the steps or rungs are fitted to the ends of the stringers.

7.1.4.8 As far as practicable, access ladders and walkways, and work platforms should be designed so that workers do not have to climb over piping or work in areas with permanent obstructions.

7.1.4.9 There should be no unprotected openings in any part of the workplace. Access opening must be protected with handrails or access covers that can be locked back during access.

7.1.4.10 As far as practicable, manholes should not be situated in transit areas, however, if they are, proper fencing should protect them.

7.1.4.11 Access ladders and manholes should be large enough for persons to safely enter and leave.

7.2 Lashing systems

7.2.1 General provisions

Lashing systems, including tensioning devices, should comply with the following criteria:

- .1 strength and height should be sufficient to prevent workers falling;
- .2 alternative container stowage configurations and the need to provide fencing as operational conditions change;
- .3 damage to fencing and how to prevent failure due to that damage; and
- .4 temporary fittings should be of adequate strength and capable of being securely installed.

7.2.2 Twistlock design

7.2.2.1 Ships should ensure that the number of different types of twistlocks provided for cargo securing is kept to a minimum and clear instructions are provided for their operation. The use of too many different types of twistlocks may lead to confusion as to whether the twistlocks are locked.

7.2.2.2 The design of twistlocks should ensure the following:

- .1 positive locking with easy up and down side identification;
- .2 dislodging from corner fitting is not possible even when grazing a surface;
- .3 access and visibility of the unlocking device is user friendly;
- .4 unlocked positions are easily identifiable and do not relock inadvertently due to jolting or vibration; and
- .5 Unlocking poles are as light as possible and user friendly.

7.2.3 Lashing rod design

7.2.3.1 The design of container ship securing systems should take into account the practical abilities of the workers to lift, reach, hold, control and connect the components called for in all situations anticipated in the cargo securing plan.

7.2.3.2 The maximum length of a lashing bar which is sufficient to reach the lower corner of a high cube container on the third tier should be 5200 mm.

7.2.3.3 The weight of lashing bars should be minimized as low as possible consistent with the necessary mechanical strength to a level as low as practicable.

7.2.3.4 The head of the lashing bar that is inserted in the corner fitting should have a pivot/hinge or other appropriate design so that the bar does not come out of the corner fitting accidentally.

7.2.3.5 The bars length in conjunction with the length and design of the turnbuckle should be such that the need of extensions is eliminated when lashing high cube (9' 6") containers.

7.2.3.6 Light weight bars should be provided where special tools are needed to lash high cube containers.

7.2.4 *Storage bins and lashing equipment stowage design*

7.2.4.1 Bins or stowage places for lashing materials should be provided.

7.2.4.2 Bins for faulty or damaged gear should also be provided and appropriately marked. A lighting plan should be developed to provide for:

7.3 Lighting design

7.3.1 The proper illumination of access ways³, taking into account the shadows created by containers that may be stowed in the area to be lit, for example different length containers in or over the work area.

7.3.2 A separate fixed lighting system for each working space between the container bays, which is bright enough⁴ for the work to be done, but minimizes glare to the deck workers.

7.3.3 Such illumination should, where possible, be designed as a permanent installation and adequately guarded against breakage.

7.3.4 The illumination intensity should take into consideration the distance to the uppermost reaches where cargo securing equipment is utilized.

8 OPERATIONAL AND MAINTENANCE PROCEDURES

Procedures for safe lashing and securing operations should be included in the ships Safety Management System as part of the ISM Code documentation.

³ Not less than 10 lux, 1 ft. candle.

⁴ Not less than 50 lux, 5 foot candles (Safety and health in ports, ILO Code of Practice, section 7.1.5).

8.1 Failure to provide safe lashing stations onboard/carry out lashing by port workers

8.1.1 Where there are lashing and unlashings locations onboard ship where no fall protection, such as adequate handrails are provided, and no other safe method can be found, the containers should not be lashed or unlashings and the situation should be reported to shore side supervisor and the master or deck officer immediately.

8.1.2 If protective systems cannot be designed to provide safe protected access and lashing work positions, in all cargo configurations then cargo should not be stowed in that location. Neither crew nor shore workers should be subjected to hazardous working conditions in the normal course of securing cargo.

8.2 Container deck working

8.2.1 Transit areas should be safe and clear of cargo and all equipment.

8.2.2 Any necessarily unprotected openings in work platforms (i.e. those with a potential fall of less than 2 m), and gaps and apertures on deck should be properly highlighted.

8.2.3 The use of fencing is essential to prevent falls. When openings in safety barriers are necessary to allow container crane movements, particularly with derricking cranes, removable fencing should be used whenever possible.

8.2.4 It should be taken into account that when lifting lashing bars that can weigh between 11 and 21 kg and turnbuckles between 16 and 23 kg, there may be a risk of injury if handled above shoulder height with the arms extended. It is therefore recommended that personnel work in pairs to reduce the individual workload in securing the lashing gear.

8.2.5 It is recommended when handling such heavy weights that the lifter use their body weight to raise the bar to an upright position which will allow the large muscles of the legs to take most of the weight keeping a firm grip and a straight back.

8.2.6 Personnel engaged in container ship cargo operations should wear appropriate PPE whilst carrying out lashing operations.

8.2.7 Personnel engaged in container ship cargo operations should be familiarized with the ship's unique characteristics and potential hazards arising from such operations necessary to carry out their duties.

8.2.8 The ship's crew must be properly trained to use the equipment provided and recognize and avoid potential hazards and be familiar with the vessel layout.

8.3 Maintenance

8.3.1 In line with section 2.3 (Inspection and maintenance schemes) of the Revised Guidelines for the preparation of the cargo securing manual (MSC/Circ....) all ships should maintain a record book, which should contain the procedures for accepting, maintaining and repairing or rejecting of cargo securing devices. The record book should also contain a record of inspections.

8.3.2 Lighting should be properly maintained.

8.3.3 Walkways, ladders, stairways and fencings should be subject to a periodic maintenance programme which will reduce/prevent corrosion and prevent subsequent collapse.

8.3.4 Corroded walkways, ladders, stairways and fencings should be repaired/replaced as soon as practicable, except where it interferes with safe operations. In such cases repairs should be effected immediately.

9 SPECIALIZED CONTAINER SAFETY DESIGN

9.1 Reefer Power Outlets should be interlocked and shipboard terminals provide a safe, watertight electrical connection.

9.2 Reefer power outlets should feature a heavy duty, interlocked and circuit breaker protected electrical power outlet. This should ensure the outlet can not be switched 'live' until a plug is fully engaged and the actuator rod is pushed to the 'On' position. Pulling the actuator rod to the 'Off' position should manually de-energize the circuit.

9.3 The reefer power circuit should de-energize automatically if the plug is accidentally withdrawn while in the 'On' position. Also, the interlock mechanism should break the circuit while the pin and sleeve contacts are still engaged. This provides total operator safety and protection against shock hazard while eliminating arcing damage to the plug and receptacle.

9.4 Reefer power outlets should be designed to ensure that the worker is not standing directly in front of the socket when switching takes place.

9.5 The positioning of the reefer feed outlets should not be such that the flexible cabling needs to be laid out in such a way as to cause a tripping hazard.

9.6 Stevedores or ships crew who are required to handle reefer cables and/or connect and disconnect reefer units should be given training in recognizing defective wires and plugs.

10 REFERENCES

ILO Code of Practice – Safety and Health in Ports

ISO Standard 3874 – The Handling and Securing of Type 1 Freight Containers

ANNEX 7**DRAFT MSC CIRCULAR****REVISED RECOMMENDATIONS ON SAFETY OF PERSONNEL DURING
CONTAINER SECURING OPERATIONS**

1 The Maritime Safety Committee, at its seventieth session (7 to 11 December 1998) expressed serious concern at the dangers to personnel working at the top of containers during container securing operations, which result from container securing arrangements being located in difficult and dangerous locations, and approved the Recommendation on safety of personnel during container securing operations, as set out in the annex.

2 The Maritime Safety Committee at its [eighty fourth] session (... May 2008) also expressed concern at the dangers to personnel engaged in the operation of securing containers at deck level and approved recommendations, as set out in Annex [...] of the Code of Safe Practice for Cargo Stowage and Securing.

3 Member Governments are invited to bring these Recommendations to the attention of port authorities, containership owners, designers and all other parties concerned and to consider other positive measures to address this problem in port and when approving cargo securing arrangements, as appropriate.

ANNEX

REVISED RECOMMENDATION ON SAFETY OF PERSONNEL DURING CONTAINER SECURING OPERATIONS

1 It has been noted that a number of fatal accidents to crew and dockworkers have involved falls from the top of containers during container securing and unsecuring operations. Although fall protection and fall arrest systems and equipment are available for use whenever container top work is involved, they are cumbersome and reduce the speed of loading and unloading operations of a ship, and thus of limited use and effect.

2 The conventional means of securing containers in non-cellular deck spaces are heavy and difficult to handle, resulting in accidents and non-fatal physical injuries. Newly developed equipment such as semi-automatic and dual function twistlocks are only partially effective in eliminating danger. They depend on the stacking height of containers on deck not exceeding four and require a safe work place on the quayside for their application or removal.

3 A safer environment for personnel involved in the securing of containers can be achieved by shipowners and ship designers focusing on the safety of container securement at the initial stages of the building of a ship, rather than relying on operational methods for this purpose after the ship is built. Such successful current design ideas include:

.1 Hatchless holds

These containership designs usually have cell guides to the full height of stowage and do not normally require container top working.

.2 Flexible boxship arrangements

These designs are involved on deck cell guides which can be altered in length to accommodate the different lengths of container currently used in the industry, e.g. 20, 30 or 40 feet.

.3 Deck cell guides

This usually means either “hatchless holds” or a hatchless ship, but designs exist with cell guides on deck but also with hatch covers. Although deck cell guides have a good safety and securement record, they can create operational inconvenience when loading the varying lengths of container that are commonly in use.

.4 Lashing frames

These are mobile personnel carriers by which lashing personnel work on the twistlocks without having to climb upon the container tops. These are often used from container gantries but are operationally more convenient when independent of the shore gantries so that lashing/unlashing can continue without interfering with, and causing delay to, the loading/unloading operation.

.5 Lashing platform

These are permanent or partly mobile platforms, whereby access to deck twistlocks, etc., can be achieved without having to climb on the top of the container.

4 In addition to these alternative arrangements, new and equally effective concepts are likely to evolve if increased attention is given to the achievement of safe securing and unsecuring of containers at the ship design stage instead of relying upon operational methods for this purpose. If the process of securing is made safer for the personnel involved and more efficient, a reduction in the loss of containers overboard will provide financial and environmental benefits.

5 Containership owners and designers are therefore reminded of the dangers associated with container securing operations and urged to use and develop container securing systems which are safe by design, with the aim of eliminating the need for container top work, work in other equally hazardous locations, or the handling by crew or dock workers of heavy and unwieldy securing equipment.

6 Information provided by document MSC 80/21/7 (United Kingdom) indicated an increase in injuries arising from the operation of lashing containers at deck level. Research in the United Kingdom has shown that 40% of accidents to dockworkers occur onboard ships and the majority of these are related to lashing activities on container ships. In many cases the design and layout of lashing arrangements on such ships take insufficient account of the safety of the crew and dockworkers required to handle the lashing equipment. As a consequence, a new annex to the CSS Code has been adopted and all relevant parties are urged to reflect it in their provisions.

7 Personnel engaged in securing operations should be familiarized with the unique vessel characteristics and potential hazards arising from such operations. Training should include situational awareness to identify and avoid hazards.

ANNEX 8

**DRAFT AMENDMENTS TO THE REVISED GUIDELINES FOR THE
PREPARATION OF THE CARGO SECURING MANUAL (MSC/CIRC.745),
AS CONTAINED IN ANNEX 1 TO DOCUMENT DSC 12/10**

ANNEX

**REVISED GUIDELINES FOR THE PREPARATION OF
THE CARGO SECURING MANUAL**

CHAPTER 5 – CARGO SAFE ACCESS PLAN (CSAP)

1 The first sentence of paragraph 5.1 is replaced as follows:

“5.1 Ships which are specifically designed and fitted for the purpose of carrying containers should be provided with a Cargo Safe Access Plan (CSAP) in order to demonstrate that personnel will have safe access for container securing operations.”

ANNEX 9**DRAFT MSC CIRCULAR****RECOMMENDATIONS ON THE SAFE USE OF PESTICIDES IN SHIPS
APPLICABLE TO THE FUMIGATION OF CARGO HOLDS**

- 1 The Maritime Safety Committee, at its sixty-second session (24 to 28 May 1993), approved the Recommendations on the safe use of pesticides in ships (MSC/Circ.612), proposed by the Sub-Committee on Containers and Cargoes at its thirty-second session.
- 2 The Maritime Safety Committee, at its [eighty-fourth] session (... 2008), approved the Recommendations on the safe use of pesticides in ships applicable to the fumigation of cargo holds, which apply to carriage of solid bulk cargoes including grain in pursuance of the requirement of SOLAS regulation VI/4, proposed by the Sub-Committee on Dangerous Goods, Solid Cargoes and Containers at its twelfth session, as set out in the annex to the present circular.
- 3 The Committee agreed that the Recommendations should not apply to the carriage of fresh food produce under controlled atmosphere.
- 4 Member Governments are invited to bring the Recommendations to the attention of competent authorities, mariners, fumigators, fumigant and pesticide manufacturers and others concerned.
- 5 The present circular supersedes MSC/Circ.612, as amended by MSC/Circ.689 and MSC/Circ.746 with regard to the fumigation of cargo holds.

ANNEX

RECOMMENDATIONS ON THE SAFE USE OF PESTICIDES IN SHIPS APPLICABLE TO THE FUMIGATION OF CARGO HOLDS

1 INTRODUCTION

1.1 Insect and mite pests of plant and animal products may be carried into the cargo holds with goods (introduced infestation); they may move from one kind of product to another (cross-infestation) and may remain to attack subsequent cargoes (residual infestation). Their control may be required to comply with phytosanitary requirements to prevent spread of pests and for commercial reasons to prevent infestation and contamination of, or damage to, cargoes of human and animal food both raw and processed materials. Although fumigants may be used to kill rodent pests, the control of rodents on board ships is dealt with separately. In severe cases of infestation of bulk cargoes such as cereals, excessive heating may occur.

1.2 The following sections provide guidance to shipmasters in the use of pesticides* with a view to safety of personnel. They cover pesticides used for the control of insect** and rodent pests in empty and loaded cargo holds.

2 PREVENTION OF INFESTATION

2.1 Maintenance and sanitation

2.1.1 Ship cargo holds, tank top ceilings and other parts of the ship should be kept in a good state of repair to avoid infestation. Many ports of the world have rules and by-laws dealing specifically with the maintenance of ships intended to carry grain cargoes; for example, boards and ceilings should be completely grain-tight.

2.1.2 Cleanliness, or good housekeeping, is as important a means of controlling pests on a ship as it is in a home, warehouse, mill or factory. Since insect pests on ships become established and multiply in debris, much can be done to prevent their increase by simple, thorough cleaning. Box beams and stiffeners, for example, become filled with debris during discharge of cargo and unless kept clean can become a source of heavy infestation. It is important to remove thoroughly all cargo residue from deckhead frames and longitudinal deck girders at the time of discharge, preferably when the cargo level is suitable for convenient cleaning. Where available, industrial vacuum cleaners are of value for the cleaning of cargo holds and fittings.

2.1.3 The material collected during cleaning should be disposed of, or treated, immediately so that the insects cannot escape and spread to other parts of the ship or elsewhere. In port it may be burnt or treated with a pesticide, but in many countries such material may only be landed under phytosanitary supervision. If any part of the ship is being fumigated the material may be left exposed to the gas.

* The word *pesticide* as used throughout the text means fumigants. Examples of some commonly used pesticides are listed in appendix 1.

** The word *insect* as used throughout the text includes mites.

2.2 Main sites of infestation

2.2.1 *Tank top ceiling*: If, as often happens, cracks appear between the ceiling boards, food material may be forced down into the underlying space and serve as a focus of infestation for an indefinite period. Insects bred in this space can readily move out to attack food cargoes and establish their progeny in them.

2.2.2 *'Tween-deck centre lines, wooden feeders and bins* are often left in place for several voyages and because of their construction are a frequent source of infestation. After unloading a grain cargo, burlap and battens covering the narrow spaces between the planks should be removed and discarded before the holds are cleaned or washed down. These coverings should be replaced by new material in preparation for the next cargo.

2.2.3 *Transverse beams and longitudinal deck girders* which support the decks and hatch openings may have an L-shaped angle-bar construction. Such girders provide ledges where grain may lodge when bulk cargoes are unloaded. The ledges are often in inaccessible places overlooked during cleaning operations.

2.2.4 *Insulated bulkheads near engine-rooms*: When the hold side of an engine-room bulkhead is insulated with a wooden sheathing, the airspace and the cracks between the boards often become filled with grain and other material. Sometimes the airspace is filled with insulating material which may become heavily infested and serves as a place for insect breeding. Temporary wooden bulkheads also provide an ideal place for insect breeding, especially under moist conditions, such as when green lumber is used.

2.2.5 *Cargo battens*: The crevices at the sparring cleats are ideal places for material to lodge and for insects to hide.

2.2.6 *Bilges*: Insects in accumulations of food material are often found in these spaces.

2.2.7 *Electrical conduit casings*: Sometimes the sheet-metal covering is damaged by general cargo and when bulk grain is loaded later, the casings may become completely filled. This residual grain has often been found to be heavily infested. Casings that are damaged should be repaired immediately or, where possible, they should be replaced with steel strapping, which can be cleaned more easily.

2.2.8 Other places where material accumulates and where insects breed and hide include:

The area underneath burlap, which is used to cover limber boards and sometimes to cover tank top ceilings.

Boxing around pipes, especially if it is broken.

Corners, where old cereal material is often found.

Crevices at plate landings, frames and chocks.

Wooden coverings of manholes or wells leading to double-bottom tanks or other places.

Cracks in the wooden ceiling protecting the propeller shaft tunnel.

Beneath rusty scale and old paint on the inside of hull plates.

Shifting boards.

Dunnage material, empty bags and used separation cloths.

Inside lockers.

3 CHEMICAL CONTROL OF INSECT INFESTATION

3.1 Methods of chemical disinfection

3.1.1 *Types of pesticides and methods of insect control*

3.1.1.1 To avoid insect populations becoming firmly established in cargo holds and other parts of a ship, it is necessary to use some form of chemical toxicant for control. The materials available may be divided conveniently into two classes: contact insecticides and fumigants. The choice of agent and method of application depend on the type of commodity, the extent and location of the infestation, the importance and habits of the insects found, and the climatic and other conditions. Recommended treatments are altered or modified from time to time in accordance with new developments.

3.1.1.2 The success of chemical treatments does not lie wholly in the pesticidal activity of the agents used. In addition, an appreciation of the requirements and limitations of the different available methods is required. Crew members can carry out small-scale or “spot” treatments if they adhere to the manufacturer’s instructions and take care to cover the whole area of infestation. However, extensive or hazardous treatments including fumigation and spraying near human and animal food should be placed in the hands of professional operators, who should inform the master of the identity of the active ingredients used, the hazards involved and the precautions to be taken.

3.1.2 *Fumigants*

3.1.2.1 Fumigants act in a gaseous phase even though they may be applied as solid or liquid formulations from which the gas arises. Effective and safe use requires that the space being treated be rendered gastight for the period of exposure, which may vary from a few hours to several days, depending on the fumigant type and concentration used, the pests, the commodities treated and the temperature. Additional information is provided on two of the most widely used fumigants, Methyl bromide and Phosphine, in appendix 1.

3.1.2.2 Since fumigant gases are poisonous to humans and require special equipment and skills in application, they should be used by specialists and not by the ship’s crew.

3.1.2.3 Evacuation of the space under gas treatment is mandatory and in some cases it will be necessary for the whole ship to be evacuated (see 3.3.1 and 3.3.2 below).

3.1.2.4 A “fumigator-in-charge” should be designated by the fumigation company, government agency or appropriate authority. He should be able to provide documentation to the master proving his competence and authorization. The master should be provided with written instructions by the fumigator-in-charge on the type of fumigant used, the hazards to human health involved and the precautions to be taken, and in view of the highly toxic nature of all commonly used fumigants these should be followed carefully. Such instructions should be written in a language readily understood by the master or his representative.

3.2 Disinfestation of empty cargo holds

3.2.1 An empty cargo hold may be fumigated. Examples of some commonly used pesticides are listed in appendix 1. (For precautions before, during and after fumigation of cargo holds see 3.3 below.)

3.3 Disinfestation of cargoes and surrounds

3.3.1 *Fumigation with aeration (ventilation) in port*

3.3.1.1 Fumigation and aeration (ventilation) of empty cargo holds should always be carried out in port (alongside or at anchorage). Ships should not be permitted to leave port until gas-free certification has been received from the fumigator-in-charge.

3.3.1.2 Prior to the application of fumigants to cargo holds, the crew should be landed and remain ashore until the ship is certified “gas-free”, in writing, by the fumigator-in-charge or other authorized person. During this period a watchman should be posted to prevent unauthorized boarding or entry, and warning signs should be prominently displayed at gangways and at entrances to accommodation. A specimen of such a warning sign is given in appendix 2.

3.3.1.3 The fumigator-in-charge should be retained throughout the fumigation period and until such time as the ship is declared gas-free.

3.3.1.4 At the end of the fumigation period the fumigator will take the necessary action to ensure that the fumigant is dispersed. If crew members are required to assist in such actions, for example in opening hatches, they should be provided with adequate respiratory protection and adhere strictly to instructions given by the fumigator-in-charge.

3.3.1.5 The fumigator-in-charge should notify the master in writing of any spaces determined to be safe for re-occupancy by essential crew members prior to the aeration of the ship.

3.3.1.6 In such circumstances the fumigator-in-charge should monitor, throughout the fumigation and aeration periods, spaces to which personnel have been permitted to return. Should the concentration in any such area exceed the occupational exposure limit values set by the flag State regulations, crew members should be evacuated from the area until measurements show re-occupancy to be safe.

3.3.1.7 No unauthorized persons should be allowed on board until all parts of the ship have been determined gas-free, warning signs removed and clearance certificates issued by the fumigator-in-charge.

3.3.1.8 Clearance certificates should only be issued when tests show that all residual fumigant has been dispersed from empty cargo holds and adjacent working spaces and any residual fumigant material has been removed.

3.3.1.9 Entry into a space under fumigation should never take place except in the event of an extreme emergency. If entry is imperative the fumigator-in-charge and at least one other person should enter, each wearing adequate protective equipment appropriate for the fumigant used and a safety harness and lifeline. Each lifeline should be tended by a person outside the space, who should be similarly equipped.

3.3.1.10 If a clearance certificate cannot be issued after the fumigation of cargo in port, the provisions of 3.3.2 should apply.

3.3.2 *Fumigation continued in transit*

3.3.2.1 Fumigation in transit should only be carried out at the discretion of the master. This should be clearly understood by owners, charterers, and all other parties involved when considering the transport of cargoes that may be infested. Due consideration should be taken of this when assessing the options of fumigation. The master should be aware of the regulations of the flag State Administration with regard to in-transit fumigation. The application of the process should be with the agreement of the port State Administration. The process may be considered under two headings:

- .1 fumigation in which treatment is intentionally continued in a sealed space during a voyage and in which no aeration has taken place before sailing; and
- .2 in-port cargo fumigation where some aeration is carried out before sailing, but where a clearance certificate for the cargo hold(s) cannot be issued because of residual gas and the cargo hold(s) has been re-sealed before sailing.

3.3.2.2 Before a decision on sailing with a fumigated cargo hold(s) is made it should be taken into account that, due to operational conditions, the circumstances outlined in 3.3.2.1.2 may arise unintentionally, e.g. a ship may be required to sail at a time earlier than anticipated when the fumigation was started. In such circumstances the potential hazards may be as great as with a planned in-transit fumigation and all the precautions in the following paragraphs should be observed.

3.3.2.3 Before a decision is made as to whether a fumigation treatment planned to be commenced in port and continued at sea should be carried out, special precautions are necessary. These include the following:

- .1 at least two members of the crew (including one officer) who have received appropriate training (see 3.3.2.6) should be designated as the trained representatives of the master responsible for ensuring that safe conditions in accommodation, engine-room and other working spaces are maintained after the fumigator-in-charge has handed over that responsibility to the master (see 3.3.2.12); and
- .2 the trained representatives of the master should brief the crew before a fumigation takes place and satisfy the fumigator-in-charge that this has been done.

3.3.2.4 Empty cargo holds, are to be inspected and/or tested for leakage with instruments so that proper sealing can be done before or after loading. The fumigator-in-charge, accompanied by a trained representative of the master or a competent person, should determine whether the cargo holds to be treated are or can be made sufficiently gastight to prevent leakage of the fumigant to the accommodation, engine-rooms and other working spaces in the ship. Special attention should be paid to potential problem areas such as bilge and cargo line systems. On completion of such inspection and/or test, the fumigator-in-charge should supply to the master for his retention a signed statement that the inspection and/or test has been performed, what provisions have been made and that the cargo holds are or can be made satisfactory for fumigation. Whenever a cargo

hold is found not to be sufficiently gastight, the fumigator-in-charge should issue a signed statement to the master and the other parties involved.

3.3.2.5 Accommodation, engine-rooms, areas designated for use in navigation of the ship, frequently visited working areas and stores, such as the forecastle head spaces, adjacent to cargo holds being subject to fumigation in transit should be treated in accordance with the provisions of 3.3.2.13. Special attention should be paid to gas concentration safety checks in problem areas referred to in 3.3.2.4.

3.3.2.6 The trained representatives of the master designated in 3.3.2.3 should be provided and be familiar with:

- .1 the information in the relevant Safety Data Sheet; and
- .2 the instructions for use, e.g. on the fumigant label or package itself, such as the recommendations of the fumigant manufacturer concerning methods of detection of the fumigant in air, its behaviour and hazardous properties, symptoms of poisoning, relevant first aid and special medical treatment and emergency procedures.

3.3.2.7 The ship should carry:

- .1 gas-detection equipment and adequate fresh supplies of service items for the fumigant(s) concerned as required by 3.3.2.12, together with instructions for its use and the occupational exposure limit values set by the flag State regulations for safe working conditions;
- .2 instructions on disposal of residual fumigant material;
- .3 at least four sets of adequate respiratory protective equipment; and
- .4 a copy of the latest version of the Medical First Aid Guide for Use in Accidents Involving Dangerous Goods (MFAG), including appropriate medicines and medical equipment.

3.3.2.8 The fumigator-in-charge should notify the master in writing of the spaces containing the cargo to be fumigated and also of any other spaces that are considered unsafe to enter during the fumigation. During the application of the fumigant the fumigator-in-charge should ensure that the surrounding areas are checked for safety.

3.3.2.9 If cargo holds are to be fumigated in transit:

- .1 After application of the fumigant, an initial check should be made by the fumigator-in-charge together with trained representatives of the master for any leak which, if detected, should be effectively sealed. When the master is satisfied that all precautions detailed in 3.3.2.1 to 3.3.2.12 have been fulfilled (refer to model checklist in appendix 3) then the vessel may sail. Otherwise, provisions outlined in 3.3.2.9.2 or 3.3.2.9.3 are to be followed.

If the provisions of 3.3.2.9.1 are not satisfied,

either:

- .2 After application of fumigants, the ship should be delayed in port alongside at a suitable berth or at anchorage for such a period as to allow the gas in the fumigated cargo holds to reach sufficiently high concentrations to detect any possible leakage. Special attention should be paid to those cases where fumigants in a solid or liquid form have been applied which may require a long period (normally from 4 to 7 days unless a recirculation or similar distribution system is used) to reach such a high concentration that leakages can be detected. If leakages are detected, the ship should not sail until the source(s) of such leakages are determined and eliminated. After ascertaining that the ship is in a safe condition to sail, i.e. no gas leakages are present, the fumigator-in-charge should furnish the master with a written statement that:
 - .2.1 the gas in the cargo hold(s) has reached sufficiently high concentrations to detect any possible leakages;
 - .2.2 spaces adjacent to the treated cargo hold(s) have been checked and found gas-free; and
 - .2.3 the ship's representative is fully conversant with the use of the gas-detection equipment provided.

or:

- .3 After application of the fumigants and immediately after the sailing of the ship, the fumigator-in-charge should remain on board for such a period as to allow the gas in the fumigated cargo hold or spaces to reach sufficiently high concentrations to detect any possible leakage, or until the fumigated cargo is discharged (see 3.3.2.20), whichever is the shorter, to check and rectify any gas leakages. Prior to his leaving the ship, he should ascertain that the ship is in a safe condition, i.e. no gas leakages are present, and he should furnish the master with a written statement to the effect that the provisions of 3.3.2.9.2.1, 3.3.2.9.2.2 and 3.3.2.9.2.3 have been carried out.

3.3.2.10 On application of the fumigant, the fumigator-in-charge should post warning signs at all entrances to places notified to the master as in 3.3.2.8. These warning signs should indicate the identity of the fumigant and the date and time of fumigation. A specimen of such a warning sign is given in appendix 2.

3.3.2.11 At an appropriate time after application of the fumigant, the fumigator-in-charge, accompanied by a representative of the master, should check that accommodation, engine-rooms and other working spaces remain free of harmful concentrations of gas.

3.3.2.12 Upon discharging his agreed responsibilities, the fumigator-in-charge should formally hand over to the master in writing responsibility for maintaining safe conditions in all occupied spaces. The fumigator-in-charge should ensure that gas-detection and respiratory protection equipment carried on the ship is in good order, and that adequate fresh supplies of consumable items are available to allow sampling as required in 3.3.2.13.

3.3.2.13 Gas concentration safety checks at all appropriate locations, which should at least include the spaces indicated in 3.3.2.5, should be continued throughout the voyage at least at eight-hour intervals or more frequently if so advised by the fumigator-in-charge. These readings should be recorded in the ship's log-book.

3.3.2.14 Except in extreme emergency, cargo holds sealed for fumigation in transit should never be opened at sea or entered. If entry is imperative, at least two persons should enter, wearing adequate protection equipment and a safety harness and lifeline tended by a person outside the space, similarly equipped with protective, self-contained breathing apparatus.

3.3.2.15 If it is essential to ventilate a cargo hold or holds, every effort should be made to prevent a fumigant from accumulating in accommodation or working areas. Those spaces should be carefully checked to that effect. If the gas concentration in those areas at any time exceeds the occupational exposure limit values set by the flag State regulations, they should be evacuated and the cargo hold or cargo holds should be re-sealed. If a cargo hold is re-sealed after ventilation it should not be assumed that it is completely clear of gas and tests should be made and appropriate precautions taken before entering.

3.3.2.16 Prior to the arrival of the ship, generally not less than 24 hours in advance, the master should inform the appropriate authorities of the country of destination and ports of call that fumigation in transit is being carried out. The information should include the type of fumigant used, the date of fumigation, the cargo holds which have been fumigated, and whether ventilation has commenced. Upon arrival at the port of discharge, the master should also provide information as required in 3.3.2.6.2 and 3.3.2.7.2.

3.3.2.17 On arrival at the port of discharge the requirements of receiving countries regarding handling of fumigated cargoes should be established. Before entry of fumigated cargo holds, trained personnel from a fumigation company or other authorized persons, wearing respiratory protection, should carry out careful monitoring of the spaces to ensure the safety of personnel. The monitored values should be recorded in the ship's log-book. In case of need or emergency the master may commence ventilation of the fumigated cargo holds under the conditions of 3.3.2.15, having due regard for the safety of personnel on board. If this operation is to be done at sea, the master should evaluate weather and sea conditions before proceeding.

3.3.2.18 Only mechanical unloading that does not necessitate entry of personnel into the cargo holds of such fumigated cargoes should be undertaken. However, when the presence of personnel in cargo holds is necessary for the handling and operation of unloading equipment, continuous monitoring of the fumigated spaces should be carried out to ensure the safety of the personnel involved. When necessary, these personnel should be equipped with adequate respiratory protection.

3.3.2.19 During the final stages of discharge, when it becomes necessary for personnel to enter the cargo holds, such entry should only be permitted subsequent to verification that such cargo holds are gas-free.

3.3.2.20 Upon completion of discharge and when the ship is found free of fumigants and certified as such, all warning signs should be removed. Any action in this respect should be recorded in the ship's log-book.

4 REGULATIONS FOR THE USE OF PESTICIDES

4.1 National and international controls on pesticide usage

4.1.1 In many countries the sale and use of pesticides are regulated by governments to ensure safety in application and prevention of contamination of foodstuffs. Among the factors taken into account in such regulations are the recommendations made by international organizations such as FAO and WHO, especially in regard to maximum limits of pesticide residues in food and foodstuffs.

4.1.2 Examples of some commonly used pesticides are listed in appendix 1. Pesticides should be used strictly in accordance with the manufacturer's instructions as given on the label or package itself. National regulations and requirements vary from one country to another; therefore particular pesticides which may be used for treatment of cargo holds and accommodation in ships may be limited by the regulations and requirements of:

- .1 the country where the cargo is loaded or treated;
- .2 the country of destination of the cargo, especially in regard to pesticide residues in foodstuffs; and
- .3 flag State of the ship.

4.1.3 Ships' masters should ensure that they have the necessary knowledge of the above regulations and requirements.

5 SAFETY PRECAUTIONS – GENERAL

5.1 Fumigation

5.1.1 Ship's personnel should not handle fumigants and such operations should be carried out only by qualified operators. Personnel allowed to remain in the vicinity of a fumigation operation for a particular purpose should follow the instructions of the fumigator-in-charge implicitly.

5.1.2 Aeration of treated cargo holds should be completed and a clearance certificate issued as in 3.3.1.8 or 3.3.1.10 before personnel are permitted to enter.

5.2 Exposure to pesticides resulting in illness

5.2.1 In the case of exposure to pesticides and subsequent illness, medical advice should be sought immediately. Information on poisoning may be found in the Medical First Aid Guide for Use in Accidents Involving Dangerous Goods (MFAG) or on the package (manufacturer's instructions and safety precautions on the label or the package itself).

APPENDIX 1

FUMIGANTS SUITABLE FOR SHIPBOARD USE

The materials listed should be used strictly in accordance with the manufacturer's instructions and safety precautions given on the label or package itself, especially in respect of flammability, and with regard to any further limitations applied by the law of the country of loading, destination or flag of the ship, contracts relating to the cargo, or the shipowner's instructions.

1 Fumigants against insects in empty cargo holds

TO BE APPLIED ONLY BY QUALIFIED OPERATORS

- Carbon dioxide
- Nitrogen
- Methyl Bromide and carbon dioxide mixture
- Methyl Bromide
- Hydrogen cyanide
- Phosphine

2 Fumigants against insects in loaded or partially loaded cargo holds

CARE IS NEEDED IN SELECTING TYPES AND AMOUNTS OF FUMIGANTS FOR TREATMENT OF PARTICULAR COMMODITIES

- Carbon dioxide
- Nitrogen
- Methyl Bromide and carbon dioxide mixture
- Methyl Bromide
- Phosphine

3 Fumigant information

3.1 *Methyl Bromide*

Methyl Bromide is used in situations where a rapid treatment of commodities or space is required. It should not be used in spaces where ventilation systems are not adequate for the removal of all gases from the free space. In-ship in-transit fumigations with Methyl Bromide should not be carried out. Fumigation with Methyl Bromide should be permitted only when the ship is in the confines of a port (either at anchor or alongside) and to disinfest before discharge, once crew members have disembarked (see 3.1.2.3). Prior to discharge, ventilation must be done, forced if necessary, to reduce the gaseous residues below the occupational exposure limit values set by the flag State regulations in the free spaces. (See procedures for ventilation in 3.3.2.17 to 3.3.2.19).

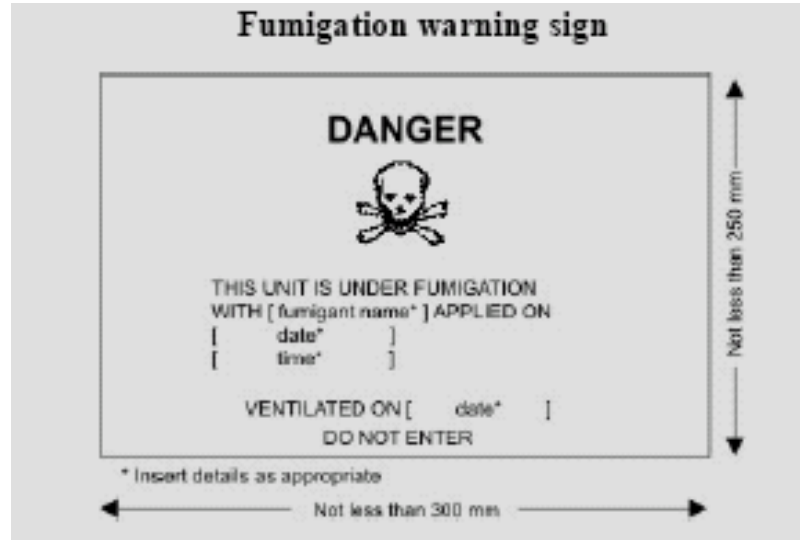
3.2 *Phosphine*

3.2.1 A variety of Phosphine-generating formulations are used for in-ship in-transit or at-berth fumigations. Application methods vary widely and include surface-only treatment, probing, perforated tubing laid at the bottom of spaces, recirculation systems and gas-injection systems or their combinations. Treatment times will vary considerably depending on the temperature, depth of cargo and on the application method used.

3.2.2 Any discharge of active packages producing Phosphine gas represent a significant risk to the public who may encounter them at sea. It should therefore be ensured that all waste and residues are disposed of in an appropriate manner, either by incineration or by disposal on shore, as recommended by the manufacturer. **Clear written instructions must be given to the master of the ship, to the receiver of the cargo and to the authorities at the discharging port as to how any powdery residues are to be disposed of.**

3.2.3 These will vary with each formulation and the method of application. Prior to discharge, ventilation must be done, forced if necessary, to reduce the gaseous residues below the occupational exposure limit values set by the flag State regulations in the free spaces (see procedures for ventilation in 3.3.2.17 to 3.3.2.19). For safety aspects during the voyage see 3.3.2.3.

APPENDIX 2



APPENDIX 3
MODEL CHECKLIST FOR IN-TRANSIT FUMIGATION

Date:

Port: Terminal/Quay:

Ship's name:

Type of fumigant: Method of application:

Date & time fumigation commenced:

Name of fumigator/company:

The master and fumigator-in-charge, or their representatives, should complete the checklist jointly. The purpose of this checklist is to ensure that the responsibilities and requirements of 3.3.2.11, and 3.3.2.12 are carried out fully for in-transit fumigation under section 3.3.2.9.

Safety of operations requires that all questions should be answered affirmatively by ticking the appropriate boxes. If this is not possible, the reason should be given and agreement reached upon precautions to be taken between ship and fumigator-in-charge. If a question is considered to be not applicable write "n/a", explaining why, if appropriate.

PART A: BEFORE FUMIGATION

	SHIP	FUMIGATOR- IN-CHARGE
1 The inspection required before loading has been performed (3.3.2.4)	[]	[]
2 All the cargo holds to be fumigated are satisfactory for fumigation	[]	[]
3 Spaces, where found not to be satisfactory, have been sealed	[]	[]
4 The master or his trained representatives have been made aware of the specific areas to be checked for gas concentrations throughout the fumigation period	[]	[]
5 The master or his trained representatives have been made familiar with the fumigant label, detection methods, safety procedures and emergency procedures (refer to 3.3.2.6)	[]	[]
6 The fumigator-in-charge has ensured that gas-detection and respiratory protection equipment carried on the ship is in good order, and that adequate fresh supplies of consumable items for this equipment are available to allow sampling as required by 3.3.2.13.	[]	[]
7 The master has been notified in writing of:		
(a) the spaces containing cargo to be fumigated	[]	[]
(b) any other spaces that are considered unsafe to enter during the fumigation	[]	[]

PART B: AFTER FUMIGATION

The following procedure should be carried out after application of fumigant and closing and sealing of cargo holds.

	SHIP	FUMIGATOR- IN-CHARGE
8 Presence of gas has been confirmed inside each hold under fumigation	[]	[]
9 Each hold has been checked for leakage and sealed properly	[]	[]
10 Spaces adjacent to the treated cargo holds have been checked and found gas-free	[]	[]
11 The responsible crew members have been shown how to take gas readings properly when gas is present and they are fully conversant with the use of gas-detection equipment provided	[]	[]
12 Methods of application:		
(a) Surface application method	[]	[]
Initial rapid build-up of the gas in the upper regions of hold airspace with subsequent penetration downward of the gas over a longer period		
or		
(b) Deep probing	[]	[]
More rapid dispersion of gas than in (a) with lower concentrations in upper regions of airspace in the hold		
or		
(c) Recirculation	[]	[]
Rapid dispersion of gas throughout hold but at lower initial gas levels with subsequent build-up of gas levels which, however, may be lower due to even distribution		
or		
(d) Other	[]	[]
13 The master or trained representatives have been briefed fully on the method of application and the spread of the gas throughout the hold	[]	[]
14 The master or trained representatives have been made:		
(a) aware that even though the initial check may not indicate any leaks, it is essential that monitoring is to be continued in the accommodation, engine-room, etc. because gas concentrations may reach their highest levels after several days	[]	[]
(b) aware of the possibility of the spreading of gas throughout the duct keel and/or ballast tanks	[]	[]
15 The fumigator-in-charge has supplied a signed statement to the master conforming to the requirements of 3.3.2.12 for his retention	[]	[]
The above has been agreed:		
Time:		Date:
For Ship:		Fumigator-in-charge:
Rank:		

ANNEX 10**DRAFT MSC CIRCULAR****RECOMMENDATIONS ON THE SAFE USE OF PESTICIDES IN SHIPS
APPLICABLE TO THE FUMIGATION OF CARGO TRANSPORT UNITS**

- 1 The Maritime Safety Committee, at its sixty-second session (24 to 28 May 1993), approved the Recommendations on the safe use of pesticides in ships (MSC/Circ.612), proposed by the Sub-Committee on Containers and Cargoes at its thirty-second session.
- 2 The Maritime Safety Committee, at its [eighty-fourth] session (... 2008), approved the Recommendations on the safe use of pesticides in ships applicable to the fumigation of cargo transport units, which apply to carriage of packaged dangerous goods in pursuance of the requirements of SOLAS regulation VI/4 and the relevant parts of the IMDG Code, proposed by the Sub-Committee on Dangerous Goods, Solid Cargoes and Containers at its twelfth session, as set out in the annex to the present circular.
- 3 The Committee agreed that the Recommendations should not apply to the carriage of fresh food produce under controlled atmosphere.
- 4 Member Governments are invited to bring the Recommendations to the attention of competent authorities, mariners, fumigators, fumigant and pesticide manufacturers and others concerned.
- 5 The present circular supersedes MSC/Circ.612, as amended by MSC/Circ.689 and MSC/Circ.746 with regard to the fumigation of cargo transport units.

ANNEX

RECOMMENDATIONS ON THE SAFE USE OF PESTICIDES IN SHIPS APPLICABLE TO THE FUMIGATION OF CARGO TRANSPORT UNITS

1 Introduction

1.1 These recommendations address the hazards to personnel arising from the operations involved in the carriage of fumigated containers. This guidance is aimed at everyone involved in the supply chain. Although the contents of the container may not be subject to the provisions of the International Maritime Dangerous Goods (IMDG) code, the process of fumigating such a container may bring it into the scope of the code. If the container comes within the scope of the code hazard communication provisions are mandatory. Hazard communication measures required by the IMDG Code include:

- .1 warning signs on containers;
- .2 transport documents describing the fumigation method and, if appropriate, ventilation date; and
- .3 requirements to declare fumigated containers on ships' manifests.

1.2 It is generally acknowledged, however, that there is widespread non-compliance with these requirements. Before entering the container all personnel should assess the risk as to whether it is safe to enter and, if appropriate, determine the level of fumigant present. The use of gas detection equipment may be required.

2 Reasons for fumigation

2.1 The presence of insects and rodents on ships is clearly undesirable for various reasons, and in addition to aesthetic and nuisance aspects, they may damage equipment and spread disease and infection, contaminate food in galleys and food stores, and cause damage to cargoes that will result in commercial or other losses.

2.2 The same highly toxic chemicals are used in containers as on board bulk ships. However, when a container that contains fumigant chemicals leaves the place at which it was fumigated, no-one can practically supervise the hazard unless they are aware of the presence of the fumigant. Any person who later enters the container can therefore be unknowingly exposed to dangerous levels of highly toxic chemicals.

2.3 Insects in containers

2.3.1 Grubs and larvae of insects and other species can infest cargo, as well as packaging, dunnage, etc., associated with the cargo, at any stage during harvesting, manufacture, processing, storage, packing or transport. These can spoil foodstuffs, textiles, leather goods, furniture, art and antiques, affect electronic equipment, contaminate sterile goods or deface consumer packaging or labelling, making the goods unfit for sale and therefore valueless.

2.3.2 Insect and mite pests of plant and animal products may be carried into the containers with goods (introduced infestation); they may move from one kind of product to another

(cross-infestation) and may remain to attack subsequent cargoes (residual infestation). Their control may be required to comply with phyto-sanitary requirements to prevent spread of pests and for commercial reasons to prevent infestation and contamination of, or damage to, cargoes of human and animal food.

2.4 Rodents

2.4.1 Rodents should be controlled not only because of the damage they may do to cargo or the ship's equipment, but also, as required by the International Health Regulations, to prevent the spread of disease. Importers, particularly those that operate food processing plants, make great efforts to eliminate infestation in order to prevent the invasion of the importer's local storage or processing plant from infestation carried in incoming cargo. Consequently, they regularly fumigate their premises and may insist that goods delivered to their premises are certified free of infestation by means of fumigation.

3 Shore-side fumigation operations – fumigated containers

3.1 Fumigated containers which have been ventilated

3.1.1 It is important to ensure that freight containers are properly ventilated by opening the doors and allowing the gas to escape. This can be a natural process, or can be accelerated by mechanical means such as blowers or extractors. The ventilation process can take many hours.

3.1.2 Freight containers or cargo transport units that have been completely ventilated after fumigation to ensure that no harmful concentration of gas remains should have the warning signs marked to show that it has been ventilated and the date of ventilation (in accordance with Special Provision 902 and Column 17 of the Dangerous Goods list for UN3359 Fumigated Unit) is not subject to the other requirements of the IMDG Code.

3.1.3 Care should be taken even after a container has been declared as ventilated. Gas can be held in packages of cargo, then desorbed over a long period of time, even over many days, raising the level of gas inside the container to above the safe exposure level. Bagged cereals and cartons with large air spaces are likely to produce this effect. Alternatively, gas and the fumigant sachets or tablets can become 'trapped' at the far end of a container by tightly packed cargo.

3.2 Containers loaded without ventilation after fumigation (fumigation in transit)

3.2.1 A freight container or cargo transport unit containing cargo under fumigation should not be allowed on board until sufficient time has elapsed to allow the attainment of a reasonably uniform gas concentration throughout the cargo. Because of variations due to types and amounts of fumigants and commodities and temperature levels, it is recommended that the period to elapse between fumigant application and loading should be determined locally for each country. Twenty-four hours is normally adequate for this purpose.

3.2.2 Carriage of fumigated containers which have not been ventilated before loading must be carried in accordance with the IMDG Code; the text below is reproduced from the 33rd amendment to the IMDG Code. A container which is carried under fumigation is classified as Class 9, assigned a UN Number (UN 3359) and a Proper Shipping Name (Fumigated Unit). The Dangerous Goods List of the IMDG Code also specifies the following for fumigated units. It assigns two Special Provisions:

Special Provision SP302

In the Proper Shipping Name, the word “UNIT” means a cargo transport unit.

Special Provision SP910

A FUMIGATED UNIT is a closed cargo transport unit containing goods or materials that either are or have been fumigated within the unit. The fumigant gases used are either poisonous or asphyxiant. The gases are usually evolved from solid or liquid preparations distributed within the unit. Fumigated units are subject to the following provisions:

- 1 Cargo transport units shall be fumigated and handled taking into account the provisions of the IMO publication Recommendations on the Safe Use of Pesticides in Ships, as amended.
- 2 Only cargo transport units that can be closed in such a way that the escape of gas is reduced to a minimum shall be used for the transport of fumigated cargo.
- 3 Class 9 placards shall not be affixed to a fumigated unit, except as required for other class 9 substances or articles packed therein (see 5.3.1.3).
- 4 Fumigated units shall be marked with a warning sign affixed to the access door(s) identifying the type and amount of fumigant used and the date and time of fumigation (see 5.3.2.5).
- 5 The transport document for a fumigated unit shall show the type and amount of fumigant used and the date and time of fumigation (see 5.4.4.2). In addition, instructions for disposal for any residual fumigant, including fumigation devices if used, shall be provided.
- 6 A closed cargo transport unit that has been fumigated is not subject to the provisions of this Code if it has been completely ventilated either by opening the doors of the unit or by mechanical ventilation after fumigation and if the date of ventilation is marked on the fumigation warning sign. When the fumigated goods or materials have been unloaded, the fumigation warning sign(s) shall be removed (see also 7.4.3).
- 7 When fumigated units are stowed under deck, equipment for detecting fumigant gas(es) shall be carried on the ship with instructions for their use.
- 8 Fumigants shall not be applied to the contents of a cargo transport unit once it has been loaded aboard the ship.

3.2.3 In column 17 (Properties and Observations) of the Dangerous Goods list for UN 3359, the following information is given:

A ‘FUMIGATED UNIT’ is a closed cargo transport unit containing goods or materials that either are or have been fumigated within the unit. The fumigant gases used are either poisonous or asphyxiant. The gases are usually evolved from solid or liquid preparations distributed within the unit. Fumigants shall not be applied to the contents of a cargo

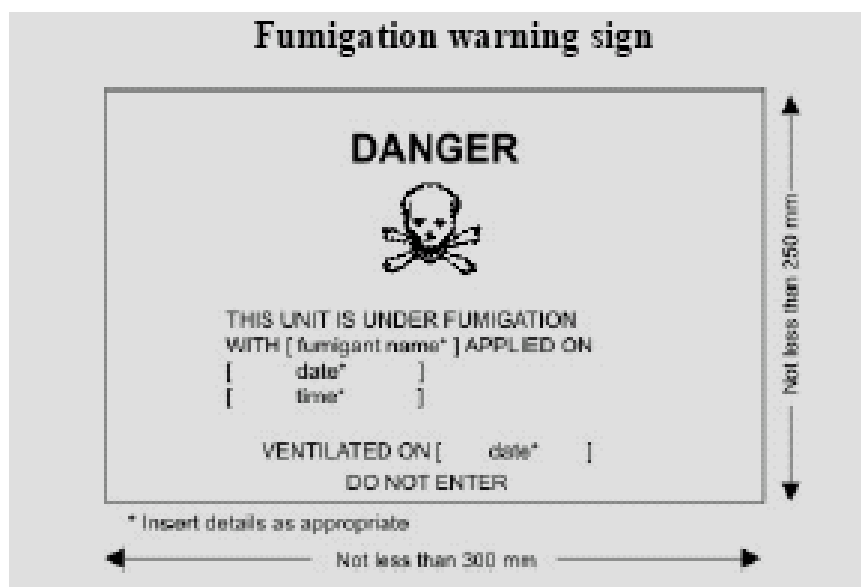
transport unit once it has been loaded aboard the ship. A closed cargo transport unit that has been fumigated is not subject to the provisions of this Code if it has been completely ventilated either by opening the doors of the unit or by mechanical ventilation after fumigation and the date of ventilation is marked on the fumigation warning sign (see also Special Provision 910).

3.2.4 Marking of the Cargo Transport Unit

3.2.4.1 To meet the requirements of the IMDG Code the container has to be marked in accordance with chapter 5.3 of the IMDG Code, the relevant text is reproduced below:

Paragraph 5.3.2.5 Fumigated units

- .1 The marking of the proper shipping name (FUMIGATED UNIT) and the UN number (UN 3359) is not required on fumigated units. However, if a fumigated unit is loaded with dangerous goods, any mark required by the provisions in 5.3.2.0 to 5.3.2.4 shall be marked on the fumigated unit.
- .2 A fumigated unit shall be marked with the warning sign, as specified in .3, affixed in a location where it will be easily seen by persons attempting to enter the interior of the unit. The marking, as required by this paragraph, shall remain on the unit until the following provisions are met:
 - .1 the fumigated unit has been ventilated to remove harmful concentrations of fumigant gas; and
 - .2 the fumigated goods or materials have been unloaded.
- .3 The fumigation warning sign shall be rectangular and shall be not less than 300 mm wide and 250 mm high. The markings shall be in black print on a white background with lettering not less than 25 mm high. An illustration of this sign is given below:



Transport documentation for the fumigated cargo transport unit

3.2.5 To meet the requirements of the IMDG Code the container must be documented in accordance with chapter 5.4 of the Code the relevant text is reproduced below:

Paragraph 5.4.4.2 Fumigated unit

The transport document for a fumigated unit shall show the type and amount of fumigant used and the date and time of fumigation. In addition, instructions for disposal of any residual fumigant, including fumigation devices, if used, shall be provided.

4 Fumigants used

There are a number of chemicals that are used as fumigants such as Phosphine and Methyl Bromide.

4.1 Phosphine UN 2199

4.1.1 This process requires a long period of time to work completely. This can be applied with little technical training as it is supplied in sachets, tablets or pressed plates containing Magnesium Phosphide or Aluminium Phosphide. These generate Phosphine gas when exposed to the moisture in the air. The gas has a slight “fishy garlic” smell and breaks down into a powdery grey residue.

4.1.2 The rate of generation of Phosphine depends on the temperature, the airborne moisture and the degree the generating material is exposed to the air.

4.1.3 Symptoms of poisoning by inhalation of Phosphine include nausea, vomiting, headache, feeling weak, fainting, pain in chest, cough, chest tightness and difficulty breathing. Pulmonary oedema (the presence of excess fluid in the lungs usually due to heart failure) can follow, usually within 24 hours, but sometimes this is delayed for some days.

4.2 Methyl bromide UN 1062

4.2.1 Fumigation with Methyl bromide is a relatively rapid process that can normally be completed in less than 48 hours. So these containers are not usually presented for shipment with gas above the toxicity levels (threshold limits) set by national agencies.

4.2.2 Symptoms of poisoning by inhalation of Methyl Bromide include headaches, dizziness, and eye irritation; coughing, nausea, abdominal discomfort, and numbness of feet. Higher exposure will bring about unconsciousness to central nervous system, convulsions, and loss of vision, balance and hearing.

4.2.3 Methyl Bromide is supplied as a gas. So during application, expertise is required to carry out the operation.

5 Ship-side operations

5.1 Fumigation after loading on board a ship

5.1.1 No person should be allowed by the master to fumigate the contents of a freight container, or cargo transport unit once it has been loaded on board a ship.

5.2 Containers loaded without ventilation after fumigation (fumigation in transit)

5.2.1 If it is intended that freight containers or cargo transport units containing cargo under fumigation should be taken on board ship without preliminary ventilation, their shipment must be considered as a Class 9 Hazard under the IMDG Code and as such the procedures should conform to the provisions as specified in the entries for FUMIGATED UNIT (UN 3359) of the Code. The following special precautions, incorporating the IMDG provisions, are necessary:

- .1 A freight container or cargo transport unit containing cargo under fumigation should not be allowed on board until sufficient time has elapsed to allow the attainment of a reasonably uniform gas concentration throughout the cargo. Because of variations due to types and amounts of fumigants and commodities and temperature levels, it is recommended that the period to elapse between fumigant application and loading should be determined locally for each country. Twenty-four hours is normally adequate for this purpose. Before loading the container should be checked for leaks and any leakage sealed.
- .2 The master should be informed prior to loading of freight containers and cargo transport units under fumigation. These should be identified with suitable warning signs, incorporating the identity of the fumigant and the date and time of fumigation. Any freight container under fumigation must have the doors substantially secured before loading onto a ship. Plastic or lightweight metal seals are not sufficient for this purpose. The securing arrangement must be such as to allow only authorized entry to the freight container. If container doors are to be locked, the means of locking should be of such a construction that, in case of emergency, the doors could be opened without delay. Adequate instructions for disposal of any residual fumigant material should be provided.
- .3 Shipping documents for freight containers or cargo transport units concerned should show the date of fumigation and the type and amount of fumigant used.
- .4 Stowage on deck should be at least 6 m away from vent intakes, crew quarters and regularly occupied spaces.
- .5 Stowage under deck should only be undertaken when unavoidable and then only in a cargo space equipped with mechanical ventilation sufficient to prevent the build-up of fumigant concentrations above the toxicity levels (threshold limits) set by national agencies. The threshold limit for occupational exposure to the fumigant can be found on the Safety Data Sheet. The ventilation rate of the mechanical ventilation system should be at least two air changes per hour, based on the empty cargo space.
- .6 Equipment suitable for detecting the fumigant gas or gases used should be carried on the ship, with instructions for its use.
- .7 Where the stowage requirements above cannot be met, cargo spaces carrying fumigated freight containers or cargo transport units should be treated as if under fumigation and the provisions below should apply.

5.2.2 Before a fumigated container is loaded to a vessel below deck special precautions are necessary. This includes the following:

- .1 At least an officer and one other are to receive appropriate training and will be designated as the trained representatives of the master. The master, through his representative, is responsible for ensuring safe conditions in the occupied spaces of the vessel.
- .2 The trained representatives should brief the crew before the container is loaded.

5.2.3 The fumigant gas is heavier than air so care should be taken in the holds particularly when working on the tank tops.

5.2.4 The trained representatives of the master should be provided and be familiar with:

- .1 The information in the relevant Safety Data Sheet (SDS), if available.
- .2 The instructions on the packaging itself, such as the recommendations of the fumigant manufacturer concerning methods of detection of the fumigant in air, its behaviour and hazards properties, symptoms of poisoning, relevant first aid and special medical treatment and emergency procedures.

5.2.5 The ship should carry:

- .1 adequate gas-detection equipment for the fumigant concerned, together with instructions for its use;
- .2 instructions on disposal of residual fumigant material;
- .3 at least four sets of adequate respiratory protective equipment; and
- .4 a copy of the latest version of the Medical First Aid Guide for Use in Accidents Involving Dangerous Goods (MFAG), including appropriate medicines and medical equipment.

5.2.6 Prior to the arrival of the ship, generally not less than 24 hours in advance, the master should inform the appropriate authorities of the country of destination and ports of call that fumigation in transit is being carried out. The information should include the type of fumigant used; the date of fumigation and cargo spaces carrying fumigated freight containers or cargo transport units.

5.2.7 The instructions on the fumigant label or package itself, such as the recommendations of the fumigant manufacturer concerning methods of detection of the fumigant in air, its behaviour and hazardous properties, symptoms of poisoning, relevant first aid and special medical treatment.

5.2.8 Disposal of any residual fumigant material should be in accordance with suppliers instructions.

6 Hazards to personnel

6.1 If for any reason, the ship's crew or other personnel have to open a container declared as being under fumigation they must be very careful.

6.2 There are no obvious signs when Methyl bromide has been used as a fumigant (e.g., by sight or smell). The container should be left open as long as possible and then checked with the equipment available and should be declared gas free before entry is allowed. In the case of an emergency, entry may be allowed, with full confined space precautions, if there is any gas found to be present.

6.3 If the container is fumigated with Phosphine there are normally visual signs inside the container of the fumigant in the form of sachets, tablets, pressed plates or powder. The state of the packaging depends on the time these have been exposed and the atmosphere that they have been exposed in. It is also possible that the fumigants have moved between cargo items and may not be immediately visible.

6.4 As moisture is required for the reaction to take place, when a container is opened at sea the level of moisture in the air may restart the reaction.

6.5 After the Magnesium or Aluminium Phosphide reacts with moisture to generate Phosphine, a residue of magnesium or aluminium hydroxide remains. This is a light powdery grey substance like ash. Hopefully this has been retained in some kind of packaging so that it can be removed safely. If, however, there is a residue over the cargo, the crew must avoid breathing in this residue or getting it into their eyes or mouth. If not they are still at risk of being poisoned by the residue, which may still be able to generate some Phosphine.

6.6 It should be noted that there are certain commodities (e.g., edible nuts) where a small amount of fumigant is put in cotton wool and placed inside each bag. These items are then dangerous because their handling brings the fumigant close to the face.

6.7 Personnel should be made aware that not every fumigated container is declared and, hence, not marked as such. There are indicators for fumigated containers like tapes on vents or the door joints, a possible "fishy garlic" smell of Phosphine and packets or piles of powdery residue inside the container.

7 Fumigation detection

7.1 The most effective method of protection is to carry out gas tests when the container doors are opened. As a minimum, it is recommended to test for Phosphine and Methyl bromide as the two most common fumigants used. If gas is found the container should be put aside for ventilation.

7.1.1 Stain tube gas test equipment

7.1.1.1 Glass stain tube equipment is simple in design and use, robust and reliable. A test for Phosphine and Methyl bromide can be carried out by a person standing outside the container using a lance inserted into the container doorway. In practice air is drawn by small hand-held bellows through a glass tube containing impregnated crystals which react with the gas for which the test is being done. If the air is contaminated by the gas in question, the crystals change colour.

The function is not affected by moisture, but care has to be taken to warm the tubes to above 0°C in sub zero temperatures. Also a reasonable degree of light is required to detect the colour change of the crystals. The tubes should be used in accordance with the manufacturer's instructions. In particular, they must not be used after their expiry date.

7.1.2 Electronic (photo-ionisation gas testing equipment)

7.1.2.1 Gas tests can be carried out that detect the presence of gases and their concentration levels. Similarly, equipment can confirm that there is a safe level of oxygen within the container. At the present time the technology is such that both the quantification and discrimination are poor. There are frequent false positives due to cross sensitivities and readings are not accurate enough for determining safe exposure levels. Therefore the use of these instruments at the present time is not recommended.

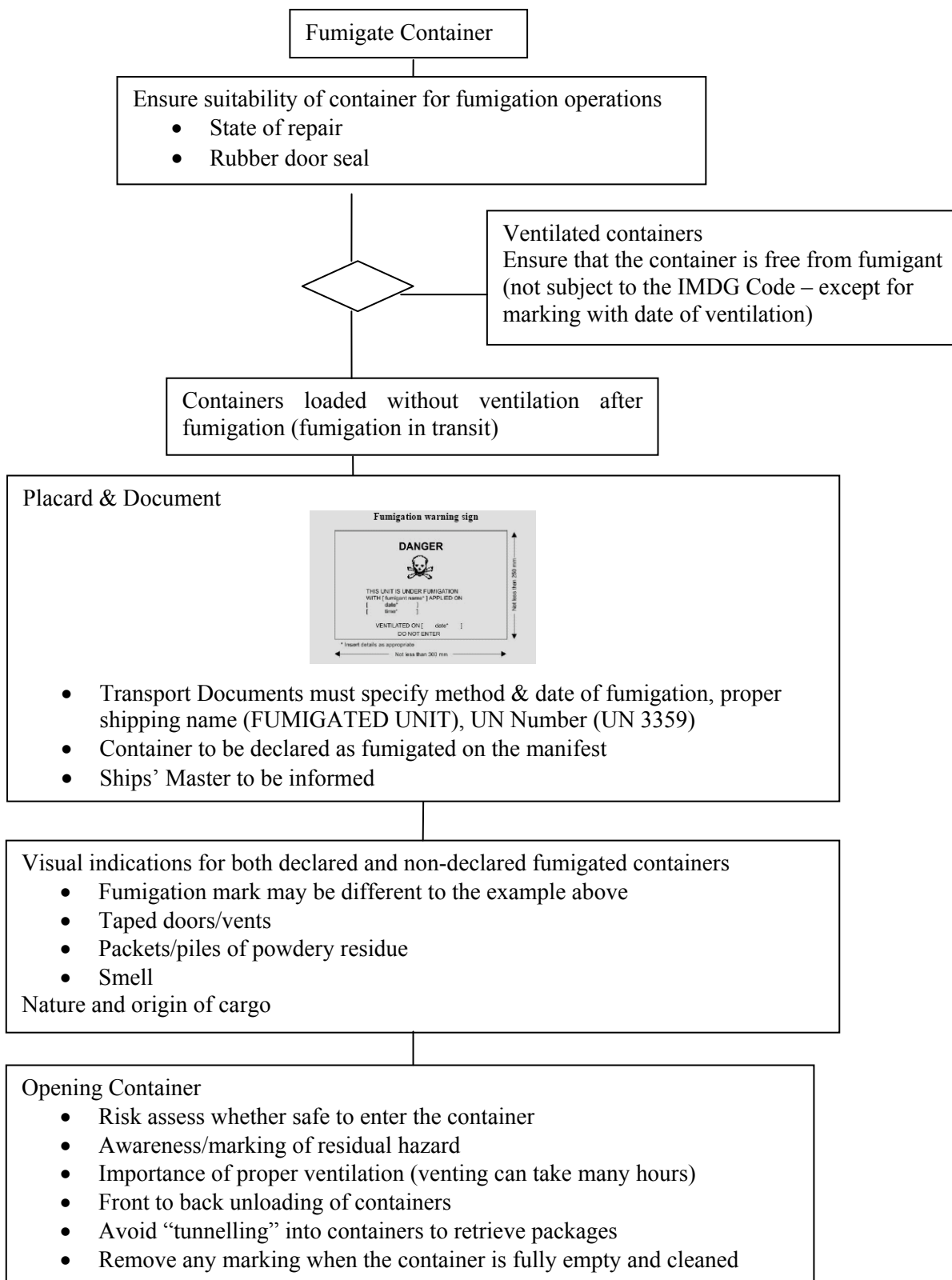
7.2 Personal monitors

7.2.1 Small electronic personal monitors are available for Phosphine, but not for Methyl Bromide. Phosphine monitors can be placed inside the container while unloaders are working, or worn by individuals on outer garments. The location of an independent monitor is important both to ensure that any fumigant is detected and ensure that the reading is not compromised by ventilation at the door or external contaminants. Monitors issue an audible signal if Phosphine levels reach the pre-set level and are useful as warning devices. However, they should not be used for the initial fumigation detection and measurement process. Also, electronic monitors have the disadvantage that they can respond to a range of harmless substances giving misleading alarm signals.

7.2.2 Personal monitors are also available to show the level of oxygen within the container. This would indicate a deoxygenated atmosphere but would not necessarily indicate that the atmosphere is free from fumigant.

APPENDIX

AIDE MEMOIRE FOR FUMIGATION OF CONTAINERS



ANNEX 11**DRAFT RESOLUTION MSC...(84)
(adopted on [... May 2008])****ADOPTION OF AMENDMENTS TO THE INTERNATIONAL CONVENTION
FOR THE SAFETY OF LIFE AT SEA, 1974, AS AMENDED**

THE MARITIME SAFETY COMMITTEE,

RECALLING Article 28(b) of the Convention on the International Maritime Organization concerning the functions of the Committee,

RECALLING FURTHER article VIII(b) of the International Convention for the Safety of Life at Sea (SOLAS), 1974 (hereinafter referred to as "the Convention"), concerning the amendment procedure applicable to the Annex to the Convention, other than to the provisions of chapter I thereof,

HAVING CONSIDERED, at its [eighty-fourth] session, amendments to the Convention, proposed and circulated in accordance with article VIII(b)(i) thereof,

1. ADOPTS, in accordance with article VIII(b)(iv) of the Convention, amendments to the Convention, the text of which is set out in the Annex to the present resolution;
2. DETERMINES, in accordance with article VIII(b)(vi)(2)(bb) of the Convention, that the said amendments shall be deemed to have been accepted on [1 July 2009], unless, prior to that date, more than one third of the Contracting Governments to the Convention or Contracting Governments the combined merchant fleets of which constitute not less than 50% of the gross tonnage of the world's merchant fleet, have notified their objections to the amendments;
3. INVITES SOLAS Contracting Governments to note that, in accordance with article VIII(b)(vii)(2) of the Convention, the amendments shall enter into force on [1 January 2010] upon their acceptance in accordance with paragraph 2 above;
4. REQUESTS the Secretary-General, in conformity with article VIII(b)(v) of the Convention, to transmit certified copies of the present resolution and the text of the amendments contained in the Annex to all Contracting Governments to the Convention;
5. FURTHER REQUESTS the Secretary-General to transmit copies of this resolution and its Annex to Members of the Organization, which are not Contracting Governments to the Convention.

ANNEX

**AMENDMENTS TO THE INTERNATIONAL CONVENTION
FOR THE SAFETY OF LIFE AT SEA, 1974, AS AMENDED**

CHAPTER II-2

CONSTRUCTION-FIRE PROTECTION, FIRE DETECTION AND FIRE EXTINCTION

1 In regulation 1 the following new paragraph 2.3 is added:

“2.3 The following ships, with cargo spaces intended for the carriage of packaged dangerous goods, shall comply with regulation 19.3, except when carrying dangerous goods specified as class 6.2 and 7 and dangerous goods in limited quantities* and excepted quantities** in accordance with tables 19.1 and 19.3 not later than the date of the first renewal survey on or after the [date of entry into force of the amendments]:

- .1 passenger ships and cargo ships of 500 gross tonnage and upwards constructed on or after 1 September 1984 but before [date of entry into force of the amendments]; and
- .2 cargo ships of less than 500 gross tonnage constructed on or after 1 February 1992 but before [date of entry into force of the amendments].

Notwithstanding these provisions:

- .1 passenger ships and cargo ships of 500 gross tonnage and upwards constructed on or after 1 September 1984 but before 1 July 1986 need not comply with regulation 19.3.3 provided that they comply with regulation 54.2.3 as adopted by the resolution MSC.1(XLV);
- .2 passenger ships and cargo ships of 500 gross tonnage and upwards constructed on or after 1 July 1986 but before 1 February 1992 need not comply with regulation 19.3.3 provided that they comply with regulation 54.2.3 as adopted by the resolution MSC.6(48);
- .3 passenger ships and cargo ships of 500 gross tonnage and upwards constructed on or after 1 September 1984 but before 1 July 1998 need not comply with regulations 19.3.10.1 and 19.3.10.2; and
- .4 cargo ships of less than 500 gross tonnage constructed on or after 1 February 1992 but before 1 July 1998 need not comply with regulations 19.3.10.1 and 19.3.10.2.”

Footnote *: Refer to chapter 3.4 of the International Maritime Dangerous Goods Code.

Footnote **: Refer to chapter 3.5 of the International Maritime Dangerous Goods Code.

2 Replace note 1 to table 19.1 by the following text:

“¹ For classes 4 and 5.1 solids not applicable to closed freight containers. For classes 2, 3, 6.1 and 8 when carried in closed freight containers the ventilation rate may

be reduced to not less than two air changes per hour. For classes 4 and 5.1 liquids when carried in closed freight containers, the ventilation rate may be reduced to not less than two air changes per hour. For the purpose of this requirement a portable tank is a closed freight container”.

3 Replace the table 19.3 by the following table:

“Table 19.3 - Application of the requirements to different classes of dangerous goods except solid dangerous goods in bulk

Class	Regulation 19																							
	1.1 to 1.6	1.4S	2.1	2.2	2.3 flammable ²⁰	2.3 non-flammable	3 FP ¹⁵ < 23°C	3 FP ¹⁵ ≥ 23°C to ≤ 60°C	4.1	4.2	4.3 liquids ²¹	4.3 solids	5.1	5.2 ¹⁶	6.1 liquids FP ¹⁵ < 23°C	6.1 liquids FP ¹⁵ ≥ 23°C to ≤ 60°C	6.1 liquids	6.1 solids	8 liquids FP ¹⁵ < 23°C	8 liquids FP ¹⁵ ≥ 23°C to ≤ 60°C	8 liquids	8 solids	9	
3.1.1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3.1.2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-
3.1.3	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3.1.4	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3.2	X	-	X	-	X	-	X	-	-	-	X ¹⁸	-	-	-	X	-	-	-	X	-	-	-	X ¹⁷	
3.3	X	X	X	X	-	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X	-	
3.4.1	-	-	X	-	-	X	X	-	X ¹¹	X ¹¹	X	X	X ¹¹	-	X	X	-	X ¹¹	X	X	-	-	X ¹¹	
3.4.2	-	-	X	-	-	-	X	-	-	-	-	-	-	-	X	-	-	-	X	-	-	-	X ¹⁷	
3.5	-	-	-	-	-	-	X	-	-	-	-	-	-	-	X	X	X	-	X	X ¹⁹	X ¹⁹	-	-	
3.6	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X ¹⁴	
3.7	-	-	-	-	-	-	X	X	X	X	X	X	X	-	X	X	-	-	X	X	-	-	-	
3.8	X ¹²	-	X	X	X	X	X	X	X	X	X	X	X ¹³	-	X	X	-	-	X	X	-	-	-	
3.9	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
3.10.1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
3.10.2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

¹¹ When “mechanically-ventilated spaces” are required by the International Maritime Dangerous Goods Code, as amended.

¹² Stow 3 m horizontally away from the machinery space boundaries in all cases.

¹³ Refer to the International Maritime Dangerous Goods Code, as amended.

¹⁴ As appropriate to the goods to be carried.

¹⁵ FP means flashpoint.

- ¹⁶ Under the provisions of the IMDG Code, as amended, stowage of class 5.2 dangerous goods under deck or in enclosed ro-ro spaces is prohibited.
- ¹⁷ Only applicable to dangerous goods evolving flammable vapour listed in the IMDG Code.
- ¹⁸ Only applicable to dangerous goods having a flashpoint less than 23°C listed in the IMDG Code.
- ¹⁹ Only applicable to dangerous goods having a subsidiary risk class 6.1.
- ²⁰ Under the provisions of the IMDG Code, as amended, stowage of class 2.3 having subsidiary risk class 2.1 under deck or in enclosed ro-ro spaces is prohibited.
- ²¹ Under the provisions of the IMDG Code, as amended, stowage of class 4.3 liquids having a flashpoint less than 23°C under deck or in enclosed ro-ro spaces is prohibited.”
- 4 Add the words “and excepted quantities” with the following footnote after the text “except when carrying dangerous goods in limited quantities” in regulation II-2/19.2.1:
“Refer to chapter 3.5 of the International Maritime Dangerous Goods Code.”
- 5 Add the words “and excepted quantities” at the end of regulation II-2/19.4.

ANNEX 12**DRAFT RESOLUTION MSC...(84)
(adopted on [... May 2008])****ADOPTION OF AMENDMENTS TO THE INTERNATIONAL CODE OF SAFETY
FOR HIGH-SPEED CRAFT, 2000 (2000 HSC CODE)**

THE MARITIME SAFETY COMMITTEE,

RECALLING Article 28(b) of the Convention on the International Maritime Organization concerning the functions of the Committee,

NOTING resolution MSC.97(73), by which it adopted the International Code of Safety for High-Speed Craft, 2000 (hereinafter referred to as “the 2000 HSC Code”), which has become mandatory under chapter X of the International Convention for the Safety of Life at Sea (SOLAS), 1974, (hereinafter referred to as “the Convention”),

NOTING ALSO article VIII(b) and regulation X/1.2 of the Convention concerning the procedure for amending the 2000 HSC Code,

HAVING CONSIDERED, at its [eighty-fourth] session, amendments to the 2000 HSC Code proposed and circulated in accordance with article VIII(b)(i) of the Convention,

1. ADOPTS, in accordance with article VIII(b)(iv) of the Convention, amendments to the 2000 HSC Code, the text of which is set out in the Annex to the present resolution;
2. DETERMINES, in accordance with article VIII(b)(vi)(2)(bb) of the Convention, that the amendments shall be deemed to have been accepted on [1 July 2009] unless, prior to that date, more than one third of the Contracting Governments to the Convention or Contracting Governments the combined merchant fleets of which constitute not less than 50% of the gross tonnage of the world’s merchant fleet, have notified their objections to the amendments;
3. INVITES Contracting Governments to note that, in accordance with article VIII(b)(vii)(2) of the Convention, the amendments shall enter into force on [1 January 2010] upon their acceptance in accordance with paragraph 2 above;
4. REQUESTS the Secretary-General, in conformity with article VIII(b)(v) of the Convention, to transmit certified copies of the present resolution and the text of the amendments contained in the Annex to all Contracting Governments to the Convention;
5. FURTHER REQUESTS the Secretary-General to transmit copies of this resolution and its Annex to Members of the Organization, which are not Contracting Governments to the Convention.

ANNEX*

**AMENDMENTS TO THE INTERNATIONAL CODE OF SAFETY
FOR HIGH-SPEED CRAFT, 2000 (2000 HSC CODE)**

**CHAPTER 7
FIRE SAFETY**

- 1 Replace note 1 to table 7.17-1 by the following text:

“¹ For classes 4 and 5.1 solids not applicable to closed freight containers. For classes 2, 3, 6.1 and 8 when carried in closed freight containers the ventilation rate may be reduced to not less than two air changes per hour. For classes 4 and 5.1 liquids when carried in closed freight containers, the ventilation rate may be reduced to not less than two air changes per hour. For the purpose of this requirement a portable tank is a closed freight container.”

- 2 Replace the table 7.17-3 by the following table:

“TABLE 7.17-3

Application of the requirements of section 7.17.3 to different classes of dangerous goods except solid dangerous goods in bulk

* The annex also contains at the end a list of footnotes to be added or to be amended in the 2000 HSC Code.

Section	Class																							
	1.1 to 1.6	1.4S	2.1	2.2	2.3 flammable ¹⁷	2.3 non-flammable	3 FP ¹² < 23°C	3 FP ¹² ≥ 23°C to ≤ 60°C	4.1	4.2	4.3 liquids ¹⁸	4.3 solids	5.1	5.2 ¹³	6.1 liquids FP ¹² < 23°C	6.1 liquids FP ¹² ≥ 23°C to ≤ 60°C	6.1 liquids	6.1 solids	8 liquids FP ¹² < 23°C	8 liquids FP ¹² ≥ 23°C to ≤ 60°C	8 liquids	8 solids	9	
7.17.3.1.1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
7.17.3.1.2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-
7.17.3.1.3	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
7.17.3.1.4	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
7.17.3.2	X	-	X	-	X	-	X	-	-	-	X ¹⁵	-	-	-	X	-	-	-	X	-	-	-	X ¹⁴	
7.17.3.3	X	X	X	X	-	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X	-	
7.17.3.4.1	-	-	X	-	-	X	X	-	X ⁸	X ⁸	X	X	X ⁸	-	X	X	-	X ⁸	X	X	-	-	X ⁸	
7.17.3.4.2	-	-	X	-	-	-	X	-	-	-	-	-	-	-	X	-	-	-	X	-	-	-	X ¹⁴	
7.17.3.5	-	-	-	-	-	-	X	-	-	-	-	-	-	-	X	X	X	-	X	X ¹⁶	X ¹⁶	-	-	
7.17.3.6	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X ¹¹	
7.17.3.7	-	-	-	-	-	-	X	X	X	X	X	X	X	-	X	X	-	-	X	X	-	-	-	
7.17.3.8	X ⁹	-	X	X	X	X	X	X	X	X	X	X	X ¹⁰	-	X	X	-	-	X	X	-	-	-	
7.17.3.9	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
7.17.3.10.1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
7.17.3.10.2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

- ⁸ When “mechanically-ventilated spaces” are required by the International Maritime Dangerous Goods Code, as amended.
- ⁹ Stow 3 m horizontally away from the machinery space boundaries in all cases.
- ¹⁰ Refer to the International Maritime Dangerous Goods Code, as amended.
- ¹¹ As appropriate to the goods to be carried.
- ¹² FP means flashpoint.
- ¹³ Under the provisions of the IMDG Code, stowage of class 5.2 dangerous goods under deck or in enclosed ro-ro spaces is prohibited.
- ¹⁴ Only applicable to dangerous goods evolving flammable vapour listed in the IMDG Code.
- ¹⁵ Only applicable to dangerous goods having a flashpoint less than 23°C listed in the IMDG Code.
- ¹⁶ Only applicable to dangerous goods having a subsidiary risk class 6.1.
- ¹⁷ Under the provisions of the IMDG Code, as amended, stowage of class 2.3 having subsidiary risk class 2.1 under deck or in enclosed ro-ro spaces is prohibited.
- ¹⁸ Under the provisions of the IMDG Code, as amended, stowage of class 4.3 liquids having a flashpoint less than 23°C under deck or in enclosed ro-ro spaces is prohibited.”

- 3 Add the words “and excepted quantities” with the following footnote after the text “except when carrying dangerous goods in limited quantities” in regulation 7.17.1:

“Refer to chapter 3.5 of the International Maritime Dangerous Goods Code.”

ANNEX 13**DRAFT MSC CIRCULAR****CARRIAGE OF DANGEROUS GOODS****Document of compliance with the special requirements for ships carrying dangerous goods under the provisions of regulation II-2/19 of the 1974 SOLAS Convention, as amended and of regulation 7.17 of HSC Code 2000, as amended**

1 The Maritime Safety Committee, at its sixty-third session (16 to 25 May 1994), considered and approved a standard format for the document of compliance required by regulation II-2/54.3 of the SOLAS Convention, as amended. The Committee further agreed that the period of validity of the document of compliance should not exceed 5 years and should not be extended beyond the expiry date of the valid Cargo Ship Safety Construction Certificate issued to the ship concerned under the provisions of SOLAS regulation I/12.

2 The Maritime Safety Committee, at its seventy-fifth session (15 to 24 May 2002), in view of the amendments to SOLAS chapter II-2, adopted by resolution MSC.99(73), considered and approved a revised standard format for the document of compliance required by regulation II-2/19.4 of the SOLAS Convention, as amended, applicable as from 1 July 2002. This format is reproduced in MSC/Circ.1027.

3 The Maritime Safety Committee, at its seventy-ninth session (1 to 10 December 2004), recognizing the need to take into account the amendments to table 19.3 of SOLAS regulation II-2/19 which had been adopted by resolution MSC.134(76), decided that it was necessary to highlight the prohibition on stowage of class 5.2 dangerous goods under deck or in enclosed ro-ro spaces in documents of compliance required by regulation II-2/19 of the SOLAS Convention, as amended, for any ship built on or after 1 July 2004 when issuing or renewing the said documents.

4 The Committee, recognizing also that this prohibition on stowage under the IMDG Code also applies to all ships built before 1 July 2004 and subject to regulation II-2/19 (or II-2/54) of the SOLAS Convention, as amended, also decided that the prohibition on stowage should be taken into account when renewing documents of compliance for:

- any passenger ship built on or after 1 September 1984 and before 1 July 2004;
- any cargo ship of 500 gross tonnage or above built on or after 1 September 1984 and before 1 July 2004; and
- any cargo ship of less than 500 gross tonnage built on or after 1 February 1992 and before 1 July 2004.

5 Furthermore, the Committee, at the same session, agreed that the standard document of compliance format set out in MSC/Circ.1027 should be used when renewing documents of ships subject to SOLAS regulation II-2/54 applicable before 1 July 2002, and that in such cases the references to regulations II-2/19 and II-2/19.4 appearing in the standard format should be replaced by references to regulations II-2/54 and II-2/54.3 respectively.

6 The Committee, at its eighty-first session (10 to 19 May 2006), considered the report of the forty-ninth session of the DE Sub-Committee and agreed the inclusion of a standard format for a document of compliance with special requirements for high-speed craft carrying dangerous goods as required by regulation 7.17.4 of the 2000 HSC Code in the Code, although the draft amendments to the Code were not adopted.

7 The Committee, [at its eighty-... session (date)], in view of the amendments to table 19.3 in SOLAS chapter II-2 and table 7.17-3 in 2000 HSC Code, adopted by resolutions MSC.XX(XX) and MSC.YY(YY), respectively, considered and approved again revised standard formats for the document of compliance required by regulation II-2/19.4 of the SOLAS Convention, as amended and by regulation 7.17.4 of the 2000 HSC Code, as amended.

8 The Committee, at that session, confirmed that the period of validity of the document of compliance should not exceed:

- .1 five years for cargo ships and should not be extended beyond the expiry date of the valid cargo ship safety construction certificate issued to cargo ships concerned under the provisions of SOLAS regulation I/12; and
- .2 one year for passenger ships and should not be extended beyond the expiry date of the valid passenger ship safety certificate issued to passenger ships concerned under the provisions of SOLAS regulation I/12.

9 The Committee, at that session, further agreed that:

- .1 it is still necessary to highlight the prohibition on stowage of class 5.2 dangerous goods under deck or in closed ro-ro spaces when issuing or renewing documents of compliance according to the revised standard formats; and
- .2 the revised standard formats should be used when renewing documents of compliance for existing ships subject to SOLAS regulation II-2/1.2.3 and that in such cases the reference to regulation II-2/19 appearing in the revised standard format should be replaced by "II-2/19.3 as applicable according to II-2/1.2.3".

10 The revised standard formats of the document of compliance recommended for use and acceptance by Member Governments and Contracting Governments to the SOLAS Convention and 2000 HSC Code are set out in annex 1 and annex 2, respectively.

11 Member Governments are invited to draw this circular to the attention of authorities responsible for issuing and renewing documents of compliance, bodies acting on behalf of these governments, and shipowners, ship operators and masters, with a view to harmonizing the practices of the various Administrations.

12 Member Governments are also invited to draw this circular to the attention of authorities tasked by the port State with carrying out inspections of ships, and to recommend them to take the above into account when discharging their responsibilities.

13 This circular supersedes MSC/Circ.1027 and MSC/Circ.1148.

ANNEX 1

STANDARD FORMAT OF THE DOCUMENT OF COMPLIANCE

Special Requirements for Ships carrying Dangerous Goods

Issued in pursuance of the requirement of regulation II-2/19.4
of the International Convention for Safety of Life at Sea, 1974,
as amended, under the authority of

the Government of _____

Name of ship: _____

Distinctive number or letters: _____

Port of registry: _____

Ship type: _____

IMO Number (if applicable): _____

THIS IS TO CERTIFY:

.1 that the construction and equipment of the above-mentioned ship was found to comply with the provisions of regulation II-2/19 of the International Convention for the Safety of Life at Sea, 1974, as amended; and

.2 that the ship is suitable for the carriage of those classes of dangerous goods as specified in the appendix hereto, subject to any provisions in the International Maritime Dangerous Goods (IMDG) Code and the Code of Safe Practice for Solid Bulk Cargoes (BC) Code for individual substances, materials or articles also being complied with.

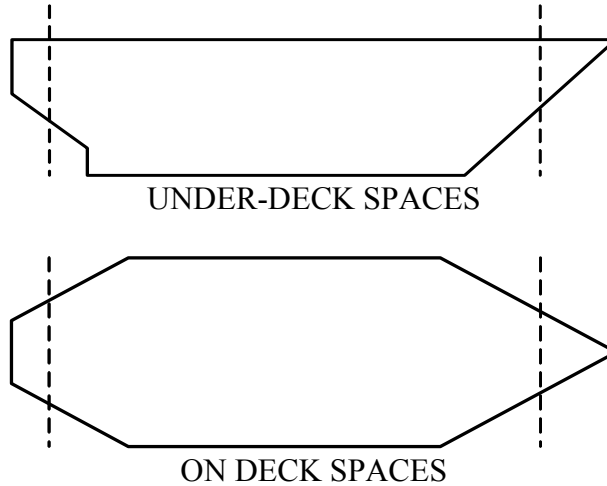
This document is valid until _____

Issued at _____
(Signature of authorized official issuing the certificate)

NOTE: There are no special requirements in the above-mentioned regulation II-2/19 for the carriage of dangerous goods of classes 6.2 and 7, and for the carriage of dangerous goods in limited quantities, as required in chapter 3.4 of the IMDG Code, and excepted quantities, as required in chapter 3.5 of the IMDG Code.

APPENDIX

Spaces to be indicated in the plans with numbers corresponding with the table below



Class	Hold							
		1	2	3
1.1 to 1.6								
1.4S								
2.1								
2.2								
2.3	flammable							
2.3	non-flammable							
3	FP < 23°C							
3	FP ≥ 23°C to ≤ 60°C							
4.1								
4.2								
4.3 liquids								
4.3 solid								
5.1								
5.2								
6.1 liquids	FP < 23°C							
6.1 liquids	FP ≥ 23°C to ≤ 60°C							
6.1 liquids								
6.1 solid								
8 liquids	FP < 23°C							
8 liquids	FP ≥ 23°C to ≤ 60°C							
8 liquids								
8 solid								
9								

“P” indicates
PACKAGED GOODS
PERMITTED.

“A” indicates
PACKAGED AND
BULK GOODS
ALLOWED.

“X” indicates NOT
ALLOWED.

Remarks related to the information in the table above as applicable:

NOTE: Cargoes in bulk may be listed individually by name and class

ANNEX 2

STANDARD FORMAT OF THE DOCUMENT OF COMPLIANCE

Special Requirements for Ships carrying Dangerous Goods

Issued in pursuance of the requirement of part D, chapter 7 of the International Code of Safety for High-Speed Craft, 2000 as amended, under the authority of

the Government of _____

Name of craft: _____

Design type and hull No.: _____

Distinctive number or letters: _____

IMO Number (if applicable):⁵ _____

Port of registry: _____

Category: Category A craft/Category B craft/cargo craft⁶

Type of craft: hovercraft, surface effect ship, hydrofoil, single-hull vessel, multi-hull vessel, other (please state.....)⁶

CERTIFICATE

1. The construction and equipment of the above-mentioned craft have been found to comply with the provisions of part D, chapter 7 of the International Code of Safety for High-Speed Craft, 2000, as amended;
2. The craft is suitable to carry the classes of dangerous goods indicated in the attached appendix, subject to concurrent application of the International Maritime Dangerous Goods Code (IMDG Code) and the Code of Safe Practice for Solid Bulk Cargoes (BC Code) in respect of the various materials or items.

This document is valid until _____

Issued at _____
(Signature of authorized official issuing the certificate)

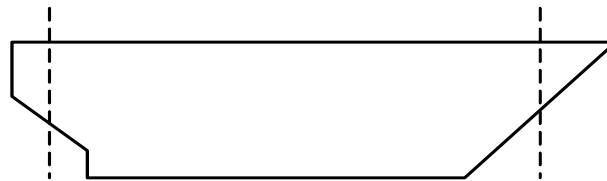
Note: Part D of chapter 7 stipulates no special provisions for the carriage of dangerous goods of classes 6.2 and 7, nor for the carriage of dangerous goods in limited quantities as defined in chapter 3.4 of the IMDG Code.

⁵ IMO Ship Identification Number Scheme, adopted by the Organization through resolution A.600(15).

⁶ Delete where applicable.

APPENDIX

Indicate spaces on plans using the corresponding numbers from the table below



UNDER-DECK SPACES



ON DECK SPACES

Class	Hold								
		1	2	3	
1.1 to 1.6									
1.4S									
2.1									
2.2									
2.3 flammable									
2.3 non-flammable									
3 FP < 23°C									
3 FP ≥ 23°C to ≤ 60°C									
4.1									
4.2									
4.3 liquids									
4.3 solid									
5.1									
5.2									
6.1 liquids FP < 23°C									
6.1 liquids FP ≥ 23°C to ≤ 60°C									
6.1 liquids									
6.1 solid									
8 liquids FP < 23°C									
8 liquids FP ≥ 23°C to ≤ 60°C									
8 liquids									
8 solid									
9									

“P” indicates
PACKAGED GOODS
PERMITTED.

“A” indicates
PACKAGED AND
BULK GOODS
ALLOWED.

“X” indicates NOT
ALLOWED.

Comments on the information contained in the table above as applicable:

NOTE: Bulk cargoes may be listed individually, by designation and class.

ANNEX 14**JUSTIFICATION FOR A PROPOSED NEW WORK PROGRAMME ITEM
(in accordance with MSC-MEPC.1/Circ.1)****AMENDMENTS TO THE INTERNATIONAL CONVENTION FOR SAFE CONTAINERS, 1972
RELATED TO THE CAPACITY TO EXAMINE CONTAINERS****1 Scope of the proposal**

To review and/or revise as necessary, specific provisions of the International Convention for Safe Containers, 1972 (CSC), concerning:

- .1 Periodic Examination Scheme (CSC, regulation 2);
- .2 Continuous Examination Programme (CSC, regulation 2.3);
- .3 Recommendation on harmonized interpretation and implementation of the International Convention for Safe Containers, 1972, as amended (CSC/Circ.100); and
- .4 any related IMO documents, i.e. circulars.

2 Compelling need

2.1 From a practical standpoint with the use of the existing requirements for the maintenance and examination of containers, contained within regulation 2 of the CSC, personnel involved in the handling of containers during loading and discharging of ships are being subjected to an increased risk of serious injury as a result of undetected damages.

2.2 Investigations to date suggest that problems may exist with inspection programmes outlined in the CSC.

2.3 Additionally, a number of delegations have proposed that it would be useful to standardize to some extent the scope and principles of examination programmes.

3 Analysis of the issues involved, having regard to the costs to the maritime industry and global legislative and administrative burdens

No costs to the maritime industry are anticipated. The administrative burdens to the Organization and to the Member States are anticipated to be minimal.

4 Benefits

The ambiguous nature of the existing recommendations has led to inadequate maintenance and examination requirements for some containers, and in a number of cases resulted in risks to the personnel involved with the handling of containers. Specific guidance needs to be developed to remove the ambiguities for the maintenance and examination requirements.

5 Priority and target completion date

This matter should have high priority since the issues are of ongoing concern. It is expected that two sessions will be needed to conclude this new item. The new item should be added to the work programme and agenda for DSC 13.

6 Specific indication of the action required

Revised requirements for maintenance and examination procedures will need to be prepared to update the existing annex 1, regulation 2 of the International Convention for Safe Containers, 1972, and/or associated IMO documents.

7 Remarks on the criteria for general acceptance

- .1 The subject of the proposal is within the scope of IMO objectives.
- .2 The item is within the relevant provisions of the Strategic plan for the Organization and the High-level action plan.
- .3 Adequate industry standards do exist, but they are incomplete and inconsistently applied.
- .4 It is believed that the benefits do justify the proposed action.

8 Identification of which subsidiary bodies are essential to complete the work

The work should be able to be accomplished by the Sub-Committee on Dangerous Goods, Solid Cargoes and Containers exclusively.



IMO

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SUB-COMMITTEE ON DANGEROUS
GOODS, SOLID CARGOES AND
CONTAINERS
12th session
Agenda item 19

DSC 12/19/Add.1
7 November 2007
Original: ENGLISH

REPORT TO THE MARITIME SAFETY COMMITTEE

Attached is the annex to annex 4 to the report to the Maritime Safety Committee (DSC 12/19).

For reasons of economy, this document is printed in a limited number. Delegates are kindly asked to bring their copies to meetings and not to request additional copies.

ANNEX**DRAFT TEXT OF THE MANDATORY INTERNATIONAL MARITIME SOLID BULK
CARGOES (IMSBC) CODE****Table of Contents**

Foreword	
Section 1	General provisions and definitions
Section 2	General loading, carriage and unloading precautions
Section 3	Safety of personnel and ship
Section 4	Assessment of acceptability of consignments for safe shipment
Section 5	Trimming procedures
Section 6	Methods of determining angle of repose
Section 7	Cargoes that may liquefy
Section 8	Test procedures for cargoes that may liquefy
Section 9	Materials possessing chemical hazards
Section 10	Carriage of solid bulk wastes
Section 11	Security provisions
Section 12	Stowage factor conversion tables
Section 13	References
Appendix 1	Individual schedules of solid bulk cargoes
Appendix 2	Laboratory test procedures, associated apparatus and standards
Appendix 3	Properties of solid bulk cargoes
Appendix 4	Index of solid bulk cargoes

FOREWORD

The International Convention for the Safety of Life at Sea, 1974 (SOLAS Convention), as amended, deals with various aspects of maritime safety and contains, in parts A and B of chapter VI and part B of chapter VII, the mandatory provisions governing the carriage of solid bulk cargoes and the carriage of dangerous goods in solid form in bulk, respectively. These provisions are amplified in the Code of Safe Practice for Solid Bulk Cargoes (BC Code).

Detailed fire protection arrangements for ships carrying solid bulk cargoes are incorporated into chapter II-2 of the SOLAS Convention by regulations 10 and 19. Attention is drawn to regulation II-2/19.4 (or II-2/54.3) of the SOLAS Convention as amended. This provides for an appropriate document as evidence of compliance of construction and equipment with the requirements of regulation II-2/19 (or II.2/54) to be issued to ships carrying dangerous goods in solid form in bulk, as defined in regulation VII/7 of the Convention, except class 6.2 and class 7, which are:

- cargo ships of 500 gross tonnage or over constructed on or after 1 September 1984; or
- cargo ships of less than 500 gross tonnage constructed on or after 1 February 1992.

The BC Code that was adopted by resolution [MSC.xx(85)] was recommended to Governments for adoption or for use as the basis for national regulations in pursuance of their obligations under regulation of the SOLAS Convention, as amended. The BC Code is mandatory under the provision of the SOLAS Convention from [date of entry into force]. However, some parts of the Code continue to be recommendatory or informative. It needs to be emphasized that, in the context of the language of the Code: the words “shall”, “should” and “may”, when used in the Code, mean that the relevant provisions are “mandatory”, “recommendatory” and “optional”, respectively. Observance of the Code harmonizes the practices and procedures to be followed and the appropriate precautions to be taken in the loading, trimming, carriage and discharge of solid bulk cargoes when transported by sea, ensuring compliance with the mandatory provisions of the SOLAS Convention.

The Code has undergone many changes, both in layout and content, in order to keep pace with the expansion and progress of industry. Maritime Safety Committee (MSC) is authorized by the Organization’s Assembly to adopt amendments to the Code, thus enabling the IMO to respond promptly to developments in transport.

The MSC at its eighty-fifth session agreed that, in order to facilitate the safe transport of solid bulk cargoes, the provisions of the BC Code, 2008, may be applied from 1 January 2009 on a voluntary basis, pending their official entry into force on 1 January 2011 without any transitional period. This is described in resolution [MSC. xx(85)].

Section 1

General Provisions

1.1 Introductory Note

The problems involved in the carriage of bulk cargoes were recognized by the delegates to the 1960 International Conference on Safety of Life at Sea, but at that time it was not possible to frame detailed requirements, except for the carriage of grain. The Conference did recommend, however, in paragraph 55 of Annex D to the Convention, that an internationally acceptable code of safe practice for the shipment of bulk cargoes should be drawn up under the sponsorship of the International Maritime Organization (IMO). This work was undertaken by the Organization's Sub-Committee on Containers and Cargoes and several editions of the Code of Safe Practice for solid Bulk Cargoes (BC Code) have been published, since the first edition in 1965. The Sub-Committee was expanded to include dangerous goods and is now called the Sub-Committee on Dangerous Goods, Solid Cargoes and Containers (DSC Sub-Committee).

The prime hazards associated with the shipment of solid bulk cargoes are those relating to structural damage due to improper cargo distribution, loss or reduction of stability during a voyage and chemical reactions of cargoes. Therefore the primary aim of this Code is to facilitate the safe stowage and shipment of solid bulk cargoes by providing information on the dangers associated with the shipment of certain types of solid bulk cargoes and instructions on the procedures to be adopted when the shipment of solid bulk cargoes is contemplated. The requirements for the transport of grain are covered by the International Code for the Safe Carriage of Grain in Bulk (International Grain Code, 1991).

1.2 Cargoes listed in this Code

1.2.1 Typical cargoes currently shipped in bulk, together with advice on their properties and methods of handling, are given in the schedules for individual cargoes. However, these schedules are not exhaustive and the properties attributed to the cargoes are given only for guidance. Consequently, before loading, it is essential to obtain current valid information from the shipper on the physical and chemical properties of the cargoes presented for shipment. The shipper shall provide appropriate information about the cargo to be shipped (see section 4.2).

1.2.2 The master shall consult the appropriate cargo schedule in this Code and observe all necessary precautions. The master shall consider to consult the authorities at the ports of loading and discharge, as necessary, concerning the requirements which may be in force and applicable for the carriage.

1.3 Cargoes not listed in this Code

1.3.1 If a solid cargo which is not listed in appendix 1 to this Code is proposed for carriage in bulk, the shipper shall, prior to loading, provide the competent authority of the port of loading with the characteristics and properties of the cargo in accordance with section 4 of this Code. Based on the information received, the competent authority will assess the acceptability of the cargo for safe shipment.

1.3.1.1 When it is assessed that the solid bulk cargo proposed for carriage may present hazards as those defined by group A or B of this Code, advice is to be sought from the competent authorities of the port of unloading and of the flag state. The three competent authorities will set the preliminary suitable conditions for the carriage of this cargo.

1.3.1.2 When it is assessed that the solid bulk cargo proposed for carriage presents no specific hazards for transportation, the carriage of this cargo will be authorized. The competent authorities of the port of unloading and of the flag State will be advised of that authorization.

1.3.2 The competent authority of the port of loading will provide to the master a certificate stating the characteristics of the cargo and the required conditions for carriage and handling of this shipment. The competent authority of the port of loading will also submit an application to the Organization, within one year from the issue of the certificate, to incorporate this solid bulk cargo into annex 1 of this Code. The format of this application will be as outlined in subsection 1.3.3.

1.3.3 Format for the properties of cargoes not listed in this Code and conditions of the carriage

Tentative Bulk Cargo Shipping Name (in capital letters)

DESCRIPTION (Describe the cargo)

CHARACTERISTICS (fill the following table)

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
SIZE	CLASS	GROUP

HAZARD (Clarify the hazard of carriage of the cargo.)

(Determine the following types of requirements. If no requirement is necessary, write "No special requirements".)

STOWAGE & SEGREGATION

HOLD CLEANLINESS

WEATHER PRECAUTIONS

LOADING

PRECAUTIONS

VENTILATION

CARRIAGE

DISCHARGE

CLEAN UP

(Specify the emergency procedures for the cargo, if necessary.)

EMERGENCY PROCEDURES

<u>SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED</u>
<u>EMERGENCY PROCEDURES</u>
<u>EMERGENCY ACTION IN THE EVENT OF FIRE</u>
<u>MEDICAL FIRST AID</u>

1.4 Application and Implementation of this Code

The provisions contained in this Code apply to all ships to which the SOLAS Convention, as amended, applies and which are carrying solid bulk cargoes as defined in regulation 2 of part A of chapter VI of the Convention.

Although this Code is legally treated as a mandatory instrument under the SOLAS Convention the following provisions of this Code remain recommendatory or informative:

Section 11 Security provisions (except subsection 11.1.1);

Section 12 Stowage factor conversion tables;

Section 13 References to related information and recommendations;

Appendices other than appendix 1 “Individual schedules of solid bulk cargoes”; and

The texts in the sections for “DESCRIPTION”, “CHARACTERISTICS”, “HAZARDS” and “EMERGENCY PROCEDURES” of individual schedules of solid bulk cargoes in appendix 1.

1.5 Exemptions and Equivalent measures

1.5.1 Where this Code requires that a particular provision for the transport of solid bulk cargoes shall be complied with, a competent authority or competent authorities (port State of departure, port State of arrival or flag State) may authorize any other provision by exemption if satisfied that such provision is at least as effective and safe as that required by this Code. Acceptance of an exemption authorized under this section by a competent authority not party to it is subject to the discretion of that competent authority. Accordingly, prior to any shipment covered by the exemption, the recipient of the exemption shall notify other competent authorities concerned.

1.5.2 Competent authority or competent authorities which have taken the initiative with respect to the exemption:

- .1 shall send a copy of such exemption to the Organization which shall bring it to the attention of the Contracting Parties to SOLAS, and
- .2 shall take action to amend this Code to include the provisions covered by the exemption, as appropriate.

1.5.3 The period of validity of the exemption shall be not more than five years from the date of authorization. An exemption that is not covered under 1.5.2.2 may be renewed in accordance with the provisions of this section.

1.5.4 A copy of the exemption or an electronic copy thereof shall be maintained on board each ship transporting solid bulk cargoes in accordance with the exemption, as appropriate.

1.5.5 Contact information for the main designated national competent authorities concerned is given in the separate document issued by the Organization.

1.6 Conventions

Parts A and B of chapter VI and part B of chapter VII of the SOLAS Convention, as amended, deal with the carriage of solid bulk cargoes and the carriage of dangerous good in solid form in bulk, respectively, and are reproduced in full:

CHAPTER VI

CARRIAGE OF CARGOES

Part A

General Provisions

Regulation 1

Definitions

For the purpose of this chapter, unless expressly provided otherwise:

1 *BC Code* means the Code of Safe Practice for Solid Bulk Cargoes adopted by the Maritime Safety Committee of the Organization by resolution [MSC... (85)], as may be amended by the Organization, provided that such amendments are adopted, brought into force and take effect in accordance with the provisions of article VIII of the present Convention concerning the amendment procedures applicable to the annex other than chapter I.

2 *Solid bulk cargo* means any cargo, other than liquid or gas, consisting of a combination of particles, granules or any larger pieces of material generally uniform in composition, which is loaded directly into the cargo spaces of a ship without any intermediate form of containment.

Regulation 2

Application

1 This chapter applies to the carriage of cargoes (except liquids in bulk, gases in bulk and those aspects of carriage covered by other chapters) which, owing to their particular hazards to ships or persons on board, may require special precautions in all ships to which the present regulations apply and in cargo ships of less than 500 gross tonnage. However, for cargo ships of less than 500 gross tonnage, the Administration, if it considers that the sheltered nature and conditions of voyage are such as to render the application of any specific requirements of part A or B of this chapter unreasonable or unnecessary, may take other effective measures to ensure the required safety for these ships.

2 To supplement the provisions of parts A and B of this chapter, each Contracting Government shall ensure that appropriate information on cargo and its stowage and securing is provided, specifying, in particular, precautions necessary for the safe carriage of such cargoes.*

Regulation 3

Requirements for the carriage of solid bulk cargoes other than grain

The carriage of solid bulk cargoes other than grain shall be in compliance with the relevant provisions of the BC Code.

Regulation 4

Cargo information

1 The shipper shall provide the master or his representative with appropriate information on the cargo sufficiently in advance of loading to enable the precautions which may be necessary for proper stowage and safe carriage of the cargo to be put into effect. Such information[†] shall be confirmed in writing* and by appropriate shipping documents prior to loading the cargo on the ship.

2 The cargo information shall include:

* Refer to:

- .1 the Code of Safe Practice for Cargo Stowage and Securing adopted by the Organization by resolution A.714(17), as amended;
- .2 the Code of Safe Practice for Ships Carrying Timber Deck Cargoes adopted by the Organization by resolution A.715(17), as amended; MSC/Circ.525, Guidance note on precautions to be taken by the masters of ships of below 100 metres in length engaged in the carriage of logs; and MSC/Circ.548, Guidance note on precautions to be taken by masters of ships engaged in the carriage of timber cargoes; and
- .3 the International Maritime Solid Bulk Cargoes (IMSBC) Code adopted by the Organization by resolution MSC.[...](85).

[†] Refer to MSC/Circ.663, Form for cargo information.

* Reference to documents in this regulation does not preclude the use of electronic data processing (EDP) and electronic data interchange (EDI) transmission techniques as an aid to paper documentation.

- .1 in the case of general cargo, and of cargo carried in cargo units, a general description of the cargo, the gross mass of the cargo or of the cargo units, and any relevant special properties of the cargo. For the purpose of this regulation the cargo information required in sub-chapter 1.9 of the Code of Safe Practice for Cargo Stowage and Securing, adopted by the Organization by resolution A.714(17), as may be amended, shall be provided. Any such amendment to sub-chapter 1.9 shall be adopted, brought into force and take effect in accordance with the provisions of article VIII of the present Convention concerning the amendment procedures applicable to the annex other than chapter I;
- .2 in the case of solid bulk cargo, information as required by section 4 of the BC Code.

3 Prior to loading cargo units on board ships, the shipper shall ensure that the gross mass of such units is in accordance with the gross mass declared on the shipping documents.

Regulation 5

Oxygen analysis and gas detection equipment

1 When transporting a solid bulk cargo which is liable to emit a toxic or flammable gas, or cause oxygen depletion in the cargo space, an appropriate instrument for measuring the concentration of gas or oxygen in the air shall be provided together with detailed instructions for its use. Such an instrument shall be to the satisfaction of the Administration.

2 The Administration shall take steps to ensure that crews of ships are trained in the use of such instruments.

Regulation 6

The use of pesticides in ships *

Appropriate precautions shall be taken in the use of pesticides in ships, in particular for the purposes of fumigation.

Regulation 7

Stowage and securing

1 Cargo, cargo units[†] and cargo transport units[‡] carried on or under deck shall be so loaded, stowed and secured as to prevent as far as is practicable, throughout the voyage, damage or hazard to the ship and the persons on board, and loss of cargo overboard.

* Refer to:

- .1 [The IMO Recommendations on the safe use of pesticides in ships (MSC/Circ.612, as amended)];
- .2 [The IMO Recommendations on the safe use of pesticides in ships applicable to the fumigation of cargo holds (MSC.1/Circ.[...])]; and
- .3 [The IMO Recommendations on the safe use of pesticides in ships applicable to the fumigation of cargo transport units (MSC.1/Circ.[...])] as appropriate.

[†] Refer to the Code of Safe Practice for Cargo Stowage and Securing, adopted by the Organization by resolution A.714(17) as amended.

2 Cargo, cargo units and cargo transport units shall be so packed and secured within the unit as to prevent, throughout the voyage, damage or hazard to the ship and the persons on board.

3 Appropriate precautions shall be taken during loading and transport of heavy cargoes or cargoes with abnormal physical dimensions to ensure that no structural damage to the ship occurs and to maintain adequate stability throughout the voyage.

4 Appropriate precautions shall be taken during loading and transport of cargo units and cargo transport units on board ro-ro ships, especially with regard to the securing arrangements on board such ships and on the cargo units and cargo transport units and with regard to the strength of the securing points and lashings.

5 Freight containers shall not be loaded to more than the maximum gross weight indicated on the Safety Approval Plate under the International Convention for Safe Containers (CSC), as amended.

6 All cargoes, other than solid and liquid bulk cargoes, cargo units and cargo transport units, shall be loaded, stowed and secured throughout the voyage in accordance with the Cargo Securing Manual approved by the Administration. In ships with ro-ro spaces, as defined in regulation II-2/3.41, all securing of such cargoes, cargo units, and cargo transport units, in accordance with the Cargo Securing Manual, shall be completed before the ship leaves the berth. The Cargo Securing Manual shall be drawn up to a standard at least equivalent to relevant guidelines developed by the Organization.*

Part B

Special provisions for solid bulk cargoes

Regulation 8

Acceptability for shipment

1 Prior to loading a solid bulk cargo, the master shall be in possession of comprehensive information on the ship's stability and on the distribution of cargo for the standard loading conditions. The method of providing such information shall be to the satisfaction of the Administration.*

‡ Refer to the International Maritime Dangerous Goods (IMDG) Code, adopted by the Organization by resolution MSC.122(75).

* Refer to the Guidelines on the preparation of the Cargo Securing Manual (MSC/Circ.745).

* Refer to:

- .1 the Recommendation on intact stability for passenger and cargo ships under 100 metres in length adopted by the Organization by resolution A.167(ES.IV) and to amendments to this Recommendation adopted by the Organization by resolution A.206(VII); and
- .2 the Recommendation on a severe wind and rolling criterion (weather criterion) for the intact stability of passenger and cargo ships of 24 metres in length and over adopted by the Organization by resolution A.562(14).

Regulation 9

Loading, unloading and stowage of solid bulk cargoes[†]

1 For the purpose of this regulation, terminal representative means a person appointed by the terminal or other facility, where the ship is loading or unloading, who has responsibility for operations conducted by that terminal or facility with regard to the particular ship.

2 To enable the master to prevent excessive stresses in the ship's structure, the ship shall be provided with a booklet, which shall be written in a language with which the ship's officers responsible for cargo operations are familiar. If this language is not English, the ship shall be provided with a booklet written also in the English language. The booklet shall, as a minimum, include:

- .1 stability data, as required by regulation II-1/22;
- .2 ballasting and deballasting rates and capacities;
- .3 maximum allowable load per unit surface area of the tank top plating;
- .4 maximum allowable load per hold;
- .5 general loading and unloading instructions with regard to the strength of the ship's structure including any limitations on the most adverse operating conditions during loading, unloading, ballasting operations and the voyage;
- .6 any special restrictions such as limitations on the most adverse operating conditions imposed by the Administration or organization recognized by it, if applicable; and
- .7 where strength calculations are required, maximum permissible forces and moments on the ship's hull during loading, unloading and the voyage.

3 Before a solid bulk cargo is loaded or unloaded, the master and the terminal representative shall agree on a plan^{*} which shall ensure that the permissible forces and moments on the ship are not exceeded during loading or unloading, and shall include the sequence, quantity and rate of loading or unloading, taking into consideration the speed of loading or unloading, the number of pours and the deballasting or ballasting capability of the ship. The plan and any subsequent amendments thereto shall be lodged with the appropriate authority of the port State.

4 The master and terminal representative shall ensure that loading and unloading operations are conducted in accordance with the agreed plan.

[†] Refer to the Code of Practice for the Safe Loading and Unloading of Bulk Carriers (BLU Code) adopted by the Organization by resolution A.862(20).

^{*} Refer to the Code of Practice for the Safe Loading and Unloading of Bulk Carriers (BLU Code) adopted by the Organization by resolution A.862(20).

5 If during loading or unloading any of the limits of the ship referred to in paragraph 2 are exceeded or are likely to become so if the loading or unloading continues, the master has the right to suspend operation and the obligation to notify accordingly the appropriate authority of the port State with which the plan has been lodged. The master and the terminal representative shall ensure that corrective action is taken. When unloading cargo, the master and terminal representative shall ensure that the unloading method does not damage the ship's structure.

6 The master shall ensure that ship's personnel continuously monitor cargo operations. Where possible, the ship's draught shall be checked regularly during loading or unloading to confirm the tonnage figures supplied. Each draught and tonnage observation shall be recorded in a cargo log-book. If significant deviations from the agreed plan are detected, cargo or ballast operations or both shall be adjusted to ensure that the deviations are corrected.

CHAPTER VII

Carriage of dangerous goods

Part B

Carriage of dangerous goods in solid form in bulk

Regulation 7

Definitions

Dangerous goods in solid form in bulk means any material, other than liquid or gas, consisting of a combination of particles, granules or any larger pieces of material, generally uniform in composition, which is covered by the IMDG Code and is loaded directly into the cargo spaces of a ship without any intermediate form of containment, and includes such materials loaded in a barge on a barge-carrying ship.

Regulation 8

Application^{*}

1 Unless expressly provided otherwise, this part applies to the carriage of dangerous goods in solid form in bulk in all ships to which the present regulations apply and in cargo ships of less than 500 gross tonnage.

2 The carriage of dangerous goods in solid form in bulk is prohibited except in accordance with the provisions of this part.

3 To supplement the provisions of this part, each Contracting Government shall issue, or cause to be issued, instructions on emergency response and medical first aid relevant to incidents involving dangerous goods in solid form in bulk, taking into account the guidelines developed by the Organization.[‡]

^{*} Refer to regulation II-2/19, which contains special requirements for ship carrying dangerous goods.

[‡] Refer to the *Medical First Aid Guide for Use in Accidents involving Dangerous Goods (MFAG)* (MSC/Circ.857).

Regulation 9

Requirements for the carriage of dangerous goods in solid form in bulk

The carriage of dangerous goods in solid form in bulk shall be in compliance with the relevant provisions of the BC Code, as defined in regulation VI/1.1.

Regulation 10

Documents

1 In all documents relating to the carriage of dangerous goods in solid form in bulk by sea, the bulk cargo shipping name of the goods shall be used (trade names alone shall not be used).

2 Each ship carrying dangerous goods in solid form in bulk shall have a special list or manifest setting forth the dangerous goods on board and the location thereof. A detailed stowage plan, which identifies by class and sets out the location of all dangerous goods on board, may be used in place of such a special list or manifest. A copy of one of these documents shall be made available before departure to the person or organization designated by the port State authority.

Regulation 11

Stowage and segregation requirements

1 Dangerous goods in solid form in bulk shall be loaded and stowed safely and appropriately in accordance with the nature of the goods. Incompatible goods shall be segregated from one another.

2 Dangerous goods in solid form in bulk, which are liable to spontaneous heating or combustion, shall not be carried unless adequate precautions have been taken to minimize the likelihood of the outbreak of fire.

3 Dangerous goods in solid form in bulk, which give off dangerous vapours, shall be stowed in a well ventilated cargo space.

Regulation 12

Reporting of incidents involving dangerous goods

1 When an incident takes place involving the loss or likely loss overboard of dangerous goods in solid form in bulk into the sea, the master, or other person having charge of the ship, shall report the particulars of such an incident without delay and to the fullest extent possible to the nearest coastal State. The report shall be drawn up based on general principles and guidelines developed by the Organization.*

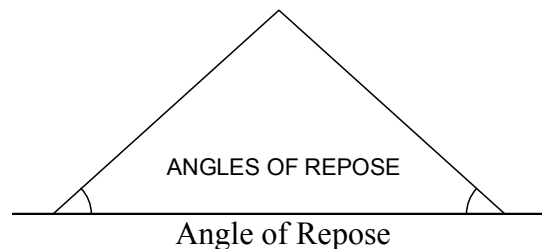
* Refer to the General principles for ship reporting systems and ship reporting requirements, including Guidelines for reporting incidents involving dangerous goods, harmful substances and/or marine pollutants, adopted by the Organization by resolution A.851(20).

2 In the event of the ship referred to in paragraph 1 being abandoned, or in the event of a report from such a ship being incomplete or unobtainable, the company, as defined in regulation IX/1.2, shall, to the fullest extent possible, assume the obligations placed upon the master by this regulation.

1.7 Definitions

For the purpose of this Code, unless expressly provided otherwise, the following definitions shall apply:

1.7.1 *Angle of repose* means the maximum slope angle of non-cohesive (i.e., free-flowing) granular material. It is measured as the angle between a horizontal plane and the cone slope of such material.



1.7.2 *Bulk Cargo Shipping Name (BCSN)* identifies a bulk cargo during transport by sea. When a cargo is listed in this Code, the Bulk Cargo Shipping Name of the cargo is identified by capital letters in the individual schedules or in the index. When the cargo is a dangerous good, as defined in the IMDG Code, as defined in regulation VII/1.1 of the SOLAS Convention, the Proper Shipping Name of that cargo is the Bulk Cargo Shipping Name.

1.7.3 *Bulk density* means the weight of solids, air and water per unit volume. Bulk density is expressed in kilograms per cubic metre (kg/m^3), in general. The void spaces in the cargo may be filled with air and water.

1.7.4 *Cargo space* means any space in a ship designated for carriage of cargoes.

1.7.5 *Cargoes which may liquefy* means cargoes which contain a certain proportion of fine particles and a certain amount of moisture. They may liquefy if shipped with a moisture content in excess of their transportable moisture limit.

1.7.6 *Cohesive material* means materials other than non-cohesive materials.

1.7.7 *Competent Authority* means any national regulatory body or authority designated or otherwise recognized as such for any purpose in connection with this Code.

1.7.8 *Concentrates* means materials obtained from a natural ore by a process of enrichment or beneficiation by physical or chemical separation and removal of unwanted constituents.

1.7.9 *Consignment* means a solid bulk cargo presented by a shipper for transport.

1.7.10 *Flow moisture point* means the percentage moisture content (wet mass basis) at which a flow state develops under the prescribed method of test in a representative sample of the material (see paragraph 1 of appendix 2).

1.7.11 *Flow state* means a state occurring when a mass of granular material is saturated with liquid to an extent that, under the influence of prevailing external forces such as vibration, impaction or ships motion, it loses its internal shear strength and behaves as a liquid.

1.7.12 *Group A* consists of cargoes which may liquefy if shipped at a moisture content in excess of their transportable moisture limit.

1.7.13 *Group B* consists of cargoes which possess a chemical hazard which could give rise to a dangerous situation on a ship.

1.7.14 *Group C* consists of cargoes which are neither liable to liquefy (Group A) nor to possess chemical hazards (Group B).

1.7.15 *High-density solid bulk cargo* means a solid bulk cargo with a stowage factor of 0.56 m³/t or less.

1.7.16 *IMDG Code* means the International Maritime Dangerous Goods (IMDG) Code adopted by the Maritime Safety Committee of the Organization by resolution MSC.122(75), as may be amended by the Organization.

1.7.17 *Incompatible materials* means materials that may react dangerously when mixed. They are subject to the segregation requirements of subsection 9.3 and the schedules for individual cargoes classified in Group B.

1.7.18 *International Ship and Port Facility Security (ISPS) Code* means the International Code for the Security of Ships and of Port Facilities consisting of Part A (the provisions of which shall be treated as mandatory) and part B (the provisions of which shall be treated as recommendatory), as adopted, on 12 December 2002, by resolution 2 of the Conference of Contracting Governments to the International Convention for the Safety of Life at Sea, 1974 as may be amended by the Organization.

1.7.19 *Materials hazardous only in bulk (MHB)* means materials which may possess chemical hazards when carried in bulk other than materials classified as dangerous goods in the IMDG Code.

1.7.20 *Moisture content* means that portion of a representative sample consisting of water, ice or other liquid expressed as a percentage of the total wet mass of that sample.

1.7.21 *Moisture migration* means the movement of moisture contained in a cargo by settling and consolidation of the cargo due to vibration and ship's motion. Water is progressively displaced, which may result in some portions or all of the cargo developing a flow state.

1.7.22 *Non cohesive material* means dry materials that readily shift due to sliding during transport, as listed in appendix 3, paragraph 1, "Properties of dry bulk cargoes".

1.7.23 *Representative test sample* means a sample of sufficient quantity for the purpose of testing the physical and chemical properties of the consignment to meet specified requirements.

1.7.24 *Shipper* means any person by whom or in whose name, or on whose behalf, a contract of carriage of goods by sea has been concluded with a carrier, or any person by whom or in whose name, or on whose behalf, the goods are actually delivered to the carrier in relation to the contract of carriage by sea.

1.7.25 *Solid bulk cargo* means any cargo, other than a liquid or a gas, consisting of a combination of particles, granules or any larger pieces of material generally uniform in composition which is loaded directly into the cargo spaces of a ship without any intermediate form of containment.

1.7.26 *Stowage factor* means the figure which expresses the number of cubic metres which one tonne of cargo will occupy.

1.7.27 *Transportable Moisture Limit (TML) of a cargo which may liquefy* means the maximum moisture content of the cargo which is considered safe for carriage in ships not complying with the special provisions of subsection 7.3.2. It is determined by the test procedures, approved by a competent authority, such as those specified in paragraph 1 of appendix 2.

1.7.28 *Trimming* means any levelling of a cargo within a cargo space, either partial or total.

1.7.29 *Ventilation* means exchange of air from outside to inside a cargo space.

- .1 *Continuous Ventilation* means ventilation that is operating at all times.
- .2 *Mechanical Ventilation* means power-generated ventilation.
- .3 *Natural Ventilation* means ventilation that is not power-generated.
- .4 *Surface Ventilation* means ventilation of the space above the cargo.

Section 2

General loading, carriage and unloading precautions

2.1 Cargo distribution

2.1.1 General

A number of accidents have occurred as a result of improper loading and unloading of solid bulk cargoes. It shall be noted that solid bulk cargoes have to be properly distributed throughout the ship to provide adequate stability and to ensure that the ship's structure is never overstressed. Furthermore, the shipper shall provide the master with adequate information about the cargo, as specified in section 4, to ensure that the ship is properly loaded. Further guidance is found in the other Code developed by the Organization

- * Refer to the Code of Practice for the Safe Loading and Unloading of Bulk Carriers, adopted by the Organization by resolution A.862(20), as amended.

2.1.2 To prevent the structure being overstressed

A general cargo ship is normally constructed to carry cargoes in the range of 1.39 to 1.67 cubic metres per tonne when loaded to full bale and deadweight capacities. When loading a high-density solid bulk cargo, particular attention shall be paid to the distribution of weights to avoid excessive stresses, taking into account that the loading conditions may be different from those found normally and that improper distribution of such cargo may be capable of stressing either the structure under the load or the entire hull. To set out exact rules for the distribution of loading is not practicable for all ships because the structural arrangements of each vessel may vary greatly. The information on proper distribution of cargo may be provided in the ship's stability information booklet or may be obtained by the use of loading calculators, if available.

2.1.3 To aid stability

2.1.3.1 Having regard to regulation II-1/22.1 of SOLAS Convention, a stability information booklet shall be provided aboard all ships subject to the Convention. The master shall be able to calculate the stability for the anticipated worst conditions during the voyage as well as that on departure and demonstrate that the stability is adequate.

2.1.3.2 Shifting divisions and bins, of adequate strength, shall be erected whenever solid bulk cargoes, which are suspected of readily shifting, are carried in 'tween-deck cargo spaces or in only partially filled cargo spaces.

2.1.3.3 As far as practicable, high-density cargoes shall normally be loaded in the lower hold cargo spaces in preference to 'tween-deck cargo spaces.

2.1.3.4 When it is necessary to carry high-density cargoes in 'tween-decks or higher cargo spaces, due consideration shall be paid to ensure that the deck area is not overstressed and that the ship's stability is not reduced below the minimum acceptable level specified in the ship's stability data.

2.2 Loading and unloading

2.2.1 Cargo spaces shall be inspected and prepared for the particular cargo which is to be loaded. Guidance on bulk carrier inspections is contained in recommendations published by the Organization.*

* Refer to the Guidance to Ships' Crews and Terminal Personnel for Bulk Carrier Inspections, adopted by the Organization by resolution A.866(20).

2.2.2 Due consideration shall be paid to bilge wells and strainer plates, for which special preparation is necessary, to facilitate drainage and to prevent entry of the cargoes into the bilge system.

2.2.3 Bilge lines, sounding pipes and other service lines within the cargo space shall be in good order.

2.2.4 Because of the velocity at which some high-density solid bulk cargoes are loaded, special care may be necessary to protect cargo space fittings from damage. To sound bilges after the completion of loading may be effective to detect damage on cargo space fittings.

2.2.5 As far as practicable ventilation systems shall be shut down or screened and air conditioning systems placed on recirculation during loading or discharge, to minimize dust ingress into the living quarters or other interior spaces.

2.2.6 Due consideration shall be paid to minimize the extent to which dust may come into contact with moving parts of deck machinery and external navigational aids.

Section 3

Safety of personnel and ship

3.1 General requirements

3.1.1 Prior to and during loading, carriage and discharge of a solid bulk cargo, all necessary safety precautions shall be observed.

3.1.2 A copy of the instructions on emergency response and medical first aid* relevant to incidents involving dangerous goods in solid form in bulk shall be on board.

* Reference information is provided in the Medical First Aid Guide for Use in Accidents Involving Dangerous Goods (MFAG) (MSC/Circ.857), published by the Organization.

3.2 Poisoning, corrosive and asphyxiation hazards

3.2.1 Some solid bulk cargoes are susceptible to oxidation, which may result in oxygen depletion, emission of toxic gases or fumes and self-heating. Some cargoes are not liable to oxidize but may emit toxic fumes, particularly when wet. There are also cargoes which, when wetted, are corrosive to skin, eyes and mucous membranes or to the ship's structure. When these cargoes are carried particular attention shall be paid to protection of personnel and the need for special precautions to be taken prior to loading and after unloading.

3.2.2 Appropriate attention shall be paid that cargo spaces and adjacent spaces may be depleted in oxygen or may contain toxic or asphyxiating gases, and that an empty cargo space or tank which has remained closed for some time may have insufficient oxygen to support life.

3.2.3 Many solid bulk cargoes are liable to cause oxygen depletion in a cargo space or tank. These include, but are not limited to, most vegetable products and forest products, ferrous metals, metal sulphide concentrates and coal cargoes.

3.2.4 Prior to entry into an enclosed space aboard a ship, appropriate procedures shall be followed taking into account the recommendations developed by the Organization*. It is to be noted that, after a cargo space or tank has been tested and generally found to be safe for entry, small areas may exist where oxygen is deficient or toxic fumes are still present.

* Refer to the "Recommendations for entering enclosed spaces aboard ships" adopted by the Organization by resolution A.864(20), as amended.

3.2.5 When carrying a solid bulk cargo which is liable to emit a toxic or flammable gas, and/or cause oxygen depletion in the cargo space, the appropriate instrument(s) for measuring the concentration of gas and oxygen in the cargo space shall be provided.

3.2.6 Emergency entry into a cargo space shall be undertaken only by trained personnel wearing self-contained breathing apparatus and protective clothing and always under the supervision of a responsible officer.

3.3 Health hazards due to dust

To minimize the chronic and acute risks associated with exposure to the dust of some solid bulk cargoes, the need for a high standard of personal hygiene of those exposed to the dust cannot be over emphasized. Precautions, including the use of appropriate breathing protection, protective clothing, protective skin creams, adequate personal washing and laundering of outer clothing, shall be taken as necessary.

3.4 Flammable atmosphere

3.4.1 Dust of some solid bulk cargoes may constitute an explosion hazard, especially while loading, unloading and cleaning. This risk can be minimized by ventilating to prevent the formation of a dust-laden atmosphere and by hosing down rather than sweeping.

3.4.2 Some cargoes may emit flammable gases in sufficient quantities to constitute a fire or explosion hazard. Where this is indicated in the cargo schedule in this Code or by the cargo information provided by the shipper, the cargo spaces shall be effectively ventilated as necessary. The atmosphere in the cargo spaces shall be monitored by means of an appropriate gas detector. Due consideration shall be paid to the ventilation and monitoring of the atmosphere in the enclosed spaces adjacent to the cargo spaces.

3.5 Ventilation

3.5.1 Unless expressly provided otherwise, when cargoes which may emit toxic gases are carried, the cargo spaces shall be provided with mechanical or natural ventilation; and, when cargoes which may emit flammable gases are carried, the cargo spaces shall be provided with mechanical ventilation.

3.5.2 If maintaining ventilation would endanger the ship or the cargo, it may be interrupted unless this would produce a risk of explosion.

3.5.3 When continuous ventilation is required by the schedule for the cargo in this Code or by the cargo information provided by the shipper, ventilation shall be maintained while the cargo is onboard, unless a situation develops where ventilation would endanger the ship.

3.5.4 Ventilation openings shall be provided in holds intended for the carriage of cargoes which require continuous ventilation. Such openings shall comply with the requirements of the Load Line Convention as amended for openings not fitted with means of closure.

3.5.5 Ventilation shall be such that any escaping hazardous gases, vapours or dust, cannot enter the accommodation or other interior spaces in hazardous concentrations. Due consideration shall be given to prevent escaping hazardous gases, vapours or dust from reaching enclosed work areas. Adequate precautions shall be taken to protect the personnel in these work areas.

3.5.6 When a cargo may heat spontaneously ventilation other than surface ventilation shall not be applied. On no account shall air be directed into the body of the cargo.

3.6 Cargo under in-transit fumigation

Fumigation shall be performed based on the recommendations developed by the Organization*.

- * Refer to “Recommendations on the safe use of pesticides in ships applicable to the fumigation of cargo holds” approved by the Maritime Safety Committee by the document MSC.1/Circ.[...].

Section 4

Assessment of acceptability of consignments for safe shipment

4.1 Identification and classification

4.1.1 Each solid bulk cargo in this Code has been assigned a Bulk Cargo Shipping Name (BCSN). When a solid bulk cargo is carried by sea it shall be identified in the transport documentation by the BCSN. The BCSN shall be supplemented with the United Nations (UN) number when the cargo is dangerous goods.

4.1.2 If waste cargoes are being transported for disposal, or for processing for disposal, the name of the cargoes shall be preceded by the word "WASTE".

4.1.3 Correct identification of a solid bulk cargo facilitates identification of the conditions necessary to safely carry the cargo and the emergency procedures, if applicable.

4.1.4 Solid bulk cargoes shall be classified, where appropriate, in accordance with the UN Manual of Tests and Criteria, part III. The various properties of a solid bulk cargo required by this Code shall be determined, as appropriate to that cargo, in accordance with the test procedures approved by a competent authority in the country of origin, when such test procedures exist. In the absence of such test procedures, those properties of a solid bulk cargo shall be determined, as appropriate to that cargo, in accordance with the test procedures prescribed in appendix 2 to this Code.

4.2 Provision of information

4.2.1 The shipper shall provide the master or his representative with appropriate information on the cargo sufficiently in advance of loading to enable the precautions which may be necessary for proper stowage and safe carriage of the cargo to be put into effect.

4.2.2 Cargo information shall be confirmed in writing and by appropriate shipping documents prior to loading. The cargo information shall include:

- the BCSN when the cargo is listed in this Code. Secondary names may be used in addition to the BCSN;
- the cargo group (A&B, A, B, or C);
- the IMO Class of the cargo, if applicable;
- the UN number preceded by letters UN for the cargo, if applicable;
- the total quantity of the cargo offered;
- the stowage factor;
- the need for trimming and the trimming procedures, as necessary;

- the likelihood of shifting, including angle of repose, if applicable;
- additional information in the form of a certificate on the moisture content of the cargo and its transportable moisture limit in the case of a concentrate or other cargo which may liquefy;
- likelihood of formation of a wet base (see subsection 7.2.3 of this Code);
- toxic or flammable gases which may be generated by cargo, if applicable;
- flammability, toxicity, corrosiveness and propensity to oxygen depletion of the cargo, if applicable;
- self-heating properties of the cargo, and the need for trimming, if applicable;
- properties on emission of flammable gases in contact with water, if applicable;
- radioactive properties, if applicable; and
- any other information required by national authorities.

4.2.3 Information provided by the shipper shall be accompanied by a declaration. An example of a cargo declaration form is set out in the next page. The other form may be used for cargo declaration. As an aid to paper documentation, Electronic Data Processing (EDP) or Electronic Data Interchange (EDI) techniques may be used.

**FORM FOR CARGO INFORMATION
for Solid Bulk Cargoes**

BCSN	
Shipper	Transport document Number
Consignee	Carrier
Name/means of transport Port/place of departure	Instructions or other matters
Port/place of destination	
General description of the cargo (Type of material/particle size)*	Gross mass (kg/tonnes)
Specifications of bulk cargo, if applicable: Stowage factor: Angle of repose, if applicable: Trimming procedures: Chemical properties if potential hazard*: * e.g., Class & UN No. or "MHB"	
Group of the cargo <input type="checkbox"/> Group A & B* <input type="checkbox"/> Group A* <input type="checkbox"/> Group B <input type="checkbox"/> Group C	* For cargoes which may liquefy (Group A and Group A & B cargoes) Transportable Moisture Limit Moisture content at shipment
Relevant special properties of the cargo (e.g., highly soluble in water)	Additional certificate(s)* <input type="checkbox"/> Certificate of moisture content and transportable moisture limit <input type="checkbox"/> Weathering certificate <input type="checkbox"/> Exemption certificate <input type="checkbox"/> Other (specify) * If required
DECLARATION I hereby declare that the consignment is fully and accurately described and that the given test results and other specifications are correct to the best of my knowledge and belief and can be considered as representative for the cargo to be loaded.	Name/status, company/organization of signatory Place and date Signature on behalf of shipper

4.3 Certificates of test

4.3.1 To obtain the information required in 4.2.1 the shipper shall arrange for the cargo to be properly sampled and tested. The shipper shall provide the ship's master or his representative with the appropriate certificates of test, if required in this Code.

4.3.2 When a concentrate or other cargo which may liquefy is carried, the shipper shall provide the ship's master or his representative with a signed certificate of the TML, and a signed certificate or declaration of the moisture content. The certificate of TML shall contain, or be accompanied by the result of the test for determining the TML. The declaration of moisture content shall contain, or be accompanied by, a statement by the shipper that the moisture content is, to the best of his knowledge and belief, the average moisture content of the cargo at the time the declaration is presented to the master.

4.3.3 When a concentrate or other cargo which may liquefy is to be loaded into more than one cargo space of a ship, the certificate or the declaration of moisture content shall certify the moisture content of each type of finely grained material loaded into each cargo space. Notwithstanding this requirement, if sampling according to an internationally or nationally accepted standard procedures indicates that the moisture content is uniform throughout the consignment, then one certificate or declaration of average moisture content for all cargo spaces is acceptable.

4.3.4 Where certification is required by the individual schedules for cargoes possessing chemical hazards, the certificate shall contain, or be accompanied by, a statement from the shipper that the chemical characteristics of the cargo are, to the best of his knowledge, those present at the time of the ship's loading.

4.4 Sampling procedures

4.4.1 Physical property tests on the consignment are meaningless unless they are conducted prior to loading on truly representative test samples.

4.4.2 Sampling shall be conducted only by persons who have been suitably trained in sampling procedures and who are under the supervision of someone who is fully aware of the properties of the consignment and also the applicable principles and practices of sampling.

4.4.3 Prior to taking samples, and within the limits of practicability, a visual inspection of the consignment which is to form the ship's cargo shall be carried out. Any substantial portions of material which appear to be contaminated or significantly different in characteristics or moisture content from the bulk of the consignment shall be sampled and analysed separately. Depending upon the results obtained in these tests, it may be necessary to reject those particular portions as unfit for shipment.

4.4.4 Representative samples shall be obtained by employing techniques which take the following factors into account:

- .1 the type of material;
- .2 the particle size distribution;

- .3 composition of the material and its variability;
- .4 the manner in which the material is stored, in stockpiles, rail wagons or other containers, and transferred or loaded by material-handling systems such as conveyors, loading chutes, crane grabs, etc.;
- .5 the chemical hazards (toxicity, corrosivity, etc.);
- .6 the characteristics which have to be determined: moisture content, TML, bulk density/stowage factor, angle of repose, etc.;
- .7 variations in moisture distribution throughout the consignment which may occur due to weather conditions, natural drainage, e.g., to lower levels of stockpiles or containers, or other forms of moisture migration; and
- .8 variations which may occur following freezing of the material.

4.4.5 Throughout the sampling procedures, utmost care shall be taken to prevent changes in quality and characteristics. Samples shall be immediately placed in suitable sealed containers which are properly marked.

4.4.6 Unless expressly provided otherwise, sampling for the test required by this Code shall follow an internationally or nationally accepted standard procedure.

4.5 Interval between sampling/testing and loading for TML and moisture content determination

4.5.1 A test to determine the TML of a solid bulk cargo shall be conducted within six months to the date of loading the cargo. Notwithstanding this provision, where the composition or characteristics of the cargo are variable for any reason, a test to determine the TML shall be conducted again after it is reasonably assumed that such variation has taken place.

4.5.2 Sampling and testing for moisture content shall be conducted as near as practicable to the time of loading. If there has been significant rain or snow between the time of testing and loading, check tests shall be conducted to ensure that the moisture content of the cargo is still less than its TML. The interval between sampling/testing and loading shall never be more than seven days.

4.5.3 Samples of frozen cargo shall be tested for the TML or the moisture content after the free moisture has completely thawed.

4.6 Sampling procedures for concentrate stockpiles

4.6.1 It is not practicable to specify a single method of sampling for all consignments since the character of the material and the form in which it is available will affect the selection of the procedure to be used. In the absence of internationally or nationally accepted standard sampling procedures, the following sampling procedures for concentrate stockpiles may be used to determine the moisture content and the TML of mineral concentrates. These procedures are not intended to replace sampling procedures, such as the use of automatic sampling, that achieve equal or superior accuracy of either moisture content or TML.

4.6.2 Sub-samples are taken in a reasonably uniform pattern, where possible from a leveled stockpile.

4.6.3 A plan of the stockpile is drawn and divided into areas, each of which contains approximately 125 t, 250 t or 500 t depending on the amount of concentrate to be shipped. Such a plan will indicate the number of sub-samples required and where each is to be taken. Each sub-sample taken is drawn from approximately 50 cm below the surface of the designated area.

4.6.4 The number of sub-samples and sample size are given by the competent authority or determined in accordance with the following scale:

Consignments of not more than 15,000 t:

One 200 g sub-sample is taken for each 125 t to be shipped.

Consignments of more than 15,000 but not more than 60,000 t:

One 200 g sub-sample is taken for each 250 t to be shipped.

Consignments of more than 60,000 t:

One 200 g sub-sample is taken for each 500 t to be shipped.

4.6.5 Sub-samples for moisture content determination are placed in sealed containers (such as plastic bags, cans, or small metallic drums) immediately on withdrawal for conveyance to the testing laboratory, where they are thoroughly mixed in order to obtain a fully representative sample. Where testing facilities are not available at the testing site, such mixing is done under controlled conditions at the stockpile and the representative sample placed in a sealed container and shipped to the test laboratory.

4.6.6 Basic procedural steps include:

- .1 identification of consignment to be sampled;
- .2 determination of the number of individual sub-samples and representative samples, as described in 4.6.4, which are required;
- .3 determination of the positions from which to obtain sub-samples and the method of combining such sub-samples to arrive at a representative sample;
- .4 gathering of individual sub-samples and placing them in sealed containers;
- .5 thorough mixing of sub-samples to obtain the representative sample; and
- .6 placing the representative sample in a sealed container if it has to be shipped to a test laboratory.

4.7 Examples of standardized sampling procedures, for information

- ISO 3082: 1998 - Iron ores – Sampling and sample preparation procedures
- ISO 1988: 1975 - Hard coal – Sampling
- ASTMD2234-99 - Standard Practice for Collection of a Gross Sample of Coal

- Australian Standards
 - AS 4264.1 - Coal and Coke-Sampling
 - Part 1: Higher rank coal – Sampling Procedures
 - AS 1141 – Series - Methods of sampling and testing aggregates
 - BS.1017:1989 - Methods of sampling coal and coke
 - BS 1017 - British Standard Part 1: 1989 methods of sampling of coal
 - BS 1017 - British Standard Part 2: 1994 methods of sampling of coal

- Canadian Standard Sampling Procedure for Concentrate Stockpiles
- European Communities Method of Sampling for the Control of Fertilizers

- JIS M 8100 - Japanese General Rules for Methods of Sampling Bulk Materials
- JIS M 8100: 1992 - Particulate cargoes – General Rules for Methods of Sampling

- Polish Standard Sampling Procedure for:
 - Iron and Manganese Ores – Ref. No. PN-67/H-04000
 - Nonferrous Metals – Ref. No. PN-70/H-04900

Russian Federation Standard Sampling Procedure for the Determination of Moisture Content in Ore Concentrates.

4.8 Documentation required on board the ship carrying dangerous goods

4.8.1 Each ship carrying dangerous goods in solid form in bulk shall have a special list or manifest setting forth the dangerous goods on board and the location thereof, in accordance with SOLAS regulation VII/10.2. A detailed stowage plan, which identifies by class and sets out the location of all dangerous goods on board, may be used in place of such a special list or manifest.

4.8.2 When dangerous goods in solid form in bulk are carried appropriate instructions on emergency response to incidents involving the cargoes shall be on board.

4.8.3 Cargo ships of 500 gross tonnage and over constructed on or after 1 September 1984 and cargo ships of less than 500 gross tonnage constructed on or after 1 February 1992, subject to SOLAS regulation II-2/19.4 (or II-2/54.3), shall have a Document of Compliance when carrying dangerous goods in solid form in bulk except class 6.2 and class 7.

Section 5

Trimming procedures

5.1 General provisions for trimming

5.1.1 Trimming a cargo reduces the likelihood of the cargo shifting and minimizes the air entering the cargo, which could lead to spontaneous heating. To minimize these risks, cargoes shall be trimmed reasonably level, as necessary.

5.1.2 Cargo spaces shall be as full as practicable without resulting in excessive loading on the bottom structure or 'tween-deck to prevent sliding of a solid bulk cargo. Due consideration shall be given to the amount of a solid bulk cargo in each cargo space, taking into account the possibility of shifting and longitudinal moments and forces of the ship. Cargo shall be spread as widely as practicable to the boundary of the cargo space. Alternate hold loading restrictions, as required by SOLAS chapter XII, may also need to be taken into account.

5.1.3 The Master has the right to require that the cargo be trimmed level, where there is any concern regarding stability based upon the information available, taking into account the characteristics of the ship and the intended voyage.

5.2 Special provisions for multi-deck ships

5.2.1 When a solid bulk cargo is loaded only in lower cargo spaces, it shall be trimmed sufficiently to equalize the mass distribution on the bottom structure.

5.2.2 When solid bulk cargoes are carried in 'tween-decks, the hatchways of such 'tween-decks shall be closed in those cases where the loading information indicates an unacceptable level of stress of the bottom structure if the hatchways are left open. The cargo shall be trimmed reasonably level and shall either extend from side to side or be secured by additional longitudinal divisions of sufficient strength. The safe load-carrying capacity of the 'tween-decks shall be observed to ensure that the deck structure is not overloaded.

5.2.3 If coal cargoes are carried in 'tween decks, the hatchways of such 'tween-decks shall be tightly sealed to prevent air moving up through the body of the cargo in the 'tween decks.

5.3 Special provisions for cohesive bulk cargoes

5.3.1 All damp cargoes and some dry ones possess cohesion. For cohesive cargoes, the general provisions in subsection 5.1 shall apply.

5.3.2 The angle of repose is not an indicator of the stability of a cohesive bulk cargo and it is not included in the individual schedules for cohesive cargoes.

5.4 Special provisions for non-cohesive bulk cargoes

5.4.1 Non-cohesive bulk cargoes are those listed in paragraph 1 in appendix 3 and any other cargo not listed in the appendix exhibiting the properties of a non-cohesive material.

5.4.2 For trimming purposes, solid bulk cargoes can be categorized as cohesive or non-cohesive. The angle of repose is a characteristic of non-cohesive bulk cargoes which is indicative of cargo stability and has been included in the individual schedules for non-cohesive cargoes. The angle of repose of the cargoes shall establish which provisions of this section apply. Methods for determining the angle of repose are given in section 6.

5.4.3 Non-cohesive bulk cargoes having an angle of repose less than or equal to 30°.

These cargoes, which flow freely like grain, shall be carried according to the provisions applicable to the stowage of grain cargoes*. The bulk density of the cargo shall be taken into account when determining:

- .1 the scantlings and securing arrangements of divisions and bin bulkheads; and
- .2 the stability effect of free cargo surfaces.

* Reference is made to chapter VI of the SOLAS Convention, and the International Code for the Safe Carriage of Grain in Bulk adopted by the Maritime Safety Committee of the Organization by resolution MSC.23(59).

5.4.4 Non-cohesive bulk cargoes having an angle of repose greater than 30° to 35° inclusive.

These cargoes shall be trimmed according to the following criteria:

- .1 the unevenness of the cargo surface measured as the vertical distance (Δh) between the highest and lowest levels of the cargo surface shall not exceed $B/10$, where B is the beam of the ship in metres, with a maximum allowable $\Delta h = 1.5$ m; or
- .2 loading is carried out using trimming equipment approved by the competent authority.

5.4.5 Non-cohesive bulk cargoes having an angle of repose greater than 35°.

These cargoes shall be trimmed according to the following criteria:

- .1 the unevenness of the cargo surface measured as the vertical distance (Δh) between the highest and lowest levels of the cargo surface shall not exceed $B/10$, where B is the beam of the ship in metres, with a maximum allowable $\Delta h = 2$ m; or
- .2 loading is carried out using trimming equipment approved by the competent authority.

Section 6

Methods of determining the angle of repose

6.1 General

An angle of repose of a non-cohesive solid bulk material shall be measured by a method approved by the appropriate authority as required by section 4.1.4 of this Code.

6.2 Recommended test methods

There are various methods in use to determine the angle of repose for non-cohesive solid bulk materials. The recommended test methods are listed below:

6.2.1 Tilting box method

This laboratory test method is suitable for non-cohesive granular materials with a grain size not greater than 10 mm. A full description of the equipment and procedure is given in subsection 2.1 of appendix 2.

6.2.2 Shipboard test method

In the absence of a tilting box apparatus, an alternative procedure for determining the approximate angle of repose is given in subsection 2.2 of appendix 2.

Section 7

Cargoes which may liquefy

7.1 Introduction

7.1.1 The purpose of this section is to bring to the attention of Masters and others with responsibilities for the loading and carriage of bulk cargoes, the risks associated with liquefaction and the precautions to minimize the risk. Such cargoes may appear to be in a relatively dry granular state when loaded, and yet may contain sufficient moisture to become fluid under the stimulus of compaction and the vibration which occurs during a voyage.

7.1.2 A ship's motion may cause a cargo to shift sufficiently to capsize the vessel. Cargo shift can be divided into two types, namely, sliding failure or liquefaction consequence. Trimming the cargo in accordance with section 5 can prevent sliding failure.

7.1.3 Some cargoes which may liquefy may also heat spontaneously.

7.2 Conditions for hazards

7.2.1 Group A cargoes contain a certain proportion of small particles and a certain amount of moisture. Group A cargoes may liquefy during a voyage even when they are cohesive and trimmed level. Liquefaction can result in cargo shift. This phenomenon may be described as follows:

- .1 the volume of the spaces between the particles reduces as the cargo is compacted owing to the ship motion, etc.;
- .2 the reduction in space between cargo particles causes an increase in water pressure in the space; and
- .3 the increase in water pressure reduces the friction between cargo particles resulting in a reduction in the shear strength of the cargo.

7.2.2 Liquefaction does not occur when one of the following conditions is satisfied:

- .1 the cargo contains very small particles. In this case particle movement is restricted by cohesion and the water pressure in spaces between cargo particles does not increase;
- .2 the cargo consists of large particles or lumps. Water passes through the spaces between the particles and there is no increase in the water pressure. Cargoes which consist entirely of large particles will not liquefy;
- .3 the cargo contains a high percentage of air and low moisture content. Any increase in the water pressure is inhibited. Dry cargoes are not liable to liquefy.

7.2.3 A cargo shift caused by liquefaction may occur when the moisture content exceeds the TML. Some cargoes are susceptible to moisture migration and may develop a dangerous wet base even if the average moisture content is less than the TML. Although the cargo surface may appear dry undetected liquefaction may take place resulting in shifting of the cargo.

Cargoes with high moisture content are prone to sliding particularly when the cargo is shallow and subject to large heel angles.

7.2.4 In the resulting viscous fluid state cargo may flow to one side of the ship with a roll but not completely return with a roll the other way. Consequently the ship may progressively reach a dangerous heel and capsize quite suddenly.

7.3 Provisions for cargoes which may liquefy

7.3.1 General

7.3.1.1 Concentrates or other cargoes which may liquefy shall only be accepted for loading when the actual moisture content of the cargo is less than its TML. Notwithstanding this provision, such cargoes may be accepted for loading on specially constructed or fitted cargo ships even when their moisture content exceeds the TML.

7.3.1.2 Cargoes which contain liquids other than packaged canned goods or the like shall not be stowed in the same cargo space above or adjacent to these solid bulk cargoes.

7.3.1.3 Adequate measures shall be taken to prevent liquids entering the cargo space in which these solid bulk cargoes are stowed during the voyage.

7.3.1.4 Masters shall be cautioned about the possible danger of using water to cool these cargoes while the ship is at sea. Introducing water may bring the moisture content of these cargoes to a flow state. When necessary, due regard shall be paid to apply water in the form of a spray.

7.3.2 Specially constructed or fitted cargo ships

7.3.2.1 Cargoes having a moisture content in excess of the TML shall only be carried in specially constructed cargo ships or in specially fitted cargo ships.

7.3.2.2 Specially constructed cargo ships shall have permanent structural boundaries, so arranged as to confine any shift of cargo to an acceptable limit. The ship concerned shall carry evidence of approval by the Administration.

7.3.2.3 Specially fitted cargo ships shall be fitted with specially designed portable divisions to confine any shift of cargo to an acceptable limit. Specially fitted cargo ships shall be in compliance with the following requirement:

- .1 The design and positioning of such special arrangements shall adequately provide not only the restraint of the immense forces generated by the flow movement of high-density bulk cargoes, but also for the need to reduce to an acceptable safe level the potential heeling movements arising out of a transverse cargo flow across the cargo space. Divisions provided to meet these requirements shall not be constructed of wood.
- .2 The elements of the ship's structure bounding such cargo shall be strengthened, as necessary.

- .3 The plan of special arrangements and details of the stability conditions on which the design has been based shall have been approved by the Administration. The ship concerned shall carry evidence of approval by the Administration.

7.3.2.4 A submission made to an Administration for approval of such a ship shall include:

- .1 relevant structural drawings, including scaled longitudinal and transverse sections;
- .2 stability calculations, taking into account loading arrangements and possible cargo shift, showing the distribution of cargo and liquids in tanks, and of cargo which may become fluid; and
- .3 any other information which may assist the Administration in the assessment of the submission.

Section 8

Test procedures for cargoes which may liquefy

8.1 General

For a Group A cargo, the actual moisture content and transportable moisture limit shall be determined in accordance with a procedure determined by the appropriate authority as required by section 4.1.4 of this Code, unless the cargo is carried in a specially constructed or fitted ship.

8.2 Test procedures for measurement of moisture content

There are recognized international and national methods for determining moisture content for various materials. Reference is made in paragraph 1.1.4.4 of appendix 2.

8.3 Methods for determining transportable moisture limit

The recommended methods for determining transportable moisture limit are given in appendix 2.

8.4 Complementary test procedure for determining the possibility of liquefaction

A ship's master may carry out a check test for approximately determining the possibility of flow on board ship or at the dockside by the following auxiliary method:

Half fill a cylindrical can or similar container (0.5 to 1 litre capacity) with a sample of the material. Take the can in one hand and bring it down sharply to strike a hard surface such as a solid table from a height of about 0.2 m. Repeat the procedure 25 times at one or two second intervals. Examine the surface for free moisture or fluid conditions. If free moisture or a fluid condition appears, arrangements should be made to have additional laboratory tests conducted on the material before it is accepted for loading.

Section 9

Materials possessing chemical hazards

9.1 General

Solid bulk cargoes which may possess a chemical hazard during transport, because of their chemical nature or properties, are in Group B. Some of these materials are classified as dangerous goods and others are materials hazardous only in bulk (MHB). It is essential to obtain current, valid information about the physical and chemical properties of the cargoes to be shipped in bulk, prior to loading.

9.2 Hazard classification

9.2.1 The classification of materials possessing chemical hazards and intended to be shipped in bulk under the requirements of this Code shall be in accordance with 9.2.2 and 9.2.3.

9.2.2 Classification of dangerous goods

SOLAS regulation VII/7 defines dangerous goods in solid form in bulk. For the purpose of this Code, dangerous goods shall be classified in accordance with chapter 2 of the IMDG Code.

9.2.2.1 Class 4.1: Flammable solids

The materials in this class are readily combustible solids and solids which may cause fire through friction.

9.2.2.2 Class 4.2: Substances liable to spontaneous combustion

The materials in this class are materials, other than pyrophoric materials, which, in contact with air without energy supply, are liable to self-heating.

9.2.2.3 Class 4.3: Substances which, in contact with water, emit flammable gases

The materials in this class are solids which, by interaction with water, are liable to become spontaneously flammable or to give off flammable gases in dangerous quantities.

9.2.2.4 Class 5.1: Oxidizing substances

The materials in this class are materials while in themselves not necessarily combustible, may, generally by yielding oxygen cause, or contribute to, the combustion of other material.

9.2.2.5 Class 6.1: Toxic substances

The materials in this class are materials liable either to cause death or serious injury or to harm human health if swallowed or inhaled, or by skin contact.

9.2.2.6 Class 7: Radioactive materials

The materials in this class are any materials containing radionuclides where both the activity concentration and the total activity in the consignment exceed the values specified in 2.7.7.2.1 to 2.7.7.2.6 of the IMDG Code.

9.2.2.7 Class 8: Corrosive substances

The materials in this class are materials which, by chemical action, will cause severe damage when in contact with living tissue or will materially damage, or even destroy, other goods or the means of transport.

9.2.2.8 Class 9: Miscellaneous dangerous substances and articles

The materials in this class are materials and articles which, during transport, present a danger not covered by other classes.

9.2.3 Materials Hazardous only in Bulk (MHB)

These are materials which may possess chemical hazards when transported in bulk other than dangerous goods.

9.3 Stowage and segregation requirements

9.3.1 General requirements

9.3.1.1 The potential hazards of the cargoes in Group B and falling within the classification of 9.2.2 and 9.2.3 entail the need for segregation of incompatible cargoes. Segregation shall also take account of any identified subsidiary risk.

9.3.1.2 In addition to general segregation as between whole classes of materials there may be a need to segregate a particular material from others. In the case of segregation from combustible materials this shall be understood not to include packaging material, ceiling or dunnage; the latter shall in these circumstances be kept to a minimum.

9.3.1.3 For the purpose of segregating incompatible materials, the words “hold” and “compartment” are deemed to mean a cargo space enclosed by steel bulkheads or shell plating and by steel decks. The boundaries of such a space shall be resistant to fire and liquid.

9.3.1.4 When two or more different solid bulk cargoes of Group B are to be carried, the segregation between them shall be in accordance with 9.3.4.

9.3.1.5 Where different grades of a solid bulk cargo are carried in the same cargo space, the most stringent segregation provisions applicable to any of the different grades shall apply to all of them.

9.3.1.6 When solid bulk cargoes of Group B and dangerous goods in packaged form are to be carried, the segregation between them shall be in accordance with 9.3.3.

9.3.1.7 Incompatible materials shall not be handled simultaneously. Upon completion of loading one such cargo, the hatch covers of every cargo space shall be closed and the decks cleaned of residue before the loading of other materials is commenced. When discharging, the same procedures shall be followed.

9.3.1.8 To avoid contamination, all foodstuffs shall be stowed:

- .1 “separated from” a material which is indicated as toxic;
- .2 “separated by a complete compartment or hold from” all infectious materials;
- .3 “separated from” radioactive materials; and
- .4 “away from” corrosive materials.

9.3.1.9 Materials which may evolve toxic gases in sufficient quantities to affect health shall not be stowed in those spaces from where such gases may penetrate into living quarters or ventilation systems connecting to living quarters.

9.3.1.10 Materials which present corrosive hazards of such intensity as to affect either human tissue or the ship’s structure shall only be loaded after adequate precautions and protective measures have been taken.

9.3.1.11 After discharge of toxic or oxidizing cargoes, the spaces used for their carriage shall be inspected for contamination before being used for other cargoes. A space which has been contaminated shall be properly cleaned and examined before being used for other cargoes.

9.3.1.12 After discharge of cargoes, a close inspection shall be made for any residue which shall be removed before the ship is presented for other cargoes.

9.3.1.13 For cargoes for which in case of an emergency the hatches shall be opened, these hatches shall be kept free to be capable of being opened up.

9.3.2 Special requirements

9.3.2.1 Materials of classes 4.1, 4.2 and 4.3

9.3.2.1.1 Materials of these classes shall be kept as cool and dry as reasonably practicable and, unless expressly provided otherwise in this Code, shall be stowed “away from” all sources of heat or ignition.

9.3.2.1.2 Electrical fittings and cables shall be in good condition and properly safeguarded against short circuits and sparking. Where a bulkhead is required to be suitable for segregation purposes, cable and conduit penetrations of the decks and bulkheads shall be sealed against the passage of gas and vapour.

9.3.2.1.3 Cargoes liable to give off vapours or gases which can form an explosive mixture with air shall be stowed in a mechanically ventilated space.

9.3.2.1.4 Prohibition of smoking in dangerous areas shall be enforced, and clearly legible “NO SMOKING” signs shall be displayed.

9.3.2.2 Materials of class 5.1

9.3.2.2.1 Cargoes of this class shall be kept as cool and dry as reasonably practicable and, unless expressly provided otherwise in this Code, shall be stowed “away from” all sources of heat or ignition. They shall also be stowed “separated from” other combustible materials.

9.3.2.2.2 Before loading cargoes of this class, particular attention shall be paid to the cleaning of the cargo spaces into which they will be loaded. As far as reasonably practicable, non-combustible securing and protecting materials shall be used and only a minimum of dry wooden dunnage shall be used.

9.3.2.2.3 Precautions shall be taken to avoid the penetration of oxidizing materials into other cargo spaces, bilges and other spaces which may contain a combustible material.

9.3.2.3 Materials of class 7

9.3.2.3.1 Cargo spaces used for the transport of Low Specific Activity Materials (LSA-I) and Surface Contaminated Objects (SCO-I) shall not be used for other cargoes until decontaminated by a qualified person so that the non-fixed contamination on any surface when averaged over an area of 300 cm² does not exceed the following levels:

4 Bq/cm² (10⁻⁴ μCi/cm²) for beta and gamma emitters and the low-toxicity alpha emitters; natural uranium; natural thorium; uranium-235 or uranium-238; thorium-232; thorium-228 and thorium-230 when contained in ores, physical or chemical concentrates; radionuclides with a half-life of less than 10 days; and

0.4 Bq/cm² (10⁻⁵ μCi/cm²) for all other alpha emitters.

9.3.2.4 Materials of class 8 or materials having similar properties

9.3.2.4.1 These cargoes shall be kept as dry as reasonably practicable.

9.3.2.4.2 Prior to loading these cargoes attention shall be paid to the cleaning of the cargo spaces into which they will be loaded particularly to ensure that these spaces are dry.

9.3.2.4.3 Penetration of these materials into other cargo spaces, bilges, wells and between the ceiling boards shall be prevented.

9.3.2.4.4 Particular attention shall be paid to the cleaning of the cargo spaces after unloading, as residues of these cargoes may be highly corrosive to the ship's structure. Hosing down of the cargo spaces followed by careful drying shall be considered.

9.3.3 Segregation between bulk materials possessing chemical hazards and dangerous goods in packaged form

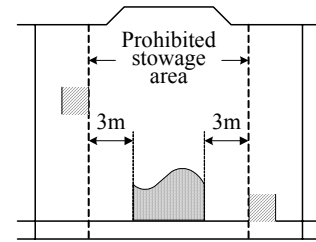
9.3.3.1 Unless otherwise required in this section or in the individual schedules, segregation between solid bulk cargoes of Group B and dangerous goods in packaged form shall be in accordance with the following table.

The Dangerous Goods List of the IMDG Code shall be consulted for additional requirements with regard to stowage and segregation of packaged dangerous goods.

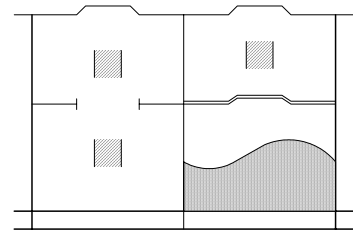
	Dangerous goods in packaged form																
	Class	1.1 1.2 1.5	1.3	1.4	2.1 2.2 2.3	3	4.1	4.2	4.3	5.1	5.2	6.1	6.2	7	8	9	
Bulk cargo (classified as dangerous goods)																	
Flammable solids	4.1	4	3	2	2	2	X	1	X	1	2	X	3	2	1	X	
Substances liable to spontaneous combustion	4.2	4	3	2	2	2	1	X	1	2	2	1	3	2	1	X	
Substances which, in contact with water, emit flammable gases	4.3	4	4	2	1	X	2	X	1	X	2	2	X	2	2	1	X
Oxidizing substances (agents)	5.1	4	4	2	2	X	2	1	2	2	X	2	1	3	1	2	X
Toxic substances	6.1	2	2	X	X	X	X	X	1	X	1	1	X	1	X	X	X
Radioactive materials	7	2	2	2	2	2	2	2	2	2	1	2	X	3	X	2	X
Corrosive substances	8	4	2	2	1	X	1	1	1	1	2	2	X	3	2	X	X
Miscellaneous dangerous substances and articles	9	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Materials Hazardous only in Bulk (MHB)		X	X	X	X	X	X	X	X	X	X	X	X	3	X	X	X

Numbers relate to the following segregation terms:

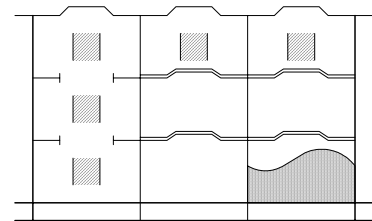
- 1 “Away from”:
Effectively segregated so that incompatible materials cannot interact dangerously in the event of an accident but may be carried in the same hold or compartment or on deck provided a minimum horizontal separation of 3 metres, projected vertically, is provided.



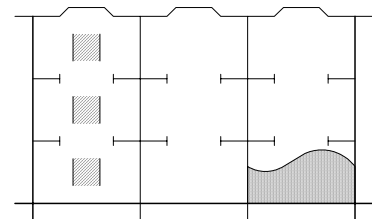
- 2 “Separated from”:
In different holds when stowed under deck. Provided an intervening deck is resistant to fire and liquid, a vertical separation, i.e., in different compartments, may be accepted as equivalent to this segregation.



- 3 “Separated by a complete compartment or hold from”:
Means either a vertical or a horizontal separation. If the decks are not resistant to fire and liquid, then only a longitudinal separation, i.e., by an intervening complete compartment, is acceptable.



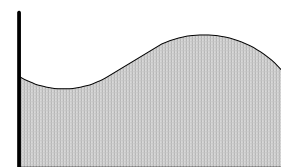
- 4 “Separated longitudinally by an intervening complete compartment or hold from”:
Vertical separation alone does not meet this requirement.



- X Segregation, if any, is shown in the Dangerous Goods List of the IMDG Code or in the individual schedules in this Code.

Legend

Reference bulk material



Packages containing incompatible goods



Deck resistant to liquid and fire



NOTE: Vertical lines represent transverse watertight bulkheads between cargo spaces.

9.3.4 Segregation between solid bulk cargoes possessing chemical hazards

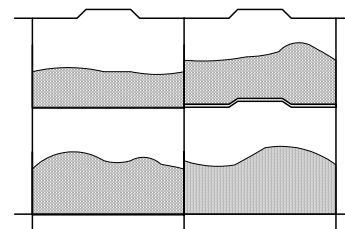
Unless otherwise required in this section or in the individual schedules for cargoes of Group B, segregation between solid bulk cargoes possessing chemical hazards shall be according to the following table:

Solid bulk materials										
	Class	4.1	4.2	4.3	5.1	6.1	7	8	9	MHB
Flammable solids	4.1	X								
Substances liable to spontaneous combustion	4.2	2	X							
Substances which, in contact with water, emit flammable gases	4.3	3	3	X						
Oxidizing substances	5.1	3	3	3	X					
Toxic substances	6.1	X	X	X	2	X				
Radioactive materials	7	2	2	2	2	2	X			
Corrosive substances	8	2	2	2	2	X	2	X		
Miscellaneous dangerous substances and articles	9	X	X	X	X	X	2	X	X	
Materials Hazardous only in Bulk (MHB)	MHB	X	X	X	X	X	2	X	X	X

Numbers relate to the following segregation terms:

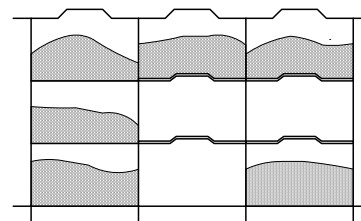
2 Separated from:

In different holds when stowed under deck. Provided an intervening deck is resistant to fire and liquid, a vertical separation, i.e., in different compartments, may be accepted as equivalent to this segregation.



3 Separated by a complete compartment or hold from:

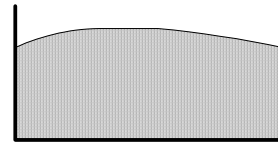
Either a vertical or a horizontal separation. If the decks are not resistant to fire and liquid, then only a longitudinal separation, i.e., by an intervening complete compartment, is acceptable.



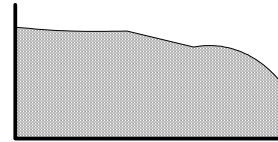
X Segregation, if any, is shown in the individual schedules in this Code.

Legend

Reference bulk material



Incompatible bulk material



Deck resistant to liquid and fire



NOTE: Vertical lines represent transverse watertight bulkheads between cargo spaces.

Section 10

Transport of solid wastes in bulk

10.1 Preamble

10.1.1 The transboundary movement of wastes represents a threat to human health and to the environment.

10.1.2 Wastes shall be carried in accordance with the relevant international recommendations and conventions and in particular, where it concerns transport in bulk by sea, with the provisions of this Code.

10.2 Definitions

10.2.1 *Wastes*, for the purpose of this section, means solid bulk cargoes containing or contaminated with one or more constituents which are subject to the provisions of this Code applicable to cargoes of classes 4.1, 4.2, 4.3, 5.1, 6.1, 8 or 9 for which no direct use is envisaged but which are carried for dumping, incineration or other methods of disposal.

10.2.2 *Transboundary movement of waste* means any shipment of wastes from an area under the national jurisdiction of one country to or through an area under the national jurisdiction of another country, or to or through an area not under the national jurisdiction of any country provided at least two countries are involved in the movement.

10.3 Applicability

10.3.1 The provisions of this section are applicable to the transport of wastes in bulk by ships and shall be considered in conjunction with all other provisions of this Code.

10.3.2 Solid cargoes containing or contaminated with radioactive materials are subject to the provisions applicable to the transport of radioactive materials and are not to be considered as wastes for the purposes of this section.

10.4 Transboundary movements under the Basel Convention *

* Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (1989).

Transboundary movement of wastes is permitted to commence only when:

- .1 notification has been sent by the competent authority of the country of origin, or by the generator or exporter through the channel of the competent authority of the country of origin, to the country of final destination; and
- .2 the competent authority of the country of origin, having received the written consent of the country of final destination stating that the wastes will be safely incinerated or treated by other methods of disposal, has given authorization for the movement.

10.5 Documentation

In addition to the required documentation for the transport of solid bulk cargoes all transboundary movements of wastes shall be accompanied by a waste movement document from the point at which a transboundary movement commences to the point of disposal. This document shall be available at all times to the competent authorities and to all persons involved in the management of waste transport operations.

10.6 Classification of wastes

10.6.1 A waste containing only one constituent which is a cargo subject to the provisions of this Code applicable to cargoes of classes 4.1, 4.2, 4.3, 5.1, 6.1, 8 or 9 shall be regarded as being that particular cargo. If the concentration of the constituent is such that the waste continues to present a hazard inherent in the constituent itself, it shall be classified as the class applicable to that constituent.

10.6.2 A waste containing two or more constituents which are cargoes subject to the provisions of this Code applicable to cargoes of classes 4.1, 4.2, 4.3, 5.1, 6.1, 8 or 9 shall be classified under the applicable class in accordance with their dangerous characteristics and properties as described in 10.6.3 and 10.6.4.

10.6.3 The classification according to dangerous characteristics and properties shall be carried out as follows:

- .1 determination of the physical and chemical characteristics and physiological properties by measurement or calculation followed by classification according to the criteria applicable to the constituents; or
- .2 if the determination is not practicable, the waste shall be classified according to the constituent presenting the predominant hazard.

10.6.4 In determining the predominant hazard, the following criteria shall be taken into account:

- .1 if one or more constituents fall within a certain class and the waste presents a hazard inherent in these constituents, the waste shall be included in that class; or
- .2 if there are constituents falling under two or more classes, the classification of the waste shall take into account the order of precedence applicable to cargoes with multiple hazards set out in the IMDG Code.

10.7 Stowage and handling of wastes

Wastes shall be stowed and handled in accordance with the provisions of sections 1 to 9 of this Code and with any additional provisions included in the individual schedules for cargoes in Group B applicable to the constituents presenting the hazards.

10.8 Segregation

Wastes shall be segregated in accordance with the provisions of 9.3.3 and 9.3.4, as appropriate.

10.9 Accident procedures

In the event that, during transport, a waste will constitute a danger for the carrying ship or the environment, the Master shall immediately inform the competent authorities of the countries of origin and destination and receive advice on the action to be taken.

Section 11

Security Provisions

Introductory note

The provisions of this section address the security of bulk cargoes in transport by sea. It should be borne in mind that some substances shipped as bulk cargo may through their intrinsic nature, or when shipped in combination with other substances, be used as constituents for, or enhance the effect of weapons used in the commission of unlawful acts. (It should also be borne in mind that ships used to carry bulk cargoes may also be used as a means to transport unauthorized weapons, incendiary devices or explosives, irrespective of the nature of the cargo carried.) National competent authorities may apply additional security provisions, which should be considered when offering or transporting bulk cargoes. The provisions of this chapter remain recommendatory except subsection 11.1.1.

11.1 General provisions for companies, ships and port facilities

11.1.1 The relevant provisions of chapter XI-2 of SOLAS 74, as amended, and of part A of the ISPS Code shall apply to companies, ships and port facilities engaged in the handling and transport of bulk cargoes and to which regulation XI-2 of SOLAS 74, as amended, apply taking into account the guidance given in part B of the ISPS Code.

11.1.2 Due regard should be given to the security-related provisions of the ILO/IMO Code of practice on security in ports and the IMDG Code, as appropriate.

11.1.3 Any shore-based company personnel, ship based personnel and port facility personnel engaged in the handling and transport of bulk cargoes should be aware of any security requirements for such cargoes, in addition to those specified in the ISPS Code, and commensurate with their responsibilities.

11.1.4 The training of the company security officer, shore-based company personnel having specific security duties, port facility security officer and port facility personnel having specific duties, engaged in the handling and transport of bulk cargoes, should also include elements of security awareness related to the nature of those cargoes, for example where such cargoes are materials hazardous only in bulk.

11.1.5 All shipboard personnel and port facility personnel who are not mentioned in subsection 11.1.4 and are engaged in the transport of bulk cargoes should be familiar with the provisions of the relevant security plans related to those cargoes, commensurate with their responsibilities.

11.2 General provisions for shore-side personnel

11.2.1 For the purpose of this subsection, *Shore-side personnel* covers individuals such as those who:

- prepare transport documents for bulk cargoes;
- offer bulk cargoes for transport;
- accept bulk cargoes for transport;

- handle bulk cargoes;
- prepare bulk cargoes loading/stowage plans;
- load/unload bulk cargoes into/from ships; and
- enforce or survey or inspect for compliance with applicable rules and – regulations; or are otherwise involved in the handling and transport of bulk cargoes as determined by the competent authority.

However, the provisions of subsection 11.2 do not apply to:

- the company security officer and appropriate shore-based company personnel mentioned in section A/13.1 of the ISPS Code;
- the ship security officer and the shipboard personnel mentioned in sections A/13.2 and A/13.3 of the ISPS Code; and
- the port facility security officer, the appropriate port facility security personnel and the port facility personnel having specific security duties mentioned in sections A/18.1 and A/18.2 of the ISPS Code.

For the training of those officers and personnel, refer to the ISPS Code.

11.2.2 Shore-side personnel engaged in transport by sea of bulk cargoes should consider security provisions for the transport of bulk cargoes commensurate with their responsibilities.

11.2.3 Security training

11.2.3.1 The training of shore-side personnel should also include elements of security awareness, the need to control access to cargoes and ships, and general guidance on the types of bulk cargoes of security significance.

11.2.3.2 Security awareness training should address the nature of security risks, recognizing security risks, methods to address and reduce risks and actions to be taken in the event of a security breach. It should include awareness of security plans (if appropriate, refer to subsection 11.3), commensurate with the responsibilities of individuals and their part in implementing security plans.

11.2.3.3 Such training should be provided or verified upon employment in a position involving transport of bulk cargoes by sea and should be periodically supplemented with retraining.

11.2.3.4 Records of all security training undertaken should be kept by the employer and made available to the employee if requested.

11.3 Provisions for bulk cargoes with high potential security implications

11.3.1 For the purposes of this subsection, high consequence bulk cargoes with high potential security implications are those which have the potential for misuse in an unlawful act and which may, as a result, produce serious consequences such as mass casualties or mass destruction, for example, Class 5.1 ammonium nitrate UN 1942 and ammonium nitrate fertilizers UN 2067.

11.3.2 The provisions of this subsection do not apply to ships and to port facilities (see the ISPS Code for ship security plan and for port security plan).

11.3.3 Consignors and others engaged in the transport of bulk cargoes with high potential security implications should adopt, implement and comply with a security plan that addresses at least the elements specified in subsection 11.3.4.

11.3.4 The security plan should comprise at least the following elements:

- .1 specific allocation of responsibilities for security to competent and qualified persons with appropriate authority to carry out their responsibilities;
- .2 records of bulk cargoes with high potential security implications or types of bulk cargoes with high potential security implications transported;
- .3 review of current operations and assessment of vulnerabilities, including intermodal transfer, temporary transit storage, handling and distribution, as appropriate;
- .4 clear statements of measures, including training, policies (including response to higher threat conditions, new employee/employment verification, etc.), operating practices (e.g., choice/use of routes where known, control of access to ships, bulk cargo storage and loading areas, proximity to vulnerable infrastructure, etc.), equipment and resources that are to be used to reduce security risks;
- .5 effective and up to date procedures for reporting and dealing with security threats, breaches of security or security-related incidents;
- .6 procedures for the evaluation and testing of security plans and procedures for periodic review and update of the plans;
- .7 measures to ensure the security of transport information contained in the plan; and
- .8 measures to ensure that the distribution of transport information is limited as far as possible.

Section 12

Stowage factor conversion tables

12.1 Cubic metres per metric tonne to cubic feet per long ton (2240 lb, 1016 kg)

Factor: $1 \text{ m}^3/\text{t} = 35.87 \text{ ft}^3/\text{ton}$ (rounded to the nearest hundredth of a ft^3/ton)

m^3/t	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	-	0.36	0.72	1.08	1.43	1.79	2.15	2.51	2.87	3.23
0.1	3.59	3.95	4.30	4.66	5.02	5.38	5.74	6.10	6.46	6.82
0.2	7.17	7.53	7.89	8.25	8.61	8.97	9.33	9.68	10.04	10.40
0.3	10.76	11.12	11.48	11.84	12.20	12.55	12.91	13.27	13.63	13.99
0.4	14.35	14.71	15.07	15.42	15.78	16.14	16.50	16.86	17.22	17.58
0.5	17.94	18.29	18.65	19.01	19.37	19.73	20.09	20.45	20.80	21.16
0.6	21.52	21.88	22.24	22.60	22.96	23.32	23.67	24.03	24.39	24.75
0.7	25.11	25.47	25.83	26.19	26.54	26.90	27.26	27.62	27.98	28.34
0.8	28.70	29.05	29.41	29.77	30.13	30.49	30.85	31.21	31.57	31.92
0.9	32.28	32.64	33.00	33.36	33.72	34.08	34.44	34.79	35.15	35.51
1.0	35.87	36.23	36.59	36.95	37.31	37.66	38.02	38.38	38.74	39.10
1.1	39.46	39.82	40.17	40.53	40.89	41.25	41.61	41.97	42.33	42.69
1.2	43.04	43.40	43.76	44.12	44.48	44.84	45.20	45.56	45.91	46.27
1.3	46.63	46.99	47.35	47.71	48.07	48.43	48.78	49.14	49.50	49.86
1.4	50.22	50.58	50.94	51.29	51.65	52.01	52.37	52.73	53.09	53.45
1.5	53.81	54.16	54.52	54.88	55.24	55.60	55.96	56.32	56.67	57.03
1.6	57.39	57.75	58.11	58.47	58.83	59.19	59.54	59.90	60.26	60.62

ft^3/ton

12.2 Cubic feet per long ton (ft^3/ton) (2240 lb, 1016 kg) to cubic metres per metric tonne (m^3/t) (2204 lb, 1000 kg)

Factor: $1 \text{ ft}^3/\text{ton} = 0.02788 \text{ m}^3/\text{t}$ (rounded to the nearest ten thousandth of a m^3/t)

ft^3/ton	0	1	2	3	4	5	6	7	8	9
0	-	0.0279	0.0558	0.0836	0.1115	0.1394	0.1676	0.1952	0.2230	0.2509
10	0.2788	0.3067	0.3346	0.3624	0.3903	0.4182	0.4461	0.4740	0.5018	0.5297
20	0.5576	0.5855	0.6134	0.6412	0.6691	0.6970	0.7249	0.7528	0.7806	0.8085
30	0.8364	0.8643	0.8922	0.9200	0.9479	0.9758	1.0037	1.0316	1.0594	1.0873
40	1.1152	1.1431	1.1710	1.1988	1.2267	1.2546	1.2825	1.3104	1.3382	1.3661
50	1.3940	1.4219	1.4498	1.4776	1.5055	1.5334	1.5613	1.5892	1.6170	1.6449
60	1.6728	1.7007	1.7286	1.7564	1.7843	1.8122	1.8401	1.8680	1.8958	1.9237
70	1.9516	1.9795	2.0074	2.0352	2.0631	2.0910	2.1189	2.1468	2.1746	2.2025
80	2.2304	2.2583	2.2862	2.3140	2.3419	2.3698	2.3977	2.4256	2.4534	2.4818
90	2.5092	2.5371	2.5650	2.5928	2.6207	2.6486	2.6765	2.7044	2.7322	2.7601
100	2.7880	2.8159	2.8438	2.8716	2.8995	2.9274	2.9553	2.9832	3.0110	3.0389

m^3/t

Section 13

References to Related Information and Recommendations

13.1 General

This section lists the references to the IMO instruments relevant to the requirements in this Code. It should be noted that this listing is not exhaustive.

13.2 Reference List

The references to the subsections in this Code, references to the relevant IMO instruments and subjects are in the following tables. Column 1 contains the references to the subsection numbers in this Code. Column 2 contains the references to the relevant IMO Instruments. Column 3 identifies the relevant subjects.

Reference to subsections in this Code (1)	Reference to the relevant IMO instruments (2)	Subject (3)
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13.2.1 Dangerous goods & Classification

9.2	IMDG Code (SOLAS VII/1.1) SOLAS VII/1.2	Classification of Dangerous Goods
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13.2.2 Stability

2.1.3	SOLAS II-1/5-1	Stability information
2.1.3	SOLAS VI/8.1	Stability information
2.1.3	SOLAS VI/9.2.1	Stability information
2.1.3	SOLAS VI/9.4	Loading and trimming of bulk cargoes
2.1.3	SOLAS XII/8	Stability information

* A reference to a provision in the SOLAS Convention is given in the form chapter/regulation. For example, SOLAS regulation II-1/5-1 means regulation 5-1 in chapter II-1 of the Convention.

13.2.3 Fire extinguishing arrangements

General Group B*	SOLAS II-2/10.7	Fire extinguishing arrangements in cargo spaces
General	FSS Code Chapter 9	Fixed fire detection and fire alarm systems
General	FSS Code Chapter 10	Sample extraction smoke detection systems
Group B	SOLAS II-2/19	Special requirements for ships carrying dangerous goods
Group A, B and C	MSC/Circ.1146	List of solid bulk cargoes for which a fixed gas fire-extinguishing system may be exempted

* Group A, B and C in the table means cargoes in Group A, B and C, respectively.

13.2.4 Ventilation

General Group B	International Convention on Loadlines 1966, Annex I, regulation 19	Ventilation openings
General Group B	SOLAS II-2/9.7	Ventilation systems
General Group B	SOLAS II-2/19.3.4	Ventilation for ships carrying dangerous goods

13.2.5 Personnel protection

General Group B	IMO/WHO/ILO Medical First Aid Guide for Use in Accidents Involving Dangerous Goods (MFAG)	First aid measures
General Group B	SOLAS II-2/10.10 and FSS Code chapter 3	Fire-fighter's outfit
General Group B	SOLAS II-2/19.3.6.1 and FSS Code chapter 3	Protective clothing
General Group B	SOLAS II-2/19.3.6.2 and FSS Code chapter 3	Self-contained breathing apparatus

13.2.6 Gas detection

General	SOLAS VI/5	Oxygen analysis and gas detection equipment.
General	Recommendations on the safe use of pesticides in ships applicable to the fumigation of cargo holds (MSC.1/Circ.[...]), section 3.	Gas detection equipment for fumigation

13.2.7 Minimum information/Documentation

4.7.3	SOLAS II-2/19.4	Document of compliance for carriage of dangerous goods
4.2	SOLAS VI/4	Cargo information
4.2	SOLAS XII/10 SOLAS XII/8	Density of bulk cargoes Cargo restrictions and other information
4.2	SOLAS VI/9.2	Stability and other information on ships
4.2	SOLAS VII/10	Documentation for solid bulk dangerous goods

13.2.8 Insulation of machinery space boundaries

Group B	SOLAS II-2/3.2, 3.4, 3.10	Definitions of "A", "B" and "C" class divisions
Group B	SOLAS II-2/9.2	Fire integrity of bulkheads and decks
Group B	SOLAS II-2/19	Insulation requirement ("A-60")

13.2.9 Fumigation

3.6	Recommendations on the safe use of pesticides in ships applicable to the fumigation of cargo holds (MSC.1/Circ.[...]), section 3.	Fumigation, application of fumigation, fumigants, safety precautions
3.6	SOLAS VI/6	Use of pesticides in ships

13.2.10 Segregation

9.4	SOLAS VII/11	Stowage and segregation requirement
9.4	IMDG Code, chapter 7.2.6	Segregation between bulk materials possessing chemical hazards and dangerous goods in packaged form

13.2.11 Transport of solid wastes in bulk

10.4	Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (1989)	Permitted Transboundary movement of wastes
10.6	IMDG Code, chapter 7.8.4	Classification of waste materials

13.2.12 Entering enclosed spaces

3.2.5	MSC/Circ.744, 14 June 1996	Recommendations for Entering enclosed spaces aboard ships
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13.2.13 Avoidance of excessive stresses

2.1.2	SOLAS XII/5 & 6	Structural strength
2.1.2	SOLAS XII/11	Loading instrument

APPENDIX 1
INDIVIDUAL SCHEDULES OF
SOLID BULK CARGOES

ALFALFA**DESCRIPTION**

Material derived from dried alfalfa grass. Shipped in the form of meal, pellets, etc. Requires a certificate from a competent authority or shipper stating that the material as shipped does not meet the requirements for seed cake. Shipments, which do meet the oil and moisture criteria for seed cake, should comply with the requirements for seed cake (a) UN 1386, seed cake (b) UN 1386 or seed cake UN 2217.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	508 to 719	139 to 1.97
SIZE	CLASS	GROUP
Fine Powder	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

No special requirements.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

ALUMINA

DESCRIPTION

Alumina is a fine, white odourless powder with little or no moisture. Insoluble in organic liquids. Moisture content: 0% to 5%. If wet, alumina is unpumpable. This cargo is insoluble in water.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	781 to 1087	0.92 to 1.28
SIZE	CLASS	GROUP
Fine Powder	Not applicable	C

HAZARD

Alumina dust is very abrasive and penetrating. Irritating to eyes and mucous membranes. This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Bilge wells shall be clean, dry and covered as appropriate, to prevent ingress of the cargo. Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear goggles or other equivalent dust eye-protection and dust filter masks. Those persons shall wear protective clothing, as necessary.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

The water used for the cleaning of the cargo spaces, after discharge of this cargo, shall not be pumped by the fixed bilge pumps. A portable pump shall be used, as necessary, to clear the cargo spaces of the water.

ALUMINA, CALCINED

DESCRIPTION

Light to dark grey in colour. No moisture content. This cargo is insoluble in water.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	1639	0.61
SIZE	CLASS	GROUP
Small particles and lumps	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear protective clothing, goggles or other equivalent dust eye-protection and dust filter masks, as necessary.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

The water used for the cleaning of the cargo spaces, after discharge of this cargo, shall not be pumped by the fixed bilge pumps. A portable pump shall be used, as necessary, to clear the cargo spaces of the water.

ALUMINA SILICA

DESCRIPTION

White, consists of alumina and silica crystals. Low moisture content (1% to 5%).

Lumps 60%.

Coarse grained powder – 40%. This cargo is insoluble in water.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	1429	0.70
SIZE	CLASS	GROUP
Not applicable	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear protective clothing, goggles or other equivalent dust eye-protection and dust filter masks, as necessary.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

The water used for the cleaning of the cargo spaces, after discharge of this cargo, shall not be pumped by the fixed bilge pumps. A portable pump shall be used, as necessary, to clear the cargo spaces of the water.

ALUMINA SILICA, Pellets

DESCRIPTION

White to off-white. No moisture content.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	1190 to 1282	0.78 to 0.84
SIZE	CLASS	GROUP
Length: 6.4 mm to 25.4 mm Diameter: 6.4 mm	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear protective clothing, goggles or other equivalent dust eye-protection and dust filter masks, as necessary.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

ALUMINIUM FERROSILICON POWDER UN 1395**DESCRIPTION**

Fine powder or briquettes.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)		STOWAGE FACTOR (m³/t)
Not applicable	-		-
SIZE	CLASS	SUBSIDIARY RISK	GROUP
Not applicable	4.3	6.1	B

HAZARD

In contact with water may evolve hydrogen, a flammable gas which may form an explosive mixture in air. Impurities may, under similar conditions produce phosphine and arsine, which are highly toxic gases.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

“Separated from” foodstuffs and all class 8 liquids.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Prior to loading this cargo, a certificate shall be provided by the manufacturer or shipper stating that the material was stored under cover, but exposed to the weather in the particle size to be shipped, for not less than 3 days prior to shipment. The bulkheads between the cargo spaces and the engine-room shall be gastight and shall be inspected and approved by the competent authority. During handling of this cargo, “NO SMOKING” signs shall be posted on decks and in areas adjacent to cargo spaces and no naked lights shall be permitted in these areas. At least two sets of self-contained breathing apparatus, in addition to those required by SOLAS regulation II-2/10.10, shall be provided on board.

VENTILATION

Continuous mechanical ventilation shall be conducted during the voyage for the cargo spaces carrying this cargo. If maintaining ventilation endangers the ship or the cargo, it may be interrupted unless there is a risk of explosion or other danger due to interruption of the ventilation. In any case mechanical ventilation shall be maintained for a reasonable period prior to discharge.

CARRIAGE

For quantitative measurements of hydrogen, phosphine and arsine and silane, suitable detectors for each gas or combination of gases shall be on board while this cargo is carried. The detectors shall be of certified safe type for use in explosive atmosphere. The concentrations of these gases in the cargo spaces carrying this cargo shall be measured regularly, during the voyage, and the results of the measurements shall be recorded and kept on board.

DISCHARGE

No special requirements.

CLEAN UP

After discharge of this cargo, the cargo spaces shall be swept clean twice. Water shall not be used for cleaning of the cargo space which has contained this cargo, because of danger of gas.

EMERGENCY PROCEDURES**SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED**

Self-contained breathing apparatus.

EMERGENCY PROCEDURES

Wear self-contained breathing apparatus.

EMERGENCY ACTION IN THE EVENT OF FIRE

Batten down and use CO₂ if available. **Do not use water.**

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAG), as amended.

ALUMINIUM NITRATE UN 1438**DESCRIPTION**

Colourless or white crystals. Soluble in water.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	-	-
SIZE	CLASS	GROUP
Not applicable	5.1	B

HAZARD

If involved in a fire will greatly intensify the burning of combustible materials and yield toxic nitrous fumes. Although non-combustible, mixtures with combustible material are easily ignited and may burn fiercely.

STOWAGE & SEGREGATION

“Separated from” foodstuffs.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Due regard shall be paid to prevent contact of the cargo and combustible materials.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

EMERGENCY PROCEDURES

SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED

Protective clothing (gloves, overalls, headgear).
Self-contained breathing apparatus.
Spray nozzles.

EMERGENCY PROCEDURES

Wear protective clothing and self-contained breathing apparatus.

EMERGENCY ACTION IN THE EVENT OF FIRE

Use copious quantities of water, which is best applied in the form of a spray to avoid disturbing the surface of the material. The material may fuse or melt; in which condition application of water may result in extensive scattering of the molten materials. Exclusion of air or the use of CO₂ will not control the fire. Due consideration should be given to the effect on the stability of the ship due to accumulated water.

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAG), as amended.

ALUMINIUM SILICON POWDER, UNCOATED UN 1398

DESCRIPTION

Powder

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	-	-
SIZE	CLASS	GROUP
Not applicable	4.3	B

HAZARD

In contact with water may evolve hydrogen, a flammable gas which may form explosive mixtures with air. Impurities may, under similar circumstances, produce phosphine and arsine, which are highly toxic gases. May also evolve silanes, which are toxic and may ignite spontaneously.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

“Separated from” foodstuffs and all class 8 liquids.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable before loading, during loading and during voyage. This cargo shall not be loaded during precipitation. During loading of this cargo all non-working hatches of the cargo spaces to which this cargo are loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Prior to loading this cargo, a certificate shall be provided by the manufacturer or shipper stating that the material was stored under cover, but exposed to the weather in the particle size to be shipped, for not less than 3 days prior to shipment. The bulkheads between the cargo spaces and the engine-room shall be gastight and shall be inspected and approved by the competent authority. During handling of this cargo, “NO SMOKING” signs shall be posted on decks and in areas adjacent to cargo spaces and no naked lights shall be permitted in these areas. This cargo shall be loaded in cargo spaces fitted with mechanical ventilation having at least two separate fans. The total ventilation shall be at least six air changes per hour, based on the empty space. At least two sets of self-contained breathing apparatus, in addition to those required by SOLAS regulation II-2/10.10, shall be provided on board.

VENTILATION

Continuous mechanical ventilation shall be conducted during the voyage for the cargo spaces carrying this cargo. If maintaining ventilation endangers the ship or the cargo, it may be interrupted unless there is a risk of explosion or other danger due to interruption of the ventilation. In any case mechanical ventilation shall be maintained for a reasonable period prior to discharge. Ventilation shall be arranged such that any escaping gases are minimized from reaching living quarters on or under the deck.

CARRIAGE

For quantitative measurements of hydrogen, phosphine, arsine, suitable detectors for each gas or combination of gases shall be on board while this cargo is carried. The detectors shall be of certified safe type for use in explosive atmosphere. The concentrations of these gases in the cargo spaces carrying this cargo shall be measured regularly, during the voyage, and the results of the measurements shall be recorded and kept on board.

DISCHARGE

No special requirements.

CLEAN UP

After discharge of this cargo, the cargo spaces shall be swept clean twice.

Water shall not be used for cleaning of the cargo space which has contained this cargo, because of danger of gas.

EMERGENCY PROCEDURES**SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED**

Self-contained breathing apparatus.

EMERGENCY PROCEDURES

Wear self-contained breathing apparatus.

EMERGENCY ACTION IN THE EVENT OF FIRE

Batten down and use CO₂ if available. **Do not use water.**

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAG), as amended.

ALUMINIUM SMELTING BY-PRODUCTS OR ALUMINIUM REMELTING BY-PRODUCT UN 3170

DESCRIPTION

Aluminium smelting by-products are wastes from the aluminium manufacturing process. Grey or black powder or lumps with some metallic inclusions. The term encompasses various different waste materials, which include but are not limited to:

ALUMINIUM DROSS
ALUMINIUM SALT SLAGS
ALUMINIUM SKIMMINGS

SPENT CATHODES
SPENT POTLINER

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	1220	0.82
SIZE	CLASS	GROUP
Not applicable	4.3	B

HAZARD

Contact with water may cause heating with possible evolution of flammable and toxic gases such as hydrogen, ammonia and acetylene.

This cargo is non-combustible or has a low fire-risk.

Fire is unlikely but may follow an explosion of flammable gas and will be difficult to extinguish. In port, flooding maybe considered, but due consideration should be given to stability.

STOWAGE & SEGREGATION

“Separated from” foodstuffs and all class 8 liquids.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Prior to loading this cargo, a certificate shall be provided by the manufacturer or shipper stating that, after manufacture, the material was stored under cover, but exposed to the weather in the particle size to be shipped, for not less than three days. Whilst the ship is alongside and the hatches of the cargo spaces containing this cargo are closed, the mechanical ventilation shall be operated continuously as weather permits. During handling of this cargo, "NO SMOKING" signs shall be posted on decks and in areas adjacent to cargo spaces and no naked lights shall be permitted in these areas. At least two self-contained breathing apparatus, in addition to those required by SOLAS regulation II-2/10.10, shall be provided on board. Bulkheads between the cargo spaces and the engine-room shall be gastight. Inadvertent pumping through machinery spaces shall be avoided.

VENTILATION

Continuous mechanical ventilation shall be conducted during the voyage for the cargo spaces carrying this cargo. If maintaining ventilation endangers the ship or the cargo, it may be interrupted unless there is a risk of explosion or other danger due to interruption of the ventilation. In any case mechanical ventilation shall be maintained for a reasonable period prior to discharge. Ventilation shall be arranged such that any escaping gases are minimized from reaching living quarters on or under the deck.

CARRIAGE

For quantitative measurements of hydrogen, ammonia and acetylene, suitable detectors for each gas or combination of gases shall be on board while this cargo is carried. The detectors shall be of certified safe type for use in explosive atmosphere. The concentrations of these gases in the cargo spaces carrying this cargo shall be measured regularly, during voyage, and the results of the measurements shall be recorded and kept on board. Suitable detectors for quantitative measurements of hydrogen, ammonia and acetylene should be on board. Regularly monitor for hydrogen, ammonia and acetylene. Record and keep the measurements.

DISCHARGE

No special requirements.

CLEAN UP

Water shall not be used for cleaning of the cargo space which has contained this cargo, because of danger of gas.

EMERGENCY PROCEDURES**SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED**

Nil

EMERGENCY PROCEDURES

Nil

EMERGENCY ACTION IN THE EVENT OF FIRE

Batten down and use CO₂ if available. **Do not use water.** If this proves ineffective, endeavour to stop fire from spreading and head for the nearest suitable port.

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAG), as amended.

AMMONIUM NITRATE UN 1942

with not more than 0.2% total combustible substances including any organic substance calculated as carbon, to the exclusion of any other added substance

(see **AMMONIUM NITRATE BASED FERTILIZER UN 2067 & UN 2071**)

DESCRIPTION

White crystals, prills or granules. Wholly or partly soluble in water. Supporters of combustion. Hygroscopic.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
27° to 42°	1000	1.00
SIZE	CLASS	GROUP
1 to 4 mm	5.1	B

HAZARD

A major fire aboard a ship carrying these materials may involve a risk of explosion in the event of contamination (e.g., by fuel oil) or strong confinement. An adjacent detonation may also involve a risk of explosion. If heated strongly, this cargo decomposes, giving off toxic gases and gases which support combustion.

Ammonium nitrate dust might be irritating to skin and mucous membranes.

This cargo is hygroscopic and will cake if wet.

STOWAGE & SEGREGATION

There should be no sources of heat or ignition in the cargo space.

“Separated by a complete compartment or hold from” combustible materials (particularly liquids), chlorates, chlorides, chlorites, hypochlorites, nitrites, permanganates and fibrous materials (e.g., cotton, jute, sisal, etc.).

“Separated from” all other goods.

If the bulkhead between the cargo space and the engine-room is not insulated to class A-60 standard, this cargo shall be stowed “away from” the bulkhead.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under Sections 4 and 5 of the Code.

Prior to loading, the following provisions shall be complied with:

- This cargo shall not be accepted for loading when the temperature of the cargo is above 40°C.

- Prior to loading, the shipper *shall* provide the master with a certificate signed by the shipper stating that all the relevant conditions of the cargo required by this Code including this individual schedule have been met.
- The fuel tanks situated under the cargo spaces to be used for the transport of this cargo *shall* be pressure tested to ensure that there is no leakage of manholes and piping systems leading to the tanks.
- All electrical equipment, other than those of approved intrinsically safe type, in the cargo spaces to be used for this cargo shall be electrically disconnected from the power source, by appropriate means other than a fuse, at a point external to the space. This situation shall be maintained while the cargo is on board.
- Due consideration shall be paid to the possible need to open hatches in case of fire to provide maximum ventilation and to apply water in an emergency and the consequent risk to the stability of the ship through fluidization of the cargo.

During loading, the following provisions shall be complied with:

- Smoking shall not be allowed on deck and in the cargo spaces and. “NO SMOKING” signs shall be displayed while this cargo is on board.
- Bunkering of fuel oil shall not be allowed. Pumping of fuel oil in spaces adjacent to the cargo spaces for this cargo, other than the engine room, shall not be allowed.
- As far as reasonably practicable, combustible securing and protecting materials shall not be used. When wooden dunnage is necessary, only a minimum shall be used.

PRECAUTIONS

This cargo shall only be accepted for loading when the competent authority satisfied in regard to the resistance to detonation of this material based on the test^{*}. Prior to loading, the shipper shall provide the master with a certificate stating that the resistance to detonation of this material is in compliance with this requirement. The master and officers shall note that a fixed gas fire-extinguishing system is ineffective on the fire involving this cargo and that applying water may be necessary. Pressure on the fire mains shall be maintained for fire-fighting and fire hoses shall be laid out or be in position and ready for immediate use during loading and discharging of this cargo. No welding, burning, cutting or other operations involving the use of fire, open flame, spark- or arc-producing equipment shall be carried out in the vicinity of the cargo spaces containing this cargo except in an emergency. Precautions shall be taken to avoid the penetration of this cargo into other cargo spaces, bilges and other enclosed spaces. Smoking shall not be allowed on deck and in the cargo spaces and “NO SMOKING” signs shall be displayed on deck whenever this cargo is on board. The hatches of the cargo spaces, whenever this material is on board, shall be kept free to be capable of being opened in case of an emergency. When the bulkhead between the cargo space and the engine-room is not insulated to class A-60 standard, this cargo shall not be accepted for loading unless the competent authority approves that the arrangement is equivalent.

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear goggles or other equivalent dust eye-protection and dust filter masks. Those persons shall wear protective clothing, as necessary.

Footnote: ^{*} Reference is made in section 5 of Appendix 2 to this Code.

VENTILATION

The cargo spaces carrying this cargo shall not be ventilated during voyage.

CARRIAGE

Hatches of the cargo spaces carrying this cargo shall be weathertight to prevent the ingress of water.

DISCHARGE

If this cargo has hardened, it shall be trimmed to avoid the formation of overhangs, as necessary. Bunkering or pumping of fuel oil shall not be allowed.

CLEAN UP

After discharge of this cargo, the bilge wells and the scuppers of the cargo spaces shall be checked and any blockage in the bilge wells and the scuppers shall be removed.

EMERGENCY PROCEDURES

SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED

Protective clothing (boots, gloves, coveralls, and headgear).
Self-contained breathing apparatus.

EMERGENCY PROCEDURES

Wear protective clothing and self-contained breathing apparatus.

EMERGENCY ACTION IN THE EVENT OF FIRE

Fire in a cargo space containing this material: Open hatches to provide maximum ventilation. Ship's fixed gas fire extinguishing will be inadequate. Use copious quantities of water. Flooding of the cargo space may be considered but due consideration should be given to stability.

Fire in an adjacent cargo space: Open hatches to provide maximum ventilation. Heat transferred from fire in an adjacent space can cause the material to decompose with consequent evolution of toxic fumes. Dividing bulkheads should be cooled.

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAG), as amended.

AMMONIUM NITRATE BASED FERTILIZER UN 2067**DESCRIPTION**

Crystals, granules or prills. Wholly or partly soluble in water. Hygroscopic.

Ammonium nitrate-based fertilizers classified as UN 2067 are uniform mixtures containing ammonium nitrate as the main ingredient within the following composition limits:

- .1 not less than 90% ammonium nitrate with not more than 0.2% total combustible/organic material calculated as carbon and with added matter, if any, which is inorganic and inert towards ammonium nitrate; or
- .2 less than 90% but more than 70% ammonium nitrate with other inorganic materials or more than 80% but less than 90% ammonium nitrate mixed with calcium carbonate and/or dolomite and not more than 0.4% total combustible/organic material calculated as carbon; or
- .3 ammonium nitrate-based fertilizers containing mixtures of ammonium nitrate and ammonium sulphate with more than 45% but less than 70% ammonium nitrate and not more than 0.4% total combustible organic material calculated as carbon such that the sum of the percentage compositions of ammonium nitrate and ammonium sulphate exceeds 70%.

Notes:

1. All nitrate ions for which there is present in the mixture a molecular equivalent of ammonium ions should be calculated as ammonium nitrate.
2. The transport of ammonium nitrate materials which are liable to self-heating sufficient to initiate decomposition is prohibited.
3. This entry may only be used for substances that do not exhibit explosive properties of class 1 when tested in accordance to Test Series 1 and 2 of class 1 (see UN Manual of Tests and Criteria, part I).

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
27° to 42°	900 to 1200	0.83 to 1.11
SIZE	CLASS	GROUP
1 to 5 mm	5.1	B

HAZARD

Supports combustion. A major fire aboard a ship carrying these substances may involve a risk of explosion in the event of contamination (e.g., by fuel oil) or strong confinement. An adjacent detonation may involve a risk of explosion.

If heated strongly decomposes, risk of toxic fumes and gases which supports combustion, in the cargo space and on deck.

Fertilizer dust might be irritating to skin and mucous membranes.

This cargo is hygroscopic and will cake if wet.

STOWAGE AND SEGREGATION

“Separated by a complete compartment or hold from” combustible materials (particularly liquid), bromates, chlorates, chlorites, hypochlorites, nitrites, perchlorates, permanganates, powdered metals and vegetable fibres (e.g., cotton, jute, sisal, etc.);

“Separated from” all other goods;

“Separated from” sources of heat or ignition (see also Loading);

Not to be stowed immediately adjacent to any tank or double bottom containing fuel oil heated to more than 50°C.

If the bulkhead between the cargo space and the engine-room is not insulated to class A-60 standard, this cargo shall be stowed “away from” the bulkhead.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

Prior to loading, the following provisions shall be complied with:

- This cargo shall not be accepted for loading when the temperature of the cargo is above 40°C.
- Prior to loading, the shipper shall provide the master with a certificate signed by the shipper stating that all the relevant conditions of the cargo required by this Code including this individual schedule have been met.
- The fuel tanks situated under the cargo spaces to be used for the transport of this cargo shall be pressure tested to ensure that there is no leakage of manholes and piping systems leading to the tanks.
- All electrical equipment, other than those of approved intrinsically safe type, in the cargo spaces to be used for this cargo shall be electrically disconnected from the power source, by appropriate means other than a fuse, at a point external to the space. This situation shall be maintained while the cargo is on board.
- Due consideration shall be paid to the possible need to open hatches in case of fire to provide maximum ventilation and to apply water in an emergency and the consequent risk to the stability of the ship through fluidization of the cargo.

During loading, the following provisions shall be complied with:

Bunkering of fuel oil shall not be allowed. Pumping of fuel oil in spaces adjacent to the cargo spaces for this cargo, other than the engine room, shall not be allowed.

- As far as reasonably practicable, combustible securing and protecting materials shall not be used. When wooden dunnage is necessary, only a minimum shall be used.

PRECAUTIONS

This cargo shall only be accepted for loading when the competent authority satisfied in regard to the resistance to detonation of this material based on the test*. Prior to loading, the shipper shall provide the master with a certificate stating that the resistance to detonation of this material is in compliance with this requirement. Pressure on the fire mains shall be maintained for fire-fighting and fire hoses shall be laid out or be in position and ready for immediate use during loading and discharging of this cargo. No welding, burning, cutting or other operations involving the use of fire, open flame, spark- or arc-producing equipment shall be carried out in the vicinity of the cargo spaces containing this cargo except in an emergency. Smoking shall not be allowed on deck and in the cargo spaces and "NO SMOKING" signs shall be displayed on deck whenever this cargo is on board. Precautions shall be taken to avoid the penetration of this cargo into other cargo spaces, bilges and other enclosed spaces. The hatches of the cargo spaces, whenever this material is on board, shall be kept free to be capable of being opened in case of an emergency.

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear goggles or other equivalent dust eye-protection and dust filter masks. Those persons shall wear protective clothing, as necessary.

Footnote: * Reference is made in section 5 of appendix 2 to this Code.

VENTILATION

The cargo spaces carrying this cargo shall not be ventilated during voyage.

CARRIAGE

Hatches of the cargo spaces carrying this cargo shall be weathertight to prevent the ingress of water. The temperature of this cargo shall be monitored and recorded daily during the voyage to detect decomposition resulting in spontaneous heating and oxygen depletion.

DISCHARGE

Bunkering or pumping of fuel oil shall not be allowed. If this cargo has hardened, it shall be trimmed to avoid the formation of overhangs, as necessary.

CLEAN UP

After discharge of this cargo, the bilge wells and the scuppers of the cargo spaces shall be checked and any blockage in the bilge wells and the scuppers shall be removed.

EMERGENCY PROCEDURES

SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED

Protective clothing (boots, gloves, coveralls, and headgear).
Self-contained breathing apparatus.

EMERGENCY PROCEDURES

Wear protective clothing and self-contained breathing apparatus.

EMERGENCY ACTION IN THE EVENT OF FIRE

Fire in a cargo space containing this material: Open hatches to provide maximum ventilation. Ship's fixed fire-fighting installation will be inadequate. Use copious quantities of water. Flooding of the cargo space may be considered but due consideration should be given to stability.

Fire in an adjacent cargo space: Open hatches to provide maximum ventilation. Heat transferred from fire in an adjacent space can cause the material to decompose with consequent evolution of toxic fumes. Dividing bulkheads should be cooled.

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAG), as amended.

AMMONIUM NITRATE BASED FERTILIZER UN 2071**DESCRIPTION**

Usually granules. Wholly or partly soluble in water. Hygroscopic.

Ammonium nitrate-based fertilizers classified as UN 2071 are uniform ammonium nitrate based fertilizer mixtures of the nitrogen, phosphate or potash, containing not more than 70% ammonium nitrate and not more than 0.4% total combustible organic material calculated as carbon or with not more than 45% ammonium nitrate and unrestricted combustible material. Fertilizers within these composition limits are not subject to the provisions of this schedule when shown by a trough Test (see UN Manual of Tests and Criteria, part III, subsection 38.2) that they are not liable to self-sustaining decomposition.

Notes:

1. All nitrate ions for which there is present in the mixture a molecular equivalent of ammonium ions should be calculated as ammonium nitrate.
2. The transport of ammonium nitrate materials which are liable to self-heating sufficient to initiate a decomposition is prohibited.
3. The NPK proportions for a fertilizer should not be used as a guide to its ability to undergo self-sustaining decomposition as this depends on the chemical species present (refer to UN Manual of Tests and Criteria, part III, subsection 38.2).

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
27° to 42°	900 to 1200	0.83 to 1.11
SIZE	CLASS	GROUP
1 to 5 mm	9	B

HAZARD

These mixtures may be subject to self-sustaining decomposition if heated. The temperature in such a reaction can reach 500°C. Decomposition, once initiated, may spread throughout the remainder, producing gases which are toxic. None of these mixtures is subject to the explosion hazard.

Fertilizer dust might be irritating to skin and mucous membranes.

This cargo is hygroscopic and will cake if wet.

STOWAGE AND SEGREGATION

“Separated by a complete compartment or hold from” combustible materials (particularly liquid), bromates, chlorates, chlorites, hypochlorites, nitrites, perchlorates, permanganates, powdered metals and vegetable fibres (e.g., cotton, jute, sisal, etc.).

“Separated from” all other goods.

“Separated from” sources of heat or ignition (see also Loading).

Not to be stowed immediately adjacent to any tank or double bottom containing fuel oil heated to more than 50°C.

If the bulkhead between the cargo space and the engine-room is not insulated to class A-60 standard, “away from” the bulkhead.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

Prior to loading, the following provisions shall be complied with:

- All electrical equipment, other than those of approved intrinsically safe type, in the cargo spaces to be used for this cargo shall be electrically disconnected from the power source, by appropriate means other than fuse, at a point external to the space. This situation shall be maintained while the cargo is on board.
- Due consideration shall be paid to the possible need to open hatches in case of fire to provide maximum ventilation and to apply water in an emergency and the consequent risk to the stability of the ship through fluidization of the cargo.
- In addition, if decomposition occurs, the residue left after decomposition may have only half the mass of the original cargo. Due consideration shall be paid to the effect of the loss of mass on the stability of the ship.

During loading, the following provisions shall be complied with:

Bunkering of fuel oil shall not be allowed. Pumping of fuel oil in spaces adjacent to the cargo spaces for this cargo, other than the engine room, shall not be allowed.

PRECAUTIONS

This cargo shall only be accepted for loading when, as a result of testing in the trough test, its liability to self-sustaining decomposition shows decomposition rate not greater than 0.25 m/h. Pressure on the fire mains shall be maintained for fire-fighting and fire hoses shall be laid out or be in position and ready for immediate use during loading and discharging of this cargo. No welding, burning, cutting or other operations involving the use of fire, open flame, spark- or arc-producing equipment shall be carried out in the vicinity of the cargo spaces containing this cargo except in an emergency. Smoking shall not be allowed on deck and in the cargo spaces and "NO SMOKING" signs shall be displayed on deck whenever this cargo is on board. Precautions shall be taken to avoid the penetration of this cargo into other cargo spaces, bilges and other enclosed spaces. The hatches of the cargo spaces, whenever this material is on board, shall be kept free to be capable of being opened in case of an emergency.

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear goggles or other equivalent dust eye-protection and dust filter masks. Those persons shall wear protective clothing, as necessary.

VENTILATION

The cargo spaces carrying this cargo shall not be ventilated during voyage.

CARRIAGE

Hatches of the cargo spaces carrying this cargo shall be weathertight to prevent the ingress of water.

The temperature of this cargo shall be monitored and recorded daily during the voyage to detect decomposition resulting in spontaneous heating and oxygen depletion.

DISCHARGE

Bunkering or pumping of fuel oil shall not be allowed. If this cargo has hardened, it shall be trimmed to avoid the formation of overhangs, as necessary.

CLEAN UP

After discharge of this cargo, the bilge wells and the scuppers of the cargo spaces shall be checked and any blockage in the bilge wells and the scuppers shall be removed.

EMERGENCY PROCEDURES

SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED

Protective clothing (boots, gloves, coveralls, and headgear).
Self-contained breathing apparatus.

EMERGENCY PROCEDURES

Wear protective clothing and self-contained breathing apparatus.

EMERGENCY ACTION IN THE EVENT OF FIRE

Fire in a cargo space containing this material: Open hatches to provide maximum ventilation. Ship's fixed fire-fighting installation will be inadequate. Use copious quantities of water. Flooding of the cargo space may be considered but due consideration should be given to stability.

Fire in an adjacent cargo space: Open hatches to provide maximum ventilation. Heat transferred from fire in an adjacent space can cause the material to decompose with consequent evolution of toxic fumes. Dividing bulkheads should be cooled.

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAG), as amended.

AMMONIUM NITRATE BASED FERTILIZER (non-hazardous)
(see AMMONIUM NITRATE-BASED FERTILIZER UN 2067 & UN 2071)

DESCRIPTION

Crystals, granules or prills non-cohesive when dry. Wholly or partly soluble in water.

Ammonium nitrate based fertilizers transported in conditions mentioned in this schedule are uniform mixtures containing ammonium nitrate as the main ingredient within the following composition limits:

- .1 not more than 70% ammonium nitrate with other inorganic materials;
- .2 not more than 80% ammonium nitrate mixed with calcium carbonate and/or dolomite and not more than 0.4% total combustible organic material calculated as carbon;
- .3 nitrogen type ammonium nitrate based fertilizers containing mixtures of ammonium nitrate and ammonium sulphate with not more than 45% ammonium nitrate and not more than 0.4% total combustible organic material calculated as carbon; and
- .4 uniform ammonium nitrate based fertilizer mixtures of the nitrogen, phosphate or potash, containing not more than 70% ammonium nitrate and not more than 0.4% total combustible organic material calculated as carbon or with not more than 45% ammonium nitrate and unrestricted combustible material. Fertilizers within these composition limits are not subject to the provisions of this schedule when shown by a trough Test (see UN Manual of Tests and Criteria, part III, subsection 38.2) that they are liable to self-sustaining decomposition or if they contain an excess of nitrate greater than 10% by mass.

Notes:

1. All nitrate ions for which there is present in the mixture a molecular equivalent of ammonium ions should be calculated as ammonium nitrate.
2. The transport of ammonium nitrate materials which are liable to self-heating sufficient to initiate decomposition is prohibited.
3. The NPK proportions for a fertilizer should not be used as a guide to its ability to undergo self-sustaining decomposition as this depends on the chemical species present (refer to UN Manual of Tests and Criteria, part III, subsection 38.2).
4. This schedule may only be used for substances that do not exhibit explosive properties of class 1 when tested in accordance to Test Series 1 and 2 of class 1 (see UN Manual of Tests and criteria, part I).
5. This schedule may only be used if the chemical or physical properties of an ammonium nitrate based fertilizer are such that when tested it does not meet the established defining criteria of any class.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
27° to 42°	1000 to 1200	0.83 to 1.00
SIZE	CLASS	GROUP
1 to 4 mm	Not applicable	C

HAZARD

This cargo is non-combustible or with a low fire-risk.

Even though this cargo is classified as non-hazardous, it will behave in the same way as the ammonium nitrate based fertilizers classified in class 9 under UN 2071 when heated strongly, by decomposing and giving off toxic gases.

The speed of the decomposition reaction is lower, but there will be a risk of toxic fumes in the cargo space and on deck if the cargo is strongly heated.

Fertilizer dust might be irritating to skin and mucous membranes.

This cargo is hygroscopic and will cake if wet.

STOWAGE AND SEGREGATION

The compatibility of non-hazardous ammonium nitrate based fertilizers with other materials which may be stowed in the same cargo space should be considered before loading.

“Separated from” sources of heat or ignition (see also **LOADING**).

Not to be stowed immediately adjacent to any tank or double bottom containing fuel oil heated to more than 50°C.

Fertilizers of this type should be stowed out of direct contact with a metal engine-room boundary.

This may be done, for example, by using flame-retardant bags containing inert materials or by any equivalent barrier approved by the competent authority. This requirement need not apply to short international voyages.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

Prior to loading, the following provisions shall be complied with:

- All electrical equipment, other than those of approved intrinsically safe type, in the cargo spaces to be used for this cargo shall be electrically disconnected from the power source, by appropriate means other than a fuse, at a point external to the space. This situation shall be maintained while the cargo is on board.
- Due consideration shall be paid to the possible need to open hatches in case of fire to provide maximum ventilation and to apply water in an emergency and the consequent risk to the stability of the ship through fluidization of the cargo.
- In addition, if decomposition occurs, the residue left after decomposition may have only half the mass of the original cargo. Due consideration shall be paid to the effect of the loss of mass on the stability of the ship.

During loading, the following provisions shall be complied with:

Bunkering of fuel oil shall not be allowed. Pumping of fuel oil in spaces adjacent to the cargo spaces for this cargo, other than the engine room, shall not be allowed.

PRECAUTIONS

No welding, burning, cutting or other operations involving the use of fire, open flame, spark or arc-producing equipment shall be carried out in the vicinity of the cargo spaces containing this cargo except in an emergency. Smoking shall not be allowed on deck and in the cargo spaces and “NO SMOKING” signs shall be displayed on deck whenever this cargo is on board. The hatches of the cargo spaces, whenever this material is on board, shall be kept free to be capable of being opened in case of an emergency.

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear goggles or other equivalent dust eye-protection and dust filter masks. Those persons shall wear protective clothing, as necessary.

VENTILATION

The cargo spaces carrying this cargo shall not be ventilated during voyage.

CARRIAGE

Hatches of the cargo spaces carrying this cargo shall be weathertight to prevent the ingress of water.

The temperature of this cargo shall be monitored and recorded daily during the voyage to detect decomposition resulting in spontaneous heating and oxygen depletion.

DISCHARGE

Bunkering or pumping of fuel oil shall not be allowed. If this cargo has hardened, it shall be trimmed to avoid the formation of overhangs, as necessary.

CLEAN UP

After discharge of this cargo, the bilge wells and the scuppers of the cargo spaces shall be checked and any blockage in the bilge wells and the scuppers shall be removed.

EMERGENCY PROCEDURES

SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED

Protective clothing (boots, gloves, coveralls, and headgear).
Self-contained breathing apparatus.

EMERGENCY PROCEDURES

Wear protective clothing and self-contained breathing apparatus.

EMERGENCY ACTION IN THE EVENT OF FIRE

Fire in a cargo space containing this material: Open hatches to provide maximum ventilation. Ship's fixed fire-fighting installation will be inadequate. Use copious quantities of water. Flooding of the cargo space may be considered but due consideration should be given to stability.

Fire in an adjacent cargo space: Open hatches to provide maximum ventilation. Heat transferred from fire in an adjacent space can cause the material to decompose with consequent evolution of toxic fumes. Dividing bulkheads should be cooled.

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAG), as amended.

AMMONIUM SULPHATE

DESCRIPTION

Brownish grey to white crystals. Soluble in water. Free flowing. Absorbs moisture. Moisture content 0.04% to 0.5%. Ammonia odour. Subject to natural loss in weight.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
28° to 35°	943 to 1052	0.95 to 1.06
SIZE	CLASS	GROUP
2 mm to 4 mm	Not applicable	C

HAZARD

Dust may cause skin and eye irritation. Harmful if swallowed. Even though this cargo is classified as non-hazardous, it may cause heavy corrosion of framing, side shell, bulkhead etc. if sweating of cargo space occurs.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Avoid generating dust when loading. During loading, due consideration shall be paid to minimize dust generation. Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear goggles or other equivalent dust eye-protection and dust filter masks. Those persons shall wear protective clothing, as necessary.

VENTILATION

The cargo spaces carrying this cargo shall not be ventilated during voyage.

CARRIAGE

No special requirements.

DISCHARGE

If this cargo has hardened, it shall be trimmed to avoid the formation of overhangs, as necessary.

CLEAN UP

After discharge of this cargo, the cargo spaces shall be thoroughly cleaned and washed out to remove all traces of the cargo, and dried, except in the case that the cargo to be loaded has the same BCSN of the cargo to be loaded subsequent to discharge is AMMONIUM SULPHATE.

ANTIMONY ORE AND RESIDUE

DESCRIPTION

Lead grey mineral, subject to black tarnish.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	2381 to 2941	0.34 to 0.42
SIZE	CLASS	GROUP
Not applicable	Not applicable	C

HAZARD

This cargo is non-combustible or has a low fire-risk.

If involved in a fire, dangerous fumes of antimony and sulphur oxides can evolve.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

As the density of the cargo is extremely high, the tanktop may be overstressed unless the cargo is evenly spread across the tanktop to equalize the weight distribution. Due consideration shall be paid to ensure that tanktop is not overstressed during voyage and during loading by a pile of the cargo.

PRECAUTIONS

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear protective clothing, goggles or other equivalent dust eye-protection and dust filter masks, as necessary.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

BARIUM NITRATE UN 1446**DESCRIPTION**

Glossy white crystals or powder. Soluble in water.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)		STOWAGE FACTOR (m ³ /t)
Not applicable	-		-
SIZE	CLASS	SUBSIDIARY RISK	GROUP
Fine Powder	5.1	6.1	B

HAZARD

Toxic if swallowed or by dust inhalation. If involved in a fire mixture with combustible materials are readily ignited and may burn fiercely.

STOWAGE & SEGREGATION

“Separated from” foodstuffs.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear goggles or other equivalent dust eye-protection and dust filter masks. Those persons shall wear protective clothing, as necessary. Bilge wells shall be clean, dry and covered as appropriate, to prevent ingress of the cargo.

VENTILATION

Surface ventilation only, either natural or mechanical, shall be conducted, as necessary, during the voyage for this cargo.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

EMERGENCY PROCEDURES

SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED

Protective clothing (gloves, boots, overalls, headgear). Self-contained breathing apparatus.
Spray nozzles.

EMERGENCY PROCEDURES

Wear protective clothing and self-contained breathing apparatus.

EMERGENCY ACTION IN THE EVENT OF FIRE

Use copious amounts of water, which is best applied in the form of a spray to avoid disturbing the surface of the material. The material may fuse or melt, in which condition application of water may result in excessive scattering of molten materials. Exclusion of air or the use of CO₂ will not control the fire. Due consideration should be given to the stability of the ship due to the effect of accumulated water.

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAG), as amended.

BARYTES

DESCRIPTION

Crystalline ore mineral. A sulphate of Barium. Moisture 1% to 6%.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	2941	0.34
SIZE	CLASS	GROUP
80% lumps: 6.4 to 101.6 mm 20% fines: less than 6.4 mm	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

As the density of the cargo is extremely high, the tanktop may be overstressed unless the cargo is evenly spread across the tanktop to equalize the weight distribution. Due consideration shall be paid to ensure that tanktop is not overstressed during voyage and during loading by a pile of the cargo.

PRECAUTIONS

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear protective clothing, goggles or other equivalent dust eye-protection and dust filter masks, as necessary.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

BAUXITE

DESCRIPTION

A brownish, yellow claylike and earthy mineral. Moisture content: 0% to 10%. Insoluble in water.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	1190 to 1389	0.72 to 0.84
SIZE	CLASS	GROUP
70% to 90% lumps: 2.5 mm to 500 mm 10% to 30% powder	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Bilge wells shall be clean, dry and covered as appropriate, to prevent ingress of the cargo.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

BIOSLUDGE

DESCRIPTION

Heat-dried activated sludge. Very fine granular product. Moisture: 3% to 5%. Black speckled colour.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	654	1.53
SIZE	CLASS	GROUP
Not applicable	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear protective clothing, goggles or other equivalent dust eye-protection and dust filter masks, as necessary.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

BORAX (PENTAHYDRATE CRUDE)**DESCRIPTION**

A chemical compound of Boracic Acid and soda. Free flowing powder or granules. Grey colour. Dusty.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	1087	0.92
SIZE	CLASS	GROUP
Up to 2.36 mm	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

This cargo is hygroscopic and will cake if wet.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear protective clothing, goggles or other equivalent dust eye-protection and dust filter masks, as necessary.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

If this cargo has hardened, it shall be trimmed to avoid the formation of overhangs, as necessary.

CLEAN UP

No special requirements.

**BORAX, ANHYDROUS
(crude or refined)**

DESCRIPTION

Crude is normally of yellow white appearance. When highly refined becomes white crystalline. Dusty and hygroscopic.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
35	1282	0.78
SIZE	CLASS	GROUP
Granules less than 1.4 mm	Not applicable	C

HAZARD

Dust very abrasive and irritating, but not toxic, if inhaled.

This cargo is non-combustible or has a low fire-risk.

This cargo is hygroscopic and will cake if wet.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear goggles or other equivalent dust eye-protection and dust filter masks. Those persons shall wear protective clothing, as necessary.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

If this cargo has hardened, it shall be trimmed to avoid the formation of overhangs, as necessary.

CLEAN UP

No special requirements.

BROWN COAL BRIQUETTES**DESCRIPTION**

Brown Coal (Lignite) Briquettes are manufactured by pressing dried brown coal particles into compressed blocks.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	750	1.34
SIZE	CLASS	GROUP
Mainly up to 50 mm	MHB	B

HAZARD

Briquettes are easily ignited, liable to spontaneous combustion and will deplete oxygen in cargo space.

STOWAGE & SEGREGATION

Refer to the appendix to this schedule.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo. Previous cargo battens shall be removed from the cargo spaces.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Refer to the appendix to this schedule.

PRECAUTIONS

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear protective clothing, goggles or other equivalent dust eye-protection and dust filter masks, as necessary.

VENTILATION

The cargo spaces carrying this cargo shall not be ventilated during voyage. Refer to the appendix to this schedule.

CARRIAGE

Refer to the appendix to this schedule.

DISCHARGE

Refer to the appendix to this schedule.

CLEAN UP

After discharge of this cargo, the bilge wells and the scuppers of the cargo spaces shall be checked and any blockage in the bilge wells and the scuppers shall be removed

EMERGENCY PROCEDURES

<p style="text-align: center;"><u>SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED</u></p> <p style="text-align: center;">Nil</p>
<p style="text-align: center;"><u>EMERGENCY PROCEDURES</u></p> <p style="text-align: center;">Nil</p> <p style="text-align: center;"><u>EMERGENCY ACTION IN THE EVENT OF FIRE</u></p> <p style="text-align: center;">Batten down. Exclusion of air may be sufficient to control fire. Do not use water. Seek expert advice and consider heading for the nearest suitable port.</p> <p style="text-align: center;"><u>MEDICAL FIRST AID</u></p> <p style="text-align: center;">Refer to the Medical First Aid Guide (MFAG), as amended.</p>

REMARK

The use of CO₂ or inert gas, if available, should be withheld until fire is apparent.

APPENDIX

BROWN COAL BRIQUETTES

HAZARD

1. This cargo is easily ignited, liable to heat spontaneously and deplete oxygen in the cargo space.
2. This cargo is subject to oxidation, leading to depletion of oxygen and an increase in carbon dioxide in the cargo space (see also section 3).
3. This cargo is liable to heat spontaneously and may ignite spontaneously in the cargo space. When spontaneous heating occurs, flammable and toxic gases, including carbon monoxide, may be produced. Carbon monoxide is an odourless gas, slightly lighter than air, and has flammable limits in air of 12% to 75% by volume. It is toxic by inhalation, with an affinity for blood haemoglobin over 200 times that of oxygen. The recommended Threshold Limit Value (TLV) for carbon monoxide exposure is 50 ppm.

STOWAGE & SEGREGATION

1. Boundaries of cargo spaces where these cargoes are carried *shall* be resistant to fire and liquids.
2. This cargo *shall* be “separated from” goods of classes 1 (Division 1.4), 2, 3, 4 and 5 in packaged form (see IMDG Code) and “separated from” solid bulk material of classes 4 and 5.1.
3. Stowage of goods of class 5.1 in packaged form or solid bulk materials of class 5.1 above or below this cargo *shall* be prohibited.
4. This cargo *shall* be “separated longitudinally by an intervening complete compartment or hold from” goods of class 1 other than Division 1.4.
5. This cargo *shall* not be stowed adjacent to sources of heat.

Note: For interpretation of these terms, see section 9.

LOADING

1. Prior to loading, the shipper, or their appointed agent, *shall* provide in writing to the master, the characteristics of the cargo and the recommended safe handling procedures for loading and transport of the cargo. As a minimum, the cargo’s contract specifications for moisture content, sulphur content and size *shall* be stated.
2. This cargo *shall* be stored for 7 days prior to loading. This substantially reduces the risk of spontaneous combustion in subsequent transport, storage and handling.
3. Before loading this cargo, the master *shall* ensure the following:
 - 3.1 weather deck enclosures to the cargo space have been inspected to ensure their integrity. Such closures are closed and sealed;
 - 3.2 all electrical cables and components situated in cargo spaces and adjacent spaces are free from defects. Such cables and electrical components are safe to be used in a flammable and/or dusty atmosphere or positively isolated;
4. Smoking and the use of naked flames shall not be permitted in the cargo areas and adjacent spaces and appropriate warning notices shall be posted in conspicuous places. Burning, cutting, chipping, welding or other sources of ignition shall not be permitted in the vicinity of cargo spaces or in other adjacent spaces.
5. This cargo *shall* not be dropped more than one metre during loading to minimize the production of dust and fines.

6. Individual cargo spaces *shall* be loaded without interruption, where possible. Hot spots may develop in a cargo space that has been kept open for more than six days (or less in weather over 30°C).
7. Prior to departure, the master shall be satisfied that the surface of the material has been trimmed reasonably level to the boundaries of the cargo space to avoid the formation of gas pockets and to prevent air from permeating the body of the briquettes. Casing leading into the cargo space *shall* be adequately sealed. The shipper *shall* ensure that the master receives the necessary cooperation from the loading terminal.
8. Individual cargo spaces *shall* be closed and sealed as soon as practicable after the cargo has been loaded into each cargo space.

PRECAUTIONS

1. The ship shall be suitably fitted and carry on board appropriate instruments for measuring the following without requiring entry into the cargo space:
2. It is recommended that means be provided for monitoring the temperature of the cargo in the range of 0°C to 100°C to enable the measurement of temperature of the cargo during the voyage without requiring entry into the cargo space.

CARRIAGE

1. As far as practicable, any gases which may be emitted from the cargo shall not be allowed to accumulate in adjacent enclosed spaces, such as store-rooms, carpenter's shop, passage ways, tunnels, etc. Such spaces *shall* be adequately ventilated and regularly monitored for methane, oxygen and carbon monoxide.
2. Under no circumstances, except in emergency, *shall* the hatches be opened or the cargo space be ventilated or entered during the voyage.
3. The atmosphere in the space above the cargo in each cargo space *shall* be regularly monitored for the concentrations of methane, oxygen and carbon monoxide.
4. The frequency of the monitoring *shall* be determined based upon the information provided by the shipper and the information obtained through the analysis of the atmosphere in the cargo space. The monitoring *shall* be conducted at least daily and as close as practical to the same time of day. The results of monitoring shall be recorded. The shipper may request more frequent monitoring, particularly if there is evidence of significant self-heating during the voyage.
5. The following issues shall be taken into account:
 - 5.1 The oxygen level in the sealed cargo space will fall from an initial 21% over a period of days to stabilize at levels of the order of 6 to 15%. If the oxygen level does not fall below 20%, or rapidly increases after an initial fall, it is possible that the cargo space is inadequately sealed and is at risk of spontaneous combustion.
 - 5.2 Carbon monoxide levels will build up to concentrations which fluctuate in the 200 to 2000 parts per million (ppm) range in a safe, well sealed cargo space. A rapid increase of approximately 1000 ppm in carbon monoxide levels in this cargo over a 24-hour period is a possible indicator of spontaneous combustion, particularly if accompanied by an increase in methane levels.
 - 5.3 The methane composition in briquette cargo is normally low, less than 5 ppm and does not constitute a hazard. However, a sudden and continuing rise in methane levels, to concentrations above 10 ppm, is an indicator of the occurrence of spontaneous combustion in the hold.

- 5.4 The temperature in this cargo in a well sealed cargo space normally remains at 5 to 10°C above sea water temperature, the increase being due to normal diurnal breathing of small quantities of air into the cargo space. Checking of the cargo space seals to minimize air leakage is essential. A rapid increase in temperature of approximately 20°C over 24 hours is evidence of spontaneous combustion.
6. Regular hold bilge testing *shall* be systematically carried out. If the pH monitoring indicates that a corrosion risk exists, the master *shall* ensure that all bilges are kept dry during the voyage in order to avoid possible accumulation of acids on tank tops and in the bilge system.
7. When the behaviour of the cargo during the voyage differs from that specified in the cargo information, the master *shall* report such differences to the shipper. Such reports will enable the shipper to maintain records on the behaviour of this cargo, so that the information being provided to the master can be reviewed in the light of the transport experience.
8. When the master is concerned that the cargo is showing any signs of self-heating or spontaneous combustion, such as an increase in the concentration of methane or carbon monoxide or an increase in temperature, as described above, the following actions *shall* be taken:
- 8.1 Consult with the ship's agent at the loading port. The Company's designated person ashore shall be advised immediately.
- 8.2 Check the seal of the cargo space and re-seal the cargo space, as necessary.
- 8.3 Do not enter the cargo space and do not open the hatches, unless the master considers access is necessary for the safety of the ship or safety of life. When any ship's personnel has entered into a cargo space, re-seal the cargo space immediately after the personnel vacate the cargo space.
- 8.4 Increase the frequency of monitoring the gas composition, and temperature when practicable, of the cargo.
- 8.5. Send the following information, as soon as possible, to the ship's owner or agent at the loading port to obtain expert advice:
- .1 the number of cargo spaces involved;
 - .2 monitoring results of the carbon monoxide, methane and oxygen concentrations;
 - .3 if available, temperature of the cargo, location and method used to obtain results;
 - .4 the time the gas analyses were taken (monitoring routine);
 - .5 the quantity of the cargo in the cargo space(s) involved;
 - .6 the description of the cargo as per the shipper's declaration, and any special precautions indicated on the declaration;
 - .7 the date of loading, and Estimated Time of Arrival (ETA) at the intended discharge port (which *shall* be specified); and
 - .8 any other comments or observations the master may consider relevant.

DISCHARGE

Prior to, and during discharge:

1. The cargo space shall be kept closed until just before the commencement of discharge of that space. The cargo may be sprayed with a fine water spray to reduce dust.
2. Personnel shall not enter the cargo space without having tested the atmosphere above the cargo. The personnel entering into a cargo space in which the atmosphere contains oxygen levels below 21% shall wear self-contained breathing apparatus. Carbon dioxide and carbon monoxide gas levels *shall* also be tested prior to entry into the cargo spaces. The recommended Threshold Limit Value (TLV) for carbon monoxide is 50 ppm.
3. During discharge, attention *shall* be paid to the cargo for signs of hot spots (i.e., steaming). If a hot spot is detected, the area shall be sprayed with fine water spray and the hot spot shall be removed immediately to prevent spreading. The hot spot cargo shall be spread out on the wharf away from the remainder of the cargo.
4. Prior to suspending the discharge of this cargo for more than eight hours, the hatch covers and all other ventilation for the cargo space *shall* be closed.

PROCEDURES FOR GAS MONITORING OF BROWN COAL BRIQUETTE CARGOES

1 Observations

1.1 Carbon monoxide monitoring, when conducted in accordance with the following procedures, will provide a reliable early indication of self-heating within this cargo. This allows preventive action to be considered without delay. A sudden rapid rise in carbon monoxide detected within a cargo space, particularly if accompanied by an increase in methane levels, is a conclusive indication that self-heating is taking place.

1.2 All vessels engaged in the carriage of this cargo *shall* carry on board an instrument for measuring methane, oxygen and carbon monoxide gas concentrations, to enable the monitoring of the atmosphere within the cargo space. This instrument *shall* be regularly serviced and calibrated in accordance with the manufacturer's instructions. Care shall be exercised in interpreting methane measurements carried out in the low oxygen concentrations often found in unventilated cargo holds. The catalytic sensors normally used for the detection of methane rely on the presence of sufficient oxygen for accurate measurement. This phenomenon does not affect the measurement of carbon monoxide, or measurement of methane by infrared sensor. Further guidance may be obtained from the instrument manufacturer.

2 Sampling and measurement procedure

2.1 Equipment

2.1.1 An instrument which is capable of measuring methane, oxygen and carbon monoxide concentrations shall be provided on board a ship carrying this cargo. The instrument *shall* be fitted with an aspirator, flexible connection and a length of spark-proof metal tubing to enable a representative sample to be obtained from within the square of the hatch.

2.1.2 When recommended by the manufacturer, a suitable filter *shall* be used to protect the instrument against the ingress of moisture. The presence of even a small amount of water will compromise the accuracy of the measurement.

2.2 *Siting of sampling points*

2.2.1 In order to obtain meaningful information about the behaviour of this cargo in a cargo space, gas measurements *shall* be made via one sample point per cargo space. To ensure flexibility of measurement in adverse weather, however, two sample points *shall* be provided per cargo space, one on the port side and one on the starboard side of the hatch cover or hatch coaming (refer to diagram of gas sampling point). Measurement from either of these locations is satisfactory.

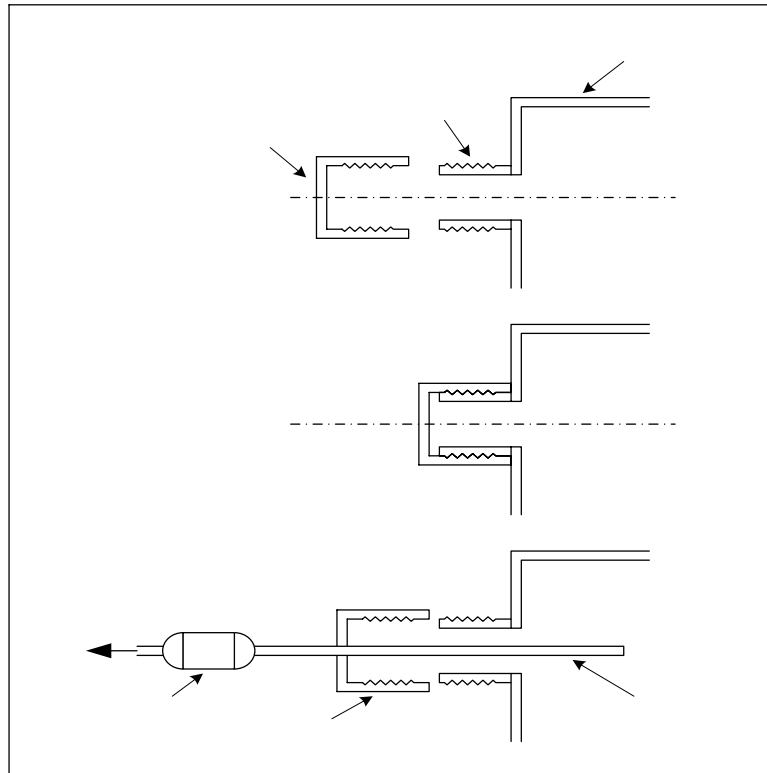


Diagram of gas sampling point

2.2.2 Each sample point *shall* comprise a hole of diameter approximately 12 mm positioned as near to the top of the hatch coaming as possible. It *shall* be sealed with a sealing cap to prevent ingress of water and air. It is essential this cap be securely replaced after each measurement to maintain a tight seal.

2.2.3 The provision of any sample point *shall* not compromise the seaworthiness of the vessel.

2.3 *Measurement*

The explanation on procedures for measurement is as follows:

- .1 remove the sealing cap, insert the rigid tube into the sampling point and tighten the integral cap to ensure an adequate seal;
- .2 connect the instrument to the sampling tube;
- .3 draw a sample of the atmosphere through the tube, using the aspirator, until steady readings are obtained;
- .4 log the results on a form which records cargo hold, date and time for each measurement; and
- .5 put back the sealing cap.

CALCIUM NITRATE UN 1454**DESCRIPTION**

White deliquescent solid soluble in water. The provisions of this Code should not apply to the commercial grades of calcium nitrate fertilizers consisting mainly of a double salt (calcium nitrate and ammonium nitrate) and containing not more than 10% ammonium nitrate and at least 12% water of crystallization.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	893 to 1099	0.91 to 1.12
SIZE	CLASS	GROUP
Not applicable	5.1	B

HAZARD

Non-combustible materials. If involved in a fire, will greatly intensify the burning of combustible materials. Although non-combustible, mixtures with combustible material are easily ignited and may burn fiercely.

This cargo is hygroscopic and will cake if wet.

This cargo is harmful if swallowed.

STOWAGE & SEGREGATION

“Separated from” foodstuffs.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Appropriate measures shall be taken to prevent the cargo from contact with combustible materials.

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Bilge wells shall be clean, dry and covered as appropriate, to prevent ingress of the cargo.

VENTILATION

The cargo spaces carrying this cargo shall not be ventilated during voyage.

CARRIAGE

No special requirements.

DISCHARGE

If this cargo has hardened, it shall be trimmed to avoid the formation of overhangs, as necessary.

CLEAN UP

No special requirements.

EMERGENCY PROCEDURES

SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED

Protective clothing (gloves, boots, coveralls, headgear). Self-contained breathing apparatus.
Spray nozzles.

EMERGENCY PROCEDURES

Wear protective clothing and self-contained breathing apparatus.

EMERGENCY ACTION IN THE EVENT OF FIRE

Use copious quantities of water, which is best applied in the form of a spray to avoid disturbing the surface of the material. The material may fuse or melt, in which condition application of water may result in extensive scattering of the molten materials. Exclusion of air or the use of CO₂ will not control the fire. Due consideration should be given to the stability of the ship due to the effect of accumulated water.

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAG), as amended.

CALCIUM NITRATE FERTILIZER

DESCRIPTION

Granules mainly of a double salt (calcium nitrate and ammonium nitrate) and containing not more than 15.5% total nitrogen and at least 12% water. Refer to the schedule for Calcium Nitrate UN No:1454 where the total nitrogen content exceeds 15.5%, or where the water content is less than 12%.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
34°	1053 to 1111	0.90 to 0.95
SIZE	CLASS	GROUP
1 mm to 4 mm	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

“Separated from” foodstuffs.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

No special requirements.

VENTILATION

The cargo spaces carrying this cargo shall not be ventilated during voyage.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

CARBORUNDUM

DESCRIPTION

A hard black crystalline compound of carbon and silicon. Odourless. No moisture content.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	1786	0.56
SIZE	CLASS	GROUP
75% lumps: under 203.2 mm 25% lumps: under 12.7 mm	Not applicable	C

HAZARD

Slightly toxic by inhalation.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Protect machinery, accommodation and equipment from dust. Personnel involved in cargo handling should wear protective clothing and dust filter masks.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

**CASTOR BEANS or
CASTOR MEAL or
CASTOR POMACE or
CASTOR FLAKE UN 2969**

DESCRIPTION

The beans from which castor oil is obtained.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	-	-
SIZE	CLASS	GROUP
Not applicable	9	B

HAZARD

Contain a powerful allergen which, by inhalation of dust or by skin contact with crushed bean products, can give rise to severe irritation of the skin, eyes, and mucous membranes in some persons. They are also toxic by ingestion.

STOWAGE & SEGREGATION

“Separated from” foodstuffs and oxidizing materials (goods in packages and solid bulk materials).

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Due consideration shall be paid to prevent dust entering living quarters and working areas. Castor meal, castor pomace and castor flakes shall not be carried in bulk.

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear goggles or other equivalent dust eye-protection and dust filter masks. Those persons shall wear protective clothing, as necessary.

VENTILATION

Surface ventilation only, either natural or mechanical, shall be conducted, as necessary, during the voyage for this cargo.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

After discharge of this cargo, the cargo spaces shall be thoroughly cleaned and washed out to remove all traces of the cargo.

EMERGENCY PROCEDURES

SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED

Protective clothing (gloves, boots, coveralls, headgear). Self-contained breathing apparatus.
Spray nozzles.

EMERGENCY PROCEDURES

Wear protective clothing and self-contained breathing apparatus.

EMERGENCY ACTION IN THE EVENT OF FIRE

Batten down. Use ship's fixed fire-fighting installation if available. Exclusion of air may be sufficient to control fire.

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAG), as amended.

CEMENT**DESCRIPTION**

Cement is a finely ground powder which becomes almost fluid in nature when aerated or significantly disturbed thereby creating a very minimal angle of repose. After loading is completed de-aeration occurs almost immediately and the product settles into a stable mass. Cement dust can be a major concern during loading and discharge if the vessel is not specially designed as a cement carrier or shore equipment is not fitted with special dust control equipment.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	1000 to 1493	0.67 to 1.00
SIZE	CLASS	GROUP
Up to 0.1 mm	Not applicable	C

HAZARD

It may shift when aerated.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

The ship shall be kept upright during loading of this cargo. This cargo shall be so trimmed to the boundaries of the cargo space that the angle of the surface of the cargo with the horizontal plane does not exceed 25 degrees. Both the specific gravity and the flow characteristics of this cargo are dependent on the volume of air in the cargo. The volume of air in this cargo may be up to 12%. This cargo shows fluid state prior to settlement. The ship carrying this cargo shall not depart until the cargo has settled. After the settlement, shifting of the cargo is not liable to occur unless the angle of the surface with the horizontal plane exceeds 30 degrees.

PRECAUTIONS

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear protective clothing, goggles or other equivalent dust eye-protection and dust filter masks, as necessary. Bilge wells shall be clean, dry and covered as appropriate, to prevent ingress of the cargo.

VENTILATION

The cargo spaces carrying this cargo shall not be ventilated during voyage.

CARRIAGE

After the completion of loading of this cargo, the hatches of the cargo spaces shall be sealed, as necessary. All vents and access ways to the cargo spaces shall be shut during the voyage. Bilges in the cargo spaces carrying this cargo shall not be pumped unless special precautions are taken.

DISCHARGE

No special requirements.

CLEAN UP

In the case that the residues of this cargo are to be washed out, the cargo spaces and the other structures and equipment which may have been in contact with this cargo or its dust shall be thoroughly swept prior to washing out. Particular attention shall be paid to bilge wells and framework in the cargo spaces. The fixed bilge pumps shall not be used to pump the cargo spaces, because this cargo may make the bilge systems inoperative.

CEMENT CLINKERS

DESCRIPTION

Cement is formed by burning limestone with clay. This burning produces rough cinder lumps that are later crushed to a fine powder to produce cement. The rough cinder lumps are called clinker and are shipped in this form to avoid the difficulties of carrying cement powder.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	1190 to 1639	0.61 to 0.84
SIZE	CLASS	GROUP
0 mm to 40 mm	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear protective clothing, goggles or other equivalent dust eye-protection and dust filter masks, as necessary. Bilge wells shall be clean, dry and covered as appropriate, to prevent ingress of the cargo.

VENTILATION

The cargo spaces carrying this cargo shall not be ventilated during voyage.

CARRIAGE

After the completion of loading of this cargo, the hatches of the cargo spaces shall be sealed. All vents and access ways to the cargo spaces shall be shut during the voyage. Bilges in the cargo spaces carrying this cargo shall not be pumped unless special precautions are taken.

DISCHARGE

No special requirements.

CLEAN UP

In the case that the residues of this cargo are to be washed out, the cargo spaces and the other structures and equipment which may have been in contact with this cargo or its dust shall be thoroughly swept prior to washing out.

CHAMOTTE

DESCRIPTION

Burned clay. Grey. Shipped in the form of fine crushed stone. Used by zinc smelters and in manufacture of firebrick (road metal). Dusty.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	667	1.50
SIZE	CLASS	GROUP
Up to 10 mm	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear protective clothing, goggles or other equivalent dust eye-protection and dust filter masks, as necessary.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

CHARCOAL**DESCRIPTION**

Wood burnt at a high temperature with as little exposure to air as possible. Very dusty, light cargo. Can absorb moisture to about 18 to 70% of its weight. Black powder or granules.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	199	5.02
SIZE	CLASS	GROUP
–	MHB	B

HAZARD

May ignite spontaneously. Contact with water may cause self-heating. Liable to cause oxygen depletion in the cargo space. Hot charcoal screenings in excess of 55°C should not be loaded.

STOWAGE & SEGREGATION

Segregation as required for class 4.1 materials. “Separated from” oily materials.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Charcoal in class 4.2 shall not be carried in bulk. This cargo shall be exposed to the weather for not less than 13 days prior to shipment. Prior to loading, the manufacturer or shipper shall give the master a certificate stating that the cargo is not class 4.2 in accordance with the result of the test approved by the competent authority*. The certificate shall also state that this cargo have been weathered for not less than 13 days. This cargo shall only be accepted for loading when the actual moisture content of the cargo is not more than 10%.

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear protective clothing, goggles or other equivalent dust eye-protection and dust filter masks, as necessary.

Footnote * Reference is made in section 6 of appendix 2 to this Code.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

EMERGENCY PROCEDURES

SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED

Nil

EMERGENCY PROCEDURES

Nil

EMERGENCY ACTION IN THE EVENT OF FIRE

Batten down; use ship's fixed fire-fighting installation if fitted. Exclusion of air may be sufficient to control fire.

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAG), as amended.

CHOPPED RUBBER AND PLASTIC INSULATION**DESCRIPTION**

Plastic and rubber insulation material, clean and free from other materials, in granular form

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	500 - 570	1.76 - 1.97
SIZE	CLASS	GROUP
Granular 1 to 4 mm	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

During handling and carriage no hotwork, burning and smoking shall be permitted in the vicinity of the cargo spaces containing this cargo. Prior to shipment, a certificate shall be given to the master by the shipper stating that this cargo consists of clean plastic and rubber material only. When the planned interval between the commencement of loading and the completion of discharge of this cargo exceeds 5 days, the cargo shall not be accepted for loading unless the cargo is to be carried in cargo spaces fitted with a fixed gas fire extinguishing system. The administration may, if it considers that the planned voyage does not exceed 5 days from the commencement of loading to the completion of discharge, exempt from the requirements of a fitted fixed gas fire-extinguishing system in the cargo spaces for the carriage of this cargo.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

CHROME PELLETS

DESCRIPTION

Pellets. Moisture: up to 2% maximum.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	1667	0.6
SIZE	CLASS	GROUP
8 to 25 mm	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

No special requirements.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

CHROMITE ORE

DESCRIPTION

Concentrates or lumpy, dark grey in colour.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	2222 to 3030	0.33 to 0.45
SIZE	CLASS	GROUP
Up to 254 mm	Not applicable	C

HAZARD

Toxic by dust inhalation.
This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

As the density of the cargo is extremely high, the tanktop may be overstressed unless the cargo is evenly spread across the tanktop to equalize the weight distribution. Due consideration shall be paid to ensure that tanktop is not overstressed during voyage and during loading by a pile of the cargo.

PRECAUTIONS

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear goggles or other equivalent dust eye-protection and dust filter masks. Those persons shall wear protective clothing, as necessary.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

CLAY**DESCRIPTION**

Clay is usually light to dark grey and comprises 10% soft lumps and 90% soft grains. The material is usually moist but not wet to the touch. Moisture is up to 25%.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	746 to 1515	0.66 to 1.34
SIZE	CLASS	GROUP
Up to 150 mm	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

The moisture content of this cargo shall be kept as low as practicable to prevent the cargo becoming glutinous and handling of the cargo becoming extremely difficult.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

Prior to washing out the residues of this cargo, the bilge wells of the cargo spaces shall be cleaned.

COAL

(See also the appendix to this schedule)

DESCRIPTION

Coal (bituminous and anthracite) is a natural, solid, combustible material consisting of amorphous carbon and hydrocarbons.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	654 to 1266	0.79 to 1.53
SIZE	CLASS	GROUP
Up to 50 mm	MHB	B (and A)

HAZARDS

Coal may create flammable atmospheres, may heat spontaneously, may deplete the oxygen concentration, may corrode metal structures. Can liquefy if predominantly fine 75% less than 5 mm coal.

STOWAGE & SEGREGATION

Refer to the appendix to this schedule.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

When a cargo may liquefy during voyage in case that the moisture content of the cargo is in excess of its TML and the cargo is carried in a ship other than specially constructed or fitted cargo ship complying with the requirements in subsection 7.3.2 of this Code, the following provisions shall be complied with:

- .1 the moisture content of the cargo shall be kept less than its TML during voyage;
- .2 unless expressly provided otherwise in this individual schedule, the cargo shall not be handled during precipitation;
- .3 unless expressly provided otherwise in this individual schedule, during handling of the cargo, all non-working hatches of the cargo spaces into which the cargo is loaded or to be loaded shall be closed;
- .4 the cargo may be handled during precipitation provided that the actual moisture content of the cargo is sufficiently less than its TML so that the actual moisture content is not liable to be increased beyond the TML by the precipitation; and
- .5 the cargo in a cargo space may be discharged during precipitation provided that the total amount of the cargo in the cargo space is to be discharged in the port.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

Without reasonable trimming, vertical cracks into the body of the coal may form permitting oxygen circulation and possible self-heating.

PRECAUTIONS

Bilge wells shall be clean, dry and covered as appropriate, to prevent ingress of the cargo. Refer to the appendix to this schedule.

VENTILATION

Refer to Special Precautions in the appendix to this schedule.

CARRIAGE

Refer to the appendix to this schedule.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

EMERGENCY PROCEDURES

SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED

Nil

EMERGENCY PROCEDURES

Nil

EMERGENCY ACTION IN THE EVENT OF FIRE

Batten down. Exclusion of air may be sufficient to control the fire. **Do not use water.** Seek expert advice and consider heading to the nearest port.

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAG), as amended.

REMARKS

The use of CO₂ or inert gas, if available, should be withheld until fire is apparent.

APPENDIX

COAL

Properties and characteristics

1. Coals may emit methane, a flammable gas. A methane/air mixture containing between 5% and 16% methane constitutes an explosive atmosphere which can be ignited by sparks or naked flame, e.g., electrical or frictional sparks, a match or lighted cigarette. Methane is lighter than air and may, therefore, accumulate in the upper region of the cargo space or other enclosed spaces. If the cargo space boundaries are not tight, methane can seep through into spaces adjacent to the cargo space.
2. Coals may be subject to oxidation, leading to depletion of oxygen and an increase in carbon dioxide or carbon monoxide concentrations in the cargo space. Carbon monoxide is an odourless gas, slightly lighter than air, and has flammable limits in air of 12% to 75% by volume. It is toxic by inhalation with an affinity for blood haemoglobin over 200 times that of oxygen.
3. Some coals may heat spontaneously and the spontaneous heating may lead to spontaneous combustion in the cargo space. Flammable and toxic gases, including carbon monoxide, may be produced.
4. Some coals may be liable to react with water and produce acids which may cause corrosion. Flammable and toxic gases, including hydrogen, may be produced. Hydrogen is an odourless gas, much lighter than air, and has flammable limits in air of 4% to 75% by volume.

Segregation and stowage requirements

1. Boundaries of cargo spaces where this cargo is carried *shall* be resistant to fire and liquids.
2. This cargo *shall* be “separated from” goods of classes 1 (Division 1.4), 2, 3, 4 and 5 in packaged form (see IMDG Code) and “separated from” solid bulk materials of classes 4 and 5.1.
3. Stowage of goods of class 5.1 in packaged form or solid bulk materials of class 5.1 above or below this cargo *shall* be prohibited.
4. The master *shall* ensure that this cargo is not stowed adjacent to hot areas.
5. This cargo *shall* be “separated longitudinally by an intervening complete compartment or hold from” goods of class 1 other than Division 1.4.

Note: For interpretation of these terms, see section 9.

General requirements for all types of these cargoes

1. Prior to loading, the shipper or his appointed agent shall provide in writing to the master the characteristics of the cargo and the recommended safe handling procedures for loading and transport of the cargo. As a minimum, the cargo’s contract specifications for moisture content, sulphur content and size shall be stated, and especially whether the cargo may be liable to emit methane or self-heat.
2. Before loading, the master *shall* ensure the following:
 - 2.1 All cargo spaces and bilge wells are clean and dry. Any residue of waste material or previous cargo is removed, including removable cargo battens; and
 - 2.2 All electrical cables and components situated in cargo spaces and adjacent spaces are free from defects. Such cables and electrical components are safe for use in an explosive atmosphere or positively isolated.

- 3 The ship *shall* be suitably fitted and carry on board appropriate instruments for measuring the following without requiring entry in the cargo space:
 - .1 concentration of methane in the atmosphere;
 - .2 concentration of oxygen in the atmosphere;
 - .3 concentration of carbon monoxide in the atmosphere; and
 - .4 pH value of cargo space bilge samples.
- 4 These instruments *shall* be regularly serviced and calibrated. Ship personnel *shall* be trained in the use of such instruments. Details of gas measurement procedures are given at the end of this appendix.
5. It is recommended that means be provided for measuring the temperature of the cargo in the range 0°C to 100°C to enable the measurement of temperature of the cargo while being loaded and during voyage without requiring entry into the cargo space.
6. Smoking and the use of naked flames *shall* not be permitted in the cargo areas and adjacent spaces and appropriate warning notices *shall* be posted in conspicuous places. Burning, cutting, chipping, welding or other sources of ignition *shall* not be permitted in the vicinity of cargo spaces or in other adjacent spaces, unless the space has been properly ventilated and the methane gas measurements indicate it is safe to do so.
7. Prior to departure, the master shall be satisfied that the surface of the material has been trimmed reasonably level to the boundaries of the cargo space to avoid the formation of gas pockets and to prevent air from permeating the body of the briquettes. Casings leading into the cargo space *shall* be adequately sealed. The shipper *shall* ensure that the master receives the necessary co-operation from the loading terminal.
8. The atmosphere in the space above the cargo in each space *shall* be regularly monitored for the concentration of methane, oxygen and carbon monoxide. Details of gas monitoring procedures are given at the end of this appendix. The results of monitoring shall be recorded. The frequency of the monitoring *shall* be determined based upon the information provided by the shipper and the information obtained through the analysis of the atmosphere in the cargo space.
9. Unless expressly provided otherwise, surface ventilation shall be conducted in all cargo spaces carrying this cargo for the first 24 hours after departure from the loading port. During this period, the atmosphere in the cargo spaces *shall* be monitored once from one sample point per cargo space and for the purpose of the gas monitoring, the ventilation shall be stopped for an appropriate period prior to the gas monitoring.
10. When the methane concentrations monitored within 24 hours after departure are at an acceptably low level, the ventilation openings *shall* be closed and the atmosphere in the cargo spaces shall be monitored. When the methane concentrations monitored within 24 hours after departure are not at an acceptably low level, surface ventilation *shall* be maintained, except for an appropriate period for gas monitoring, and the atmosphere in the cargo spaces shall be monitored. This procedure shall be followed until the methane concentrations become acceptably low level. In either event, the atmosphere in the cargo spaces *shall* be monitored on a daily basis.
11. When significant concentrations of methane is subsequently observed in unventilated cargo spaces, the appropriate special precautions for coals emitting methane *shall* apply.
12. The master *shall* ensure, as far as practicable, that any gases which may be emitted from this cargo do not accumulate in adjacent enclosed spaces.
13. The master *shall* ensure that enclosed working spaces such as storerooms, carpenter's shop, passageways, tunnels, etc. are regularly monitored for the presence of methane, oxygen and carbon monoxide. Such spaces *shall* be adequately ventilated.
14. Regular hold bilge testing *shall* be systematically carried out during voyage carrying this cargo. If the pH monitoring indicates that a corrosion risk exists, bilges shall be

frequently pumped out during the voyage in order to avoid possible accumulation of acids on tank tops and in the bilge system.

15. If the behaviour of the cargo during the voyage differs from that specified in the cargo declaration, the master *shall* report such differences to the shipper. Such reports will enable the shipper to maintain records on the behaviour of the coal cargoes, so that the information provided to the master can be reviewed in the light of transport experience.

Special Precautions

1 *Coals emitting methane*

When the shipper has informed that the cargo is liable to emit methane or analysis of the atmosphere in the cargo space indicates the presence of methane in excess of 20% of the Lower Explosion Limit (LEL), the following additional precautions *shall* be taken:

- .1 Adequate surface ventilation *shall* be maintained, except for an appropriate period for the purpose of gas monitoring.
- .2 Care *shall* be taken to remove any accumulated gases prior to operation of the hatch covers or other openings for any reason, including discharging. Care shall be taken to operate hatch covers of the cargo spaces and other openings to avoid creating sparks. Smoking and the use of naked flame *shall* be prohibited.
- .3 Personnel *shall* not be permitted to enter the cargo space or enclosed adjacent spaces unless the space has been ventilated and the atmosphere tested and found to be gas-free and to have sufficient oxygen to support life. Notwithstanding this provision, emergency entry into the cargo space may be permitted without ventilation, testing the atmosphere or the both, provided that the entry into the cargo space is undertaken only by trained personnel wearing self-contained breathing apparatus under the supervision of a responsible officer and special precautions are observed to ensure that no source of ignition is carried into the space.
- .4 The master *shall* ensure that enclosed working spaces such as storerooms, carpenter's shops, passageways, tunnels, etc. are regularly monitored for the presence of methane. Such spaces *shall* be adequately ventilated and, in the case of mechanical ventilation, only equipment safe for use in an explosive atmosphere *shall* be used.

2 *Self-heating coals*

When the shipper informed that the cargo is likely to self-heat or analysis of the atmosphere in the cargo space indicates an increasing concentration of carbon monoxide, then the following additional precautions *shall* be taken:

- .1 The cargo spaces *shall* be closed immediately after completion of loading in each cargo space. The hatch covers may also be additionally sealed with a suitable sealing tape. Only natural surface ventilation shall be permitted and ventilation *shall* be limited to the absolute minimum time necessary to remove methane which may have accumulated.
- .2 Personnel *shall* not enter the cargo space during voyage, unless they are wearing self-contained breathing apparatus and access is critical to safety of life and the safety of the ship.
- .3 Prior to loading, temperature of this cargo shall be monitored. This cargo shall only be accepted for loading when the temperature of the cargo is not higher than 55°C.

- .4 When the carbon monoxide level is increasing steadily, a potential self-heating may be developing. In such a case, the cargo space *shall* be completely closed and all ventilation ceased, and the master *shall* seek expert advice immediately. Water *shall* not be used for cooling material or fighting coal cargo fires at sea, but may be used for cooling the boundaries of the cargo space.
- .5 When the carbon monoxide level in any cargo space reaches 50 ppm or exhibit a steady rise over three consecutive days, a self-heating condition may be developing and the master shall inform the shipper and the company of, at least, the following information after an accurate assessment of the situation is to be achieved:
 - (a) identity of the cargo spaces involved; monitoring results covering carbon monoxide, methane and oxygen concentrations;
 - (b) if available, temperature of the cargo, location and method used to obtain results;
 - (c) time gas sample taken (monitoring routine);
 - (d) time ventilators opened/closed;
 - (e) quantity of coal in hold(s) involved;
 - (f) type of coal as per cargo information, and any special precautions indicated on information;
 - (g) date loaded, and ETA at intended discharge port (which *shall* be specified); and
 - (h) comments or observations from the ship's master.

Procedures for gas monitoring of coal cargoes

1 Observations

1.1 Carbon monoxide monitoring, when conducted in accordance with the following procedures, will provide a reliable early indication of self-heating within this cargo. This allows preventive action to be considered without delay.

A steady rise in the level of carbon monoxide detected within a cargo space is a conclusive indication that self-heating is taking place.

1.2 All vessels engaged in the carriage of this cargo *shall* carry on board an instrument for measuring methane, oxygen and carbon monoxide gas concentrations, to enable the monitoring of the atmosphere within the cargo space. This instrument *shall* be regularly serviced and calibrated in accordance with the manufacturer's instructions. Care shall be exercised in interpreting methane measurements carried out in the low oxygen concentrations often found in unventilated cargo holds. The catalytic sensors normally used for the detection of methane rely on the presence of sufficient oxygen for accurate measurement. This phenomenon does not affect the measurement of carbon monoxide, or measurement of methane by infrared sensor. Further guidance may be obtained from the instrument manufacturer.

2 Sampling and measurement procedure

2.1 Equipment

2.1.1 An instrument which is capable of measuring methane, oxygen and carbon monoxide concentrations shall be provided on board a ship carrying this cargo. The instrument *shall* be fitted with an aspirator, flexible connection and a length of spark-proof metal tubing to enable a representative sample to be obtained from within the square of the hatch.

2.1.2 When recommended by the manufacturer, a suitable filter *shall* be used to protect the instrument against the ingress of moisture. The presence of even a small amount of moisture will compromise the accuracy of the measurement.

2.2 *Siting of sampling points*

2.2.1 In order to obtain meaningful information about the behaviour of this cargo in a cargo space, gas measurements *shall* be made via one sample point per cargo space. To ensure flexibility of measurement in adverse weather two sample points *shall* be provided per cargo space, one on the port side and one on the starboard side of the hatch cover or hatch coaming. (Refer to the diagram of gas sampling point.) Measurement from either of these locations is satisfactory.

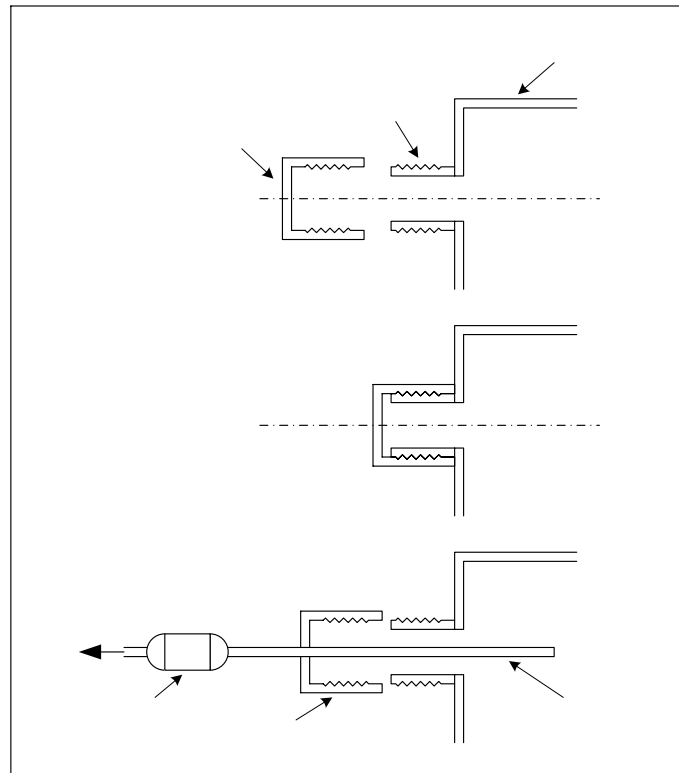


Diagram of gas sampling point

2.2.2 Each sample point *shall* comprise a hole of diameter approximately 12 mm positioned as near to the top of the hatch coaming as possible. It *shall* be sealed with a sealing cap to prevent ingress of water and air. It is essential that this cap is securely replaced after each measurement to maintain a tight seal.

2.2.3 The provisions of any sample point *shall* not compromise the seaworthiness of the vessel.

2.3 *Measurement*

The explanation on procedures for measurement is as follows:

- .1 remove the sealing cap, insert the spark-proof metal tube into the sampling point and tighten the collar to ensure an adequate seal;
- .2 connect the instrument to the sampling tube;
- .3 draw a sample of the atmosphere through the tube, using the aspirator, until steady readings are obtained;
- .4 log the results on a form which records cargo space, date and time for each measurement; and
- .5 put back the sealing cap.

2.4 Measurement strategy

The identification of incipient self-heating from measurement of gas concentrations is more readily achieved under unventilated conditions. This is not always desirable because of the possibility of the accumulation of methane to dangerous concentrations. This is primarily, but not exclusively, a problem in the early stages of a voyage. Therefore it is recommended that cargo spaces are initially ventilated until measured methane concentrations are at an acceptably low level.

2.5 Measurement in unventilated holds

Under normal conditions one measurement per day is sufficient as a precautionary measure. However, if carbon monoxide levels are higher than 30 ppm then the frequency *shall* be increased to at least twice a day at suitably spaced intervals. Any additional results *shall* be logged.

2.6 Measurement in ventilated holds

2.6.1 If the presence of methane is such that the ventilators are required to remain open, then a different procedure *shall* be applied to enable the onset of any incipient self-heating to be detected.

2.6.2 To obtain meaningful data the ventilators *shall* be closed for a period before the measurements are taken. This period may be chosen to suit the operational requirements of the vessel, but it is recommended that it is not less than four hours. It is vital in the interests of data interpretation that the shutdown time is constant whichever time period is selected. These measurements *shall* be taken on a daily basis.

COAL SLURRY

DESCRIPTION

Coal slurry is a mixture of fine particles of coal and water.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	870 to 1020	0.98 to 1.15
SIZE	CLASS	GROUP
Under 1 mm	Not applicable	A

HAZARD

Coal slurry is liable to liquefy during sea transport. Spontaneous combustion is possible if the coal dries out but is unlikely under normal conditions.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

When a cargo is carried in a ship other than specially constructed or fitted cargo ship complying with the requirements in subsection 7.3.2 of this Code, the following provisions shall be complied with:

- .1 the moisture content of the cargo shall be kept less than its TML during voyage;
- .2 unless expressly provided otherwise in this individual schedule, the cargo shall not be handled during precipitation;
- .3 unless expressly provided otherwise in this individual schedule, during handling of the cargo, all non-working hatches of the cargo spaces into which the cargo is loaded or to be loaded shall be closed;
- .4 the cargo may be handled during precipitation provided that the actual moisture content of the cargo is sufficiently less than its TML so that the actual moisture content is not liable to be increased beyond the TML by the precipitation; and
- .5 the cargo in a cargo space may be discharged during precipitation provided that the total amount of the cargo in the cargo space is to be discharged in the port.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Bilge wells shall be clean, dry and covered as appropriate, to prevent ingress of the cargo.

VENTILATION

As this cargo, in general, may emit methane, the cargo spaces carrying this cargo shall be tested regularly using a suitable gas detector and natural surface ventilation shall be conducted, as necessary.

CARRIAGE

The appearance of the surface of this cargo shall be checked regularly during voyage. If free water above the cargo or fluid state of the cargo is observed during voyage, the master shall take appropriate actions to prevent cargo shifting and potential capsize of the ship, and give consideration to seeking emergency entry into a place of refuge.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

COARSE CHOPPED TYRES

DESCRIPTION

Chopped or shredded fragments of used tyres in coarse size.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	555	1.8
SIZE	CLASS	GROUP
15x20 cm approximately	Not applicable	C

HAZARD

May self-heat slowly if contaminated by oily residual, if not properly aged before shipment and if offered to the shipment in smaller size than indicated in “characteristics”.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable before loading, during loading and during voyage. This cargo shall not be loaded during precipitation. During loading of this cargo all non-working hatches of the cargo spaces to which this cargo are loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

During handling and carriage no hotwork, burning and smoking shall be permitted in the vicinity of the cargo spaces containing this cargo. Prior to shipment, a certificate shall be given to the master by the shipper stating that this cargo is free of oily products or oily residual and has been stored under cover but in the open air for not less than 15 days prior to shipment.

When the planned interval between the commencement of loading and the completion of discharge of this cargo exceeds 5 days, the cargo shall not be accepted for loading unless the cargo is to be carried in cargo spaces fitted with a fixed gas fire extinguishing system. The administration may, if it considers that the planned voyage does not exceed 5 days from the commencement of loading to the completion of discharge, exempt from the requirements of a fitted fixed gas fire-extinguishing system in the cargo spaces for the carriage of this cargo.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

COKE

DESCRIPTION

Grey lumps may contain fines (Breeze).

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	341 to 800	1.25 to 2.93
SIZE	CLASS	GROUP
Up to 200 mm	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Bilge wells shall be clean, dry and covered as appropriate, to prevent ingress of the cargo.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

After discharge of this cargo, the bilge wells and the scuppers of the cargo spaces shall be checked and any blockage in the bilge wells and the scuppers shall be removed.

COKE BREEZE

DESCRIPTION

Greyish powder.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	556	1.8
SIZE	CLASS	GROUP
less than 10 mm	Not applicable	A

HAZARD

Coke Breeze is liable to flow if it has sufficiently high moisture content.
This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

When a cargo is carried in a ship other than specially constructed or fitted cargo ship complying with the requirements in subsection 7.3.2 of this Code, the following provisions shall be complied with:

- .1 the moisture content of the cargo shall be kept less than its TML during voyage;
- .2 unless expressly provided otherwise in this individual schedule, the cargo shall not be handled during precipitation;
- .3 unless expressly provided otherwise in this individual schedule, during handling of the cargo, all non-working hatches of the cargo spaces into which the cargo is loaded or to be loaded shall be closed;
- .4 the cargo may be handled during precipitation provided that the actual moisture content of the cargo is sufficiently less than its TML so that the actual moisture content is not liable to be increased beyond the TML by the precipitation; and
- .5 the cargo in a cargo space may be discharged during precipitation provided that the total amount of the cargo in the cargo space is to be discharged in the port.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Bilge wells shall be clean, dry and covered as appropriate, to prevent ingress of the cargo.

VENTILATION

The cargo spaces carrying this cargo shall not be ventilated during voyage.

CARRIAGE

The appearance of the surface of this cargo shall be checked regularly during voyage. If free water above the cargo or fluid state of the cargo is observed during voyage, the master shall take appropriate actions to prevent cargo shifting and potential capsize of the ship, and give consideration to seeking emergency entry into a place of refuge.

DISCHARGE

No special requirements.

CLEAN UP

After discharge of this cargo, the bilge wells and the scuppers of the cargo spaces shall be checked and any blockage in the bilge wells and the scuppers shall be removed.

COLEMANITE

DESCRIPTION

A natural hydrated calcium borate. Fine to lumps, light grey appearance similar to clay. Moisture approximately 7%.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	1639	0.61
SIZE	CLASS	GROUP
Up to 300 mm	Not applicable	C

HAZARD

No special hazards.
This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

No special requirements.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

COPPER GRANULES

DESCRIPTION

Sphere shaped pebbles. 75% copper with lead, tin, zinc, traces of others. Moisture content 1.5% approximately. Light grey colour when dry, dark green when wet. Odourless.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	4000 to 4545	0.22 to 0.25
SIZE	CLASS	GROUP
Fines up to 10 mm Clinkers up to 50 mm	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

As the density of the cargo is extremely high, the tanktop may be overstressed unless the cargo is evenly spread across the tanktop to equalize the weight distribution. Due consideration shall be paid to ensure that tanktop is not overstressed during voyage and during loading by a pile of the cargo.

PRECAUTIONS

No special requirements.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

COPPER MATTE

DESCRIPTION

Crude black copper ore. Composed of 75% copper and 25% impurities. Small metallic round stones or pellets. Odourless.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	2857 to 4000	0.25 to 0.35
SIZE	CLASS	GROUP
3 mm to 25 mm	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

As the density of the cargo is extremely high, the tanktop may be overstressed unless the cargo is evenly spread across the tanktop to equalize the weight distribution. Due consideration shall be paid to ensure that tanktop is not overstressed during voyage and during loading by a pile of the cargo.

PRECAUTIONS

No special requirements.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

COPRA (dry) UN 1363

DESCRIPTION

Dried kernels of coconuts with a penetrating rancid odour which may taint other cargoes.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	500	2.0
SIZE	CLASS	GROUP
Not applicable	4.2	B

HAZARD

Liable to heat and ignite spontaneously especially when in contact with water. Liable to cause oxygen depletion in the cargo space.

STOWAGE & SEGREGATION

This cargo shall not be stowed on or adjacent to heated surfaces including fuel oil tanks.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.
This cargo shall not be accepted for loading when wet.

PRECAUTIONS

This cargo shall only be accepted for loading when the cargo has been weathered for at least one month before shipment or when the shipper provides the master with a certificate issued by a person recognized by the competent authority of the country of origin stating that the moisture content the cargo is not more than of 5%. Smoking and the use of naked lights in cargo spaces and adjacent areas shall be prohibited. Entry into the cargo space for this cargo shall not be permitted until the cargo space has been ventilated and the atmosphere tested for concentration of oxygen.

VENTILATION

Surface ventilation only, either natural or mechanical, shall be conducted, as necessary, during the voyage for this cargo.

CARRIAGE

The temperature of this cargo shall be measured and recorded regularly during voyage to monitor for possible self heating.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

EMERGENCY PROCEDURES

SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED

Nil

EMERGENCY PROCEDURES

Nil

EMERGENCY ACTION IN THE EVENT OF FIRE

Batten down; use ship's fixed fire-fighting installation if fitted. Exclusion of air may be sufficient to control fire.

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAG), as amended.

CRYOLITE**DESCRIPTION**

A fluoride of sodium and aluminium used in the production of aluminium and for ceramic glazes. Grey pellets.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	1429	0.70
SIZE	CLASS	GROUP
6.4 mm to 12.7 mm	Not applicable	C

HAZARD

Prolonged contact may cause serious damage to the skin and nervous system.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear goggles or other equivalent dust eye-protection and dust filter masks. Those persons shall wear protective clothing, as necessary.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

DIAMMONIUM PHOSPHATE (D.A.P.)**DESCRIPTION**

Odourless white crystals or powder. Depending on source it can be dusty. Hygroscopic.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
30° to 40°	833 to 999	1.10 to 1.20
SIZE	CLASS	GROUP
Diameter: 2.54 mm	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

This cargo is hygroscopic and may harden in the cargo space under humid conditions.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear protective clothing, goggles or other equivalent dust eye-protection and dust filter masks, as necessary.

VENTILATION

The cargo spaces carrying this cargo shall not be ventilated during voyage.

CARRIAGE

Condensation in the cargo spaces carrying this cargo, sweating of this cargo and entering of water from hatch covers to the cargo spaces shall be checked regularly during the voyage. Due attention shall be paid to the sealing of hatches of the cargo spaces.

DISCHARGE

If this cargo has hardened, it shall be trimmed to avoid the formation of overhangs, as necessary.

CLEAN UP

After discharge of this cargo, particular attention shall be paid to bilge wells of the cargo spaces.

DIRECT REDUCED IRON (A)**Briquettes, hot-moulded****DESCRIPTION**

A metallic grey colloid material emanating from a densification process whereby the direct reduced iron (DRI) feed material is at a temperature greater than 650°C at time of moulding and has a density greater than 5.0 g/cm³. Fines (under 4 mm) not to exceed 5%.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	2500---3300	0.3 to 0.4 To be verified by the shipper
SIZE	CLASS	GROUP
Approximate size: Length 90 mm to 130 mm Width 80 mm to 100 mm Thickness 20 mm to 50 mm Briquette weight 0.5 to 2.0 kg Fines: under 4 mm	MHB	B

HAZARD

Material may slowly evolve hydrogen after contact with water. Temporary self-heating of about 30°C may be expected after material handling in bulk.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

“Separated from” goods of classes 1 (Division 1.4), 2, 3, 4 and 5 and class 8 acids in packaged form (see IMDG Code).

“Separated from” solid bulk materials of classes 4 and 5.

“Separated longitudinally by an intervening complete compartment or hold from” goods of class 1 other than Division 1.4 C.

Boundaries of compartments where this cargo is carried shall be resistant to fire and liquid.

HOLD CLEANLINESS

The cargo spaces shall be clean, dry and free from salt and residues of previous cargoes.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable during loading and the voyage. Open storage is acceptable prior to loading. This cargo shall not be loaded during precipitation. During loading of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

Due consideration shall be paid to evenly spreading the cargo across the tanktop to minimize the concentration of fines. This cargo shall not be loaded when the temperature is in excess of 65°C (150°F). Prior to loading wooden fixtures such as battens shall be removed.

PRECAUTIONS

Prior to loading this cargo, the shipper shall provide the master with a certificate issued by a person recognized by the competent authority of the country of shipment stating that the cargo, at the time of loading, is suitable for shipment and does not contain fines more than 5%. Where practicable, ballast tanks adjacent to the cargo spaces containing this cargo, other than double-bottom tanks, shall be kept empty. Weather deck closures shall be inspected and tested to ensure integrity. During discharge, a fine spray of fresh water may be applied to this cargo for dust control. The cargo temperature shall be monitored during loading. The shipper may provide advice in amplification of this Code but the advice shall not be contrary thereto in respect of safety.

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear protective clothing, goggles or other equivalent dust eye-protection and dust filter masks, as necessary. Radars and exposed radio communication equipment of the ship which carry this cargo shall be protected from the dust of this cargo. During handling of this cargo "NO SMOKING" signs shall be posted on decks and in areas adjacent to cargo spaces and no naked lights shall be permitted in these areas. Cargo spaces containing this cargo may become oxygen-depleted and precautions shall be taken upon entering the cargo spaces. Bilge wells shall be clean, dry and covered as appropriate, to prevent ingress of the cargo. Cargo spaces containing this cargo and adjacent spaces may become oxygen-depleted. Flammable gas may also build up in these spaces. All precautions shall be taken upon entering these spaces.

VENTILATION

Surface ventilation only, either natural or mechanical, shall be conducted, as necessary, during the voyage for this cargo. Ventilation shall be such that escaping gases cannot penetrate living quarters on or under deck.

CARRIAGE

For quantitative measurements of hydrogen, a suitable detector shall be on board while this cargo is carried. The detector shall be suitable for use in an atmosphere without oxygen and of certified safe type for use in explosive atmosphere. The concentrations of hydrogen in the cargo spaces carrying this cargo shall be measured regularly, during voyage, and the results of the measurements shall be recorded and kept on board.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

EMERGENCY PROCEDURES

SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED

Nil

EMERGENCY PROCEDURES

Nil

EMERGENCY ACTION IN THE EVENT OF FIRE

Batten down. **Do not use water.** Seek expert advice. Early application of an inert gas to a smouldering situation may be effective.

Preparations should be made for grab discharge if serious heating occurs.

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAG), as amended.

DIRECT REDUCED IRON (B)

(not to be confused with iron sponge, spent) such as lumps, pellets and cold-moulded briquettes

DESCRIPTION

Direct Reduced Iron (DRI) (B) is a metallic material of a manufacturing process formed by the reduction (removal of oxygen) of iron oxide at temperatures below the fusion point of iron. Cold-moulded briquettes should be defined as those which have been moulded at a temperature of under 650°C or which have a density of less than 5.0 g/cm³.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	More than 2000	Up to 0.5
SIZE	CLASS	GROUP
Lumps and pellets: Average particle size 6 mm to 25 mm with up to 5% fines (under 4 mm) Cold-moulded briquettes: Approximate maximum dimensions 35 mm to 40 mm	MHB	B

HAZARD

DRI may react with water and air to produce hydrogen and heat. The heat produced may cause ignition. Oxygen in an enclosed space may be depleted.

STOWAGE & SEGREGATION

“Separated from” goods of classes 1 (Division 1.4S), 2, 3, 4 and 5 and class 8 acids in packaged form (see IMDG Code).

“Separated from” solid bulk materials of classes 4 and 5. Goods of class 1, other than Division 1.4S, should not be carried in the same ship.

Boundaries of compartments where this cargo is carried shall be resistant to fire and liquid.

HOLD CLEANLINESS

The cargo spaces shall be clean, dry and free from salt and residues of previous cargoes.

Wooden fixtures such as battens shall be removed.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable before loading, during loading and during voyage.

This cargo shall not be loaded during precipitation. During loading of this cargo all non-working hatches of the cargo spaces to which this cargo are loaded or to be loaded shall be closed.

LOADING

Where practicable, adjacent ballast tanks, other than double-bottom tanks, shall be kept empty.

Weather deck closures shall be inspected and tested to ensure integrity. This cargo shall not be accepted for loading if the temperature is in excess of 65°C (150°F).

PRECAUTIONS

Prior to loading this cargo, the shipper shall provide the master with a certificate issued by a person recognized by the competent authority of the country of shipment stating that the cargo, at the time of loading, is suitable for shipment. Shippers shall certify that the cargo conforms to the requirement of this Code. Prior to shipment, this cargo shall be aged for at least 72 hours, or treated with an air passivation technique, or some other equivalent method that reduces the reactivity of the material to at least the same level as the aged product. Hatches of the cargo space for this cargo shall be sealed. All ventilators and other openings of the cargo spaces shall be closed to maintain an inert atmosphere.

- A. The shipper shall provide necessary specific instructions for carriage, either:
1. prior to loading, provision should be made to introduce the inert gas at tank top level so that the whole of the cargo space can be maintained at a low oxygen level throughout the voyage. The cargo spaces shall be maintained under an inert atmosphere containing less than 5% oxygen. The hydrogen content of the atmosphere in the cargo spaces shall be maintained at less than 1% by volume; or
 2. that the cargo has been manufactured or treated with an oxidation and corrosion-inhibiting process which has been proved, to the satisfaction of the competent authority, to provide effective protection against dangerous reaction with seawater or air under shipping conditions.
- B. The provision of paragraph A above may be waived or varied if agreed to by the competent authorities of the countries concerned, taking into account the sheltered nature, length, duration, or any other applicable conditions of any specific voyage.

The ship selected for the carriage of this cargo shall be suitable in all respects for the carriage of this cargo. Except as provided for under paragraph A2 above, any material which is wet or is known to have been wetted should not be accepted for carriage in bulk. The cargo shall be loaded, stowed and transported under dry conditions.

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear protective clothing, goggles or other equivalent dust eye-protection and dust filter masks, as necessary. Radars and exposed radio communication equipment of the ship which carry this cargo shall be protected from the dust of this cargo.

Bilge wells shall be clean, dry and covered as appropriate, to prevent ingress of the cargo. Cargo spaces containing this cargo and adjacent spaces may become oxygen-depleted. Flammable gas may also build up in these spaces. All precautions shall be taken upon entering these spaces.

VENTILATION

The cargo spaces carrying this cargo shall not be ventilated during voyage.

CARRIAGE

For quantitative measurements of oxygen and hydrogen, suitable detectors for each gas or combination of gases shall be on board while this cargo is carried. The detectors shall be suitable for use in an atmosphere without oxygen and of certified safe type for use in explosive atmosphere. The concentrations of these gases in the cargo spaces carrying this cargo shall be measured regularly, during voyage, and the results of the measurements shall be recorded and kept on board.

No smoking, burning, cutting, chipping or other source of ignition shall be allowed in the vicinity of the cargo spaces containing this cargo.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

EMERGENCY PROCEDURES

SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED

Nil

EMERGENCY PROCEDURES

Nil

EMERGENCY ACTION IN THE EVENT OF FIRE

Batten down. **Do not use water.** Seek expert advice. Early application of an inert gas to a smouldering situation may be effective. If a fire situation develops, the ship should make for the nearest suitable port and neither water, steam nor additional carbon dioxide should be used at this stage. If nitrogen gas is available, the use of this gas to keep the oxygen concentration down will contain the fire.

Preparations should be made for grab discharge if serious heating occurs.

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAG), as amended.

DOLOMITE**DESCRIPTION**

Dolomite is a light yellow/brown coloured mineral stone which is very hard and compact. Dolomite may sometimes, incorrectly, be used to describe a material consisting of the oxides of calcium and magnesium (dolomitic quicklime). In this case, see “LIME (UNSLAKED)”.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	1429 to 1667	0.6 to 0.7
SIZE	CLASS	GROUP
Up to 32 mm	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

No special requirements.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

FELSPAR LUMP

DESCRIPTION

Crystalline minerals consisting of silicates of aluminium with potassium sodium, calcium and barium. White or reddish in colour.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	1667	0.60
SIZE	CLASS	GROUP
0.1 mm to 300 mm	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

No special requirements.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

FERROCHROME**DESCRIPTION**

Raw material of iron mixed with chrome. Extremely heavy cargo.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	3571 to 5556	0.18 to 0.26
SIZE	CLASS	GROUP
Up to 300 mm	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

As the density of the cargo is extremely high, the tanktop may be overstressed unless the cargo is evenly spread across the tanktop to equalize the weight distribution. Due consideration shall be paid to ensure that tanktop is not overstressed during voyage and during loading by a pile of the cargo.

PRECAUTIONS

No special requirements.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

FERROCHROME, *exothermic*

DESCRIPTION

An alloy of iron and chromium. Extremely heavy cargo.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	3571 to 5556	0.18 to 0.28
SIZE	CLASS	GROUP
Up to 300 mm	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

As the density of the cargo is extremely high, the tanktop may be overstressed unless the cargo is evenly spread across the tanktop to equalize the weight distribution. Due consideration shall be paid to ensure that tanktop is not overstressed during voyage and during loading by a pile of the cargo.

PRECAUTIONS

During loading, carriage and discharging, welding or other hot work shall not be carried out in the vicinity of the cargo spaces containing this cargo.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

FERROMANGANESE**DESCRIPTION**

Raw material or iron mixed with manganese.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	3571 to 5556	0.18 to 0.28
SIZE	CLASS	GROUP
Up to 300 mm	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

As the density of the cargo is extremely high, the tanktop may be overstressed unless the cargo is evenly spread across the tanktop to equalize the weight distribution. Due consideration shall be paid to ensure that tanktop is not overstressed during voyage and during loading by a pile of the cargo.

PRECAUTIONS

No special requirements.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

FERRONICKEL

DESCRIPTION

An alloy of iron and nickel.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	4167	0.24
SIZE	CLASS	GROUP
Up to 300 mm	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

As the density of the cargo is extremely high, the tanktop may be overstressed unless the cargo is evenly spread across the tanktop to equalize the weight distribution. Due consideration shall be paid to ensure that tanktop is not overstressed during voyage and during loading by a pile of the cargo.

PRECAUTIONS

No special requirements.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

FERROPHOSPHORUS (including briquettes)

DESCRIPTION

An alloy of iron and phosphorus used in the steel industry.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	5000	(0.2 for briquettes)
SIZE	CLASS	GROUP
Diameter: 2.54 mm	MHB	B

HAZARD

May evolve flammable and toxic gases (e.g. phosphine) in contact with water.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

Segregation as for class 4.3 materials. "Separated from" foodstuffs and class 8 liquids.

HOLD CLEANLINESS

Clean-and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

As the density of the cargo is extremely high, the tanktop may be overstressed unless the cargo is evenly spread across the tanktop to equalize the weight distribution. Due consideration shall be paid to ensure that tanktop is not overstressed during voyage and during loading by a pile of the cargo.

PRECAUTIONS

This cargo shall be kept as dry as reasonably practicable.

VENTILATION

Mechanical ventilation shall be conducted during the voyage for the cargo spaces carrying this cargo. Ventilation fans shall be of certified safe type for use in a flammable atmosphere. They shall normally be run continuously whenever this cargo is on board. Where this is impracticable, they shall be operated as weather permits and in any case for a reasonable period prior to discharge.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

After discharge of this cargo, the cargo spaces shall be swept clean.

Water shall not be used for cleaning of the cargo space which has contained this cargo, because of danger of gas.

EMERGENCY PROCEDURES

SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED

Self-contained breathing apparatus.

EMERGENCY PROCEDURES

Wear self-contained breathing apparatus.

EMERGENCY ACTION IN THE EVENT OF FIRE

Batten down and use CO₂ if available. **Do not use water.**

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAG), as amended.

FERROSILICON UN 1408

*with 30% or more but less than 90% silicon
(including briquettes) (see appendix to this schedule)*

DESCRIPTION

Ferrosilicon is an extremely heavy cargo.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)		STOWAGE FACTOR (m³/t)
Not applicable	1389 to 2083 (1111 to 1538 for briquettes)		0.48 to 0.72 (0.65 to 0.90 for briquettes)
SIZE	CLASS		GROUP
Up to 300 mm Briquettes	4.3	6.1	B

HAZARD

In contact with moisture or water it may evolve hydrogen, a flammable gas which may form explosive mixtures with air and may, under similar circumstances, produce phosphine and arsine, which are highly toxic gases.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

“Separated from” foodstuffs and all class 8 liquids.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable before loading, during loading and during voyage. This cargo shall not be loaded during precipitation. During loading of this cargo all non-working hatches of the cargo spaces to which this cargo are loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code. As the density of the cargo is extremely high, the tanktop may be overstressed unless the cargo is evenly spread across the tanktop to equalize the weight distribution. Due consideration shall be paid to ensure that tanktop is not overstressed during voyage and during loading by a pile of the cargo. Refer to the appendix to this schedule.

PRECAUTIONS

The manufacturer or the shipper shall provide the master with a certificate stating that, after manufacture, the cargo was stored under cover, but exposed to dry weather for not less than three days prior to shipment.

VENTILATION

Continuous mechanical ventilation shall be conducted during the voyage for the cargo spaces carrying this cargo. If maintaining ventilation endangers the ship or the cargo, it may be interrupted unless there is a risk of explosion or other danger due to interruption of the ventilation. In any case mechanical ventilation shall be maintained for a reasonable period prior to discharge. Refer to the appendix to this schedule.

CARRIAGE

For quantitative measurements of hydrogen, phosphine and arsine, suitable detectors for each gas or combination of gases shall be on board while this cargo is carried. The detectors shall be of certified safe type for use in explosive atmosphere. The concentrations of these gases in the cargo spaces carrying this cargo shall be measured regularly, during voyage, and the results of the measurements shall be recorded and kept on board.

DISCHARGE

Refer to the appendix to this schedule.

CLEAN UP

After discharge of this cargo, the cargo spaces shall be swept clean twice.

Water shall not be used for cleaning of the cargo space which has contained this cargo, because of danger of gas.

EMERGENCY PROCEDURES**SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED**

Self-contained breathing apparatus.

EMERGENCY PROCEDURES

Wear self-contained breathing apparatus.

EMERGENCY ACTION IN THE EVENT OF FIRE

Batten down and use CO₂ if available. **Do not use water.**

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAG), as amended.

APPENDIX

GENERAL REQUIREMENTS FOR CARRIAGE OF FERROSILICON

1. Chapter II-2 of SOLAS requires fire-fighter's outfits, full chemical protective suits and self-contained breathing apparatus to be readily available on board.
2. Gas concentrations *shall* be measured, during the voyage, at least once during every eight hours at each outlet ventilator and in any other accessible space adjacent to the cargo space carrying this cargo and the results shall be recorded in the log-book. Facilities shall be provided to make accurate determinations of the gas concentrations at each outlet ventilator without danger to the operator.
3. Ventilation fans shall be in operation at all times from commencement of loading until the cargo space is free of ferrosilicon.
4. The bilge wells shall be in a clean, dry condition before loading. The bilge timbers shall be in good condition and covered with double burlap.
5. The bilge wells shall be opened up and the cargo space washed out after discharging. A gas check shall be made before commencement of washing out.

DETAILED REQUIREMENTS

Prior to loading, the bulkheads to the engine room *shall* be inspected and approved by the competent authority as gastight and the safety of the bilge pumping arrangements shall be approved by the competent authority. Inadvertent pumping through machinery spaces *shall* be avoided.

- (i) Where the bilge suction valve of the cargo space is located in the machinery space the valve shall be checked and the valve lid and seat lapped to a fine finish, as necessary. After re-assembly the valve shall be locked shut and a notice shall be placed adjacent to the valve warning against opening without the master's permission.
- (ii) All pipes passing through the cargo space *shall* be in good order and condition. Hold atmosphere sampling units *shall* be effectively blanked off.
- (iii) Electrical circuits for equipment in cargo spaces which is unsuitable for use in an explosive atmosphere shall be isolated by removal of links in the system other than fuses.
- (iv) The cargo spaces *shall* be ventilated by at least two separate fans which *shall* be explosion-proof and arranged so that the escaping gas flow is separated from electrical cables and components. The total ventilation *shall* be at least 6 air changes per hour, based on an empty cargo space.
- (v) Ventilator trunkings shall be in sound condition and so arranged to preclude interconnection of the atmosphere in the cargo space with other cargo spaces, accommodation or work areas.

Operational Requirements

- (i) Smoking and naked flame shall be prohibited on deck in the vicinity of the cargo space or in the cargo space itself during loading or discharging.
- (ii) Any portable lighting shall be safe for use in an explosive atmosphere.
- (iii) The cargo shall be kept dry and during wet weather conditions cargo handling shall be suspended and the cargo space shall be closed.
- (iv) Sets of self-contained breathing apparatus shall be located and stored for immediate use together with lifeline and a gas detector.
- (v) Prior to commencement of discharging, the atmosphere in the cargo space shall be tested for the presence of toxic and flammable gases.

- (vi) Checks for contaminant gases shall be carried out at 30-minute intervals while persons are in the cargo space.
- (vii) Entry into the cargo space shall be prohibited when gas concentrations exceed the Threshold Limit Values, for phosphine (0.3 ppm) for arsine (0.05 ppm) or where the oxygen level is below 18%.

GASES RELEASES FROM FERROSILICON IMPURITIES WHEN WATER IS ADDED

(i) Arsine

Arsine is a toxic, colourless gas with a garlic like odour.

Toxicity

Arsine is a nerve and blood poison. There is generally a delay before the onset of symptoms (sometimes a day or so). These are at first indefinite.

Symptoms

- 1 Feeling of malaise, difficulty in breathing, severe headache, giddiness, fainting fits, nausea, vomiting and gastric disturbances.
- 2 In severe cases, vomiting may be pronounced, the mucous membranes may have a bluish discolouration and urine is dark and bloodstained. After a day or so there is severe anaemia and jaundice.

Concentration

A concentration of 500 ppm is lethal to humans after exposure of a few minutes, while concentrations of 250 ppm are dangerous to life after 30 minutes exposure. Concentrations of 6.25 to 15.5 ppm are dangerous after exposure of 30 to 60 minutes. A concentration of 0.05 ppm is the threshold long limit to which a person may be exposed.

(ii) Phosphine

Phosphine is colourless, flammable and highly toxic and has the odour of rotting fish.

Toxicity

Phosphine acts on the central nervous system and the blood.

Symptoms

The symptoms exhibited by phosphine poisoning are an oppressed feeling in the chest, headache, vertigo, general debility, loss of appetite and great thirst. Concentrations of 2000 ppm for a few minutes and 400 to 600 ppm are dangerous to life. 0.3 ppm is the maximum concentration tolerable for several hours without symptoms.

No long term exposures to this gas *shall* be permitted.

FERROSILICON

25% to 30% silicon, or 90% or more with silicon (including briquettes) (See appendix to this schedule)

DESCRIPTION

Ferrosilicon is an extremely heavy cargo.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	1389 to 2083 (1111 to 1538 for briquettes)	0.48 to 0.72 (0.65 to 0.90 for briquettes)
SIZE	CLASS	GROUP
Diameter: 2.54 mm	MHB	B

HAZARD

In contact with moisture or water it may evolve hydrogen, a flammable gas which may form explosive mixtures with air and may, under similar circumstances, produce phosphine and arsine, which are highly toxic gases.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

Segregation as required for class 4.3 materials. "Separated from" foodstuffs and all class 8 liquids.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable before loading, during loading and during voyage. This cargo shall not be loaded during precipitation. During loading of this cargo all non-working hatches of the cargo spaces to which this cargo are loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code. Stow evenly across tank tops. Refer to the appendix to this schedule.

PRECAUTIONS

The manufacturer or the shipper shall provide the master with a certificate stating that, after manufacture, the cargo was stored under cover, but exposed to open air for not less than three days prior to shipment.

VENTILATION

Continuous mechanical ventilation shall be conducted during the voyage for the cargo spaces carrying this cargo. If maintaining ventilation endangers the ship or the cargo, it may be interrupted unless there is a risk of explosion or other danger due to interruption of the ventilation. In any case mechanical ventilation shall be maintained for a reasonable period prior to discharge. Refer to the appendix to this schedule.

CARRIAGE

For quantitative measurements of hydrogen, phosphine and arsine, suitable detectors for each gas or combination of gases shall be on board while this cargo is carried. The detectors shall be of certified safe type for use in explosive atmosphere. The concentrations of these gases in the cargo spaces carrying this cargo shall be measured regularly, during voyage, and the results of the measurements shall be recorded and kept on board.

DISCHARGE

Refer to the appendix to this schedule.

CLEAN UP

After discharge of this cargo, the cargo spaces shall be swept clean twice.

Water shall not be used for cleaning of the cargo space which has contained this cargo, because of danger of gas.

EMERGENCY PROCEDURES**SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED**

Self-contained breathing apparatus.

EMERGENCY PROCEDURES

Wear self-contained breathing apparatus.

EMERGENCY ACTION IN THE EVENT OF FIRE

Batten down and use CO₂ if available. Do not use water.

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAG), as amended.

APPENDIX

GENERAL REQUIREMENTS FOR CARRIAGE OF FERROSILICON

1. Two sets of self-contained breathing apparatus shall be carried in the ship in addition to normal fire-fighter's outfit.
2. Gas concentrations *shall* be measured, during the voyage, at least once during every eight hours at each outlet ventilator and in any other accessible space adjacent to the cargo space carrying this cargo and the results shall be recorded in the log-book. Facilities shall be provided to make accurate determinations of the gas concentrations at each outlet ventilator without danger to the operator.
3. Ventilation fans shall be in operation at all times from commencement of loading until the cargo space is free of ferrosilicon.
4. The bilge wells shall be in a clean, dry condition before loading. The bilge timbers shall be in good condition and covered with double burlap.
5. The bilge wells shall be opened up and the cargo space washed out after discharging. A gas check shall be made before commencement of washing out.

DETAILED REQUIREMENTS

Prior to loading, the bulkheads to the engine room *shall* be inspected and approved by the competent authority as gastight. Satisfaction with the safety of the bilge pumping arrangements shall be approved by the competent authority. Inadvertent pumping through machinery spaces *shall* be avoided.

- (i) Where the bilge suction valve of the cargo space is located in the machinery space the valve shall be checked and the valve lid and seat lapped to a fine finish, as necessary. After re-assembly the valve shall be locked shut and a notice shall be placed adjacent to the valve warning against opening without the master's permission.
- (ii) All pipes passing through the cargo space *shall* be in good order and condition. Hold atmosphere sampling units *shall* be effectively blanked off.
- (iii) Electrical circuits for equipment in cargo spaces which is unsuitable for use in an explosive atmosphere shall be isolated by removal of links in the system other than fuses.
- (iv) The cargo spaces *shall* be ventilated by at least two separate fans which *shall* be explosion-proof and arranged so that the escaping gas flow is separated from electrical cables and components. The total ventilation *shall* be at least 6 air changes per hour, based on an empty cargo space.
- (v) Ventilator trunkings shall be in sound condition and so arranged to preclude interconnection of the atmosphere in the cargo space with other cargo spaces, accommodation or work areas.

Operational Requirements

- (i) Smoking and naked flame shall be prohibited on deck in the vicinity of the cargo space or in the cargo space itself during loading or discharging.
- (ii) Any portable lighting shall be safe for use in an explosive atmosphere.
- (iii) The cargo shall be kept dry and during wet weather conditions cargo handling shall be suspended and the cargo space shall be closed.
- (iv) Sets of self-contained breathing apparatus shall be located and stored for immediate use together with lifeline and a gas detector.
- (v) Prior to commencement of discharging, the atmosphere in the cargo space shall be tested for the presence of toxic and flammable gases.

- (vi) Checks for contaminant gases shall be carried out at 30-minute intervals while persons are in the cargo space.
- (vii) Entry into the cargo space shall be prohibited when gas concentrations exceed the Threshold Limit Values, for phosphine (0.3 ppm) for arsine (0.05 ppm) or where the oxygen level is below 18%.

GASES RELEASES FROM FERROSILICON IMPURITIES WHEN WATER IS ADDED

(i) Arsine

Arsine is a toxic, colourless gas with a garlic like odour.

(ii) Phosphine

Phosphine is colourless, flammable and highly toxic and has the odour of rotting fish.

Toxicity

Phosphine acts on the central nervous system and the blood.

Symptoms

The symptoms exhibited by phosphine poisoning are an oppressed feeling in the chest, headache, vertigo, general debility, loss of appetite and great thirst. Concentrations of 2000 ppm for a few minutes and 400 to 600 ppm are dangerous to life. 0.3 ppm is the maximum concentration tolerable for several hours without symptoms.

No long term exposures to this gas *shall* be permitted.

FERROUS METAL BORINGS, SHAVINGS, TURNINGS or CUTTINGS UN 2793
in a form liable to self-heating

DESCRIPTION

Metal drillings usually wet or contaminated with such materials as unsaturated cutting oil, oily rags and other combustible material.

This schedule should **not** apply to consignments of materials which are accompanied by a declaration submitted prior to loading by the shipper and stating that they have no self-heating properties when transported in bulk.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	Various	Various
SIZE	CLASS	GROUP
Not applicable	4.2	B

HAZARD

These materials are liable to self-heat and ignite spontaneously, particularly when in a finely divided form, wet or contaminated with such materials, as unsaturated cutting oil, oily rags and other combustible matter.

Excessive amounts of cast iron borings or organic materials may encourage heating. Self-heating or inadequate ventilation may cause dangerous depletion of oxygen in cargo spaces.

STOWAGE & SEGREGATION

“Separated from” foodstuffs.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

During loading the material shall be compacted in the cargo space as frequently as practicable with a bulldozer or other means. The bilge of each cargo space in which the cargo is loaded shall be kept as dry as practicable. After loading the cargo shall be trimmed to eliminate peaks and compacted. Wooden wet battens and dunnage shall be removed from the cargo space before the cargo is loaded.

PRECAUTIONS

The temperature of this cargo shall be measured prior to and during loading. The temperature of the cargo in the stockyard shall be measured at points between 200 mm and 350 mm from the surface of the cargo pile. This cargo shall only be accepted for loading when the temperature of the cargo prior to loading does not exceed 55°C. If the temperature of the cargo in any cargo

space exceeds 90°C during loading, loading shall be suspended and shall not be recommenced until the temperature of the cargo in all cargo spaces has fallen below 85°C. The ship shall not depart unless the temperature of the cargo in all cargo spaces is below 65°C and has shown a steady or downward trend in temperature for at least eight hours.

VENTILATION

The cargo spaces carrying this cargo shall not be ventilated during voyage.

CARRIAGE

The surface temperature of the cargo shall be monitored and recorded daily during the voyage. Temperature readings shall be taken in such a way as not to require entry into the cargo space or, alternatively if entry is required for this purpose, at least two sets of self-contained breathing apparatus, additional to those required by SOLAS regulation II-2/10.10 should be provided.

DISCHARGE

Entry into the cargo spaces containing this cargo shall only be permitted for trained personnel wearing self-contained breathing apparatus when the main hatches are open and after adequate ventilation is conducted or for personnel using appropriate breathing apparatus.

CLEAN UP

Prior to washing out the residues of this cargo, any oil spillages shall be cleaned from the tank tops and the bilge wells of the cargo spaces for this cargo.

EMERGENCY PROCEDURES

<p><u>SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED</u></p> <p>Self-contained breathing apparatus</p>
<p><u>EMERGENCY PROCEDURES</u></p> <p>Nil</p>
<p><u>EMERGENCY ACTION IN THE EVENT OF FIRE</u></p> <p>Whilst at sea, any rise in surface temperature of the material indicates a self-heating reaction problem. If the temperature should rise to 80°C a potential fire situation is developing and the ship should make for the nearest suitable port. Batten down. Water should not be used at sea. Early application of an inert gas to a smouldering situation may be effective.</p>
<p><u>MEDICAL FIRST AID</u></p> <p>Refer to the Medical First Aid Guide (MFAG), as amended.</p>

REMARK

In port, copious quantities of water may be used, but due consideration should be given to factors affecting the stability of the ship.

FERTILIZERS WITHOUT NITRATES**(non-hazardous)****DESCRIPTION**

Powder and granular. Greenish, brown or beige in colour. Odourless. Very low moisture content (0% to 1%). Hygroscopic.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	714 to 1111	0.90 to 1.40
SIZE	CLASS	GROUP
1 mm to 3 mm	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

This cargo is hygroscopic and will cake if wet.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

No special requirements.

VENTILATION

The cargo spaces carrying this cargo shall not be ventilated during voyage.

CARRIAGE

No special requirements.

DISCHARGE

If this cargo has hardened, it shall be trimmed to avoid the formation of overhangs, as necessary.

CLEAN UP

No special requirements.

FISH (IN BULK)

DESCRIPTION

Fish carried in bulk after freezing.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	-	-
SIZE	CLASS	GROUP
Various	Not applicable	A

HAZARD

Fish carried in bulk may liquefy.
This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Prior to the carriage of this cargo, due consideration shall be paid to consult with the competent authority. The requirement in chapter 7 of this Code, requiring a determination of TML and moisture content declaration may be dispensed with for this cargo.

Bilge wells shall be clean, dry and covered as appropriate, to prevent ingress of the cargo.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

After completion of discharge, attention shall be paid to residues of this cargo, which are liable to decompose resulting in emission of toxic gases and depletion of oxygen.

FISHMEAL (FISHSCRAP), STABILIZED UN 2216

Anti-oxidant treated

*The provisions of this entry should **not** apply to consignments of fishmeal, Group C, which are accompanied by a certificate issued by the competent authority of the country of shipment, stating that the material has no self-heating properties when transported in bulk.*

DESCRIPTION

Brown to greenish-brown material obtained through heating and drying of oily fish. Moisture content: greater than 5% but not exceeding 12%, by mass. Strong odour may affect other cargo. Fat content; not more than 15%, by mass.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	300 to 700	1.5 to 3.0
SIZE	CLASS	GROUP
Not applicable	9	B

HAZARD

Liable to heat spontaneously unless has low fat content or effectively anti-oxidant treated. Liable to cause oxygen depletion in cargo space.

STOWAGE & SEGREGATION

Segregation as required for class 4.2 materials.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

The cargo shall not be accepted for loading when the temperature of the cargo exceeds 35°C or 5°C above the ambient temperature, which ever is higher. The cargo may be loaded without weathering/curing prior to loading.

PRECAUTIONS

1 This cargo shall only be accepted for loading when the stabilization of the cargo is achieved to prevent spontaneous combustion by effective application:

- .1 of between 400 and 1000 mg/kg (ppm) ethoxyquin, or
- .2 of between 1000 and 4000 mg/kg (ppm) butylated hydroxytoluene

at the time of production, within 12 months prior to shipment and anti-oxidant remnant concentration shall be not less than 100 mg/kg (ppm) at the time of shipment.

2 The shipper shall provide the master with a certificate issued by a person recognized by the competent authority of the country of shipment specifying:

- moisture content;
- fat content;
- details of anti-oxidant treatment for meals older than six months;
- anti-oxidant concentrations at the time of shipment, which must exceed 100 mg/kg (ppm);
- total weight of the consignment;
- temperature of fishmeal at the time of dispatch from the factory; and
- date of production.

A suitable equipment for quantitative measurement of the concentration of oxygen in the cargo space shall be provided on board the ship.

VENTILATION

Surface ventilation either natural or mechanical shall be conducted during the voyage, as necessary, for the cargo spaces carrying this cargo. If the temperature of the cargo exceeds 55°C and continues to increase, ventilation to the cargo space shall be stopped. If self-heating continues, then carbon dioxide or inert gas shall be introduced to the cargo spaces.

CARRIAGE

This cargo shall be kept as cool and dry as reasonably practicable. The temperature of this cargo shall be measured at eight-hour intervals during the voyage. The results of measurements shall be recorded and kept on board.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

EMERGENCY PROCEDURES

SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED

Self-contained breathing apparatus.

EMERGENCY PROCEDURES

Wear self-contained breathing apparatus.

EMERGENCY ACTION IN THE EVENT OF FIRE

Batten down; use ship's fixed fire-fighting installation, if fitted.

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAG), as amended.

FLUORSPAR**DESCRIPTION**

Yellow, green or purple crystals. Coarse dust.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	Dry: 1429 to 1786 Wet: 1786 to 2128	Dry: 0.56 to 0.70 Wet: 0.47 to 0.56
SIZE	CLASS	GROUP
Not applicable	MHB	A and B

HAZARD

This material may liquefy if shipped at moisture content in excess of their Transportable moisture limit. See section 7 of the Code. Harmful and irritating by dust inhalation.

STOWAGE & SEGREGATION

“Separated from” foodstuffs and all class 8 materials (goods in packaged form and solid bulk materials).

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

When a cargo is carried in a ship other than specially constructed or fitted cargo ship complying with the requirements in subsection 7.3.2 of this Code, the following provisions shall be complied with:

- .1 the moisture content of the cargo shall be kept less than its TML during voyage;
- .2 unless expressly provided otherwise in this individual schedule, the cargo shall not be handled during precipitation;
- .3 unless expressly provided otherwise in this individual schedule, during handling of the cargo, all non-working hatches of the cargo spaces into which the cargo is loaded or to be loaded shall be closed;
- .4 the cargo may be handled during precipitation provided that the actual moisture content of the cargo is sufficiently less than its TML so that the actual moisture content is not liable to be increased beyond the TML by the precipitation; and
- .5 the cargo in a cargo space may be discharged during precipitation provided that the total amount of the cargo in the cargo space is to be discharged in the port.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who

may be exposed to the dust of the cargo, shall wear goggles or other equivalent dust eye-protection and dust filter masks. Those persons shall wear protective clothing, as necessary. Protect machinery, accommodation and bilge wells from dust.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

EMERGENCY PROCEDURES

SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED

Nil

EMERGENCY PROCEDURES

Nil

EMERGENCY ACTION IN THE EVENT OF FIRE

Nil

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAG), as amended.

FLY ASH

DESCRIPTION

Fly Ash is the light, finely divided dusty fine powder residue from coal and oil fired power stations. Do not confuse with Calcined Pyrites.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	794	1.26
SIZE	CLASS	GROUP
Not applicable	Not applicable	C

HAZARD

May shift when aerated.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

“Separated from” foodstuffs.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

The ship carrying this cargo shall not depart until the cargo has settled.

PRECAUTIONS

Bilge wells shall be clean, dry and covered as appropriate, to prevent ingress of the cargo. Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear protective clothing, goggles or other equivalent dust eye-protection and dust filter masks, as necessary

VENTILATION

No special requirements.

CARRIAGE

After the completion of loading of this cargo, the hatches of the cargo spaces shall be sealed. All vents and access ways to the cargo spaces shall be shut during the voyage. Bilges in the cargo spaces carrying this cargo shall not be pumped unless absolutely necessary.

DISCHARGE

No special requirements.

CLEAN UP

In the case that the residues of this cargo are to be washed out, the cargo spaces and the other structures and equipment which may have been in contact with this cargo or its dust shall be thoroughly swept prior to washing out. Particular attention shall be paid to bilge wells and framework in the cargo spaces. After complying with the foregoing requirements, the cargo spaces shall be washed out and the water for washing out shall be pumped out in an appropriate manner, except in the case that the BCSN of the cargo to be loaded subsequent to discharge is FLY ASH.

GRANULATED SLAG

DESCRIPTION

Residue from steelworks blast furnaces with a dirty grey, lumpy appearance. Iron: 0.5%.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	1111	0.90
SIZE	CLASS	GROUP
Up to 5 mm	Not applicable	C

HAZARD

No special hazards. Slag dust is fine and has abrasive characteristics.
This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

This cargo shall not be accepted for loading when the temperature of the cargo exceeds 50°C.

PRECAUTIONS

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear protective clothing, goggles or other equivalent dust eye-protection and dust filter masks, as necessary.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

GRANULATE TYRE RUBBER**DESCRIPTION**

Fragmented rubber tyre material cleaned and free from other materials

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	555	1.8
SIZE	CLASS	GROUP
Granular, up to 10 mm	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

During handling and carriage no hotwork, burning and smoking shall be permitted in the vicinity of the cargo spaces containing this cargo. Prior to shipment, a certificate shall be given to the master by the shipper stating that this cargo consists of clean rubber material only. When the planned interval between the commencement of loading and the completion of discharge of this cargo exceeds 5 days, the cargo shall not be accepted for loading unless the cargo is to be carried in cargo spaces fitted with a fixed gas fire extinguishing system. The administration may, if it considers that the planned voyage does not exceed 5 days from the commencement of loading to the completion of discharge, exempt from the requirements of a fitted fixed gas fire-extinguishing system in the cargo spaces for the carriage of this cargo.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

GYPSUM

DESCRIPTION

A natural Hydrated Calcium Sulphate. Insoluble in water. It is loaded as a fine powder that aggregates into lumps. Gypsum is not water soluble. Average moisture content is 1% to 2%.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	1282 to 1493	0.67 to 0.78
SIZE	CLASS	GROUP
Up to 100 mm	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

No special requirements.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

Prior to washing out the residues of this cargo, the decks and the cargo spaces shall be shovelled and swept clean, because washing out of this cargo is difficult.

ILMENITE CLAY**DESCRIPTION**

Very heavy black clay. Abrasive. May be dusty. Titanium, silicate and iron oxides are obtained from ilmenite clay. Moisture content: 10% to 20% .

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	2000 to 2500	0.4 to 0.5
SIZE	CLASS	GROUP
Up to 0.15 mm	Not applicable	A

HAZARD

The material may liquefy if shipped at a moisture content in excess of its Transportable Moisture Limit (TML).

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

When a cargo is carried in a ship other than specially constructed or fitted cargo ship complying with the requirements in subsection 7.3.2 of this Code, the following provisions shall be complied with:

- .1 the moisture content of the cargo shall be kept less than its TML during voyage;
- .2 unless expressly provided otherwise in this individual schedule, the cargo shall not be handled during precipitation;
- .3 unless expressly provided otherwise in this individual schedule, during handling of the cargo, all non-working hatches of the cargo spaces into which the cargo is loaded or to be loaded shall be closed;
- .4 the cargo may be handled during precipitation provided that the actual moisture content of the cargo is sufficiently less than its TML so that the actual moisture content is not liable to be increased beyond the TML by the precipitation; and
- .5 the cargo in a cargo space may be discharged during precipitation provided that the total amount of the cargo in the cargo space is to be discharged in the port.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

As the density of the cargo is extremely high, the tanktop may be overstressed unless the cargo is evenly spread across the tanktop to equalize the weight distribution. Due consideration shall be paid to ensure that tanktop is not overstressed during voyage and during loading by a pile of the cargo.

PRECAUTIONS

Bilge wells shall be clean, dry and covered as appropriate, to prevent ingress of the cargo.

VENTILATION

No special requirements.

CARRIAGE

The appearance of the surface of this cargo shall be checked regularly during voyage. If free water above the cargo or fluid state of the cargo is observed during voyage, the master shall take appropriate actions to prevent cargo shifting and potential capsize of the ship, and give consideration to seeking emergency entry into a place of refuge.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

ILMENITE SAND

This cargo can be categorized as Group A or C.

DESCRIPTION

Very heavy black sand. Abrasive. May be dusty. Titanium, monazite and zinc ore are obtained from ilmenite sand. The moisture content of this cargo in Group C is 1% to 2%. When moisture content is above 2%, this cargo is to be categorized in Group A

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	2380 to 3225	0.31 to 0.42
SIZE	CLASS	GROUP
Up to 0.15 mm	Not applicable	A or C

HAZARD

This cargo in Group C has no special hazards. This cargo in Group A may liquefy if shipped at a moisture content in excess of its TML. See section 7 of this Code.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable before loading, during loading and during voyage. This cargo shall not be loaded during precipitation. During loading of this cargo all non-working hatches of the cargo spaces to which this cargo are loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

As the density of the cargo is extremely high, the tanktop may be overstressed unless the cargo is evenly spread across the tanktop to equalize the weight distribution. Due consideration shall be paid to ensure that tanktop is not overstressed during voyage and during loading by a pile of the cargo.

PRECAUTIONS

Bilge wells shall be clean, dry and covered as appropriate, to prevent ingress of the cargo.

VENTILATION

No special requirements.

CARRIAGE

The appearance of the surface of this cargo shall be checked regularly during voyage. If free water above the cargo or fluid state of the cargo is observed during voyage, the master shall take appropriate actions to prevent cargo shifting and potential capsize of the ship, and give consideration to seeking emergency entry into a place of refuge.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

IRON ORE**DESCRIPTION**

Iron ore varies in colour from dark grey to rusty red varies in iron content from haematite, (high grade ore) to ironstone of the lower commercial ranges. Moisture content: 0% to 16%. Mineral Concentrates are different cargoes (see IRON CONCENTRATE).

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	1250 to 3448	0.29 to 0.80
SIZE	CLASS	GROUP
Up to 250 mm	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

Iron ore cargoes may affect magnetic compasses.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirement.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

As the density of the cargo is extremely high, the tanktop may be overstressed unless the cargo is evenly spread across the tanktop to equalize the weight distribution. Due consideration shall be paid to ensure that tanktop is not overstressed during voyage and during loading by a pile of the cargo.

PRECAUTIONS

Loading rates of this cargo are normally very high. Due consideration shall be paid on the ballasting operation to develop the loading plan required by regulation VI/9.3 in SOLAS Convention.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

IRON ORE PELLETS**DESCRIPTION**

Pellets are approximately spherical lumps formed by crushing iron ore into a powder. This iron oxide is formed into pellets by using clay as a binder and then hardening by firing in kilns at 1315°C. Moisture content: 0% to 2%.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	1900 to 2400	0.45 to 0.52
SIZE	CLASS	GROUP
Up to 20 mm	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

As the density of the cargo is extremely high, the tanktop may be overstressed unless the cargo is evenly spread across the tanktop to equalize the weight distribution. Due consideration shall be paid to ensure that tanktop is not overstressed during voyage and during loading by a pile of the cargo.

PRECAUTIONS

No special requirements.

Bilge wells shall be clean, dry and covered as appropriate, to prevent ingress of the cargo.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

**IRON OXIDE, SPENT or
IRON SPONGE, SPENT UN 1376**
obtained from coal gas purification

DESCRIPTION

Powdery material, black, brown, red or yellow. Strong odour may taint other cargo.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	2222	0.45
SIZE	CLASS	GROUP
Up to 20 mm	4.2	B

HAZARD

Liable to heat and ignite spontaneously, especially if contaminated with oil or moisture. Toxic gases: hydrogen sulphide, sulphur dioxide, and hydrogen cyanide may be produced. Dust may cause an explosion hazard. Liable to reduce the oxygen in the cargo space.

STOWAGE & SEGREGATION

“Separated from” foodstuffs.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

As the density of the cargo is extremely high, the tanktop may be overstressed unless the cargo is evenly spread across the tanktop to equalize the weight distribution. Due consideration shall be paid to ensure that tanktop is not overstressed during voyage and during loading by a pile of the cargo.

PRECAUTIONS

Prior to loading, the shipper or the manufacturer shall provide the master with a certificate stating that the cargo has been cooled and then weathered for not less than 8 weeks prior to shipment.

VENTILATION

Surface ventilation only, either natural or mechanical, shall be conducted, as necessary, during the voyage for this cargo.

CARRIAGE

For quantitative measurements of oxygen and hydrogen cyanide, suitable detectors for each gas or combination of gases shall be on board while this cargo is carried. The detectors shall be suitable for use in an atmosphere without oxygen and of certified safe type for use in explosive atmosphere. The concentrations of these gases in the cargo spaces carrying this cargo shall be measured regularly, during voyage, and the results of the measurements shall be recorded and kept on board.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

EMERGENCY PROCEDURES

SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED

Protective clothing (gloves, boots, coveralls, headgear).
Self-contained breathing apparatus.
Spray nozzles.

EMERGENCY PROCEDURES

Wear protective clothing and self-contained breathing apparatus.

EMERGENCY ACTION IN THE EVENT OF FIRE

Batten down; use ship's fixed fire-fighting installation if available. Exclusion of air may be sufficient to control fire.

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAG), as amended.

IRONSTONE

DESCRIPTION

Ore. Moisture: 1% to 2%

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	2564	0.39
SIZE	CLASS	GROUP
75 mm	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

The cargo shall be trimmed in accordance with the cargo information required by section 4 of this Code. If doubt exists, trim reasonably level to the boundaries of the cargo space so as to minimize the risk of shifting and to ensure that adequate stability will be maintained during the voyage.

As the density of the cargo is extremely high, the tanktop may be overstressed unless the cargo is evenly spread across the tanktop to equalize the weight distribution. Due consideration shall be paid to ensure that tanktop is not overstressed during voyage and during loading by a pile of the cargo.

PRECAUTIONS

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear protective clothing, goggles or other equivalent dust eye-protection and dust filter masks, as necessary.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

LABRADORITE

DESCRIPTION

A lime-soda rock form of felspar. May give off dust.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	1667	0.60
SIZE	CLASS	GROUP
Lumps: 50 mm to 300 mm	Not applicable	C

HAZARD

No special hazards. This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable before loading, during loading and during voyage. This cargo shall not be loaded during precipitation. During loading of this cargo all non-working hatches of the cargo spaces to which this cargo are loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear protective clothing, goggles or other equivalent dust eye-protection and dust filter masks, as necessary.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

LEAD NITRATE UN 1469**DESCRIPTION**

White crystals. Soluble in water. Derived from the action of nitrate acid on lead.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)	
Not applicable	-	-	
SIZE	CLASS	SUBSIDIARY RISK	GROUP
Not applicable	5.1	6.1	B

HAZARD

Toxic if swallowed or dust inhaled.

Not combustible by itself, but mixtures with combustible materials, are easily ignited and burn fiercely.

STOWAGE & SEGREGATION

“Separated from” foodstuffs.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable before loading, during loading and during voyage. This cargo shall not be loaded during precipitation. During loading of this cargo all non-working hatches of the cargo spaces to which this cargo are loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Bilge wells shall be clean, dry and covered as appropriate, to prevent ingress of the cargo. Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear goggles or other equivalent dust eye-protection and dust filter masks. Those persons shall wear protective clothing, as necessary.

VENTILATION

Natural surface ventilation shall be conducted during the voyage, as necessary, for the cargo spaces carrying this cargo.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

EMERGENCY PROCEDURES

SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED

Protective clothing (gloves, coveralls, headgear).
Self-contained breathing apparatus.
Spray nozzles.

EMERGENCY PROCEDURES

Wear protective clothing and self-contained breathing apparatus.

EMERGENCY ACTION IN THE EVENT OF FIRE

Use copious quantities of water, which is best applied in the form of a spray to avoid disturbing the surface of the material. The material may fuse or melt, in which condition application of water may result in extensive scattering of the molten materials. Exclusion of air or the use of CO₂ will not control the fire. Due consideration should be given to the effect on the stability of the ship due to accumulated water.

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAG), as amended.

LEAD ORE**DESCRIPTION**

Heavy soft grey solid material.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	1493 to 4167	0.24 to 0.67
SIZE	CLASS	GROUP
Powder	Not applicable	C

HAZARD

Toxic, with acids evolves highly toxic vapour.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

“Separated from” all class 8 liquids.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable before loading, during loading and during voyage. This cargo shall not be loaded during precipitation. During loading of this cargo all non-working hatches of the cargo spaces to which this cargo are loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

As the density of the cargo is extremely high, the tanktop may be overstressed unless the cargo is evenly spread across the tanktop to equalize the weight distribution. Due consideration shall be paid to ensure that tanktop is not overstressed during voyage and during loading by a pile of the cargo.

PRECAUTIONS

No special requirements.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

LIME (UNSLAKED)

DESCRIPTION

White or greyish-white in colour.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	-	-
SIZE	CLASS	GROUP
Lump	MHB	B

HAZARD

Unslaked lime combines with water to form calcium hydroxide (hydrated lime) or magnesium hydroxide. This reaction develops a great deal of heat which may be sufficient to cause ignition of nearby combustible materials. This is not combustible or has a low fire-risk corrosive to eyes and mucous membranes.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

“Separated from” all packaged dangerous goods and solid bulk cargoes in Group B.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

This cargo shall be kept as dry as practicable. Bilge wells shall be clean, dry and covered as appropriate, to prevent ingress of the cargo. Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear goggles or other equivalent dust eye-protection and dust filter masks. Those persons shall wear protective clothing, as necessary.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

Do not discharge during precipitation.

CLEAN UP

No special requirements.

EMERGENCY PROCEDURES

SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED

Nil

EMERGENCY PROCEDURES

Nil

EMERGENCY ACTION IN THE EVENT OF FIRE

Nil (non-combustible).
Do not use water, if involved in a fire.

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAG), as amended.

LIMESTONE

DESCRIPTION

Limestone varies in colour from cream through white to medium dark grey (when freshly broken).

Moisture: up to 4%.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	1190 to 1493	0.67 to 0.84
SIZE	CLASS	GROUP
Fines to 90 mm	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Bilge wells shall be clean, dry and covered as appropriate, to prevent ingress of the cargo.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

LINTED COTTON SEED

with not more than 9% moisture and not more than 20.5% oil

DESCRIPTION

Cottonseed with short cotton fibres adhering to the kernel after approximately 90% – 98% of the cotton has been removed by machine.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	490	2.02
SIZE	CLASS	GROUP
-	MHB	B

HAZARD

May self-heat and deplete oxygen in cargo space.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Entry into the cargo space for this cargo shall not be permitted until the cargo space has been ventilated and the atmosphere tested for concentration of oxygen.

VENTILATION

No special requirements.

CARRIAGE

Hatches should be weathertight to prevent the ingress of water.

DISCHARGE

If this cargo has hardened, it shall be trimmed to avoid the formation of overhanging faces, as necessary.

CLEAN UP

No special requirements.

EMERGENCY PROCEDURES

SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED

Self-contained breathing apparatus.

EMERGENCY PROCEDURES

Wear self-contained breathing apparatus.

EMERGENCY ACTION IN THE EVENT OF FIRE

Batten down; use ship's fixed fire-fighting installation, if fitted.

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAG), as amended.

MAGNESIA (DEADBURNED)**DESCRIPTION**

Manufactured in briquette form and is usually white, brown or grey. It is very similar in size, appearance and handling to gravel and is dry and dusty. Deadburned magnesia is natural magnesite calcined at very high temperatures, which results in a non-reactive magnesium oxide, which does not hydrate or produce spontaneous heat.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	2000	0.5
SIZE	CLASS	GROUP
Fines to approx 30 mm	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Prior to loading, the shipper or the manufacturer shall provide the master with a declaration stating that the cargo has been sufficiently heat-treated and is ready for loading.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

MAGNESIA (UNSLAKED)

DESCRIPTION

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	1250	0.80
SIZE	CLASS	GROUP
Fines to 90 mm	MHB	B

HAZARD

Combines with water to form magnesium hydroxide with an expansion in volume and a release of heat. May ignite materials with low ignition temperatures. Similar to LIME (UNSLAKED) but is less reactive. Corrosive to eyes and mucous membranes.
This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

“Separated from” all packaged dangerous goods and solid bulk cargoes in Group B.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear goggles or other equivalent dust eye-protection and dust filter masks. Those persons shall wear protective clothing, as necessary.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

Do not discharge during precipitation.

CLEAN UP

No special requirements.

EMERGENCY PROCEDURES

SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED

Nil

EMERGENCY PROCEDURES

Nil

EMERGENCY ACTION IN THE EVENT OF FIRE

Nil (non-combustible).
Do not use water if cargo is involved in a fire.

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAG), as amended.

MAGNESITE, natural

DESCRIPTION

Magnesite is white to yellow in colour.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	1429	0.7
SIZE	CLASS	GROUP
3 mm to 30 mm	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

No special requirements.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

MAGNESIUM NITRATE UN 1474

DESCRIPTION

White crystals, soluble in water. Hygroscopic.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	-	-
SIZE	CLASS	GROUP
Not applicable	5.1	B

HAZARD

Although non-combustible by itself, mixtures with combustible material are easily ignited and may burn fiercely.

This cargo is hygroscopic and will cake if wet.

STOWAGE & SEGREGATION

“Separated from” foodstuffs.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

No special requirements.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

If this cargo has hardened, it shall be trimmed to avoid the formation of overhangs, as necessary.

CLEAN UP

No special requirements.

EMERGENCY PROCEDURES

SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED

Protective clothing (gloves, boots, coveralls, headgear).
Self-contained breathing apparatus.
Spray nozzles.

EMERGENCY PROCEDURES

Wear protective clothing and self-contained breathing apparatus.

EMERGENCY ACTION IN THE EVENT OF FIRE

Use copious quantities of water, which is best applied in the form of a spray to avoid disturbing the surface of the material. The material may fuse or melt, in which condition application of water may result in extensive scattering of the molten materials. Exclusion of air or the use of CO₂ will not control the fire. Due consideration should be given to the effect on the stability of the ship due to the accumulated water.

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAG), as amended.

REMARKS

Material is non-combustible unless contaminated.

MANGANESE ORE**DESCRIPTION**

Manganese ore is black to brownish black in colour. It is a very heavy cargo.

Moisture content: up to 15% .

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	1429 to 3125	fines to 0.32 lumps to 0.70
SIZE	CLASS	GROUP
Fine dust to 250 mm	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

As the density of the cargo is extremely high, the tanktop may be overstressed unless the cargo is evenly spread across the tanktop to equalize the weight distribution. Due consideration shall be paid to ensure that tanktop is not overstressed during voyage and during loading by a pile of the cargo.

PRECAUTIONS

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear protective clothing, goggles or other equivalent dust eye-protection and dust filter masks, as necessary.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

MARBLE CHIPS

DESCRIPTION

Dry, dusty, white to grey lumps, particles and powder mixed with a small amount of gravel and pebbles.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	654	1.53
SIZE	CLASS	GROUP
Not applicable	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear protective clothing, goggles or other equivalent dust eye-protection and dust filter masks, as necessary.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

METAL SULPHIDE CONCENTRATES

(See also Mineral Concentrates schedule)

DESCRIPTION

Mineral concentrates are refined ores in which the valuable components have been enriched by eliminating the bulk of waste materials. Generally the particle size is small although agglomerates sometimes exist in concentrates which have not been freshly produced.

The most common concentrates in this category are: zinc concentrates, lead concentrates, copper concentrates and low grade middling concentrates.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	1790 to 3230	0.31 to 0.56
SIZE	CLASS	GROUP
Various	MHB	A and B

HAZARD

Some sulphide concentrates are liable to oxidation and may have a tendency to self-heat, with associated oxygen depletion and emission of toxic fumes. Some materials may present corrosion problems.

When a Metal Sulphide Concentrate is considered as presenting a low fire-risk, the carriage of such cargo on a ship not fitted with a fixed gas fire extinguishing system should be subject to the Administration's authorization as provided by SOLAS regulation II-2/10.7.1.4.

STOWAGE & SEGREGATION

Unless determined by the competent authority, segregation as required for class 4.2 materials. "Separated from" foodstuffs and all class 8 acids.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

When a cargo is carried in a ship other than specially constructed or fitted cargo ship complying with the requirements in subsection 7.3.2 of this Code, the following provisions shall be complied with:

- .1 the moisture content of the cargo shall be kept less than its TML during voyage;
- .2 unless expressly provided otherwise in this individual schedule, the cargo shall not be handled during precipitation;
- .3 unless expressly provided otherwise in this individual schedule, during handling of the cargo, all non-working hatches of the cargo spaces into which the cargo is loaded or to be loaded shall be closed;
- .4 the cargo may be handled during precipitation provided that the actual moisture content of the cargo is sufficiently less than its TML so that the actual moisture content is not liable to be increased beyond the TML by the precipitation; and
- .5 the cargo in a cargo space may be discharged during precipitation provided that the total amount of the cargo in the cargo space is to be discharged in the port.

LOADING

This cargo shall be trimmed to ensure that the height difference between peaks and troughs does not exceed 5% of the ship's breadth and that the cargo slopes uniformly from the hatch boundaries to the bulkheads and no shearing faces remain to collapse during voyage, in particular on smaller ships, i.e., 100 m long or less.

As the density of the cargo is extremely high, the tanktop may be overstressed unless the cargo is evenly spread across the tanktop to equalize the weight distribution. Due consideration shall be paid to ensure that the tanktop is not overstressed during the voyage and during loading by a pile of the cargo.

PRECAUTIONS

Entry into the cargo space for this cargo shall not be permitted until the cargo space has been ventilated and the atmosphere tested for concentration of oxygen. Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear goggles or other equivalent dust eye-protection and dust filter masks. Those persons shall wear protective clothing, as necessary.

VENTILATION

The cargo spaces carrying this cargo shall not be ventilated during voyage.

CARRIAGE

The appearance of the surface of this cargo shall be checked regularly during voyage. If free water above the cargo or fluid state of the cargo is observed during voyage, the master shall take appropriate actions to prevent cargo shifting and potential capsize of the ship, and give consideration to seeking emergency entry into a place of refuge. For quantitative measurements of oxygen and toxic fumes liable to be evolved by the cargo, suitable detectors for each gas and fume or combination of these shall be on board while this cargo is carried. The detectors shall be suitable for use in an atmosphere without oxygen. The concentrations of these gases in the cargo spaces carrying this cargo shall be measured regularly, during voyage, and the results of the measurements shall be recorded and kept on board.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

EMERGENCY PROCEDURES

SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED

Self-contained breathing apparatus.

EMERGENCY PROCEDURES

Wear self-contained breathing apparatus.

EMERGENCY ACTION IN THE EVENT OF FIRE

Batten down; use ship's fixed fire-fighting installation.
Exclusion of air may be sufficient to control the fire. **Do not use water.**

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAG), as amended.

REMARKS

Fire may be indicated by the smell of sulphur dioxide.

Mineral Concentrates

(See Bulk Cargo Shipping Names below)

CEMENT COPPER	LEAD CONCENTRATE	SILVER LEAD CONCENTRATE
COPPER CONCENTRATE	LEAD ORE RESIDUE	SLIG (iron ore)
IRON CONCENTRATE	LEAD SILVER	ZINC AND LEAD CALCINES
IRON CONCENTRATE	CONCENTRATE	(mixed)
(pellet feed, sinter feed)	MANGANESE	ZINC AND LEAD MIDDINGS
IRON CONCENTRATE	CONCENTRATE	ZINC CONCENTRATE
(sinter feed)	NEFELENE SYENITE	ZINC SINTER
LEAD AND ZINC CALCINES	(mineral)	ZINC SLUDGE
(mixed)	NICKEL CONCENTRATE	
LEAD AND ZINC MIDDINGS	PENTAHYDRATE CRUDE	
	PYRITES	
	PYRITIC ASHES (iron)	
	PYRITIC CINDERS	

All known Bulk Cargo Shipping Names (BCSN) of mineral concentrates are listed above but the list is not exhaustive. See also the entries for Metal Sulphide Concentrates.

DESCRIPTION

Mineral concentrates are refined ores in which valuable components have been enriched by eliminating the bulk of waste materials.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	1754 to 3030	0.33 to 0.57
SIZE	CLASS	GROUP
Various	Not applicable	A

HAZARD

The above materials may liquefy if shipped at moisture content in excess of their Transportable moisture limit (TML). See section 7 of the Code. These cargoes are non-combustible or have low fire-risks.

This cargo will decompose burlap or canvas cloth covering bilge wells. Continuous carriage of this cargo may have detrimental structural effects over a long period of time.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

When a cargo is carried in a ship other than specially constructed or fitted cargo ship complying with the requirements in subsection 7.3.2 of this Code, the following provisions shall be complied with:

- .1 the moisture content of the cargo shall be kept less than its TML during voyage;
- .2 unless expressly provided otherwise in this individual schedule, the cargo shall not be handled during precipitation;
- .3 unless expressly provided otherwise in this individual schedule, during handling of the cargo, all non-working hatches of the cargo spaces into which the cargo is loaded or to be loaded shall be closed;
- .4 the cargo may be handled during precipitation provided that the actual moisture content of the cargo is sufficiently less than its TML so that the actual moisture content is not liable to be increased beyond the TML by the precipitation; and
- .5 the cargo in a cargo space may be discharged during precipitation provided that the total amount of the cargo in the cargo space is to be discharged in the port.

LOADING

This cargo shall be trimmed to ensure that the height difference between peaks and troughs does not exceed 5% of the ship's breadth and that the cargo slopes uniformly from the hatch boundaries to the bulkheads and no shearing faces remain to collapse during voyage, in particular on smaller ships, i.e., 100 m long or less.

As the density of the cargo is extremely high, the tanktop may be overstressed unless the cargo is evenly spread across the tanktop to equalize the weight distribution. Due consideration shall be paid to ensure that the tanktop is not overstressed during the voyage and during loading by a pile of the cargo.

PRECAUTIONS

Bilge wells shall be clean, dry and covered as appropriate, to prevent ingress of the cargo. Bilge system of a cargo space to which this cargo is to be loaded shall be tested to ensure it is working.

VENTILATION

The cargo spaces carrying this cargo shall not be ventilated during voyage.

CARRIAGE

The appearance of the surface of this cargo shall be checked regularly during voyage. If free water above the cargo or fluid state of the cargo is observed during voyage, the master shall take appropriate actions to prevent cargo shifting and potential capsize of the ship, and give consideration to seeking emergency entry into a place of refuge.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

MONOAMMONIUM PHOSPHATE (M.A.P.)**DESCRIPTION**

MAP is odourless and comes in the form of brownish-grey granules. It can be very dusty. Hygroscopic.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
35° to 40°	826 to 1000	1.0 to 1.21
SIZE	CLASS	GROUP
Not applicable	Not applicable	C

HAZARD

Bulk MAP has a pH of 4.5 and in the presence of moisture content can be highly corrosive.

This cargo is non-combustible or has a low fire-risk.

This cargo is hygroscopic and will cake if wet.

This cargo will decompose burlap or canvas cloth covering bilge wells. Continuous carriage of this cargo may have detrimental structural effects over a long period of time.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Protect machinery, accommodation and equipment from dust.

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear goggles or other equivalent dust eye-protection and dust filter masks. Those persons shall wear protective clothing, as necessary.

VENTILATION

The cargo spaces carrying this cargo shall not be ventilated during voyage.

CARRIAGE

Condensation in the cargo spaces carrying this cargo, sweating of this cargo and entering of water from hatch covers to the cargo spaces shall be checked regularly during the voyage. Due attention shall be paid to the sealing of hatches of the cargo spaces.

DISCHARGE

If this cargo has hardened, it shall be trimmed to avoid the formation of overhangs, as necessary.

CLEAN UP

After discharge of this cargo, particular attention shall be paid to bilge wells of the cargo spaces.

PEANUTS (in shell)

DESCRIPTION

An edible, tan coloured nut. Variable moisture content. Extremely dusty.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	304	3.29
SIZE	CLASS	GROUP
Not applicable	Not applicable	C

HAZARD

May heat spontaneously.
This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

“Away from” sources of heat.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear protective clothing, goggles or other equivalent dust eye-protection and dust filter masks, as necessary.

VENTILATION

The cargo spaces carrying this cargo shall not be ventilated during voyage.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

PEAT MOSS

DESCRIPTION

Surface mined from mires, bogs, fens, muskeg and swamps. Types include moss peat, sedge peat and grass peat. Physical properties depend on organic matter, water and air content, botanical decomposition and degree of decomposition.

May range from a highly fibrous cohesive mass of plant remains which when squeezed in its natural state exudes clear to slightly coloured water, to a well decomposed, largely amorphous material with little or no separation of liquid from solids when squeezed.

Typically air-dried peat has low density, high compressibility and high water content; in its natural state it can hold 90 percent or more of water by weight of water when saturated.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	80 to 500	2 to 12.5
SIZE	CLASS	GROUP
Fine Powder	MHB	A and B

HAZARD

Oxygen depletion and an increase in carbon dioxide in cargo and adjacent spaces.

Risk of dust explosion when loading. Caution should be exercised when walking or landing heavy machinery on the surface of uncompressed Peat Moss.

Peat Moss having a moisture content of more than 80% by weight should only be carried on specially fitted or constructed ships (see paragraphs 7.2.2 to 7.2.4 of this Code).

Dust may cause eye, nose and respiratory irritation.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

Prior to loading, this cargo shall be stockpiled under cover to effect drainage for reduction of moisture content. This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Bilge wells shall be clean, dry and covered as appropriate, to prevent ingress of the cargo.

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo.

Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who

may be exposed to the dust of the cargo, shall wear goggles or other equivalent dust eye-protection and dust filter masks. Those persons shall wear protective clothing, as necessary. All personnel of the ship carrying this cargo and all personnel involved in handling of this cargo shall be cautioned that washing hands before eating or smoking and prompt treatment of cuts and scrapes are necessary in case of contact with this cargo or its dust. Entry of personnel into cargo spaces shall not be permitted until tests have been carried out and it has been established that the oxygen content has been restored to a normal level.

VENTILATION

Surface ventilation only, either natural or mechanical, shall be conducted, as necessary, during the voyage for this cargo.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

EMERGENCY PROCEDURES

<p><u>SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED</u></p> <p>Nil</p>
<p><u>EMERGENCY PROCEDURES</u></p> <p>Nil</p> <p><u>EMERGENCY ACTION IN THE EVENT OF FIRE</u></p> <p>Batten down; use ship's fixed fire-fighting installation if fitted. Exclusion of air may be sufficient to control fire.</p> <p><u>MEDICAL FIRST AID</u></p> <p>Refer to the Medical First Aid Guide (MFAG), as amended.</p>

PEBBLES (sea)

DESCRIPTION

Round pebbles. Rolls very easily.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	1695	0.59
SIZE	CLASS	GROUP
30 mm to 110 mm	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

This cargo shall be loaded carefully to prevent damage to the tanktop.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

PELLETS (concentrates)

DESCRIPTION

Concentrate ore which has been pelletized. Moisture up to 6%.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	2128	0.47
SIZE	CLASS	GROUP
10 mm approximately	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

No special requirements.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

PERLITE ROCK

DESCRIPTION

Clay-like and dusty. Light grey. Odourless. Moisture: 0.5% to 1%

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	943 to 1020	0.98 to 1.06
SIZE	CLASS	GROUP
Not applicable	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear protective clothing, goggles or other equivalent dust eye-protection and dust filter masks, as necessary.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

PETROLEUM COKE (calcined or uncalcined)**DESCRIPTION**

Black, finely divided residue from petroleum refining in the form of powder and small pieces. The provisions of this schedule should not apply to materials having a temperature below 55°C when loaded.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	599 to 800	1.25 to 1.67
SIZE	CLASS	GROUP
Powder to small pieces	MHB	B

HAZARD

Uncalcined petroleum coke is liable to heat and ignite spontaneously when not loaded and transported under the provisions of this entry.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

“Separated from” foodstuffs.

“Separated longitudinally by an intervening complete compartment or hold from” all goods of class 1, Divisions 1.1 and 1.5.

“Separated by a complete compartment or hold from” all other hazardous materials and dangerous goods (goods in packaged form and solid bulk materials).

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

No special requirements.

LOADING

- 1 When the cargo is loaded in a cargo space over a tank containing fuel or other material having a flashpoint under 93°C, the cargo having temperature of 55°C or higher shall not be loaded in the cargo space, unless part of the cargo having temperature 44°C or lower is loaded in a layer of at least 0.6 m thickness throughout the cargo space prior to loading the cargo having temperature of 55°C or higher.
- 2 When the cargo having temperature of 55°C or higher is loaded in accordance with the above requirement and the thickness of the layer of the cargo to be loaded is bigger than 1.0 m, the cargo shall first be loaded within a layer, the thickness of which is between 0.6 m and 1.0 m.
- 3 After the completion of loading operation specified in the above paragraphs, the loading operation may proceed.

The cargo shall be trimmed in accordance with the cargo information required by section 4 of this Code.

PRECAUTIONS

This cargo shall not be loaded when the temperature of this cargo exceeds 107°C. The master shall post warnings about the high temperature of this cargo near the cargo spaces

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

EMERGENCY PROCEDURES

SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED

Protective clothing (gloves, boots, coveralls, headgear).
Self-contained breathing apparatus.
Spray nozzles.

EMERGENCY PROCEDURES

Wear protective clothing and self-contained breathing apparatus.

EMERGENCY ACTION IN THE EVENT OF FIRE

Batten down; use of ship's fixed fire-fighting installation if available.
Exclusion of air may be sufficient to control fire.

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAG), as amended.

PHOSPHATE (defluorinated)**DESCRIPTION**

Granular, similar to fine sand. Shipped dry. Dark grey. No moisture content.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	893	1.12
SIZE	CLASS	GROUP
Not applicable	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear protective clothing, goggles or other equivalent dust eye-protection and dust filter masks, as necessary.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

PHOSPHATE ROCK (calcined)

DESCRIPTION

Usually in the form of fine ground rock or prills. Extremely dusty. Hygroscopic.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	794 to 1563	0.64 to 1.26
SIZE	CLASS	GROUP
Not applicable	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

This cargo is hygroscopic and will cake if wet.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable before loading, during loading and during voyage. This cargo shall not be loaded during precipitation. During loading of this cargo all non-working hatches of the cargo spaces to which this cargo are loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear protective clothing, goggles or other equivalent dust eye-protection and dust filter masks, as necessary.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

If this cargo has hardened, it shall be trimmed to avoid the formation of overhangs, as necessary.

CLEAN UP

No special requirements.

PHOSPHATE ROCK (uncalcined)**DESCRIPTION**

Phosphate rock is an ore in which phosphorus and oxygen are chemically united. Depending on the source, it is tan to dark grey, dry and dusty. Moisture: 0% to 2%. Depending on its source this cargo may have flow characteristic, but once settled it is not liable to shift.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	1250 to 1429	0.70 to 0.80
SIZE	CLASS	GROUP
Powder to lumps	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear protective clothing, goggles or other equivalent dust eye-protection and dust filter masks, as necessary.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

PIG IRON

DESCRIPTION

Foundry pig iron is cast in 28 grades into 20 kg pigs. In a random heap, pig iron occupies approximately 50% of the apparent volume.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	3333 to 3571	0.28 to 0.30
SIZE	CLASS	GROUP
550 mm x 90 mm x 80 mm	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

This cargo is usually loaded using tubs. In such case, tubs are usually lowered by a crane into the hold and the contents are spilled out. When this cargo is loaded using tubs, the first few tubs *shall* be lowered onto the tanktop to avoid damage.

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

As the density of the cargo is extremely high, the tanktop may be overstressed unless the cargo is evenly spread across the tanktop to equalize the weight distribution. Due consideration shall be paid to ensure that tanktop is not overstressed during voyage and during loading by a pile of the cargo.

PRECAUTIONS

No special requirements.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

Prior to washing out the residues of this cargo, the bilge wells of the cargo spaces shall be cleaned.

PITCH PRILL

DESCRIPTION

Pitch Prill is made from tar produced during the coking of coal. It is black with a distinctive odour. It is extruded into its characteristic pencil shape to make handling easier.

Cargo softens between 40°C to 50°C. Melting point: 105°C to 107°C

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	500 to 800	1.25 to 2.0
SIZE	CLASS	GROUP
9 mm diameter and up to 0.7 cm long	MHB	B

HAZARDS

Melts when heated. Combustible, burns with a dense black smoke. Dust may cause skin and eye irritation. Normally this cargo has a low fire-risk. However powder of the cargo is easy to ignite and may cause fire and explosion. Special care should be taken for preventing fire during loading or discharging.

STOWAGE & SEGREGATION

Segregation as required for class 4.1 materials.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

Refer to the appendix to this schedule.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

This cargo shall not be stowed in a cargo space adjacent to heated tanks to avoid softening and melting of the cargo.

PRECAUTIONS

Refer to the appendix to this schedule.

VENTILATION

Surface ventilation only, either natural or mechanical, shall be conducted, as necessary, during the voyage for this cargo.

CARRIAGE

After the completion of loading of this cargo, the hatches of the cargo spaces shall be sealed. Condensation in the cargo spaces carrying this cargo shall be checked regularly during voyage.

DISCHARGE

Adequate measures shall be taken to prevent dust generation.

CLEAN UP

No special requirements.

EMERGENCY PROCEDURES

SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED

Protective clothing, gloves, boots, overalls, and headgear. Self-contained breathing apparatus, spray nozzles.

EMERGENCY PROCEDURES

Wear protective clothing and self contained breathing apparatus.

EMERGENCY ACTION IN THE EVENT OF A FIRE

Batten down: use ship's fixed fire-fighting installation if available.
Exclusion of air may be sufficient to control fire.

MEDICAL FIRST AID

Refer to Medical First Aid Guide (MFAG), as amended.

APPENDIX

PITCH PRILL

General Precautions:

1. Personnel engaged in loading shall be supplied with gloves, dust masks, approved protective clothing and goggles.
2. Eyewashes and sun screen creams shall be readily available.
3. Number of personnel in area of loading shall be kept to a minimum. Personnel in area of loading shall be aware of all the hazards involved.
4. Personnel engaged in the handling of this cargo *shall* wash well and keep out of the sun for a few days, after the cargo handling.
5. The hatch shall be closed after loading or discharge has ceased and the ship shall be washed out to remove all dust.
6. Due consideration shall be paid on suspending the cargo handling when wind is blowing dust.
7. After completion of discharging this cargo, the deck shall be cleaned up to remove all spillages.
8. Ventilation of the accommodation spaces *shall* be closed and the air conditioning systems for the accommodation spaces *shall* be on re-cycle mode when this cargo is being handled - either loading or discharging.
9. The cargo dust is easily ignited and may cause fire and explosion. Special care *shall* be taken to prevent fire during loading and discharging the cargo.

POTASH**DESCRIPTION**

Brown, pink or white in colour, potash is produced in granular crystals. It is odourless and hygroscopic.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
32° to 35°	971 to 1299	0.77 to 1.03
SIZE	CLASS	GROUP
Powder to 4 mm	Not applicable	C

HAZARD

No special hazards. This cargo is non-combustible or has a low fire-risk. This cargo is hygroscopic and will cake if wet.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable before loading, during loading and during voyage. This cargo shall not be loaded during precipitation. During loading of this cargo all non-working hatches of the cargo spaces to which this cargo are loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

No special requirements.

VENTILATION

The cargo spaces carrying this cargo shall not be ventilated during voyage.

CARRIAGE

After the completion of loading of this cargo, the hatches of the cargo spaces shall be sealed to prevent water ingress, as necessary.

DISCHARGE

If this cargo has hardened, it shall be trimmed to avoid the formation of overhangs, as necessary.

CLEAN UP

This cargo is mildly corrosive. After discharge of this cargo, the cargo spaces and the bilge wells shall be thoroughly swept clean and washed out to remove all traces of the cargo, except in the case that the cargo to be loaded has the same BCSN of the cargo to be loaded subsequent to discharge is POTASH.

POTASSIUM CHLORIDE

DESCRIPTION

Brown, pink or white in colour, powder. Potassium Chloride is produced in granular crystals. It is odourless and is soluble in water. Hygroscopic.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
30° to 47°	893 to 1235	0.81 to 1.12
SIZE	CLASS	GROUP
Up to 4 mm	Not applicable	C

HAZARD

Even though this cargo is classified as non-hazardous, it may cause heavy corrosion when wet. This cargo is non-combustible or has a low fire-risk. This cargo is hygroscopic and will cake if wet.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

No special requirements.

VENTILATION

The cargo spaces carrying this cargo shall not be ventilated during voyage.

CARRIAGE

After the completion of loading of this cargo, the hatches of the cargo spaces shall be sealed to prevent water ingress.

DISCHARGE

If this cargo has hardened, it shall be trimmed to avoid the formation of overhangs, as necessary.

CLEAN UP

After discharge of this cargo, the cargo spaces and the bilge wells shall be swept clean and thoroughly washed out.

POTASSIUM NITRATE UN 1486**DESCRIPTION**

Transparent, colourless or white crystalline powder or crystals. Hygroscopic.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
30° to 31°	1136	0.88
SIZE	CLASS	GROUP
Crystals or powder	5.1	B

HAZARD

Oxidizes when wet. Mixtures with combustible materials are readily ignited and may burn fiercely.

This cargo is hygroscopic and will cake if wet.

STOWAGE & SEGREGATION

“Separated from” foodstuffs.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Due regard shall be paid to prevent contact of the cargo and combustible materials.

VENTILATION

The cargo spaces carrying this cargo shall not be ventilated during voyage.

CARRIAGE

No special requirements.

DISCHARGE

If this cargo has hardened, it shall be trimmed to avoid the formation of overhangs, as necessary.

CLEAN UP

No special requirements.

EMERGENCY PROCEDURES

SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED

Protective clothing (gloves, boots, coveralls, headgear).
Self-contained breathing apparatus.
Spray nozzles.

EMERGENCY PROCEDURES

Wear protective clothing and self-contained breathing apparatus.

EMERGENCY ACTION IN THE EVENT OF FIRE

Use copious quantities of water, which is best, applied in the form of a spray to avoid disturbing the surface of the material.

The material may fuse or melt, in which condition application of water may result in extensive scattering of the molten materials.

Exclusion of air or the use of CO₂ will not control the fire.

Due consideration should be given to the effect on the stability of the ship due to accumulated water.

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAG), as amended.

REMARKS

This material is non-combustible unless contaminated.

POTASSIUM SULPHATE

DESCRIPTION

Hard crystals or powder. Colourless or white.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
31	1111	0.90
SIZE	CLASS	GROUP
Not applicable	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

No special requirements.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

PUMICE

DESCRIPTION

Highly porous rock of volcanic origin. Greyish-white.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	308 to 526	1.90 to 3.25
SIZE	CLASS	GROUP
Powder to lumps	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

No special requirements.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

PYRITE (containing copper and iron)

This cargo can be categorized as Group A or C. This cargo entry is for cargo in Group C.

DESCRIPTION

Iron disulphide, containing copper and iron. Moisture 0% to 7%. Extremely dusty.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	2000 to 3030	0.33 to 0.50
SIZE	CLASS	GROUP
Fines to lumps of 300 mm	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

As the density of the cargo is extremely high, the tanktop may be overstressed unless the cargo is evenly spread across the tanktop to equalize the weight distribution. Due consideration shall be paid to ensure that tanktop is not overstressed during voyage and during loading by a pile of the cargo.

PRECAUTIONS

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear protective clothing, goggles or other equivalent dust eye-protection and dust filter masks, as necessary.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

PYRITES, CALCINED (Calcined Pyrites)**DESCRIPTION**

Dust to fines, Calcined Pyrites is the residual product from the chemical industry where all types of metal sulphides are either used for the production of sulphuric acid or are processed to recover the elemental metals – copper, lead, zinc, etc. The acidity of the residue can be considerable, in particular, in the presence of water or moist air, where pH values between 1.3 and 2.1 are frequently noted.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	2326	0.43
SIZE	CLASS	GROUP
Not applicable	MHB	A and B

HAZARD

Highly corrosive to steel when wet. Inhalation of dust is irritating and harmful. Cargo may liquefy.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

“Separated from” foodstuffs.

HOLD CLEANLINESS

Due consideration shall be paid to cleaning and drying of the cargo spaces.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable before loading, during loading and during voyage. This cargo shall not be loaded during precipitation. During loading of this cargo all non-working hatches of the cargo spaces to which this cargo are loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

As the density of the cargo is extremely high, the tanktop may be overstressed unless the cargo is evenly spread across the tanktop to equalize the weight distribution. Due consideration shall be paid to ensure that tanktop is not overstressed during voyage and during loading by a pile of the cargo.

PRECAUTIONS

Bilge wells shall be clean, dry and covered as appropriate, to prevent ingress of the cargo. Ceiling boards shall be removed or sealed to prevent penetration by this cargo. The tanktop on which this cargo is to be loaded shall be covered with lime before loading.

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear goggles or other equivalent dust eye-protection and dust filter masks. Those persons shall wear protective clothing, as necessary.

VENTILATION

No special requirements.

CARRIAGE

After the completion of loading of this cargo, the hatches of the cargo spaces shall be sealed to prevent water ingress, as necessary.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

EMERGENCY PROCEDURES

SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED

Nil

EMERGENCY PROCEDURES

Nil

EMERGENCY ACTION IN THE EVENT OF FIRE

Nil (non-combustible).

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAG), as amended.

PYROPHYLLITE**DESCRIPTION**

A natural hydrous aluminum silicate. Chalk-white. May be dusty.

Lumps: 75%, Rubble: 20%, Fines: 5%.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	2000	0.50
SIZE	CLASS	GROUP
Lump to fine	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear protective clothing, goggles or other equivalent dust eye-protection and dust filter masks, as necessary.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

QUARTZ

DESCRIPTION

Crystalline lumps.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	1667	0.60
SIZE	CLASS	GROUP
Lumps: 50 mm to 300 mm	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

No special requirements.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

QUARTZITE**DESCRIPTION**

Quartzite is a compact, granular, metamorphosed sandstone containing quartz. It is white, red, brown or grey in colour and its size varies from large rocks to pebbles. It may also be shipped in semi-crushed and graded sizes.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	1563	0.64
SIZE	CLASS	GROUP
10 mm to 200 mm	Not applicable	C

HAZARD

No special hazards. Dust of this cargo is very abrasive. This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Protect machinery and equipment from dust. Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear goggles or other equivalent dust eye-protection and dust filter masks. Those persons shall wear protective clothing, as necessary.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-1) non-fissile or fissile-excepted UN 2912

DESCRIPTION

This schedule includes ores containing naturally occurring radionuclides (e.g., uranium, thorium) and natural or depleted uranium and thorium concentrates of such ores, including metals, mixtures and compounds.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	-	-
SIZE	CLASS	GROUP
Not applicable	7	B

HAZARD

Low radiotoxicity. Some materials may possess chemical hazards.
This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

“Separated from” foodstuffs.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Personnel shall not be unnecessarily exposed to dust of this cargo. Persons who may be exposed to the dust of the cargo shall wear protective clothing, goggles or other equivalent dust eye-protection and facemasks. There shall be no leakage outside the cargo space in which this cargo is stowed.

VENTILATION

The cargo spaces carrying this cargo shall not be ventilated during voyage.

CARRIAGE

All instructions provided by the shipper shall be followed for the carriage of this cargo.

DISCHARGE

All instructions provided by the shipper shall be followed for the discharge of this cargo.

CLEAN UP

Cargo spaces used for this cargo shall not be used for other goods until decontaminated. Refer to subsection 9.3.2.3 of this Code.

EMERGENCY PROCEDURES

SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED

Protective clothing (gloves, boots, coveralls, headgear).
Self-contained breathing apparatus.

EMERGENCY PROCEDURES

Wear protective clothing and self-contained breathing apparatus.

EMERGENCY ACTION IN THE EVENT OF FIRE

Batten down; use ship's fixed fire-fighting installation, if fitted.
Use water spray to control spread of dust, if necessary.

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAG), as amended.
Radio for medical advice.

REMARKS

Most materials are likely to be non-combustible. Speedily collect and isolate potentially contaminated equipment and cover. Seek expert advice.

**RADIOACTIVE MATERIAL SURFACE CONTAMINATED OBJECTS (SCO-1),
non-fissile or fissile-excepted UN 2913**

DESCRIPTION

The radioactivity of SCO-1 is low. This schedule includes solid objects of non-radioactive material having a radioactive material distributed on its surfaces which:

1. the non-fixed contamination on the accessible surface, averaged over 300 cm² (or the area of the surface if less than 300 cm²), does not exceed 4 Bq/cm² for beta and gamma emitters and low-toxicity alpha emitter, or 0.4 Bq/cm² for all other alpha emitters;
2. the fixed contamination on the accessible surface, averaged over 300 cm² (or the area of the surface if less than 300 cm²), does not exceed 4 x 10⁴ Bq/cm² for beta and gamma emitters and low-toxicity alpha emitters, or 4 x 10³ Bq/cm² for all other alpha emitters; and
3. the non-fixed contamination plus the fixed contamination on the inaccessible surface, averaged over 300 cm² (or the area of the surface if less than 300cm²), does not exceed 4 x 10⁴ Bq/cm² for beta and gamma emitters and low-toxicity alpha emitters, or 4 x 10³ Bq/cm² for all other alpha emitters.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	-	-
SIZE	CLASS	GROUP
Not applicable	7	B

HAZARD

Low radioactivity.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

“Separated from” foodstuffs.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Personnel shall not be exposed to dust of this cargo. Persons who may be exposed to the dust of the cargo shall wear protective clothing, goggles and facemasks. There shall be no leakage outside the cargo space in which this cargo is stowed.

VENTILATION

The cargo spaces carrying this cargo shall not be ventilated during voyage.

CARRIAGE

All instructions provided by the shipper shall be followed for the carriage of this cargo.

DISCHARGE

All instructions provided by the shipper shall be followed for the discharge of this cargo.

CLEAN UP

Cargo spaces used for this cargo shall not be used for other goods until decontaminated. Refer to subsection 9.3.2.3 of this Code.

EMERGENCY PROCEDURES

SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED

Protective clothing (gloves, boots, coveralls, headgear).
Self-contained breathing apparatus.

EMERGENCY PROCEDURES

Wear protective clothing and self-contained breathing apparatus.

EMERGENCY ACTION IN THE EVENT OF FIRE

Batten down; use ship's fixed fire-fighting installation, if fitted.
Use water spray to control spread of dust, if necessary.

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAG), as amended.
Radio for medical advice.

REMARKS

Most materials are likely to be non-combustible. Speedily collect and isolate potentially contaminated equipment and cover. Seek expert advice.

RASORITE (ANHYDROUS)

DESCRIPTION

A granular, yellow-white crystalline material with little or no dust. Abrasive. Hygroscopic.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	1282 to 1493	0.67 to 0.78
SIZE	CLASS	GROUP
Less than 2.36 mm	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

This cargo is hygroscopic and will cake if wet.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

No special requirements.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

If this cargo has hardened, it shall be trimmed to avoid the formation of overhangs, as necessary.

CLEAN UP

No special requirements.

RUTILE SAND

DESCRIPTION

Fine particled brown to black sand. Abrasive. Shipped dry. May be dusty.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	2500 to 2700	0.37 to 0.40
SIZE	CLASS	GROUP
0.15 mm or less	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable before loading, during loading and during voyage. This cargo shall not be loaded during precipitation. During loading of this cargo all non-working hatches of the cargo spaces to which this cargo are loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

As the density of the cargo is extremely high, the tanktop may be overstressed unless the cargo is evenly spread across the tanktop to equalize the weight distribution. Due consideration shall be paid to ensure that tanktop is not overstressed during voyage and during loading by a pile of the cargo.

PRECAUTIONS

Bilge wells shall be clean, dry and covered as appropriate, to prevent ingress of the cargo.

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear goggles or other equivalent dust eye-protection and dust filter masks. Those persons shall wear protective clothing, as necessary.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

SALT**DESCRIPTION**

Fine white grains. Moisture variable to 5.5%. This cargo is highly soluble. In the case of ingress of water into the holds, there is a risk to the loss of the stability of the ship through dissolution of this cargo (formation of a wet base and shifting of cargo).

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	893 to 1235	0.81 to 1.12
SIZE	CLASS	GROUP
Grains up to 12 mm	Not applicable	C

HAZARD

No special hazards. This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

The parts of the cargo space in contact with the cargo such as tanktops, hoppers, side plating and bulkheads shall be lime washed or coated with paint to prevent corrosion.

VENTILATION

The cargo spaces carrying this cargo shall not be ventilated during voyage.

CARRIAGE

After the completion of loading of this cargo, the hatches of the cargo spaces shall be sealed.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

SALT CAKE

DESCRIPTION

Impure sodium sulphate. White in colour. Granular, shipped dry.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	1052 to 1124	0.89 to 0.95
SIZE	CLASS	GROUP
10 mm to 200 mm	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

No special requirements.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

SALT ROCK

DESCRIPTION

White. Moisture content 0.02%.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	943 to 1020	0.98 to 1.06
SIZE	CLASS	GROUP
Small granules	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

No special requirements.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

SAND

DESCRIPTION

Usually fine particles. Abrasive and dusty.
Sands included in this schedule are:

FOUNDRY SAND

POTASSIUM FELSPAR SAND

QUARTZ SAND

SILICA SAND

SODA FELSPAR SAND

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	1020 to 2000	0.50 to 0.98
SIZE	CLASS	GROUP
0.1 mm to 5 mm	Not applicable	C

HAZARD

Inhalation of silica dust can result in respiratory disease. Silica particulates are easily transported by air and inhaled.

Industrial sand may be coated with resin and will cake if exposed to heat (55°C to 60°C).

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

Industrial sand coated with resin shall be “separated from” sources of heat.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable before loading, during loading and during voyage. This cargo shall not be loaded during precipitation. During loading of this cargo all non-working hatches of the cargo spaces to which this cargo are loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear goggles or other equivalent dust eye-protection and dust filter masks. Those persons shall wear protective clothing, as necessary.

VENTILATION

No special requirements.

CARRIAGE

The bilge wells of the cargo spaces carrying this cargo shall be kept dry.

DISCHARGE

No special requirements.

CLEAN UP

After discharge of this cargo, particular attention shall be paid to bilge wells of the cargo spaces.

SAWDUST

DESCRIPTION

Fine particles of wood.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	-	-
SIZE	CLASS	GROUP
Not applicable	MHB	B

HAZARD

Spontaneous combustion if not clean, dry and free from oil. Liable to cause oxygen depletion within the cargo space.

STOWAGE & SEGREGATION

Segregation as required for class 4.1 materials.
“Separated from” all class 5.1 liquids and all class 8 liquids.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Bilge wells shall be clean, dry and covered as appropriate, to prevent ingress of the cargo. Prior to loading this cargo, the shipper shall provide the master with a certificate stating that the cargo is clean, dry and free from oil.

VENTILATION

Surface ventilation only, either natural or mechanical, shall be conducted, as necessary, during the voyage for this cargo.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

EMERGENCY PROCEDURES

SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED

Nil

EMERGENCY PROCEDURES

Nil

EMERGENCY ACTION IN THE EVENT OF FIRE

Batten down; use ship's fixed fire-fighting installation if fitted.
Exclusion of air may be sufficient to control fire.

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAAG), as amended.

SCRAP METAL

DESCRIPTION

“Scrap” iron or steel covers an enormous range of ferrous metals, principally intended for recycling.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	Varies	Varies
SIZE	CLASS	GROUP
Varies	Not applicable	C

HAZARD

No special hazards. This cargo is non-combustible or has a low fire-risk except when cargo contains swarf (fine metal turnings liable to spontaneous combustion) refer to the entry for ferrous metal borings, shavings turnings or cutting in this Code.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable before loading, during loading and during voyage. This cargo shall not be loaded during precipitation. During loading of this cargo all non-working hatches of the cargo spaces to which this cargo are loaded or to be loaded shall be closed.

LOADING

Refer to the appendix to this schedule.

PRECAUTIONS

Refer to the appendix to this schedule.

VENTILATION

Surface ventilation only, either natural or mechanical, shall be conducted, as necessary, during the voyage for this cargo.

CARRIAGE

Bilges in the cargo spaces carrying this cargo shall not be pumped unless absolutely necessary. Bilgewater of this cargo may contain a certain amount of dirt and oil from old machinery. Refer to the appendix to this individual schedule.

DISCHARGE

When this cargo is discharged by magnet or spider grab:

- .1 the deck and deck machineries shall be protected from falling cargo; and
- .2 damages to the ship shall be checked, after the completion of discharge.

CLEAN UP

Prior to cleaning up the cargo spaces for this cargo, the crew shall be informed of danger due to broken glass and sharp edges. Prior to washing out the residues of this cargo, any oil spillages shall be cleaned from the tank tops and the bilge wells of the cargo spaces for this cargo.

APPENDIX

SCRAP METAL

Handling of this cargo varies from magnets to spider grabs, depending usually on the size of material. This cargo may include articles from the size of car bodies to fine metal turnings (swarf). The weight of individual pieces will also vary greatly, ranging from heavy machinery to tin cans.

Loading

Before loading, the cargo spaces *shall* be prepared as per general loading practice and any areas liable to be damaged by falling cargo *shall* be protected with dunnage. This includes decks and coamings in way of the material's path to the cargo spaces. Removing the ship's side rails may be advisable.

A layer of this cargo *shall* be carefully placed over the tank top in the square to cushion any fall out. Magnet and grab drivers *shall* be instructed not to release their loads too high above the pile.

The usual method of loading is to form a pile along the ship's centre line and use the slope to roll material into the ends and sides. Every effort must be made to work the wings and ends to evenly distribute the weight. If this is not done, the light high volume pieces will roll to the wings and the small heavy pieces will concentrate in the square.

When pumping the bilge wells, the master shall be aware of that a certain amount of dirt and oil can be expected from old machinery. Broken glass and sharp jagged edges may be present and care *shall* be taken by personnel working near scrap.

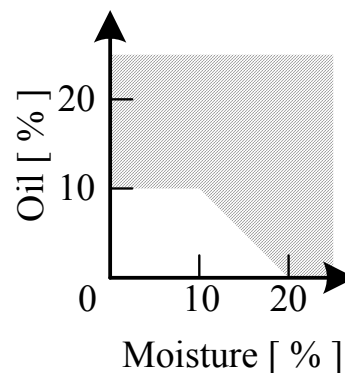
Before hatches are closed, the cargo spaces shall be checked that no sharp projections could pierce the ship's side.

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.

The range of oil and moisture content is indicated in the

figure.



To be carried in bulk only with special permission from the competent authority.

DESCRIPTION

Residue remaining after oil has been expelled mechanically from oil-bearing seeds. The cereals and cereal products included in this schedule are those derived from:

Bakery materials

Barley malt pellets

Beet

Bran pellets

Brewers grain pellets

Citrus pulp pellets

Coconut

Copra

Corn gluten

Cotton seed

Expellers

Gluten pellets

Ground nuts, meal

Hominy chop

Linseed

Maize

Meal, oily

Mill feed pellets

Niger seed, expellers

Oil cake

Palm kernel

Peanuts

Pellets, cereal

Pollard pellets

Rape seed

Rice broken

Rice bran

Safflower seed

Seed expellers, oily

Soyabean

Strussa pellets

Sunflower seed

Toasted meals

The above may be shipped in the form of pulp, meals, cake, pellets and expellers.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	478 to 719	1.39 to 2.09
SIZE	CLASS	GROUP
Not applicable	4.2	B

HAZARD

May self-heat slowly and, if wet or containing an excessive proportion of unoxidized oil, ignite spontaneously. Liable to oxidize, causing subsequent reduction of oxygen in the cargo space. Carbon dioxide may be produced.

STOWAGE & SEGREGATION

No special requirements other than prescribed in section 9.3 of this Code.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

This cargo shall only be accepted for loading when the temperature of the cargo is not higher than ambient temperature plus 10°C or 55°C, whichever is lower. Before shipment, this cargo shall be properly aged; the duration of ageing required varies with the oil content. The competent authority may permit seed cakes described in this schedule to be carried under conditions governing SEED CAKE (b), when satisfied, as a result of tests, that such relaxation is justified (see following schedule). Certificates from the competent authority giving such permission shall state the oil content and moisture content. The temperature of this cargo shall be measured regularly at a number of depths in the cargo spaces and recorded during the voyage. If the temperature of the cargo reaches 55°C and continues to increase, ventilation to the cargo shall be stopped. If self-heating continues, then carbon dioxide or inert gas shall be introduced to the cargo space. Entry of personnel into cargo spaces for this cargo shall not be permitted until tests have been carried out and it has been established that the oxygen content has been restored to a normal level.

VENTILATION

The cargo spaces carrying this cargo shall not be mechanically ventilated during voyage to prevent self-heating of the cargo, except in case of emergency.

CARRIAGE

Hatches of the cargo spaces carrying this cargo shall be weathertight to prevent the ingress of water.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

EMERGENCY PROCEDURES

SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED

Self-contained breathing apparatus.

EMERGENCY PROCEDURES

Wear self-contained breathing apparatus.

EMERGENCY ACTION IN THE EVENT OF FIRE

Batten down; use ship's fixed fire-fighting installation, if fitted.

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAG), as amended.

SEED CAKE, containing vegetable oil UN 1386

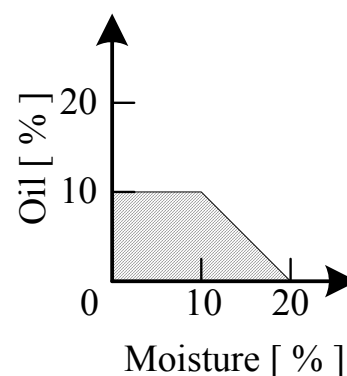
(b) solvent extraction and expelled seeds, containing not more than 10% of oil and when the amount of moisture is higher than 10%, not more than 20% of oil and moisture combined.

Note: This entry covers the following:

- .1 all solvent extracted and expelled seed cakes containing not more than 10% oil, and not more than 10% moisture; and
- .2 all solvent extracted and expelled seed cakes containing not more than 10% oil and moisture content higher than 10%, in which case, the oil and moisture combined must not exceed 20%.

The range of oil and moisture content is

indicated in the figure.



When in solvent extracted seed cake, the oil or oil and moisture content exceeds the percentages stated above, guidance should be sought from the competent authorities.

DESCRIPTION

Residue remaining after oil has been extracted by a solvent process or expelled mechanically from oil-bearing seeds. The cereals and cereal products included in this schedule are those derived from:

Bakery materials

Barley malt pellets

Beet

Bran pellets

Brewers grain pellets

Citrus pulp pellets

Coconut

Copra

Corn gluten

Cotton seed

Expellers

Gluten pellets

Ground nuts, meal

Hominy chop

Linseed

Maize

Meal, oily

Mill feed pellets

Niger seed, expellers

Oil cake

Palm kernel

Peanuts

Pellets, cereal

Pollard pellets

Rape seed

Rice broken

Rice bran

Safflower seed

Seed expellers, oily

Soyabean

Strussa pellets

Sunflower seed

Toasted meals

The above may be shipped in the form of pulp, meals, cake, pellets and expellers.

The provisions of this schedule should not apply to solvent extracted rape seed meal, pellets, soya bean meal, cotton seed meal and sunflower seed meal containing not more than 4% oil and 15% oil and moisture combined. A certificate from a person recognized by the competent authority of the country of shipment should be provided by the shipper, prior to loading, stating that the provisions for the exemption are met.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	478 to 719	1.39 to 2.09
SIZE	CLASS	GROUP
Not applicable	4.2	B

HAZARD

May self-heat slowly and, if wet or containing an excessive proportion of unoxidized oil, ignite spontaneously. Liable to oxidize, causing subsequent reduction of oxygen in the cargo space. Carbon dioxide may also be produced.

STOWAGE & SEGREGATION

No special requirements other than prescribed in section 9.3 of this Code.

If the bulkhead between the cargo space and the engine-room is not insulated to class A-60 standard, solvent extraction seed shall be stowed "away from" the bulkhead.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

This cargo shall only be accepted for loading when the cargo is substantially free from flammable solvent and a certificate from a person recognized by the competent authority of the country of shipment specifying the oil content and moisture content is issued.

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Before shipment, this cargo shall be properly aged; the duration of ageing required varies with the oil content. The temperature of this cargo shall be measured regularly at a number of depths in the cargo spaces and recorded during the voyage. If the temperature of the cargo reaches 55°C and continues to increase, ventilation to the cargo shall be stopped. If self-heating continues, then carbon dioxide or inert gas shall be introduced to the cargo space. In the case of solvent-extracted seed cakes the use of carbon dioxide or inert gas shall be withheld until it becomes apparent that fire is not liable to take place in the cargo space, to avoid the possibility of ignition of solvent vapours. Entry of personnel into cargo spaces for this cargo shall not be

permitted until tests have been carried out and it has been established that the oxygen content has been restored to a normal level. When the planned interval between the commencement of loading and the completion of discharge of this cargo exceeds 5 days, the cargo shall not be accepted for loading unless the cargo is to be carried in a cargo space equipped with facilities for introducing carbon dioxide or inert gas into the space. Smoking and the use of naked lights shall be prohibited in the vicinity of the cargo space during loading and unloading and on entry into the cargo spaces at any other time. Electrical circuits for equipment in cargo spaces which is unsuitable for use in an explosive atmosphere shall be isolated by removal of links in the system other than fuses. Spark-arresting screens shall be fitted to ventilators to the cargo spaces containing of this cargo.

VENTILATION

Surface ventilation either natural or mechanical should be conducted, as necessary, for removing any residual solvent vapour. To prevent self-heating of the cargo, caution is required when using mechanical ventilation.

CARRIAGE

Hatches of the cargo spaces carrying this cargo shall be weathertight to prevent the ingress of water.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

EMERGENCY PROCEDURES

SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED

Self-contained breathing apparatus.

EMERGENCY PROCEDURES

Wear self-contained breathing apparatus.

EMERGENCY ACTION IN THE EVENT OF FIRE

Batten down. Use ship's fixed fire-fighting installation, if fitted.

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAG), as amended.

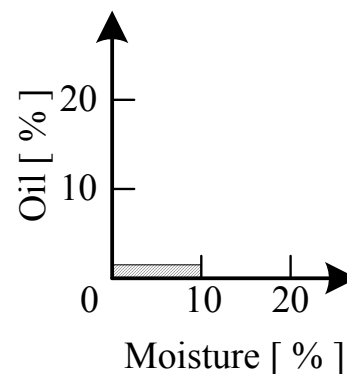
REMARKS

In the case of solvent-extracted seed cake, the use of CO₂ should be withheld until fire is apparent.

The use of CO₂ is limited to controlling the fire and further amounts may need to be injected from time to time during the sea passage to reduce the oxygen content in the hold. On arrival in port, the cargo will need to be dug out to reach the seat of the fire.

SEED CAKE UN 2217
with not more than 1.5% oil
and not more than 11% moisture.

The range of oil and moisture content is indicated
in the figure.



DESCRIPTION

Residue remaining after oil has been extracted by a solvent process from oil-bearing seeds. The cereals and cereal products included in this schedule are those derived from:

- | | |
|------------------------------|------------------------------|
| Bakery materials | Meal, oily |
| Barley malt pellets | Mill feed pellets |
| Beet | Niger seed, expellers |
| Bran pellets | Oil cake |
| Brewers grain pellets | Palm kernel |
| Citrus pulp pellets | Peanuts |
| Coconut | Pellets, cereal |
| Copra | Pollard pellets |
| Corn gluten | Rape seed |
| Cotton seed | Rice broken |
| Expellers | Rice bran |
| Gluten pellets | Safflower seed |
| Ground nuts, meal | Seed expellers, oily |
| Hominy chop | Soyabean |
| Linseed | Strussa pellets |
| Maize | Sunflower seed |

The above may be shipped in the form of pulp, meals, cake, pellets, expellers. The provisions of this entry should not apply to solvent-extracted rape seed meal pellets, soya bean meal, cotton seed meal and sunflower seed meal containing not more than 1.5% oil and not more than 11% moisture and being substantially free from flammable solvent. A certificate from a person recognized by the competent authority of the country of shipment should be provided by the shipper, prior to loading, stating that the provisions for the exemption are met.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	478 to 719	1.39 to 2.09
SIZE	CLASS	GROUP
0.1 mm - 5 mm	4.2	B

HAZARD

May self-heat slowly and, if wet or containing an excessive proportion of unoxidized oil, ignite spontaneously. Liable to oxidize, causing subsequent reduction of oxygen in the cargo space. Carbon dioxide may also be produced.

STOWAGE & SEGREGATION

No special requirements other than prescribed in section 9.3 of this Code.

If the bulkhead between the cargo space and the engine-room is not insulated to class A-60 standard, this cargo shall be stowed "away from" the bulkhead.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

This cargo shall only be accepted for loading when the cargo is substantially free from flammable solvent and a certificate from a person recognized by the competent authority of the country of shipment specifying the oil content and moisture content is issued.

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

The temperature of this cargo shall be measured regularly at a number of depths in the cargo spaces and recorded during the voyage. If the temperature of the cargo reaches 55°C and continues to increase, ventilation to the cargo shall be stopped. If self-heating continues, then carbon dioxide or inert gas shall be introduced to the cargo space. The use of carbon dioxide or inert gas shall be withheld until it becomes apparent that fire is not liable to take place in the cargo space, to avoid the possibility of ignition of solvent vapours. Entry of personnel into cargo spaces for this cargo shall not be permitted until tests have been carried out and it has been established that the oxygen content has been restored to a normal level. When the planned interval between the commencement of loading and the completion of discharge of this cargo exceeds 5 days, the cargo shall not be accepted for loading unless the cargo is to be carried in a cargo space equipped with facilities for introducing carbon dioxide or inert gas into the space. Smoking and the use of naked lights shall be prohibited in the vicinity of the cargo space during loading and unloading and on entry into the cargo spaces at any other time. Electrical circuits for equipment in cargo spaces which is unsuitable for use in an explosive atmosphere, shall be isolated by removal of links in the system other than fuses. Spark-arresting screens shall be fitted to ventilators to the cargo spaces containing of this cargo.

VENTILATION

Surface ventilation either natural or mechanical should be conducted, as necessary, for removing any residual solvent vapour. To prevent self-heating of the cargo caution is required when using mechanical ventilation.

CARRIAGE

Hatches of the cargo spaces carrying this cargo shall be weathertight to prevent the ingress of water.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

EMERGENCY PROCEDURES**SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED**

Self-contained breathing apparatus.

EMERGENCY PROCEDURES

Wear self-contained breathing apparatus.

EMERGENCY ACTION IN THE EVENT OF FIRE

Batten down. Used ship's fixed fire-fighting installation, if fitted.

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAG), as amended.

REMARKS

For solvent-extracted seed cake, the use of CO₂ should be withheld until fire is apparent. The use of CO₂ is limited to controlling the fire, and further amounts may need to be injected from time to time during passage to reduce the oxygen content in the hold. On arrival in port, the cargo will need to be dug out to reach the seat of the fire.

SEED CAKE

(non-hazardous)

DESCRIPTION

The provisions of this schedule apply to solvent extracted rape seed meal, pellets, soya bean meal, cotton seed meal and sunflower seed meal, containing not more than 4% oil and 15% oil and moisture combined and being substantially free from flammable solvents.

A certificate from a person recognized by the competent authority of the country of shipment shall be provided by the shipper, prior to loading, stating that the requirements for exemption as set out either in the schedule for seed cake UN 1386 (b) or UN 2217, whichever is applicable, are met.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	478 to 719	1.39 to 2.09
SIZE	CLASS	GROUP
Not applicable	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

No special requirements.

VENTILATION

No special requirements.

CARRIAGE

Hatches of the cargo spaces carrying this cargo shall be weathertight to prevent the ingress of water.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

SILICOMANGANESE (low carbon)
(with known hazard profile or known to evolve gases)
(with silicon content of 25% or more)

DESCRIPTION

Silicomanganese is an extremely heavy cargo, silvery metallic material with a grey oxide coating.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	approx. 3000	0.18 to 0.26
SIZE	CLASS	GROUP
approx. 10 to 100 mm	MHB	B

HAZARD

In contact with water may evolve hydrogen, a flammable gas that may form explosive mixtures with air and may, under similar conditions produce phosphine and arsine, which are highly toxic gases.

Cargo is liable to reduce oxygen content in a cargo space.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

Segregation as required for class 4.3 materials.

“Separated from” foodstuffs and all class 8 liquids.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable before loading, during loading and during voyage.

This cargo shall not be loaded during precipitation. During loading of this cargo all non-working hatches of the cargo spaces to which this cargo are loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

As the density of the cargo is extremely high, the tanktop may be overstressed unless the cargo is evenly spread across the tanktop to equalize the weight distribution. Due consideration shall be paid to ensure that tanktop is not overstressed during voyage and during loading by a pile of the cargo.

PRECAUTIONS

The manufacturer or the shipper shall provide the master with a certificate stating that, after manufacture, the cargo was stored under cover, but exposed to open air for not less than three days prior to shipment. Smoking shall not be allowed on deck and in the cargo spaces and “NO SMOKING” signs shall be displayed on deck whenever this cargo is on board. Electrical fittings and cables shall be in good condition and properly safeguarded against short circuits and sparking. Where a bulkhead is required to be suitable for segregation purposes, cable and conduit penetrations of the decks and bulkheads shall be sealed against the passage of gas and vapour. Whenever practicable, ventilation systems for the living quarters shall be shut down or screened and air condition systems shall be placed on recirculation during loading and discharge of this cargo, in order to minimize the entry of dust into living quarters or other interior spaces of the ship. Precautions shall be taken to minimize the extent to which dust of this cargo may come in contact with moving parts of deck machinery and external navigation aids such as navigation lights.

Entry of personnel into enclosed spaces should not be permitted until tests have been carried out and it has been established that the oxygen content has been restored to a normal level throughout the space and that no toxic gas is present, unless adequate ventilation and air circulation throughout the free space above the material has been effected. See appendix 6 in this Code for general precautions and procedures for entering enclosed spaces.

Prohibition of smoking in dangerous areas should be enforced, and clearly legible “NO SMOKING” signs should be displayed.

Electrical fittings and cables should be in good condition and properly safeguarded against short circuits and sparking. Where a bulkhead is required to be suitable for segregation purposes, cable and conduit penetrations of the decks and bulkheads should be sealed against the passage of gas and vapour.

Whenever possible, ventilation systems should be shut down or screened and air condition systems, if any, placed on recirculation during loading or discharge, in order to minimize the entry of dust into living quarters or other interior spaces of the ship.

Precautions should be taken to minimize the extent to which dust may come in contact with moving parts of deck machinery and external navigation aids (e.g., navigation lights).

VENTILATION

Mechanical surface ventilation shall be conducted during the voyage, as necessary, for the cargo spaces carrying this cargo.

CARRIAGE

For quantitative measurements of oxygen and flammable gases liable to be evolved by the cargo, a suitable detector for each gas or combination of gases shall be on board while this cargo is carried. The detector shall be suitable for use in an atmosphere without oxygen and of certified safe type for use in explosive atmosphere. The concentrations of these gases in the cargo spaces carrying this cargo shall be measured regularly, during voyage, and the results of the measurements shall be recorded and kept on board.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

EMERGENCY PROCEDURES

SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED

Self-contained breathing apparatus.

EMERGENCY PROCEDURES

Wear self-contained breathing apparatus.

EMERGENCY ACTION IN THE EVENT OF FIRE

Batten down and use CO₂ if available. Do not use water.

MEDICAL FIRST AID

Refer to Medical First Aid Guide (MFAG), as amended.

REMARKS

Material is virtually non-combustible when dry.

SODA ASH
(Dense and light)

DESCRIPTION

Powdery; composed of white, odourless grains and dust. It is made by the combustion of salt and limestone. Soluble in water. Soda ash is ruined on contact with oil.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	599 to 1053	0.95 to 1.67
SIZE	CLASS	GROUP
Powdery	Not applicable	C

HAZARD

No special hazards. This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear protective clothing, goggles or other equivalent dust eye-protection and dust filter masks, as necessary.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

After discharge of this cargo, the cargo spaces shall be swept clean except in cases where the cargo to be loaded has the same BCSN of the cargo to be loaded subsequent to discharge is SODA ASH. The residues of this cargo may be pumped as slurry during washing out.

SODIUM NITRATE UN 1498

DESCRIPTION

Colourless, transparent, odourless crystals. Hygroscopic and soluble in water.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	508 to 719	1.39 to 1.97
SIZE	CLASS	GROUP
Not applicable	5.1	B

HAZARD

Although non-combustible, mixtures with combustible material are readily ignited and may burn fiercely.

This cargo is hygroscopic and will cake if wet.

STOWAGE & SEGREGATION

“Separated from” foodstuffs.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Bilge wells shall be clean, dry and covered as appropriate, to prevent ingress of the cargo.

VENTILATION

The cargo spaces carrying this cargo shall not be ventilated during voyage.

CARRIAGE

No special requirements.

DISCHARGE

If this cargo has hardened, it shall be trimmed to avoid the formation of overhangs, as necessary.

CLEAN UP

No special requirements.

EMERGENCY PROCEDURES

SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED

Protective clothing (gloves, boots, coveralls, headgear).
Self-contained breathing apparatus.
Spray nozzles.

EMERGENCY PROCEDURES

Wear protective clothing and self-contained breathing apparatus.

EMERGENCY ACTION IN THE EVENT OF FIRE

Use copious quantities of water, which is best applied in the form of a spray to avoid disturbing the surface of the material. The material may fuse or melt, in which condition application may result in extensive scattering of the molten material. Exclusion of air or the use of CO₂ will not control the fire. Due consideration should be given to the effect on the stability of the ship due to accumulated water.

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAG), as amended.

REMARKS

This material is non-combustible unless contaminated.

SODIUM NITRATE AND POTASSIUM NITRATE MIXTURE UN 1499

DESCRIPTION

A hygroscopic mixture, soluble in water.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
30°	1136	0.88
SIZE	CLASS	GROUP
Not applicable	5.1	B

HAZARD

Although non-combustible, mixtures with combustible material may readily ignite and burn fiercely.

This cargo is hygroscopic and will cake if wet.

STOWAGE & SEGREGATION

“Separated from” foodstuffs.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Due regard shall be paid to prevent contact of the cargo and combustible materials.

Bilge wells shall be clean, dry and covered as appropriate, to prevent ingress of the cargo.

VENTILATION

The cargo spaces carrying this cargo shall not be ventilated during voyage.

CARRIAGE

No special requirements.

DISCHARGE

If this cargo has hardened, it shall be trimmed to avoid the formation of overhangs, as necessary.

CLEAN UP

No special requirements.

EMERGENCY PROCEDURES

SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED

Protective clothing (gloves, boots, coveralls, headgear).
Self-contained breathing apparatus.
Spray nozzles.

EMERGENCY PROCEDURES

Wear protective clothing and self-contained breathing apparatus.

EMERGENCY ACTION IN THE EVENT OF FIRE

Use copious quantities of water, which is best applied in the form of a spray to avoid disturbing the surface of the material. The material may fuse or melt, in which condition application of water may result in extensive scattering of the molten materials. Exclusion of air or the use of CO₂ will not control the fire. Due consideration should be given to the effect on the stability of the ship due to the accumulated water.

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAG), as amended.

REMARKS

Material is non-combustible unless contaminated.

STAINLESS STEEL GRINDING DUST

DESCRIPTION

Brown lumps: Moisture content 1% to 3%. May give off dust.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	2381	0.42
SIZE	CLASS	GROUP
Lumps: 75 mm to 380 mm	Not applicable	C

HAZARD

No special hazards. This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

As the density of the cargo is extremely high, the tanktop may be overstressed unless the cargo is evenly spread across the tanktop to equalize the weight distribution. Due consideration shall be paid to ensure that tanktop is not overstressed during voyage and during loading by a pile of the cargo.

PRECAUTIONS

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear protective clothing, goggles or other equivalent dust eye-protection and dust filter masks, as necessary.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

STONE CHIPPINGS

DESCRIPTION

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	1408	0.71
SIZE	CLASS	GROUP
Fines to 25 mm	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

No special requirements.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

SUGAR

DESCRIPTION

Depending on type, sugar may be either brown or white granules, with a very low moisture content to the order of 0% to 0.05%.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	625 to 1000	1.00 to 1.60
SIZE	CLASS	GROUP
Granules-up to 3 mm	Not applicable	C

HAZARD

As sugar dissolves in water, ingress of water may result in the creation of air pockets in the body of the cargo with the ship's motion. The hazards are then similar to the hazards presented by cargoes which may liquefy. In case of ingress of water into the holds, the risk to the stability of the ship through dissolution of sugar (formation of a liquid base and shifting of cargo), should be recognized. This cargo is highly soluble.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINES

No special requirements.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

No special requirements.

VENTILATION

No special requirements.

CARRIAGE

After the completion of loading of this cargo, the hatches of the cargo spaces shall be sealed to prevent water ingress, as necessary.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

SULPHATE OF POTASH AND MAGNESIUM**DESCRIPTION**

Granular light brown material. Solution in water is almost neutral. May have a slight odour, depending on the process of manufacturer. Melting point: 72°C. Moisture: 0.02%.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	1000 to 1124	0.89 to 1.00
SIZE	CLASS	GROUP
Not applicable	Not applicable	C

HAZARD

No special hazards. This cargo is highly soluble.
This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

The cargo shall be trimmed in accordance with the cargo information required by section 4 of this Code. If doubt exists, trim reasonably level to the boundaries of the cargo space so as to minimize the risk of shifting and to ensure that adequate stability will be maintained during the voyage.

PRECAUTIONS

No special requirements.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

SULPHUR UN 1350
(lump and coarse grained)

DESCRIPTION

A mineral substance found free in volcanic countries. Yellow in colour, brittle, insoluble in water, but readily fusible by heat. Sulphur is loaded in a damp or wet condition.

Note: Fine grained sulphur (flowers of sulphur) shall not be transported in bulk.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	1053 to 1176	0.85 to 0.95
SIZE	CLASS	GROUP
Slate to 10 mm granules & prills to 5 mm	4.1	B

HAZARD

Flammability and dust explosion especially during loading and unloading and after discharge and cleaning.

This cargo may ignite readily.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

“Separated from” foodstuffs.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

Must be thoroughly clean and washed with fresh water.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

When this cargo is involved in a fire, a toxic, very irritating and suffocating gas is evolved. This cargo forms explosive and sensitive mixtures with most oxidizing material. This cargo has a liability to dust explosion, which may occur especially after discharge and during cleaning. The hold trimming plates and tank tops of the cargo spaces for this cargo shall be limewashed or coated with paint to prevent corrosion. Upper sections shall have a sound coating of paint. Electrical circuits for the equipment in cargo spaces for this cargo which is unsuitable for use in an explosive atmosphere shall be isolated by removal of links in the system other than fuses. Due consideration shall be paid on the isolation of electrical circuits for the equipment in the adjacent spaces of the cargo spaces which is unsuitable for use in an explosive atmosphere. Any ventilators of the cargo spaces for this cargo shall be fitted with spark-arresting screens.

Fine grained sulphur (flowers of sulphur) **shall not** be transported in bulk.

VENTILATION

Surface ventilation only, either natural or mechanical, shall be conducted, as necessary, during the voyage for this cargo.

CARRIAGE

Bilges in the cargo spaces carrying this cargo shall be pumped regularly to prevent accumulation of water/acid solution.

DISCHARGE

No special requirements.

CLEAN UP

The cargo spaces and other structures which may have been in contact with this cargo or the dust shall not be swept. After discharge of this cargo, the cargo spaces, and other structures as necessary, shall be washed out with fresh water to remove all residues of this cargo. Then the cargo spaces shall be thoroughly dried. Wet dust or residues may form highly corrosive sulphurous acid, which is extremely dangerous to personnel and corrosive to steel. Persons involved in cleaning up shall be provided with protective clothing, goggles and facemasks to wear.

EMERGENCY PROCEDURES

SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED

Self-contained breathing apparatus.

EMERGENCY PROCEDURES

Wear self-contained breathing apparatus.

EMERGENCY ACTION IN THE EVENT OF FIRE

Batten down; use ship's fixed fire-fighting installation if available. Exclusion of air may be sufficient to control the fire. **Do not use water.**

MEDICAL FIRST AID

Refer to the Medical First Aid (MFAG), as amended.

SUPERPHOSPHATE

DESCRIPTION

Greyish-white. Moisture: 0% to 7%. Hygroscopic.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
30° to 40°	1000 to 1190	0.81 to 1.00
SIZE	CLASS	GROUP
Granular, fines and powder to 0.15 mm diameter	Not applicable	C

HAZARD

No special hazards. This cargo is non-combustible or has a low fire-risk.
This cargo is hygroscopic and will cake if wet.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

The hold trimming plates and tank tops of the cargo spaces for this cargo shall be lime washed or coated with paint to prevent corrosion.

VENTILATION

The cargo spaces carrying this cargo shall not be ventilated during voyage.

CARRIAGE

Moisture from condensation, cargo heating or leaking hatchcovers may cause formation of phosphoric or phosphorous acid which may cause corrosion to steelwork. After the completion of loading of this cargo, the hatches of the cargo spaces shall be sealed, as necessary. This cargo will decompose burlap or canvas cloth covering bilge wells.

DISCHARGE

If this cargo has hardened, it shall be trimmed to avoid the formation of overhangs, as necessary.

CLEAN UP

After discharge of this cargo, particular attention shall be paid to bilge wells of the cargo spaces.

SUPERPHOSPHATE (triple, granular)**DESCRIPTION**

Granular in form, dark grey colour and, depending on its source, can be dusty. Hygroscopic.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	813 to 909	1.10 to 1.23
SIZE	CLASS	GROUP
2 mm to 4 mm	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

This cargo is hygroscopic and will cake if wet.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Hold trimming plates and tank tops should be lime washed to prevent corrosion.

VENTILATION

The cargo spaces carrying this cargo shall not be ventilated during voyage.

CARRIAGE

Moisture from condensation, cargo heating or leaking hatchcovers may cause formation of phosphoric or phosphorous acid which may cause corrosion to steelwork. After the completion of loading of this cargo, the hatches of the cargo spaces shall be sealed, as necessary. This cargo will decompose burlap or canvas cloth covering bilge wells.

DISCHARGE

If this cargo has hardened, it shall be trimmed to avoid the formation of overhangs, as necessary.

CLEAN UP

Pay particular attention to bilge wells.

TACONITE PELLETS

DESCRIPTION

Ore. Grey, round steel pellets. Moisture: 2%.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	599 to 654	1.53 to 1.67
SIZE	CLASS	GROUP
Pellets to 15 mm diameter	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

No special requirements.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

TALC**DESCRIPTION**

Talc is an extremely soft, whitish, green or greyish natural hydrated magnesium silicate. It has a characteristic soapy, or greasy feel.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	1370 to 1563	0.64 to 0.73
SIZE	CLASS	GROUP
Powdery to 100 mm lumps	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

No special requirements.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

TANKAGE

DESCRIPTION

The dried sweeping of animal matter from slaughterhouse floors. Very dusty.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	-	-
SIZE	CLASS	GROUP
Not applicable	MHB	B

HAZARD

Subject to spontaneous heating and possible ignition. Possibly infectious.

STOWAGE & SEGREGATION

Segregation as required for class 4.2 materials.

“Separated by a complete cargo space or hold from” foodstuffs.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Bilge wells shall be clean, dry and covered as appropriate, to prevent ingress of the cargo.

Do not load if the temperature is above 38°C.

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear goggles or other equivalent dust eye-protection and dust filter masks. Those persons shall wear protective clothing, as necessary.

VENTILATION

No special requirements.

CARRIAGE

The temperature of this cargo shall be measured daily during voyage. The results of measurements shall be recorded to check possible self-heating heating.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

EMERGENCY PROCEDURES

SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED

Self-contained breathing apparatus.

EMERGENCY PROCEDURES

Wear self-contained breathing apparatus.

EMERGENCY ACTION IN THE EVENT OF FIRE

Batten down; use ship's fixed fire-fighting installation.
Use full protective clothing in case of fire situation.

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAG), as amended.

TAPIOCA

DESCRIPTION

Dry, dusty mixture of powder and granules.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
32°	735	1.36
SIZE	CLASS	GROUP
Powder and granules	Not applicable	C

HAZARD

May heat spontaneously with oxygen depletion in the cargo space.
This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear protective clothing, goggles or other equivalent dust eye-protection and dust filter masks, as necessary.

VENTILATION

The cargo spaces carrying this cargo shall not be ventilated during voyage.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

UREA**DESCRIPTION**

White, granular, and odourless commodity. Moisture content is less than 1%. Hygroscopic.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
28° to 45°	645 to 855	1.17 to 1.56
SIZE	CLASS	GROUP
1 mm to 4 mm	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

This cargo is hygroscopic and will cake if wet.

Urea (either pure or impure) may, in the presence of moisture, damage paintwork or corrode steel.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTION

No special requirements.

VENTILATION

The cargo spaces carrying this cargo shall not be ventilated during voyage.

CARRIAGE

No special requirements.

DISCHARGE

If this cargo has hardened, it shall be trimmed to avoid the formation of overhangs, as necessary.

CLEAN UP

After discharge of this cargo, the cargo spaces shall be swept, washed out and dried.

VANADIUM ORE

DESCRIPTION

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
Not applicable	1786	0.560
SIZE	CLASS	GROUP
Not applicable	MHB	B

HAZARD

Dust may be toxic.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

Segregation as required for class 6.1 materials.

“Separated from” foodstuffs.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Exposure of persons to dust should be minimized.

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear goggles or other equivalent dust eye-protection and dust filter masks. Those persons shall wear protective clothing, as necessary.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

EMERGENCY PROCEDURES

SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED

Self-contained breathing apparatus.

EMERGENCY PROCEDURES

Wear self-contained breathing apparatus.

EMERGENCY ACTION IN THE EVENT OF FIRE

Batten down; use ship's fixed fire fighting installation, if fitted.
Exclusion of air may be sufficient to control fire.

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAG), as amended.

VERMICULITE

DESCRIPTION

A mineral of the mica group. Grey. Average moisture: 6% to 10%. May give off dust.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	730	1.37
SIZE	CLASS	GROUP
3 mm	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear protective clothing, goggles or other equivalent dust eye-protection and dust filter masks, as necessary.

Prior to loading, a certificate based on test shall be provided by the manufacturer or shipper stating that the asbestos content is less than 1%.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

WHITE QUARTZ

DESCRIPTION

99.6% silica content.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	1639	0.61
SIZE	CLASS	GROUP
Lumps to 150 mm	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

No special requirements.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

WOODCHIPS

DESCRIPTION

Natural timber mechanically chipped into the approximate size of a business card.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	326	3.07
SIZE	CLASS	GROUP
As above	MHB	B

HAZARD

This material possesses a chemical hazard. Some shipments may be subject to oxidation leading to depletion of oxygen and increase of carbon dioxide in cargo and adjacent spaces.

With moisture content of 15% or more this cargo has a low fire-risk. As the moisture content decreases the fire risk increases. When dry, woodchips can be easily ignited by external sources; are readily combustible and can ignite by friction.

STOWAGE & SEGREGATION

Segregation as for class 4.1 materials.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Entry of personnel into the cargo spaces containing this cargo shall not be permitted until tests have been carried out and it has been established that the oxygen content has been restored to a normal level. In dry weather, dust, which settles on deck, will dry out quickly and becomes readily ignitable. Appropriate precautions shall be taken to prevent fire.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

EMERGENCY PROCEDURES

SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED

Nil

EMERGENCY PROCEDURES

Nil

EMERGENCY ACTION IN THE EVENT OF FIRE

Batten down; use ship's fixed fire-fighting installation if fitted.
Exclusion of air may be sufficient to control fire.

MEDICAL FIRST AID

Refer to Medical First Aid Guide (MFAG), as amended.

WOOD PELLETS

DESCRIPTION

The Wood Pellets are light blond to chocolate brown in colour; very hard and cannot be easily squashed. Wood Pellets have a typical specific density between 1,100 to 1,700 kg/m³ and a bulk density of 600 to 750 kg/m³. Wood Pellets are made of sawdust, planer shavings and other wood waste such as bark coming out of the lumber manufacturing processes. Normally there are no additives or binders blended into the pellet, unless specified. The raw material is fragmented, dried and extruded into pellet form. The raw material is compressed approximately 3.5 times and the finished Wood Pellets typically have a moisture content of 4 to 8%. Wood Pellets are used as a fuel in district heating and electrical power generation as well as a fuel for small space heaters such as stoves and fireplaces.

Wood Pellets are also used as animal bedding due to the absorption characteristics. Such Wood Pellets typically have a moisture content of 8 to 10%.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Approximately 30 degrees	600 to 750	1.4 to 1.6
SIZE	CLASS	GROUP
Cylindrical with 3 to 12 mm Diameter: 10 to 20 mm	MHB	B

HAZARD

Shipments may be subject to oxidation leading to depletion of oxygen and increase of carbon monoxide and carbon dioxide in cargo and communicating spaces.

Swelling if exposed to moisture. Wood Pellets may ferment over time if moisture content is over 15% leading to generation of asphyxiating and flammable gases which may cause spontaneous combustion.

Handling of Wood Pellets may cause dust to develop. Risk of explosion at high dust concentration.

STOWAGE AND SEGREGATION

Segregate as for class 4.1 materials.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Entry of personnel into the cargo spaces containing this cargo or the connecting spaces shall not be permitted until tests have been carried out and it has been established that the oxygen content has been restored to a normal level. The close or direct contact of this cargo and cargo hold lighting such as hot halogen lamps shall be avoided. Fuses to such lights shall be removed or secured while this cargo is present in the cargo space. Precautions shall be taken to prevent generation of high concentrations of dust during handling and cleaning of this cargo.

VENTILATION

The cargo spaces carrying this cargo shall not be ventilated during voyage.

CARRIAGE

Hatches of the cargo spaces carrying this cargo shall be weathertight to prevent the ingress of water.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

EMERGENCY PROCEDURES

SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED

Oxygen or combined carbon monoxide/dioxide meter when entering confined spaces, which has not been properly ventilated.

EMERGENCY PROCEDURES

Nil

EMERGENCY ACTION IN THE EVENT OF FIRE

Batten down; use ship's fixed fire-fighting installation.
Exclusion of air may be sufficient to control fire. Extinguish fire with carbon dioxide, foam or water.

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAG), as amended.

WOOD PULP PELLETS

DESCRIPTION

The pellets are brown in colour; very hard and cannot be easily squashed. They are light and are about half the size of a bottle cork. The pellets are made of compacted woodchips.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	326	3.07
SIZE	CLASS	GROUP
approx. 15 mm x 20 mm	MHB	B

HAZARD

This cargo possesses a chemical hazard. Some shipments may be subject to oxidation leading to depletion of oxygen and increase of carbon dioxide in cargo and adjacent spaces.

With moisture content of 15% or more this cargo has a low fire-risk. As the moisture content decreases, the fire risk increases.

STOWAGE & SEGREGATION

Segregate as for class 4.1 materials.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Entry of personnel into the cargo spaces containing this cargo shall not be permitted until tests have been carried out and it has been established that the oxygen content has been restored to a normal level. In dry weather, dust, which settles on deck, will dry out quickly and becomes readily ignitable. Appropriate precautions shall be taken to prevent fire.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

EMERGENCY PROCEDURES

SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED

Nil

EMERGENCY PROCEDURES

Nil

EMERGENCY ACTION IN THE EVENT OF FIRE

Batten down; use ship's fixed fire-fighting installation if fitted.
Exclusion of air may be sufficient to control fire.

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAAG), as amended.

ZINC ASHES UN 1435

Shipments require the approval of the competent authority of the countries of shipment and the flag State of the ship.

DESCRIPTION

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	900	1.11
SIZE	CLASS	GROUP
Not applicable	4.3	B

HAZARD

In contact with moisture or water liable to give off hydrogen, a flammable gas, and toxic gases. This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

“Separated from” foodstuffs and all class 8 liquids.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable before loading, during loading and during voyage. This cargo shall not be loaded during precipitation. During loading of this cargo all non-working hatches of the cargo spaces to which this cargo are loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code. This cargo shall not be accepted for loading when the cargo is damp or known to have been wetted.

PRECAUTIONS

Reject any damp material or any material which is known to have been wetted. Possible ignition sources, including hotwork, burning, smoking, electrical sparking, shall be eliminated in the vicinity of the cargo spaces containing this cargo during handling and carriage of this cargo.

VENTILATION

Continuous mechanical ventilation shall be conducted during the voyage for the cargo spaces carrying this cargo. If maintaining ventilation endangers the ship or the cargo, it may be interrupted unless there is a risk of explosion or other danger due to interruption of the ventilation. In any case mechanical ventilation shall be maintained for a reasonable period prior to discharge.

CARRIAGE

For quantitative measurements of hydrogen, a suitable detector shall be on board while this cargo is carried. The detector shall be of certified safe type for use in explosive atmosphere. The concentration of hydrogen in the cargo spaces carrying this cargo shall be measured regularly, during voyage, and the results of the measurements shall be recorded and kept on board.

DISCHARGE

No special requirements.

CLEAN UP

After discharge of this cargo, the cargo spaces shall be swept clean twice. Water shall not be used for cleaning of the cargo space which has contained this cargo, because of danger of gas.

EMERGENCY PROCEDURES

SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED

Protective clothing (gloves, boots, coveralls, headgear).
Self-contained breathing apparatus.

EMERGENCY PROCEDURES

Wear protective clothing and self-contained breathing apparatus.

EMERGENCY ACTION IN THE EVENT OF FIRE

Batten down; use ship's fixed fire-fighting installation if available.
Do not use water.

MEDICAL FIRST AID

Refer to the Medical First Aid Guide (MFAG), as amended.

ZIRCONSAND

DESCRIPTION

Usually fine white to yellow, very abrasive extracted from ilmenite sand. May be dusty. Shipped dry.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	2600 to 3000	0.33 to 0.36
SIZE	CLASS	GROUP
0.15 mm or less	Not applicable	C

HAZARD

No special hazard.

This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable before loading, during loading and during voyage. This cargo shall not be loaded during precipitation. During loading of this cargo all non-working hatches of the cargo spaces to which this cargo are loaded or to be loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

As the density of the cargo is extremely high, the tanktop may be overstressed unless the cargo is evenly spread across the tanktop to equalize the weight distribution. Due consideration shall be paid to ensure that tanktop is not overstressed during voyage and during loading by a pile of the cargo.

PRECAUTIONS

Bilge wells shall be clean, dry and covered as appropriate, to prevent ingress of the cargo.

Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons, who may be exposed to the dust of the cargo, shall wear goggles or other equivalent dust eye-protection and dust filter masks. Those persons shall wear protective clothing, as necessary.

VENTILATION

No special requirements.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN UP

No special requirements.

APPENDIX 2

LABORATORY TEST PROCEDURES, ASSOCIATED APPARATUS AND STANDARDS

1 Test procedures for materials which may liquefy and associated apparatus

Three methods of testing for the Transportable moisture limit are currently in general use:

- .1 flow table test;
- .2 penetration test;
- .3 Proctor/Fagerberg test.

As each method has its advantages, the selection of the test method should be determined by local practices or by the appropriate authorities.

1.1 *Flow table test procedure*

1.1.1 *Scope*

The flow table is generally suitable for mineral concentrates or other fine material with a maximum grain size of 1 mm. It may also be applicable to materials with a maximum grain size up to 7 mm. It will not be suitable for materials coarser than this and may also not give satisfactory results for some materials with high clay content. If the flow table test is not suitable for the material in question, the procedures to be adopted should be those approved by the authority of the port State.

The test described below provides for determination of:

- .1 the moisture content of a sample of cargo, hereinafter referred to as the test material;
- .2 the flow moisture point (FMP) of the test material under impact or cyclic forces of the flow table apparatus; and
- .3 the transportable moisture limit of the test material.

1.1.2 *Apparatus (see figure 1.1.2)*

- .1 Standard flow table and frame (ASTM Designation (C230-68) – see 3).

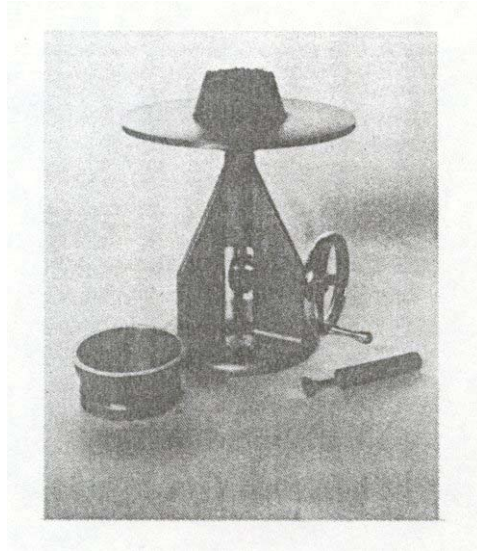


Figure 1.1.2 *Flow table and accessory apparatus*

- .2 Flow table mounting (ASTM Designation (C230-68) – see 3).
- .3 Mould (ASTM Designation (C230-68) – see 3).
- .4 Tamper (see figure 1.1.2.4): the required tamping pressure may be achieved by using calibrated, spring-loaded tampers (examples are included in figure 1.1.2.4) or some other suitable design of tamper that allows a controlled pressure to be applied via a 30 mm diameter tamper head.
- .5 Scales and weights (ASTM Designation (C109-73) – see 3) and suitable sample containers.
- .6 Glass graduated measuring cylinder and burette having capacities of 100-200 ml and 10 ml, respectively.
- .7 A hemispherical mixing bowl approximately 30 cm diameter, rubber gloves and drying dishes or pans. Alternatively, an automatic mixer of similar capacity can be used for the mixing operations. In this case, care should be exercised to ensure that the use of such a mechanical mixer does not reduce the particle size or consistency of the test material.
- .8 A drying oven with controlled temperature up to approximately 110°C. This oven should be without air circulation.

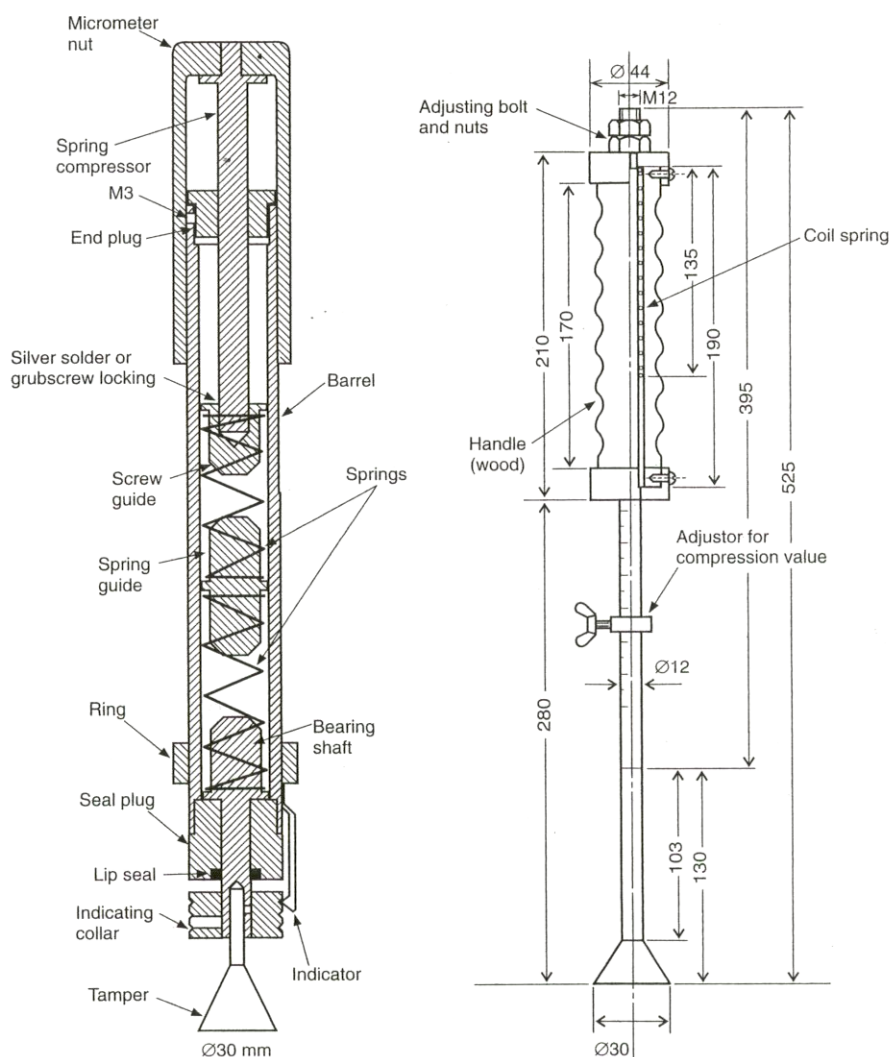


Figure 1.1.2.4 *Examples of spring-loaded tampers*

1.1.3 *Temperature and humidity*

It is preferable to work in a room where the samples will be protected from excessive temperatures, air currents and humidity variations. All phases of the material preparation and testing procedure should be accomplished in a reasonable space of time to minimize moisture losses and, in any event, within the day of commencement. Where possible, sample containers should be covered with plastic film or other suitable cover.

1.1.4 *Procedure*

The quantity of material required for a flow moisture test will vary according to the specific gravity of the material to be tested. It will range from approximately 2 kg for coal to 3 kg for mineral concentrates. It should be collected as a representative sample of the cargo being shipped. Experience has shown that more accurate test results will be obtained by ensuring that the moisture content of the test sample is increased rather than decreased towards the FMP.

Consequently, it is recommended that a preliminary flow moisture test should be conducted, generally in accordance with the following, to indicate the condition of the test sample, i.e., the quantity of water and the rate at which it is to be added or whether the sample should be air-dried to reduce its moisture content before commencing the main flow moisture test.

1.1.4.1 Preparation of the test sample

The representative sample of test material is placed in the mixing bowl and thoroughly mixed. Three subsamples (A), (B) and (C) are removed from the mixing bowl as follows: about one fifth of the sample (A) should be immediately weighed and placed in the drying oven to determine the moisture content of the sample “as received”. Two further subsamples, each of about two fifths of the gross weight, should then be taken, one (B) for the preliminary FMP test and the other (C) for the main FMP determination:

- .1 *Filling the mould.* The mould is placed on the centre of the flow table and filled in three stages with the material from the mixing bowl. The first charge, after tamping, should aim to fill the mould to approximately one third of its depth. The quantity of sample required to achieve this will vary from one material to another, but can readily be established after some experience has been gained of the packing characteristics of the material being tested.

The second charge, after tamping, should fill the mould to about two thirds of its depth and the third and final charge, after tamping, should reach to just below the top of the mould (see figure 1.1.4.2).

- .2 *Tamping procedure.* The aim of tamping is to attain a degree of compaction similar to that prevailing at the bottom of a shipboard cargo of the material being tested. The correct pressure to be applied is calculated from:

$$\text{Tamping pressure (Pa)} = \text{Bulk density of cargo (kg/m}^3\text{)} \\ \times \text{Maximum depth of cargo (m)} \\ \times \text{Gravity acceleration (m/s}^2\text{)}$$

Bulk density can be measured by a single test, using the Proctor C apparatus described in ASTM Standard D-698 or JIS-A-1210, on a sample of the cargo at the proposed moisture content of loading.

When calculating the tamping pressure, if no information concerning cargo depth is available the maximum likely depth should be used.

Alternatively, the pressure may be estimated from table 1.1.4.1.

The number of tamping actions (applying the correct, steady pressure each time) should be about 35 for the bottom layer, 25 for the middle and 20 for the top layer, tamping successively over the area completely to the edges of the sample to achieve a uniformly flat surface for each layer.

- .3 *Removal of the mould.* The mould is tapped on its side until it becomes loose, leaving the sample in the shape of a truncated cone on the table.

Table 1.1.4.1

Typical cargo	Bulk density (kg/m ³)	Maximum cargo depth			
		2 m	5 m	10 m	20 m
		← Tamper pressure (kPa) →			
Coal	1000	20 (1.4)	50 (3.5)	100 (7.1)	200 (14.1)
	2000	40 (2.8)	100 (7.1)	200 (14.1)	400 (28.3)
Metal ore	3000	60 (4.2)	150 (10.6)	300 (21.2)	600 (42.4)
	4000	80 (5.7)	200 (14.1)	400 (28.3)	800 (56.5)
Lead ore conc.	5000	100 (7.1)	250 (17.7)	500 (35.3)	1000 (70.7)

(values in parenthesis are equivalent kgf when applied via a 30 mm diameter tamper head)

1.1.4.2 The preliminary flow moisture test:

- .1 Immediately after removing the mould, the flow table is raised and dropped up to 50 times through a height of 12.5 mm at a rate of 25 times per minute. If the material is below the FMP, it usually crumbles and bumps off in fragments with successive drops of the table (see figure 1.1.4-3).
- .2 At this stage, the flow table is stopped and the material returned to the mixing bowl, where 5-10 ml of water, or possibly more, is sprinkled over the surface and thoroughly mixed into the material, either with rubber-gloved fingers or an automatic mixer.

The mould is again filled and the flow table is operated as described in 1.1.4.2.1 for up to 50 drops. If a flow state is not developed, the process is repeated with further additions of water until a flow state has been reached.

- .3 *Identification of a flow state.* The impacting action of the flow table causes the grains to rearrange themselves to produce compaction of the mass. As a result, the fixed volume of moisture contained in the material at any given level increases as a percentage of the total volume. A flow state is considered to have been reached when the moisture content and compaction of the sample produce a level of saturation such that plastic deformation occurs*. At this stage, the moulded sides of the sample may deform, giving a convex or concave profile (see figure 1.1.4-4).

* In certain conditions, the diameter of the cone may increase before the flow moisture point is reached, due to low friction between the grains rather than to plastic flow. This must not be mistaken for a flow state.

With repeated action of the flow table, the sample continues to slump and to flow outwards. In certain materials, cracks may also develop on the top surface. Cracking, with the appearance of free moisture, is not, however, an indication of development of a flow state. In most cases, measurement of the deformation is helpful in deciding whether or not plastic flow has occurred. A template which, for example, will indicate an increase in diameter of up to 3 mm in any part of the cone is a useful guide for this purpose. Some additional observations may be useful. For example: when the (increasing) moisture content is approaching the FMP, the sample cone begins to show a tendency to stick to the mould. Further, when the sample is pushed off the table, the sample may leave tracks (stripes) of moisture on the table. If such stripes are seen, the moisture content may be above the FMP: the absence of tracks (stripes) is not necessarily an indication of being below the FMP.

Measuring the diameter of the cone, at the base or at half height, will always be useful. By addition of water in increments of 0.4% to 0.5% and applying 25 drops of the flow table, the first diameter increase will generally be between 1 and 5 mm and after a further increment of water the base diameter will have expanded by between 5 and 10 mm.

- .4 As an alternative to the procedure described above, for many concentrates a fast way of finding the approximate FMP is as follows:

When the moisture content is definitely beyond the FMP, measure the diameter after 25 drops, repeat the test after adding a further increment of water, measure the diameter and draw a diagram as illustrated in figure 1.1.4-1, showing increase in diameter plotted against moisture content. A straight line drawn through the two points will cross the moisture content axis close to the FMP.

Having completed the preliminary FMP test, the sample for the main test is adjusted to the required level of moisture content (about 1% to 2%) below the flow point.

1.1.4.3 Main flow moisture test

When a flow state has been reached in the preliminary test, the moisture content of sub-sample (C) is adjusted to about 1% to 2% less than the last value which did not cause flow in the preliminary test (this is suggested simply to avoid starting the main test too close to the FMP and then having to waste time air-drying it and starting again). The final test is then carried out on this adjusted sample in the same manner as for the preliminary test, but in this case with the addition of water in increments of no more than 0.5% of the mass of the test material (the lower the “preliminary” FMP, the smaller the increments should be). After each stage, the whole moulded sample should be placed in a container, weighed immediately and retained for moisture determination if required. This will be necessary if the sample flowed or if the next, slightly wetter, sample flows. If not required it may be returned to the mixing bowl.

When a flow state has been reached, the moisture content should be determined on two samples, one with moisture content just above the FMP and the other with moisture content just below the FMP. The difference between the two values should then be 0.5% or less, and the FMP is taken as the mean of these two values.

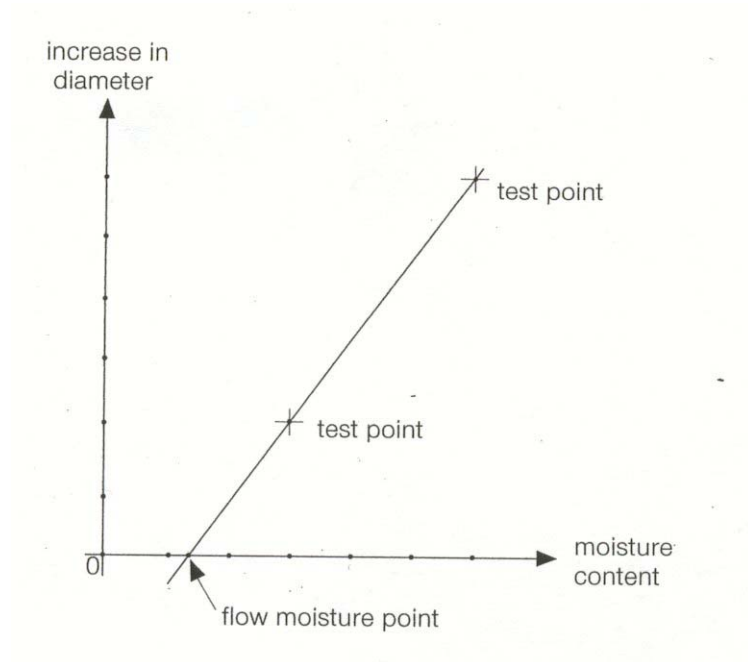


Figure 1.1.4-1



Figure 1.1.4-2

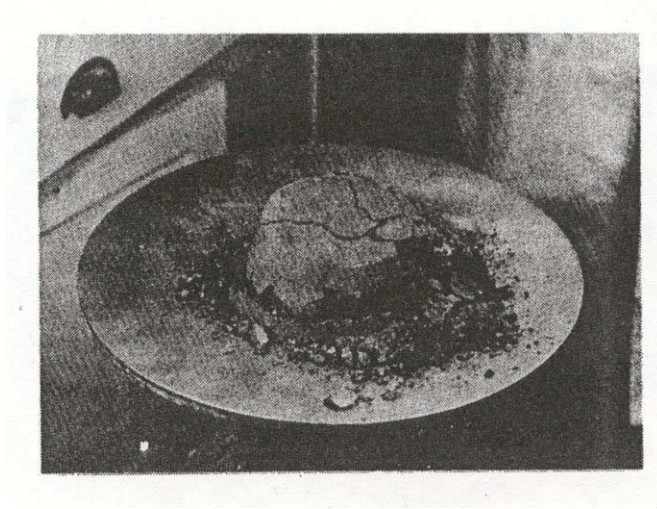


Figure 1.1.4-3

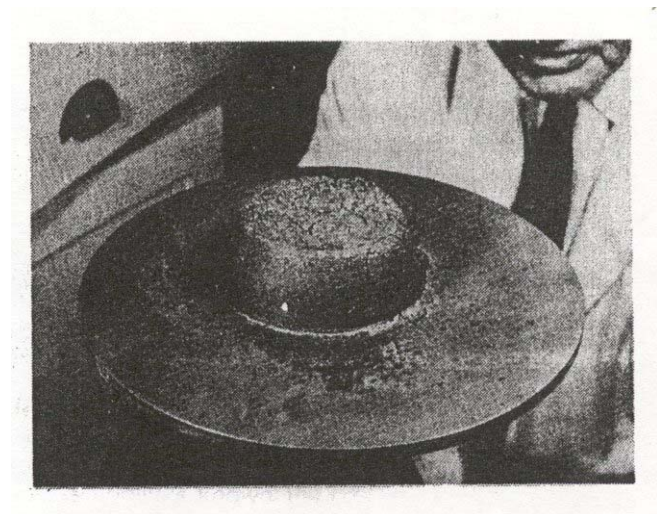


Figure 1.1.4-4

1.1.4.4 Determination of moisture content

Introduction

It should be noted that, for many materials, there are recognized international and national methods for determining moisture content. These methods, or ones that have been established to give equivalent results, should be followed.

Concentrates and similar materials

It is clearly important that the samples should be dried to a constant mass. In practice, this is ascertained after a suitable drying period at 105°C by weighing the sample successively with an interval of several hours elapsing. If the mass remains constant, drying has been completed, whereas if the mass is still decreasing, drying should be continued.

The length of the drying period depends upon many variables, such as the disposition of the material in the oven, the type of container used, the particle size, the rate of heat transfer, etc. It may be that a period of five hours is ample for one concentrate sample, whereas it is not sufficient for another. Sulphide concentrates tend to oxidize, and therefore the use of drying ovens with air circulation systems is not recommended for these materials, nor should the test sample be left in the drying oven for more than four hours.

Coal

The recommended methods for determination of the moisture content are those described in ISO 589-1974, “Hard Coal – Determination of Total Moisture”. This method, or ones that have been established to give equivalent results, should be followed.

Calculation of moisture content, FMP and transportable moisture limit:

Taking m_1 as the exact mass of the subsample “as received” (see 1.1.4.1),

Taking m_2 as the exact mass of the “as received” subsample, after drying,

Taking m_3 as the exact mass of the sample just above the flow state (see 1.1.4.3),

Taking m_4 as the exact mass of the sample just above the flow state, after drying,

Taking m_5 as the exact mass of the sample just below the flow state (see 1.1.4.3),

Taking m_6 as the exact mass of the sample just below the flow state, after drying,

Then:

- .1 The moisture content of the concentrate “as received” is:

$$\frac{(m_1 - m_2)}{m_1} \times 100, \text{ in per cent} \quad (1.1.4.4.1)$$

- .2 The FMP of the material is:

$$\frac{\frac{(m_3 - m_4)}{m_3} + \frac{m_5 - m_6}{m_5}}{2} \times 100, \text{ in per cent} \quad (1.1.4.4.2)$$

- .3 The transportable moisture limit of the material is 90% of the FMP.

Peat Moss

For all Peat Moss, determine the bulk density, using either the ASTM or CEN (20 litres) method.

Peat should be above or below 90kg/cubic metre on a dry weight basis in order to obtain the correct TML.

As indicated in 1.1.1, the following should be determined:

- .1 the moisture content of a sample of cargo (MC);
- .2 the flow moisture point (FMP);
- .3 the transportable moisture limit (TML). The TML will be determined as follows:
 - .3.1 for peat with a bulk density of greater than 90 kg/cubic metre on a dry weight is 85% of the FMP; and
 - .3.2 for peat with a bulk density of 90 kg/cubic metre or less on a dry weight, the TML is 90% of the FMP.

1.2 Penetration test procedure

The penetration test constitutes a procedure whereby a material in a cylindrical vessel is vibrated. The flow moisture point is determined on the basis of the penetration depth of an indicator.

1.2.1 Scope

- .1 The penetration test is generally suitable for mineral concentrates, similar materials, and coals up to a top size of 25 mm.
- .2 In this procedure, the sample, in a cylindrical vessel, is subjected to vertical vibration of $2g \text{ rms} \pm 10\%$ (g = gravity acceleration) for 6 minutes. When the penetration depth of a bit put on the surface exceeds 50 mm, it is judged that the sample contains a moisture greater than the flow moisture point.
- .3 This procedure consists of a preliminary test to get an approximate value of the flow moisture point and a main test to determine the accurate flow moisture point. When the approximate value of the flow moisture point is known, the preliminary test can be omitted.
- .4 The room where the samples are tested should be prepared as mentioned in 1.1.3.

1.2.2 Apparatus (see figure 1.2.2)

- .1 The test apparatus consists of:
 - .1 a vibrating table;

- .2 cylindrical vessels;
 - .3 indicators (penetration bits and a holder);
 - .4 a tamper (see 1.1.2.4); and
 - .5 ancillary equipment (see 1.1.2.5 to .8).
- .2 The vibrator (see figure 1.2.2.2), with a table on which a cylindrical vessel can be clamped, should be capable of exciting a mass of 30 kg at a frequency of either 50 Hz or 60 Hz with an acceleration of 3g rms or more, and it can be controlled to adjust the acceleration level.
- .3 Dimensions of cylindrical vessels (see figures 1.2.2.3-1 and 1.2.2.3-2) are as follows:

Cylinder size	Inner diameter	Depth	Wall thickness
small	146 mm	202 mm	9.6 mm or more
large	194 mm	252 mm	10.3 mm or more

The vessels should be made of reasonably rigid, non-magnetic, impermeable and lightweight material such as acrylics or vinyl chloride.

The small cylindrical vessel is selected for the materials having a maximum particle size of 10 mm or less. The large cylindrical vessel is for those having a maximum particle size of 25 mm or less.

- .4 Penetration bits (see figure 1.2.2.4) are made of brass. The mass of the bit for coal should be adjusted to 88 g (5 kPa), and that for concentrates to 177 g (10 kPa). When the sample contains coarse particles, it is recommended that two bits of the same pressure are put on the surface to avoid misjudgment.
- .5 A holder (see figure 1.2.2.5) should be made to guide the rod of a bit with minimum friction to the centre of a cylindrical vessel. When two bits are used, they should be positioned in accordance with figure 1.2.2.
- .6 A cylindrical vessel and penetration indicators should be selected in accordance with the nature and condition of the test sample, viz. size of particles and bulk density.

1.2.3 Procedure

1.2.3.1 Preparation of the test sample and the vibrating table:

- .1 The quantity of the sample required is approximately six times or more the capacity of the selected cylindrical vessel. The amount of representative test sample with which each container is filled should be as follows: approximately 1,700 cm³ for the small container, and 4,700 cm³ for the large container.
- .2 Mix the sample well and divide into three approximately equal sub-samples, namely (A), (B) and (C). The sub-sample (A) should be immediately weighed and placed in the drying oven to determine the moisture content of the sample “as received”.

The sub-samples (B) and (C) are used for the preliminary test and the main test, respectively.

- .3 The vibration level of the vibrating table should be calibrated, using an acceleration meter, prior to carrying out testing. The acceleration of the table should be adjusted to 2g rms \pm 10% with a container filled with a sample mounted on the table.

1.2.3.2 Preliminary flow moisture test

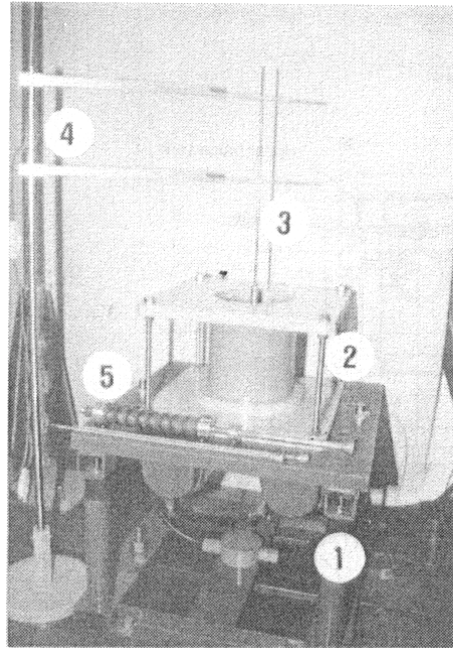
This test is intended to measure quickly the approximate flow moisture point, using sub-sample (B). Water is added in increments after every penetration test. When a flow state has been reached, the moisture content of the sample just above the flow state is measured. The moisture content of the sample just below the flow state can be calculated by deducting the increment of water last added from the gross mass of the sample.

- .1 Fill the appropriate cylindrical vessel with sub-sample (B) in four distinct stages and tamp after the addition of each layer using a specified tamper. Tamp to a pressure denoted in 1.1.4.1 for mineral concentrates or to 40 kPa for coals, and apply the pressure evenly over the whole surface area of the material until a uniformly flat surface is obtained.
- .2 Place the penetration bit on the surface of the material through the holder.
- .3 Operate the vibrator at a frequency of 50 Hz or 60 Hz with an acceleration of 2g rms \pm 10% for 6 minutes. If necessary, the acceleration level should be checked by referring to the output of the acceleration meter attached to the vibrating table.
- .4 After 6 minutes of vibration, read the depth of penetration.
- .5 When the depth of penetration is less than 50 mm, it is judged that liquefaction did not take place. Then:

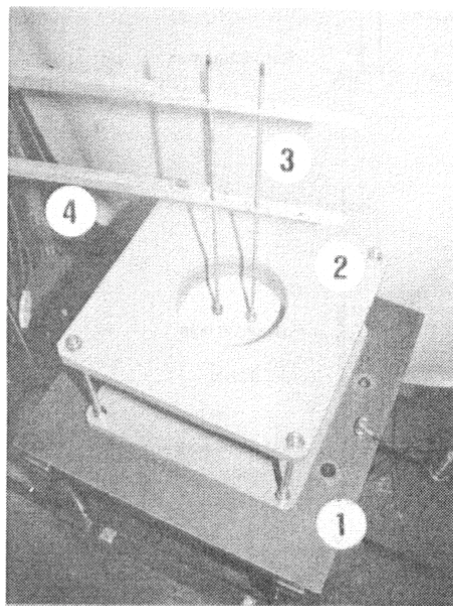
- .1 Remove the material from the cylindrical vessel and replace in the mixing bowl with the remainder of the sample.
- .2 Mix well and weigh the contents of the mixing bowl.
- .3 Sprinkle an increment of water of not more than 1% of the mass of the material in the bowl and mix well.
- .4 Repeat the procedure described in 1.2.3.2.1 to 1.2.3.2.5.
- .6 When the depth of penetration is greater than 50 mm, it is judged that liquefaction took place. Then:
 - .1 Remove the material from the cylindrical vessel and replace in the mixing bowl.
 - .2 Measure the moisture content in accordance with the procedure described in 1.1.4.4.
 - .3 Calculate the moisture content of the sample just below the flow moisture point on the basis of the amount of water added.
- .7 If the penetration depth in the first attempt exceeds 50 mm, i.e., the sample as received liquefied, mix sub-samples (B) and (C) and dry at room temperature to reduce the moisture. Then, divide the material into two sub-samples (B) and (C), and repeat the preliminary test.

1.2.3.3 The main flow moisture test

- .1 On the basis of the preliminary test, the main test should be carried out to determine the flow moisture point more accurately.
- .2 Adjust the moisture content of the sub-sample (C) to the last value, which did not cause flow in the preliminary flow moisture test.
- .3 The first test of the main flow moisture test is carried out on this adjusted sample in the same manner as described in 1.2.3.2. In this case, however, the addition of water in increments should not be more than 0.5% of the mass of the test material.
- .4 When the approximate value of the flow moisture point is known in advance, the moisture content of the sub-sample (C) is adjusted to approximately 90% of this value.
- .5 When a flow state has been reached, the flow moisture point is determined as described in 1.1.4.3.



- ① Vibration table
- ② Cylindrical vessel (150 mm diameter)
- ③ Penetration bit (10 kPa)
- ④ Bit holder
- ⑤ Tamper

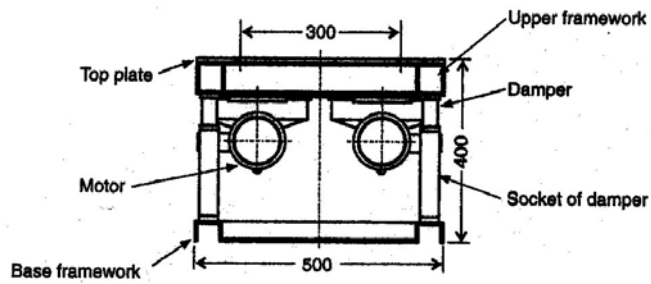


- ① Vibration table
- ② Cylindrical vessel (150 mm diameter)
- ③ Penetration bit (5 kPa)
- ④ Bit holder

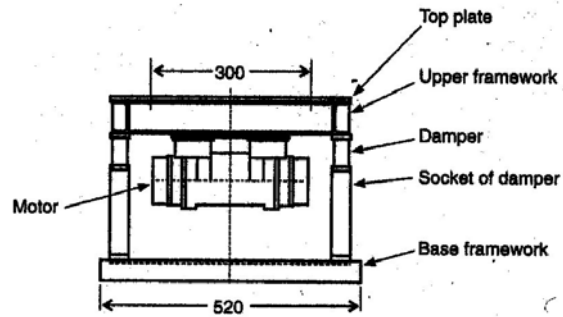
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Figure 1.2.2 Test apparatus

FRONT VIEW



SIDE VIEW



VIEW FROM BASE

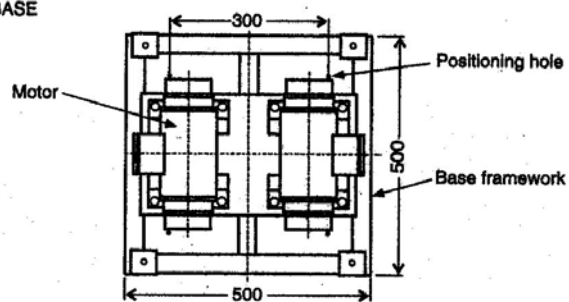


Figure 1.2.2.2 *Vibration table*

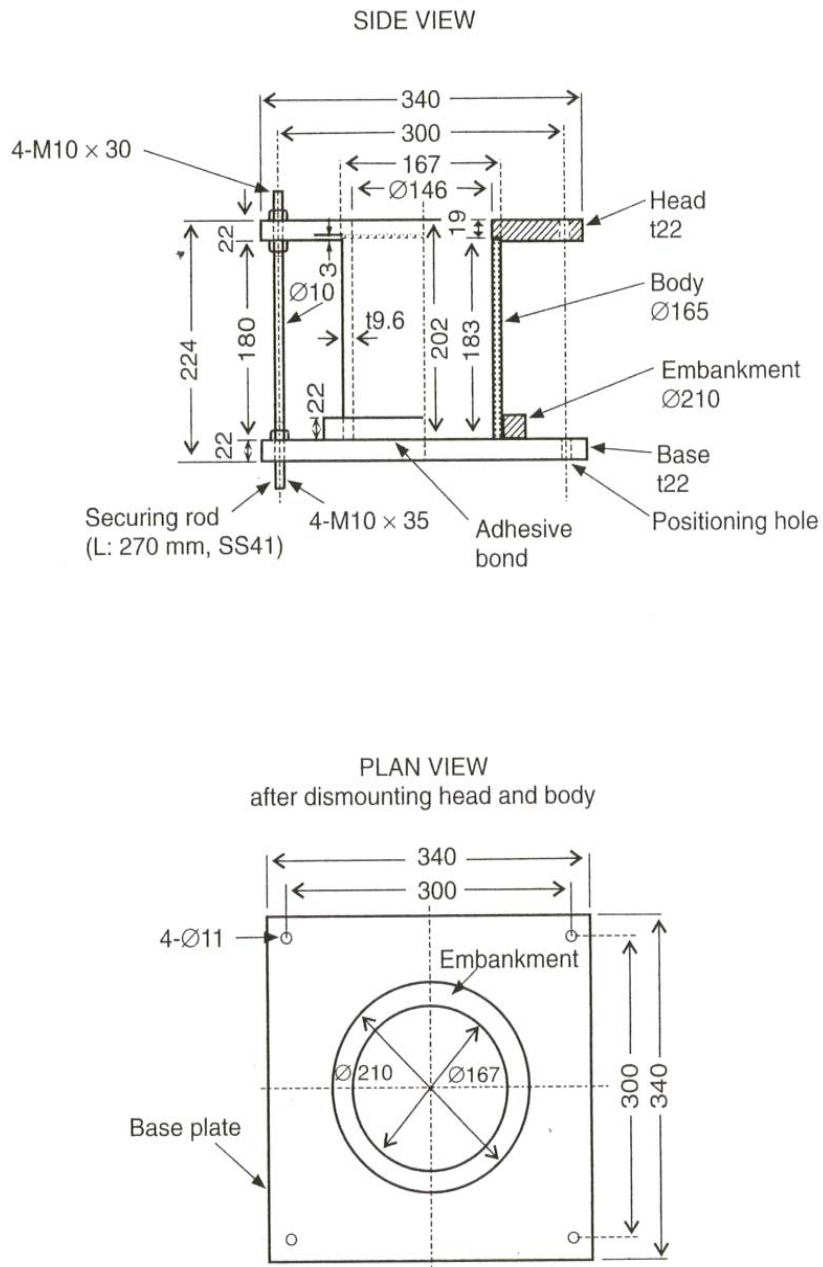


Figure 1.2.2.3-1 Cylindrical vessel, 150 mm diameter

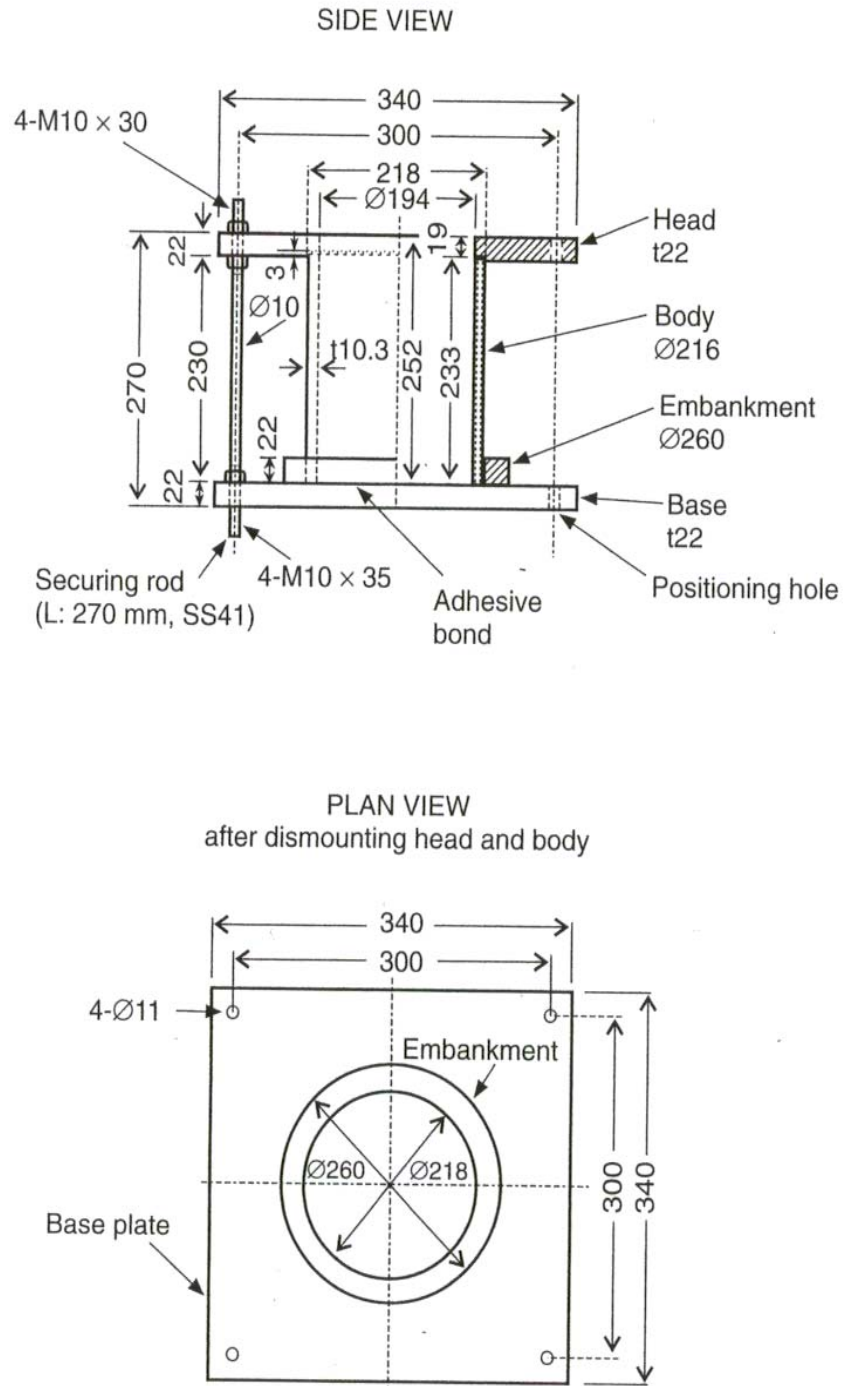
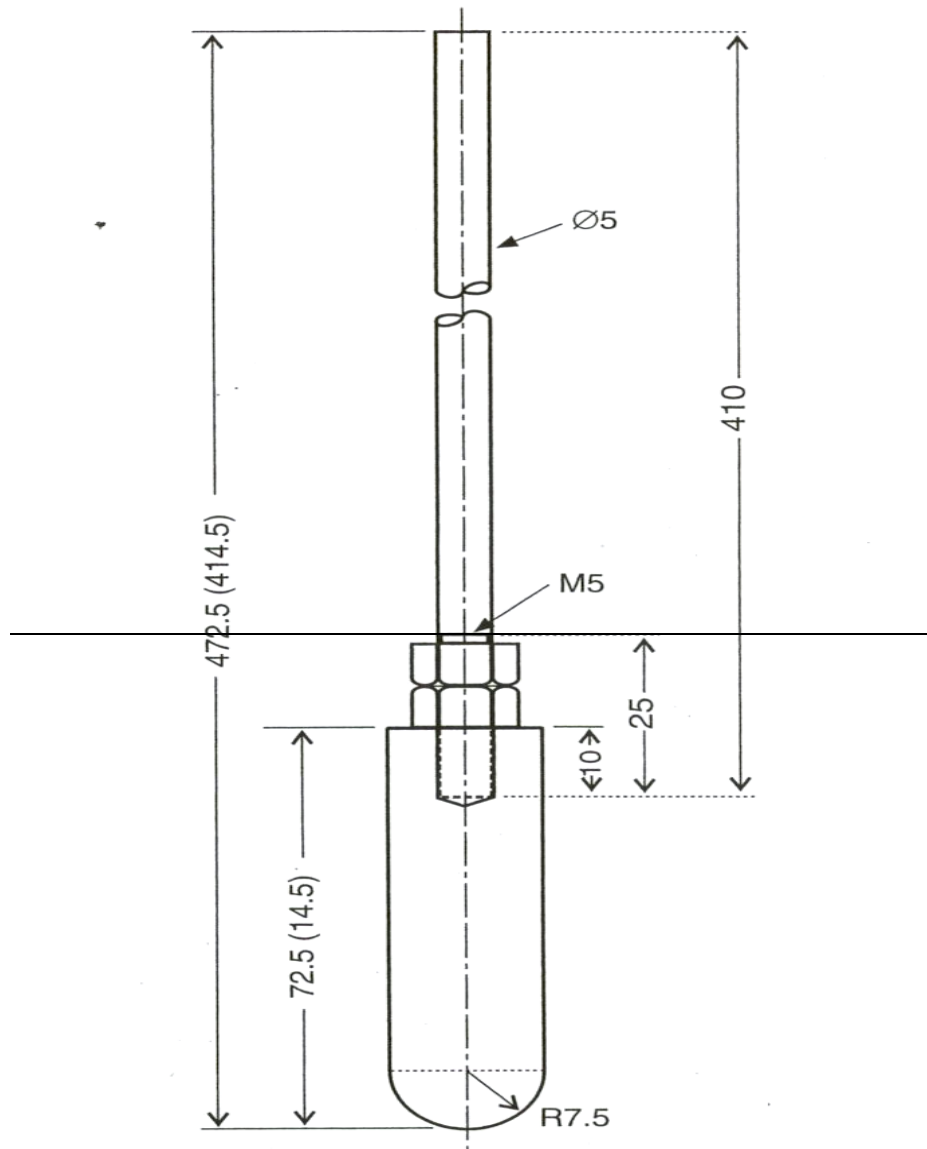


Figure 1.2.2.3-2 Cylindrical vessel, 200 mm diameter



(Dimensions indicated in brackets are of the 5 kPa bit)
(unit: mm)

Figure 1.2.2.4 Penetration bit

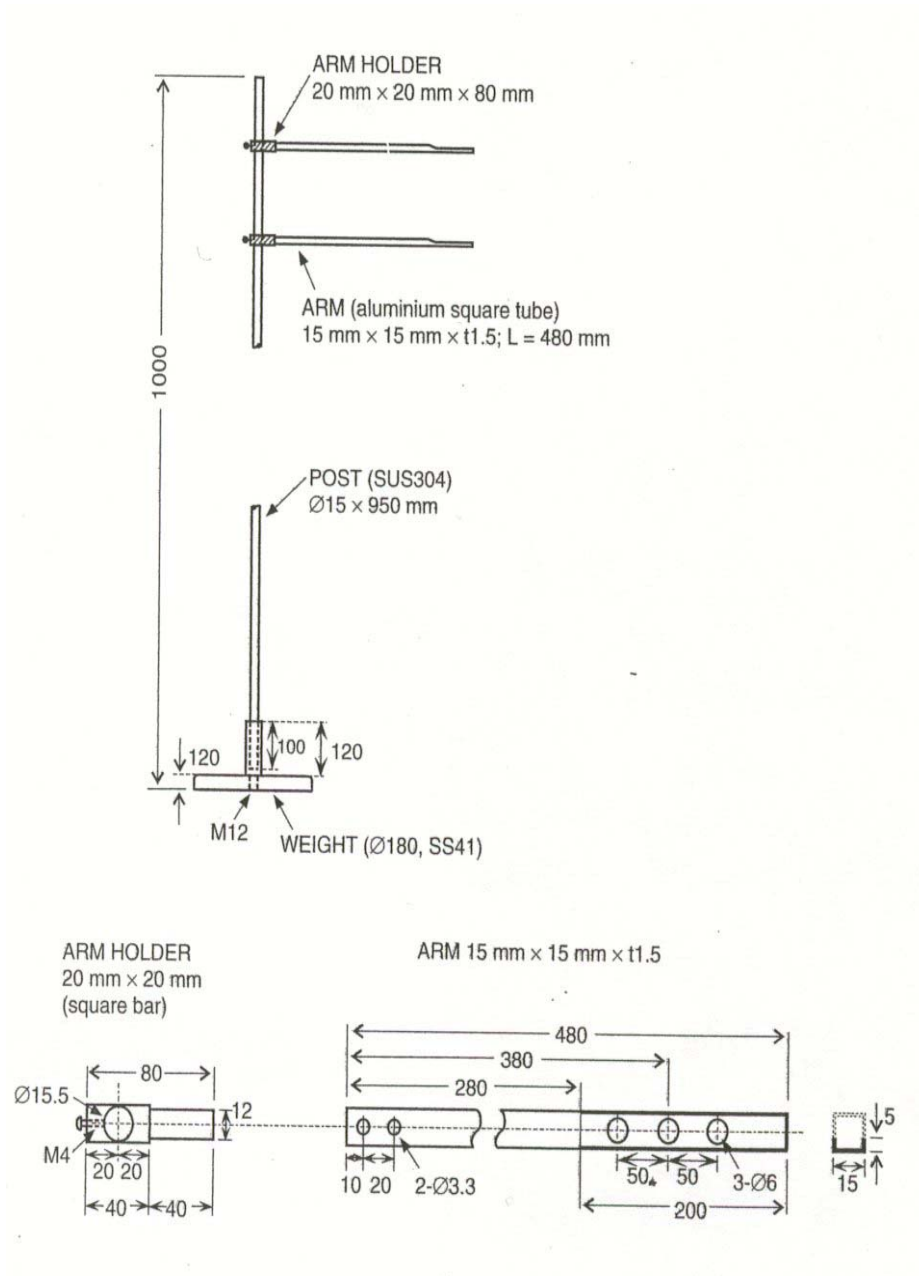


Figure 1.2.2.5 *Bit holder*

1.3 *Proctor/Fagerberg test procedure*

1.3.1 *Scope*

- .1 Test method for both fine and relatively coarse-grained ore concentrates or similar materials up to a top size of 5 mm. This method should not be used for coal or other porous materials.
- .2 Before the Proctor/Fagerberg test is applied to coarser materials with a top size greater than 5 mm, an extensive investigation for adoption and improvement is required.
- .3 The transportable moisture limit (TML) of a cargo is taken as equal to the critical moisture content at 70% degree of saturation according to the Proctor/Fagerberg method test.

1.3.2 *Proctor/Fagerberg test equipment*

- .1 The Proctor apparatus (see figure 1.3.2) consists of a cylindrical iron mould with a removable extension piece (the compaction cylinder) and a compaction tool guided by a pipe open at its lower end (the compaction hammer).
- .2 Scales and weights (see 3.2) and suitable sample containers.
- .3 A drying oven with a controlled temperature interval from 100°C to maximum 105°C. This oven should be without air circulation.
- .4 A suitable mixer. Care should be taken to ensure that the use of the mixer does not reduce the particle size or consistency of the test material.
- .5 Equipment to determine the density of the solid material, for example a pycnometer.

1.3.3.3 Temperature and humidity (see 1.1.3)

1.3.4 *Procedure*

- .1 *Establishment of a complete compaction curve.* A representative sample according to a relevant standard (see section 4.7, page 20) of the test material is dried at a temperature of approximately 100°C. The total quantity of the test material should be at least three times as big as required for the complete test sequence. Compaction tests are executed for five to ten different moisture contents (five to ten separate tests). The samples are adjusted in order that dry to almost saturated (plastic) samples are obtained. The required quantity per compaction test is about 2,000 cm³.

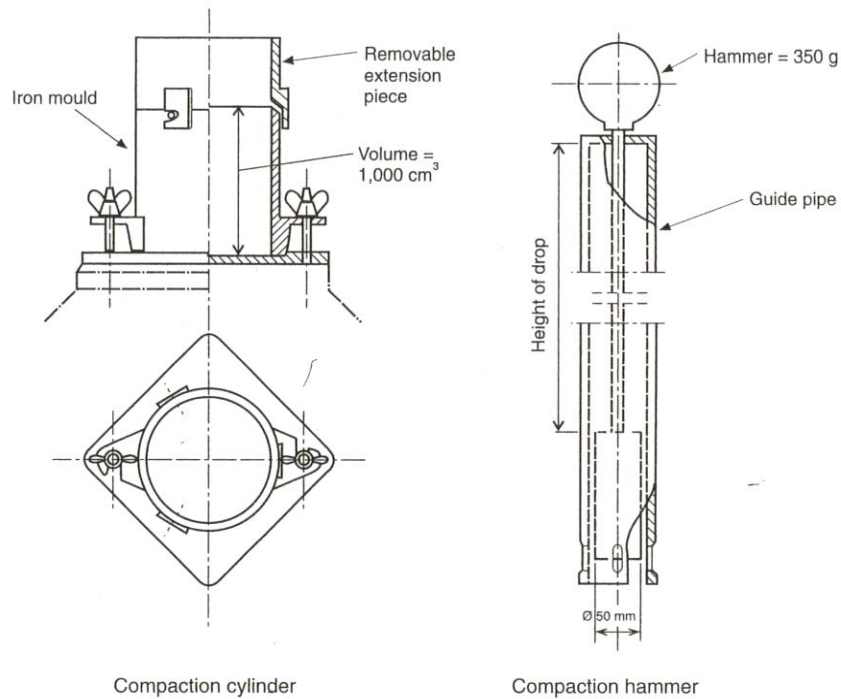


Figure 1.3.2 Proctor apparatus

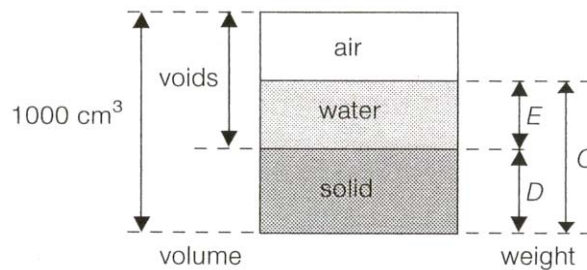


Figure 1.3.4.2

At each compaction test a suitable amount of water is added to the sample of the dried test material and mixed thoroughly for 5 minutes. Approximately one fifth of the mixed sample is filled into the mould and levelled and then the increment is tamped uniformly over the surface of the increment. Tamping is executed by dropping the hammer 25 times through the guide pipe, 0.2 m each time. The performance is repeated for all five layers. When the last layer has been tamped the extension piece is removed and the sample is levelled off along the brim of the mould. When the weight of the cylinder with the tamped sample has been determined, the cylinder is emptied, the sample is dried and the weight is determined.

The test then is repeated for the other samples with different moisture contents.

.2 *Definitions and data for calculations (see figure 1.3.4.2)*

- empty cylinder, mass in grams: A
 - cylinder with tamped sample, mass in grams: B
 - wet sample, mass in grams: C
- $$C = B - A$$
- dry sample, mass in grams: D
 - water, mass in grams (equivalent to volume in cm³): E

$$E = C - D$$

Volume of cylinder: 1000 cm³

.3 *Calculation of main characteristics*

- density of solid material, g/cm³ (t/m³): d
- dry bulk density, g/cm³ (t/m³): γ

$$\gamma = \frac{D}{1000}$$

- net water content, volume %: e_v

$$e_v = \frac{E}{D} \times 100 \times d$$

- void ratio: e (volume of voids divided by volume of solids)

$$e = \frac{1000 - D}{D} = \frac{d}{\lambda} = - 1$$

- degree of saturation, percentage by volume: S

$$S = \frac{e_v}{e}$$

- gross water content, percentage by mass: W^1

$$W^1 = \frac{E}{C} \times 100$$

- net water content, percentage by mass: W

$$W = \frac{E}{D} \times 100$$

.4 *Presentation of the compaction tests*

For each compaction test the calculated void ratio (e) value is plotted as the ordinate in a diagram with net water content (e_v) and degree of saturation (S) as the respective abscissa parameters.

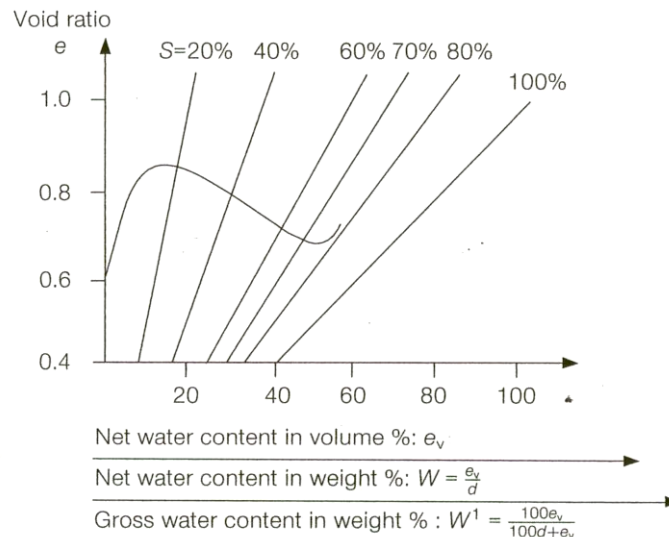


Figure 1.3.4.5

.5 *Compaction curve*

The test sequence results in a specific compaction curve (see figure 1.3.4.5).

The critical moisture content is indicated by the intersection of the compaction curve and the line $S = 70\%$ degree of saturation. The transportable moisture limit (TML) is the critical moisture content.

2 Test procedures to determine the angle of repose and associated apparatus

2.1 Determination of angle of repose of fine-grained materials (size less than 10 mm): “tilting box test”. For use in laboratory or port of loading

2.1.1 Scope

The test provides for the determination of the angle of repose of fine-grained non-cohesive materials (size less than 10 mm). The results so obtained may be used when interpreting sections 5 and 6 of this Code for the materials in question.

2.1.2 Definition

The angle of repose obtained by this test is the angle formed between the horizontal and the top of the testbox when the material in the box just begins to slide in bulk.

2.1.3 Principle of test

When measuring the angle of repose by this method, the material surface should initially be level and parallel to the testbox base. The box is tilted without vibration and tilted without vibration and tilting is stopped when the product just begins to slide in bulk.

2.1.4 Apparatus (see figure 2.1.4)

Apparatus is as follows:

- .1 A framework, on top of which is attached an open box. Attachment of the box to the frame is by means of a shaft passing through bearings affixed to both the frame and the end of the box, enabling the box to be subjected to a controlled tilt.
- .2 The dimensions of the box are 600 mm long, 400 mm wide and 200 mm high.
- .3 To prevent sliding of the material along the bottom of the box during tilting, a tightly fitting grating (openings 30 mm x 30 mm x 25 mm) is placed on the bottom of the box before filling.
- .4 Tilting of the box is effected by a hydraulic cylinder fitted between the frame and the bottom of the box. Other means may be used to obtain the required tilting but in all cases vibration must be eliminated.
- .5 To pressurize the hydraulic cylinder, a hydropneumatic accumulator may be used, pressurized by air or gas at a pressure of about 5 kp/cm².
- .6 The rate of tilting should be approximately 0.3°/s.
- .7 Range of tilt should be at least 50°.

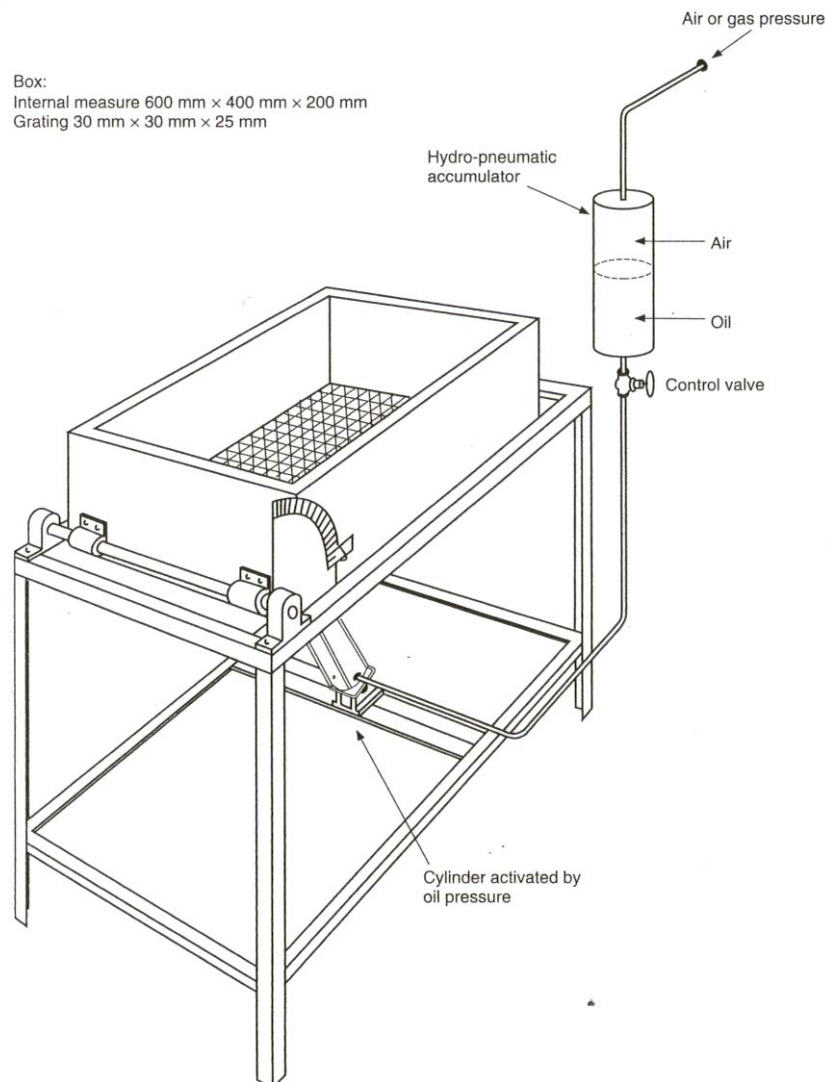


Figure 2.1.4 Basic sketch of tilting box

- .8 A protractor is fitted to the end of the shaft. One lever of the protractor is fitted so that it may be screw-adjusted to the horizontal.
- .9 The protractor should measure the angle of the top of the box to the horizontal to within an accuracy of 0.5° .
- .10 A spirit level or some other levelling device should be available to zero the protractor.

2.1.5 *Procedure*

The box is filled with the material to be tested by pouring it slowly and carefully from the lowest practical height into the box in order to obtain uniformity of loading.

The excess material is scraped off with the aid of a straight edge, inclined at about 45° towards the direction of scraping.

The tilting system is then activated and stopped when the material just begins to slide in bulk.

The angle of the top of the box to the horizontal is measured by the protractor and recorded.

2.1.6 *Evaluation*

The angle of repose is calculated as the mean of three measurements and is reported to within half a degree.

Notes: Preferably the test should be carried out with three independent samples.

Care should be taken to ensure that the shaft is adjusted to be horizontal before testing.

2.2 *Alternative or shipboard test method to be used for the determination of the angle of repose when the tilting box is not available*

2.2.1 *Definition*

According to this method the angle of repose is the angle between the cone slope and the horizontal measured at half height.

2.2.2 *Principle of test*

To determine the angle of repose, a quantity of the material to be tested is poured very carefully out of a flask onto a sheet of rough-textured paper, in such a way that a symmetrical cone is formed.

2.2.3 *Equipment*

The necessary equipment to carry out this test is as follows:

- a horizontal table free from vibrations;
- a sheet of rough-textured paper onto which the material should be poured;
- a protractor; and
- a 3-litre conical flask.

2.2.4 Procedure

Put the sheet of paper on the table. Split 10l of the material to be tested into three sub-samples and test each in the following way:

Pour two thirds of the sub-sample (i.e., 2 l) onto the sheet, producing a starting cone. The remainder of this sub-sample is then poured very carefully from a height of a few millimetres on top of the cone. Care should be taken that the cone will be built up symmetrically. This may be achieved by revolving the flask slowly close around the top of the cone when pouring.

When measuring, care should be taken that the protractor does not touch the cone; otherwise this may result in sliding of the material and spoil the test.

The angle has to be measured at four places around the cone, about 90 degrees apart.

This test should be repeated on the other two sub-samples.

2.2.5 Calculations

The angle of repose is taken as the mean of the 12 measurements and is reported to half a degree. This figure can be converted to the tilting box value as follows:

$$a_t = a_s + 3^\circ \quad (2.2.5)$$

Where a_t = angle of repose according to the tilting box text

a_s = angle of repose according to the survey test

3 Standards used in test procedures

3.1 Standard flow table and frame*

3.1.1 Flow table and frame

3.1.1.1 The flow table apparatus shall be constructed in accordance with figure 3. The apparatus shall consist of an integrally cast rigid iron frame and a circular rigid table top, 10 inches \pm 0.1 inch (254 mm \pm 2.5 mm) in diameter, with a shaft attached perpendicular to the table top by means of a screw thread. The table top, to which the shaft with its integral contact shoulder is attached, shall be mounted on a frame in such a manner that it can be raised and dropped vertically through the specified height, with a tolerance in height of \pm 0.005 inches (0.13 mm) for new tables and \pm 0.015 inches (0.39 mm) for tables in use, by means of a rotated cam. The table top shall have a fine-machined plane surface, free of blowholes and surface defects, and shall be scribed as shown in figure 3. The table top shall be of cast brass or bronze having a Rockwell hardness number not less than HRB 25 with an edge thickness of 0.3 inches (8 mm), and shall have six integral radial stiffening ribs. The table top and attached shaft shall weigh 9 lb \pm 0.1 lb (4 kg \pm 0.05 kg) and the weight shall be symmetrical around the centre of the shaft.

* Source: "Standard Specification for Flow Table for Use in Tests of Hydraulic Cement", Designation C230-68. Reprinted by permission of American Society for Testing and Materials (ASTM), 1916 Race Street, Philadelphia, Penn., USA, copyright ASTM 1977.

3.1.1.2 The cam and vertical shaft shall be of medium-carbon machinery steel, hardened where indicated in figure 3. The shaft shall be straight and the difference between the diameter of the shaft and the diameter of the bore of the frame shall be not less than 0.002 inches (0.05) and not more than 0.003 inches (0.08 mm) for new tables and shall be maintained at from 0.002 inches to 0.010 inches (0.26 mm) for tables in use. The end of the shaft shall not fall upon the cam at the end of the drop, but shall make contact with the cam not less than 120° from the point of drop. The face of the cam shall be a smooth spiralled curve of uniformly increasing radius from ½ inch to 1¼ inches (13 mm to 32 mm) in 360° and there shall be no appreciable jar as the shaft comes into contact with the cam. The cam shall be so located and the contact faces of the cam and shaft shall be such that the table does not rotate more than one revolution in 25 drops. The surfaces of the frame and of the table which come into contact at the end of the drop shall be maintained smooth, plane, and horizontal and parallel with the upper surface of the table and shall make continuous contact over a full 360°.

3.1.1.3 The supporting frame of the flow table shall be integrally cast of fine-grained, high-grade cast iron. The frame casting shall have three integral stiffening ribs extending the full height of the frame and located 120° apart. The top of the frame shall be chilled to a depth of approximately ¼ inch (6.4 mm) and the face shall be ground and lapped square with the bore to give 360° contact with the shaft shoulder. The underside of the base of the frame shall be ground to secure a complete contact with the steel plate beneath.

3.1.1.4 The flow table may be driven by a motor,¹ connected to the camshaft through an enclosed worm gear speed reducer and flexible coupling. The speed of the camshaft shall be approximately 100 rpm. The motor drive mechanism shall not be fastened or mounted on the table base plate or frame.

The performance of a flow table shall be considered satisfactory if, in calibration tests, the table gives a flow value that does not differ by more than 5 percentage points from flow values obtained with a suitable calibration material.²

3.1.2 *Flow table mounting*

3.1.2.1 The flow table frame shall be tightly bolted to a cast iron or steel plate at least 1 inch (25 mm) thick and 10 inches (250 mm) square. The top surface of this plate shall be machined to a smooth plane surface. The plate shall be anchored to the top of a concrete pedestal by four ½ inch (13 mm) bolts that pass through the plate and are embedded at least 6 inches (150 mm) in the pedestal. The pedestal shall be cast inverted on the base plate. A positive contact between the base plate and the pedestal shall be obtained at all points. No nuts or other such levelling devices shall be used between the plate and the pedestal. Levelling shall be effected by suitable means under the base of the pedestal.

¹ A 1/20 hp (40 W) motor has been found adequate. The flow table may be driven by a hand-operated camshaft as shown in the illustration.

² Such a material may be obtained from the Cement and Concrete Reference Laboratory at the National Bureau of Standards, Washington, D.C. 20234, USA.

3.1.2.2 The pedestal shall be 10 inches to 11 inches (250 mm to 275 mm) square at the top, and 15 inches to 16 inches (375 mm to 400 mm) square at the bottom, 25 inches to 30 inches (625 mm to 750 mm) in height, and shall be of monolithic construction, cast from concrete weighing at least 140 lb/ft³ (2240 kg/m³). A stable gasket cork pad, ½ inch (13 mm) thick and approximately 4 inches (102 mm) square, shall be inserted under each corner of the pedestal. The flow table shall be checked frequently for levelness of the table top, stability of the pedestal, and tightness of the bolts and nuts in the table base and the pedestal plate. (A torque of 20 lb ft (27 Nm) is recommended when tightening those fastenings.)

3.1.2.3 The table top, after the frame has been mounted on the pedestal, shall be level along two diameters at right angles to each other, in both the raised and lowered positions.

3.1.3 *Flow table lubrication*

3.1.3.1 The vertical shaft of the table shall be kept clean and shall be lightly lubricated with a light oil (SAE-10). Oil shall not be present between the contact faces of the table top and the supporting frame. Oil on the cam face will lessen wear and promote smoothness of operation. The table should be raised and permitted to drop a dozen or more times just prior to use if it has not been operated for some time.

3.1.4 *Mould*

3.1.4.1 The mould for casting the flow specimen shall be of cast bronze or brass, constructed as shown in figure 3. The Rockwell hardness number of the metal shall be not less than HRB 25. The diameter of the top opening shall be 2.75 inches \pm 0.02 inches (69.8 mm \pm 0.5 mm) for new moulds and 2.75 inches + 0.05 inches (+ 1.3 mm) and – 0.02 inches for moulds in use. The surfaces of the base and top shall be parallel and at right angles to the vertical axis of the cone. The mould shall have a minimum wall thickness of 0.2 inches (5 mm). The outside of the top edge of the mould shall be shaped so as to provide an integral collar for convenient lifting of the mould. All surfaces shall be machined to a smooth finish. A circular shield approximately 10 inches (254 mm) in diameter, with a centre opening approximately 4 inches (102 mm) in diameter, made of non-absorbing material not attacked by the cement, shall be used with the flow mould to prevent mortar from spilling on the table top.

3.2 *Scales and weights**

3.2.1 *Scales*

3.2.1.1 The scales used shall conform to the following requirements. On scales in use, the permissible variation at a load of 2000 g shall be \pm 2.0 g. The permissible variation on new scales shall be one half of this value. The sensibility reciprocal¹ shall be not greater than twice the permissible variation.

* Source, "Standard Method of Test for Compressive Strength of Hydraulic Cement Mortars", Designation C109-3. Reprinted by permission of American Society for Testing and Materials (ASTM), 1916 Race Street, Philadelphia, Penn., USA, copyright ASTM 1977.

¹ Generally defined, the sensibility reciprocal is the change in load required to change the position of rest of the indicating element or elements of a non-automatic indicating scale a definite amount at any load. For a more complete definition, see "Specifications, Tolerances, and Regulations for Commercial Weighing and Measuring Devices", *Handbook H44*, National Bureau of Standards, Washington, D.C., USA, September 1949, pp. 92 and 93.

3.2.2 *Weights*

3.2.2.1 The permissible variations on weights shall be as prescribed in the table below. The permissible variations on news weights shall be one half of the values in the table below.

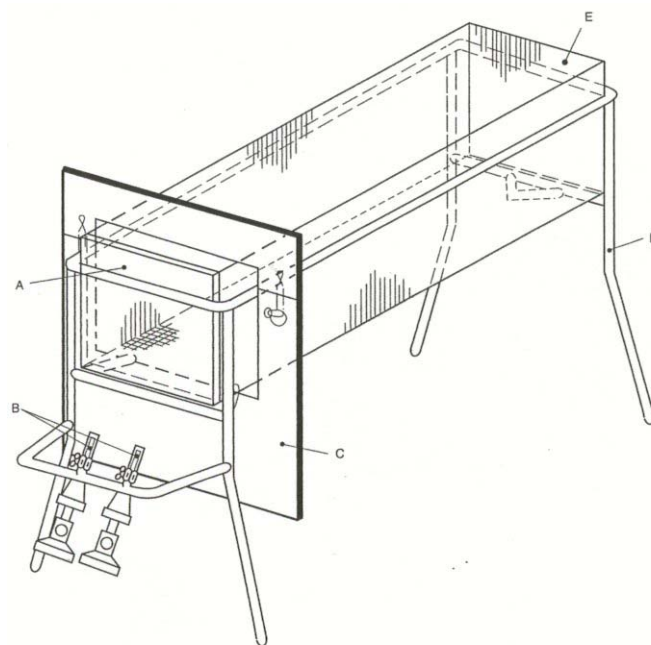
PERMISSIBLE VARIATIONS ON WEIGHTS

Weight (g)	Permissible variations on weights in use, plus or minus (g)
1000	0.50
900	0.45
750	0.40
500	0.35
300	0.30
250	0.25
200	0.20
100	0.15
50	0.10
20	0.05
10	0.04
5	0.03
2	0.02
1	0.01

4 Trough test for determination of the self-sustaining exothermic decomposition of fertilizers containing nitrates*

4.1 Definition

A fertilizer capable of self-sustaining decomposition is defined as one in which decomposition initiated in a localized area will spread throughout the mass. The tendency of a fertilizer offered for transport to undergo this type of decomposition can be determined by means of the trough test. In this test localized decomposition is initiated in a bed of the fertilizer to be contained in a horizontally mounted trough. The amount of propagation, after removal of the initiating heat source, of decomposition through the mass is measured.



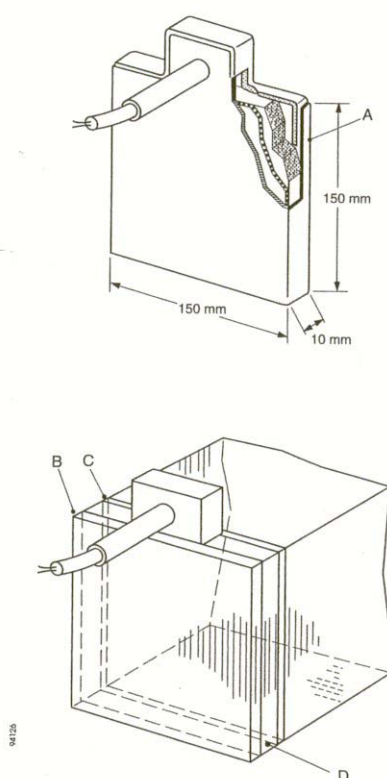
- A Steel plate (150 x 150 mm and 1 to 3 mm thick)
- B Gas burners (e.g., Teclu or Bunsen)
- C Heat shield (2 mm thick)
- D Stand (e.g., made from 15 mm wide, 2 mm thick steel bar)
- E Gauze trough (150 x 150 x 500 mm)

Figure 4-1 Gauze trough with support and burners

* Source: Section 38 of the United Nations Recommendation on the Transport of Dangerous Goods, Manual of Tests and Criteria.

4.2 Apparatus and materials

The apparatus (figure 4-1) consists of a trough of internal dimensions 150 mm x 150 mm x 500 mm, open at the top. The trough is constructed of square-meshed gauze (preferably stainless steel) with a mesh width of about 1.5 mm and a wire thickness of 1.0 mm supported on a frame made from, for example, 15 mm wide, 2 mm thick steel bars. The gauze at each end of the trough may be replaced by 1.5 mm thick, 150 mm x 150 mm stainless steel plates. The trough should be rested on a suitable support. Fertilizers with a particle size distribution such that a significant amount falls through the mesh of the trough should be tested in a trough of smaller mesh gauze, or alternatively in a trough lined with gauze of a smaller mesh. During initiation sufficient heat should be provided and maintained to establish a uniform decomposition front. Two alternative heating methods are recommended, viz:



- A Aluminium or stainless steel sheathing (thickness 3 mm)
- B Insulating plate (thickness 5 mm)
- C Aluminium foil or stainless steel plate (thickness 3 mm)
- D Position of heating device in trough

Figure 4-2 Electrical heating device (capacity 250 W)

4.2.1 Electrical heating

An electrical heating element (capacity 250 W) enclosed in a stainless steel box is placed inside and at one end of the trough (figure 4-2). The dimensions of the stainless steel box are 145 mm x 145 mm x 10 mm, and the wall thickness is 3 mm. The side of the box which is not in contact with the fertilizer should be protected with a heat shield (insulation plate 5 mm thick). The heating side of the box may be protected with aluminium foil or a stainless steel plate.

4.2.2 *Gas burners*

A steel plate (thickness 1 mm to 3 mm) is placed inside one end of the trough and in contact with the wire gauze (figure 4-1). The plate is heated by means of two burners which are fixed to the trough support and are capable of maintaining the plate at temperatures between 400°C and 600°C, i.e., dull red heat.

4.2.3 To prevent heat transport along the outside of the trough, a heat shield consisting of a steel plate (2 mm thick) should be installed at about 50 mm from the end of the trough where the heating takes place.

4.2.4 The life of the apparatus may be prolonged if it is constructed of stainless steel throughout. This is particularly important in the case of the gauze trough.

4.2.5 Propagation may be measured using thermocouples in the substance and recording the time at which a sudden temperature rise occurs as the reaction front reaches the thermocouple.

4.3 *Procedure*

4.3.1 The apparatus should be set up under a fume hood to remove toxic decomposition gases or in an open area where the fumes can be readily dispersed. Although there is no explosion risk, when performing the test it is advisable to have a protective shield, e.g., of suitable transparent plastics, between the observer and the apparatus.

4.3.2 The trough is filled with the fertilizer in the form to be offered for shipment and decomposition is initiated at one end, either electrically or by means of gas burners as described above. Heating should be continued until decomposition of the fertilizer is well established and propagation of the front (over approximately 30 mm to 50 mm) has been observed. In the case of products with high thermal stability, it may be necessary to continue heating for two hours. If fertilizers show a tendency to melt, the heating should be done with care, i.e., using a small flame.

4.3.3 About 20 minutes after the heating has been discontinued, the position of the decomposition front is noted. The position of the reaction front can be determined by difference in colour, e.g., brown (undecomposed fertilizer) to white (decomposed fertilizer), or by the temperature indicated by adjacent pairs of thermocouples which bracket the reaction front. The rate of propagation may be determined by observation and timing or from thermocouple records. It should be noted whether there is no propagation after heating is discontinued or whether propagation occurs throughout the substance.

4.4 *Test criteria and method of assessing results*

4.4.1 If propagation of the decomposition continues throughout the substance the fertilizer is considered capable of showing self-sustaining decomposition.

4.4.2 If propagation does not continue throughout the substance, the fertilizer is considered to be free from the hazard of self-sustaining decomposition.

5 Description of the Test of Resistance to Detonation

5.1 Principle

5.1.1 The test sample is confined in a steel tube and subjected to detonation shock from an explosive booster charge. Propagation of the detonation is determined from the degree of compression of lead cylinders on which the tube rests horizontally during the test.

5.2 Sample Preparation

5.2.1 The test must be carried out on a representative sample of cargo. Before being tested for resistance to detonation, the whole mass of the sample is to be thermally cycled five times between 25°C and 50°C ($\pm 1^\circ\text{C}$) in sealed tubes. The sample shall be maintained at the extreme temperatures, measured at the centre of the sample, for at least 1 hour during each thermal cycle and at 20°C ($\pm 3^\circ\text{C}$) after complete cycling until tested.

5.3 Materials

Seamless steel tube to ISO 65-1981-Heavy or equivalent

Tube length	1,000 mm
Nominal external diameter	114 mm
Nominal wall thickness	5 to 6.5 mm

Bottom plate (160 x 160 mm) of good weldable quality, thickness 5 to 6 mm to be butt-welded to one end of the tube around the entire circumference.

Initiation system and booster

Electrical blasting cap or detonating cord with non-metallic sleeve (10 to 13 g/m).

Compressed pellet of secondary explosive, such as hexogen/wax 95/5 or tetryl, with a central recess to take the detonator.

500 \pm 1 gramme plastic explosive containing 83 to 86 % penthrite, formed into a cylinder in a cardboard or plastic tube. Detonation velocity 7,300 to 7,700 m/s.

Six witness cylinders of refined, cast lead for detecting detonation

50 mm diameter x 100 mm high, refined lead of at least 99.5% purity.

5.4 Procedure

Test Temperature: 15 to 20°C. Figures 1 and 2 show the test arrangement.

Fill the tube about one-third of its height with the test sample and drop it 10 cm vertically five times on the floor. Improve the compression by striking the side wall with a hammer between drops. A further addition shall be made such that, after compaction or by raising and dropping the tube 20 times and a total of 20 intermittent hammer blows, the charge fills the tube to a distance of 70 mm from its orifice.

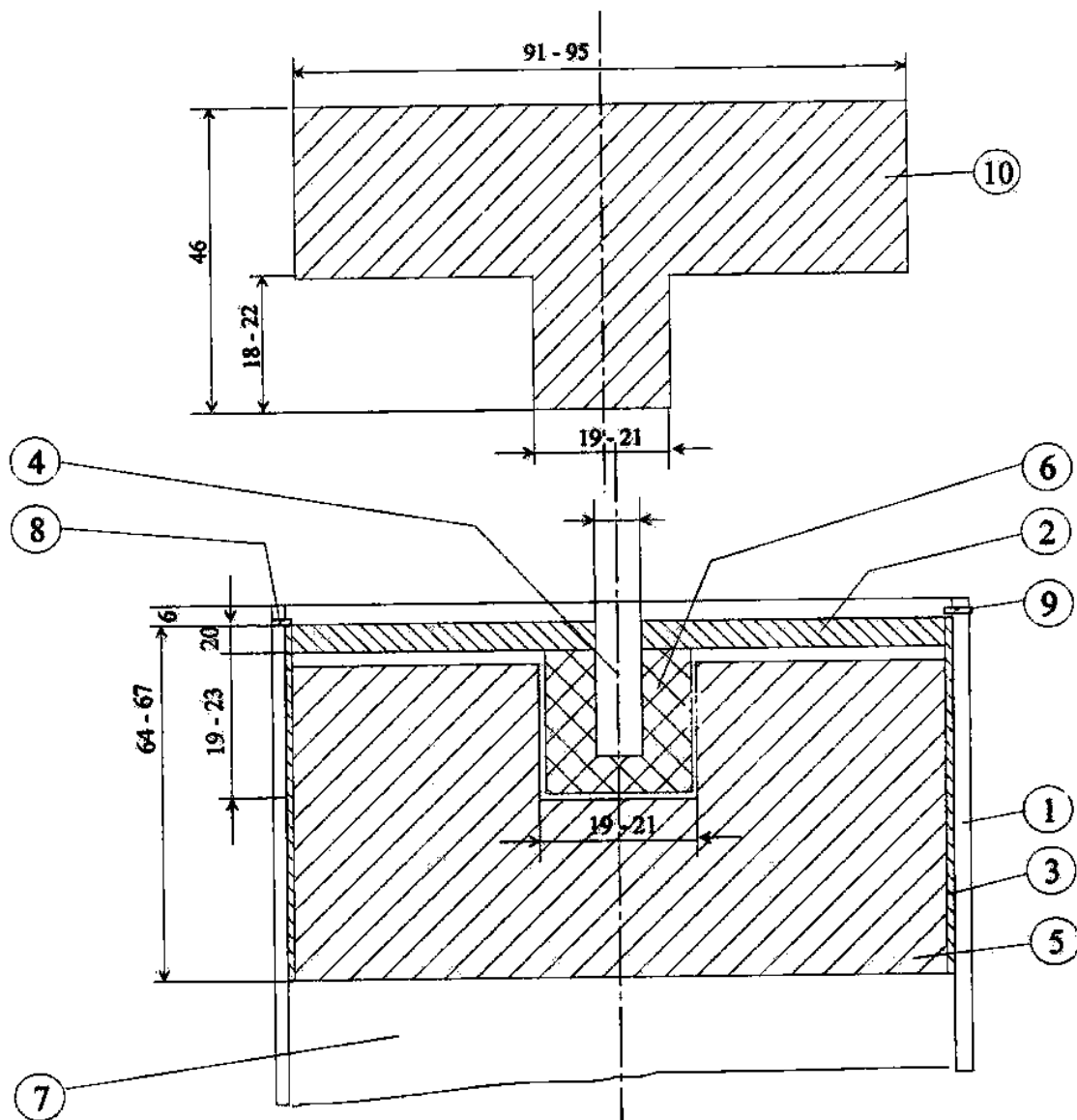
Insert the plastic explosive into the tube and press it down with a wooden die. Place the compressed pallet centrally in the recess within the plastic explosive. Close it with a wooden disc so that it remains in contact with the test sample. Lay the test tube horizontally on the 6 lead cylinders placed at 150 mm intervals (centric), with the centre of the last cylinder 75 mm from the bottom plate, on a firm, level, solid surface that is resistant to deformation or displacement. Insert the electrical blasting cap or the detonating cord.

Ensure that all necessary safety precautions are taken, connect and detonate the explosive.

Record, for each of the lead cylinders, the degree of compression expressed as a percentage of the original height of 100 mm. For oblique compression, the deformation is taken as the average of the maximum and minimum deformation.

5.5 Results

The test is to be carried out twice. If in each test one or more of the supporting lead cylinders are crushed by less than 5%, the sample is deemed to satisfy the resistance to detonation requirements.



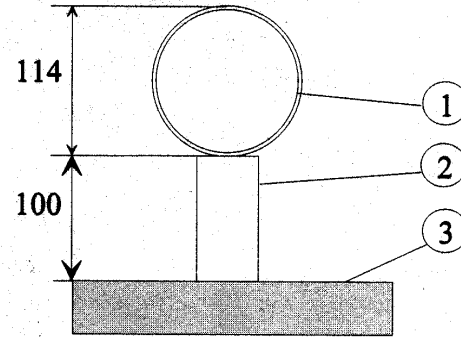
Dimensions in mm

- | | | | |
|---|-------------------------------|---|---|
| ① | Steel tube | ⑥ | Compressed pellet |
| ② | Wooden disc | ⑦ | Test sample |
| ③ | Plastic or cardboard cylinder | ⑧ | 4-mm diameter hole drilled to receive split pin (9) |
| ④ | Wooden rod | ⑨ | Split pin |
| ⑤ | Plastic explosive | ⑩ | Wooden die for (5) diameter as for detonator |

Figure 1: Booster charge

- ① Steel tube
- ② Lead cylinders
- ③ Steel block
- ④ Bottom plate
- ⑤ Booster charge

1 to 6 numbers of lead cylinders



dimensions in mm

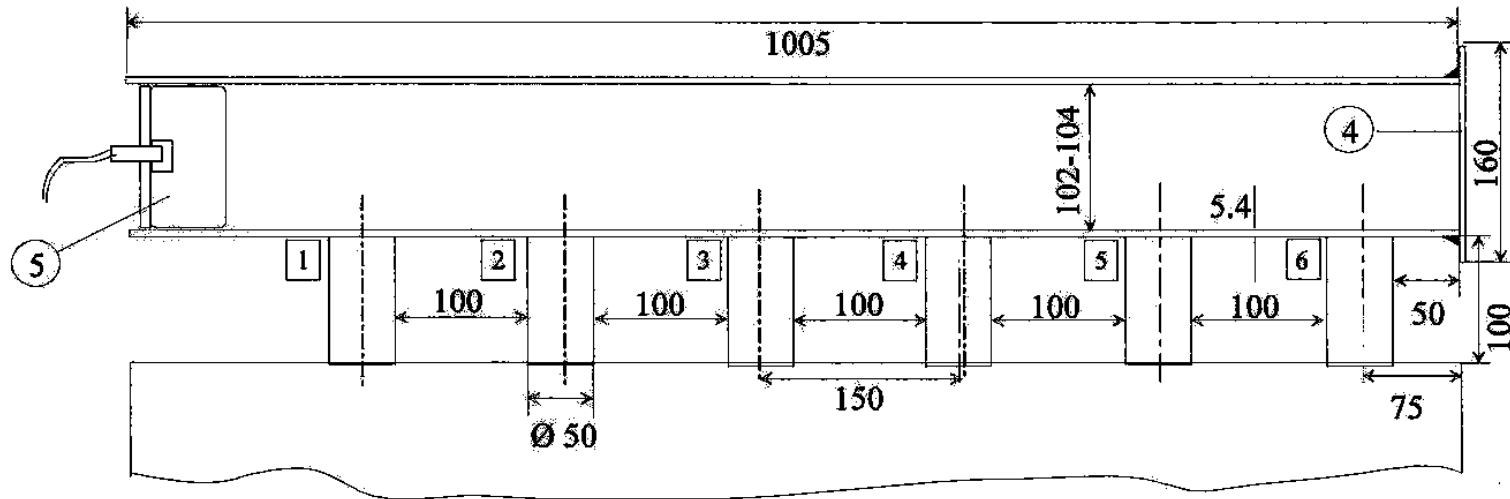


Figure 2: Positioning of the steel tube on the firing site

6 Self-heating test for charcoal

6.1 Apparatus

6.1.1 *Oven.* A laboratory oven fitted with internal air circulation and capable of being controlled at $140^{\circ}\text{C} \pm 2^{\circ}\text{C}$.

6.1.2 *Wire mesh cube.* Construct an open-top cube, 100 mm side, from phosphor bronze gauze 18.000 mesh per square centimetre (350 x 350 mesh). Insert it inside a slightly larger, well-fitting cube, made of phosphor bronze gauze 11 mesh per square centimetre (8 x 8 mesh). Fit the outer cube with a handle or hooks so that it can be suspended from above.

6.1.3 *Temperature measurement.* A suitable system to measure and record the temperature of the oven and in the centre of the cube. “Chromel-alumel” thermocouples, made from 0.27 mm diameter wire, are suitable for measuring the temperature range expected.

6.2 Procedure

6.2.1 Fill the cube with carbon and tap down gently, adding carbon until the cube is full. Suspend the sample in the centre of the oven which has been preheated to $140^{\circ}\text{C} \pm 2^{\circ}\text{C}$. Insert one of the thermocouples in the centre of the sample and the other between the cube and the oven wall. Maintain the temperature of the oven at $140^{\circ}\text{C} \pm 2^{\circ}\text{C}$ for 12 hours and record the oven temperature and the sample temperature.

6.3 Results

6.3.1 Non-activated carbon, non-activated charcoal, carbon black and lamp black fail the test if the temperature at any time during the 12 hours exceeded 200°C .

6.3.2 Activated carbon and activated charcoal fail the test if the temperature at any time during the 12 hours exceeded 400°C .

APPENDIX 3

PROPERTIES OF DRY BULK CARGOES

1 Non-cohesive cargoes

1.1 The following cargoes are non-cohesive when dry:

AMMONIUM NITRATE
AMMONIUM NITRATE BASED FERTILIZERS (TYPE A, TYPE B and
NON-HAZARDOUS)
AMMONIUM SULPHATE
BORAX, anhydrous
CALCIUM NITRATE FERTILIZER
CASTOR BEANS
DIAMMONIUM PHOSPHATE
MONOAMMONIUM PHOSPHATE
POTASSIUM CHLORIDE
POTASH
POTASSIUM NITRATE
POTASSIUM SULPHATE
SODIUM NITRATE
SODIUM NITRATE AND POTASSIUM NITRATE MIXTURE
SUPERPHOSPHATE
UREA

1.2 Prior to completion of loading, the angle of repose of the materials to be loaded should be determined (see section 6) so as to determine which provisions of this Code relating to trimming apply (see section 5).

1.3 All cargoes, other than those listed in this appendix, are cohesive and the use of the angle of repose is, therefore, not appropriate. Cargoes not listed should be treated as cohesive until otherwise shown.

2 Cargoes which may liquefy

2.1 Many fine-particled cargoes if possessing a sufficiently high moisture content are liable to flow. Thus any damp or wet cargo containing a proportion of fine particles should be tested for flow characteristics prior to loading.

3 Precautions for the cargoes which may possess a chemical hazard

3.1 In circumstances where consultation with the competent authority is required prior to shipment of dry bulk cargoes, it is equally important to consult authorities at the port of loading and discharge concerning requirements which may be in force.

3.2 Where required, the Medical First Guide for Use in Accidents Involving Dangerous Goods (MFAG) should be consulted prior to loading.

APPENDIX 4

INDEX

BULK CARGO SHIPPING NAME	GROUP	REFERENCES
ALFALFA	C	
ALUMINA	C	
ALUMINA, CALCINED	C	
ALUMINA, SILICA	C	
ALUMINA SILICA, pellets	C	
ALUMINIUM FERROSILICON POWDER UN 1395	B	
ALUMINIUM NITRATE UN 1438	B	
ALUMINIUM REMELTING BY-PRODUCTS UN 3170	B	see ALUMINIUM SMELTING BY-PRODUCTS
ALUMINIUM SILICON POWDER, UNCOATED UN 1398	B	
ALUMINIUM SMELTING BY-PRODUCTS UN 3170	B	
AMMONIUM NITRATE UN 1942	B	
AMMONIUM NITRATE BASED FERTILIZER (Type A) UN 2067	B	
AMMONIUM NITRATE BASED FERTILIZER (Type B) UN 2071	B	
AMMONIUM NITRATE, BASED FERTILIZER (non-hazardous)	C	
AMMONIUM SULPHATE	C	
ANTIMONY ORE AND RESIDUE	C	
Antimony ore residue	C	see ANTIMONY ORE AND RESIDUE
Bakery materials	B or C	see SEED CAKE
BARIUM NITRATE UN 1446	B	
Barley malt pellets	B or C	see SEED CAKE
BARYTES	C	
BAUXITE	C	
Beet, expelled or extracted	B or C	see SEED CAKE
BIOSLUDGE	C	
Blende (zinc sulphide)	A	see ZINC CONCENTRATE
BORAX, ANHYDROUS, crude	C	
BORAX, ANHYDROUS, refined	C	
BORAX (PENTAHYDRATE CRUDE)	C	
Bran pellets	B or C	see SEED CAKE
Brewer's grain pellets	B or C	see SEED CAKE
BROWN COAL BRIQUETTES	B	
Calcined clay	C	see ALUMINA, CALCINED
Calcined pyrites	A and B	see PYRITES, CALCINED
Calcium fluoride	B	see FLUORSPAR
CALCIUM NITRATE UN 1454	B	
CALCIUM NITRATE FERTILIZER	C	
Calcium oxide	B	see LIME (UNSLAKED)
Canola Pellets	B or C	see SEED CAKE
CARBORUNDUM	C	
CASTOR BEANS UN 2969	B	
CASTOR FLAKE UN 2969	B	

BULK CARGO SHIPPING NAME	GROUP	REFERENCES
CASTOR MEAL UN 2969	B	
CASTOR POMACE UN 2969	B	
CEMENT	C	
CEMENT CLINKERS	C	
CEMENT COPPER	A	see Mineral Concentrates
Chalcopyrite	A	see COPPER CONCENTRATE
CHAMOTTE	C	
CHARCOAL	B	
CHOPPED RUBBER AND PLASTIC INSULATION	C	
Chile saltpetre	B	see SODIUM NITRATE
Chilean natural nitrate	B	see SODIUM NITRATE
Chilean natural potassic nitrate	B	see SODIUM NITRATE AND POTASSIUM NITRATE MIXTURE
Chrome ore	C	see CHROMITE ORE
CHROME PELLETS	C	
CHROMITE ORE	C	
Chromium ore	C	see CHROMITE ORE
Citrus pulp pellets	B or C	see SEED CAKE
CLAY	C	
COAL	A and B	
COAL SLURRY	A	
COARSE CHOPPED TYRES	C	
Coconut	B or C	see SEED CAKE
COKE	C	
COKE BREEZE	A	
COLEMANITE	C	
COPPER CONCENTRATE	A	see Mineral Concentrates
COPPER GRANULES	C	
COPPER MATTE	C	
Copper nickel	A	see NICKEL CONCENTRATE
Copper ore concentrate	A	see COPPER CONCENTRATE
Copper precipitate	A	see CEMENT COPPER
Copra, expelled or extracted	B or C	see SEED CAKE
COPRA (dry) UN 1363	B	
Corn gluten	B or C	see SEED CAKE
Cotton seed expellers	B or C	see SEED CAKE
CRYOLITE	C	
Deadburned magnesite	C	see MAGNESIA (DEADBURNED)
DIAMMONIUM PHOSPHATE	C	
DIRECT REDUCED IRON, (A) (Briquettes, hot-moulded)	B	
DIRECT REDUCED IRON, (B) (lumps, pellets, cold moulded briquettes)	B	
DOLOMITE	C	
Dolomitic quicklime	B	see LIME (UNSLAKED)
D.R.I.	B	see DIRECT REDUCED IRON A or B
FELSPAR LUMP	C	
FERROCHROME	C	
FERROCHROME, exothermic	C	

BULK CARGO SHIPPING NAME	GROUP	REFERENCES
FERROMANGANESE	C	
Ferromanganese, exothermic	C	see FERROMANGANESE
FERRONICKEL	C	
FERROPHOSPHORUS	B	
Ferrophosphorus briquettes	B	see FERROPHOSPHORUS
FERROSILICON UN 1408	B	
FERROUS METAL BORINGS UN 2793	B	
FERROUS METAL CUTTINGS UN 2793	B	
FERROUS METAL SHAVINGS UN 2793	B	
FERROUS METAL TURNINGS UN 2793	B	
FERTILIZERS WITHOUT NITRATES	C	
FISH (IN BULK)	A	
FISHMEAL, STABILIZED UN 2216	B	
FISHSCRAP, STABILIZED UN 2216	B	
FLUORSPAR	A and B	
FLY ASH	C	
Galena (lead sulphide)	A	see LEAD CONCENTRATE
Garbage tankage	B	see TANKAGE
Gluten pellets	B or C	see SEED CAKE
GRANULATED SLAG	C	
GRANULATED TYRE RUBBER	C	
Ground nuts, meal	B or C	see SEED CAKE
GYPSUM	C	
Hominy chop	B or C	see SEED CAKE
ILMENITE CLAY	A	
ILMENITE SAND	C	
IRON CONCENTRATE	A	see Mineral Concentrates
IRON CONCENTRATE (pellet feed, sinter feed)	A	see Mineral Concentrates
Iron disulphide	C	see PYRITE
IRON ORE	C	
Iron ore (concentrate, pellet feed, sinter feed)	A	see IRON CONCENTRATE (pellet feed or sinter feed)
IRON ORE PELLETS	C	
IRON OXIDE, SPENT UN 1376	B	
IRON PYRITES	C	
Iron swarf	B	see FERROUS METAL BORINGS, SHAVINGS, TURNINGS OR CUTTINGS
Iron sponge, spent	B	see IRON OXIDE, SPENT
IRONSTONE	C	
LABRADORITE	C	
LEAD AND ZINC CALCINES	A	see Mineral Concentrates
LEAD AND ZINC MIDDINGS	A	see Mineral Concentrates
LEAD CONCENTRATE	A	see Mineral Concentrates
LEAD NITRATE UN 1469	B	
LEAD ORE	C	
Lead ore concentrate	A	see LEAD CONCENTRATE
LEAD ORE RESIDUE	A	see Mineral Concentrates
LEAD SILVER CONCENTRATE	A	see Mineral Concentrates
Lead silver ore	A	see LEAD SILVER CONCENTRATE
Lead sulphide	A	see LEAD CONCENTRATE

BULK CARGO SHIPPING NAME	GROUP	REFERENCES
Lead sulphide (galena)	A	see LEAD CONCENTRATE
Lignite	B	see BROWN COAL BRIQUETTES
LIME (UNSLAKED)	B	
LIMESTONE	C	
LINTED COTTON SEED	B	
Linseed, expelled	B or C	see SEED CAKE
Linseed, extracted	B or C	see SEED CAKE
MAGNESIA (DEADBURNED)	C	
MAGNESIA (UNSLAKED)	B	
Magnesia, clinker	C	see MAGNESIA (DEADBURNED)
Magnesia, electro-fused	C	see MAGNESIA (DEADBURNED)
Magnesia lightburned	B	see MAGNESIA (UNSLAKED)
Magnesia calcined	B	see MAGNESIA (UNSLAKED)
Magnesia caustic calcined	B	see MAGNESIA (UNSLAKED)
Magnesite clinker	C	see MAGNESIA (DEADBURNED)
MAGNESITE, natural	C	
Magnesium carbonate	C	see MAGNESITE, natural
MAGNESIUM NITRATE UN 1474	B	
MAGNETITE	A	
Magnetite-taconite	A	see MAGNETITE
Maize, expelled	B or C	see SEED CAKE
Maize, extracted	B or C	see SEED CAKE
MANGANESE CONCENTRATE	A	see Mineral Concentrates
MANGANESE ORE	C	
M.A.P.	C	see MONO AMMONIUM PHOSPHATE
MARBLE CHIPS	C	
Meal, oily	B or C	see SEED CAKE
METAL SULPHIDE CONCENTRATES	A and B	
Mill feed pellets	B or C	see SEED CAKE
Milorganite	C	see BIOSLUDGE
Mineral Concentrates	A	
MONOAMMONIUM PHOSPHATE	C	
Muriate of potash	C	see POTASSIUM CHLORIDE
NEFELINE SYENITE (mineral)	A	see Mineral Concentrates
NICKEL CONCENTRATE	A	see Mineral Concentrates
Nickel ore concentrate	A	see NICKEL CONCENTRATE
Niger seed, expelled	B or C	see SEED CAKE
Niger seed, extracted	B or C	see SEED CAKE
Oil cake	B or C	see SEED CAKE
Palm kernel, expelled	B or C	see SEED CAKE
Palm kernel, extracted	B or C	see SEED CAKE
Peanuts, expelled or extracted	B or C	see SEED CAKE
PEANUTS (in shell)	C	
PEAT MOSS	A and B	
PEBBLES (sea)	C	
PELLETS (concentrates)	C	
Pellets (cereal)	B or C	see SEED CAKE
Pellets, wood pulp	B	see WOOD PULP PELLETS
Pencil pitch	B	see PITCH PRILL
PENTAHYDRATE CRUDE	A	see Mineral Concentrates

BULK CARGO SHIPPING NAME	GROUP	REFERENCES
PERLITE ROCK	C	
PETROLEUM COKE, calcined	B	
PETROLEUM COKE, uncalcined	B	
PHOSPHATE ROCK, calcined	C	
PHOSPHATE ROCK, uncalcined	C	
PHOSPHATE, defluorinated	C	
PIG IRON	C	
PITCH PRILL	B	
Pollard pellets	B or C	see SEED CAKE
POTASH	C	
Potash muriate	C	see POTASSIUM CHLORIDE
POTASSIUM CHLORIDE	C	
POTASSIUM NITRATE UN 1486	B	
Potassium nitrate/sodium nitrate (mixture)	B	see SODIUM NITRATE AND POTASSIUM NITRATE MIXTURE UN 1499
POTASSIUM SULPHATE	C	
Prilled coal tar	B	see PITCH PRILL
PUMICE	C	
PYRITE (containing copper and iron)	C	
PYRITES, CALCINED	A and B	
PYRITES	A	see Mineral Concentrates
Pyrites (cupreous, fine, flotation, or sulphur)	A	see PYRITES
Pyritic ash	A and B	see PYRITES, CALCINED
PYRITIC ASHES	A	see Mineral Concentrates
PYRITIC CINDERS	A	see Mineral Concentrates
PYROPHYLLITE	C	
QUARTZ	C	
QUARTZITE	C	
Quicklime	B	see LIME (UNSLAKED)
RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-1) UN 2912	B	
RADIOACTIVE MATERIAL, SURFACE CONTAMINATED OBJECTS (SCO-1) UN 2913	B	
Rape seed, expelled	B or C	see SEED CAKE
Rape seed, extracted	B or C	see SEED CAKE
RASORITE (ANHYDROUS)	C	
Rice bran	B or C	see SEED CAKE
Rice broken	B or C	see SEED CAKE
Rough ammonia tankage	B	see TANKAGE
RUTILE SAND	C	
Safflower seed, expelled	B or C	see SEED CAKE
Safflower seed, extracted	B or C	see SEED CAKE
SALT	C	
SALT CAKE	C	
SALT ROCK	C	
Saltpetre	B	see POTASSIUM NITRATE
SAND	C	
Sand, ilmenite	C	see ILMENITE SAND
Sand, zircon	C	see ZIRCON SAND
SAWDUST	B	

BULK CARGO SHIPPING NAME	GROUP	REFERENCES
SCRAP METAL	C	
SEED CAKE Type (a) UN 1386	B	
SEED CAKE Type (b) UN 1386	B	
SEED CAKE UN 2217	B	
SEED CAKE (non-hazardous)	C	
Seed expellers, oily	B or C	see SEED CAKE
SILICOMANGANESE	B	
SILVER LEAD CONCENTRATE	A	see Mineral Concentrates
Silver lead ore concentrate	A	see SILVER LEAD CONCENTRATE
Sinter		see ZINC AND LEAD CALCINES
Slag, granulated	C	see GRANULATED SLAG
SLIG, iron ore	A	see Mineral Concentrates
SODA ASH	C	
SODIUM NITRATE UN 1498	B	
SODIUM NITRATE AND POTASSIUM NITRATE MIXTURE UN 1499	B	
Soyabean, expelled	B or C	see SEED CAKE
Soyabean, extracted	B or C	see SEED CAKE
STAINLESS STEEL GRINDING DUST	C	
Steel swarf	B	see FERROUS METAL BORINGS, SHAVINGS, TURNINGS OR CUTTINGS
Stibnite	C	see ANTIMONY ORE AND RESIDUE
STONE CHIPPINGS	C	
Strussa pellets	B or C	see SEED CAKE
SUGAR	C	
SULPHATE OF POTASH AND MAGNESIUM	C	
Sulphide concentrates	B	see METAL SULPHIDE CONCENTRATES
SULPHUR UN 1350	B	
Sunflower seed, expelled	B or C	see SEED CAKE
Sunflower seed, extracted	B or C	see SEED CAKE
SUPERPHOSPHATE	C	
SUPERPHOSPHATE (triple granular)	C	
Swarf	B	see FERROUS METAL BORINGS, SHAVINGS, TURNINGS OR CUTTINGS
TACONITE PELLETS	C	
TALC	C	
TANKAGE	B	
Tankage fertilizer	B	see TANKAGE
TAPIOCA	C	
Toasted meals	B or C	see SEED CAKE
Triple superphosphate	C	see SUPERPHOSPHATE, triple granular
UREA	C	
VANADIUM ORE	B	
VERMICULITE	C	
WHITE QUARTZ	C	
WOODCHIPS	B	
WOOD PELLETS	B	
WOOD PULP PELLETS	B	

BULK CARGO SHIPPING NAME	GROUP	REFERENCES
ZINC AND LEAD CALCINES	A	see Mineral Concentrates
ZINC AND LEAD MIDDINGS	A	see Mineral Concentrates
ZINC ASHES UN 1435	B	
ZINC CONCENTRATE	A	see Mineral Concentrates
Zinc, dross, residue or skimmings	B	see ZINC ASHES
Zinc ore, burnt	A	see ZINC CONCENTRATE
Zinc ore, calamine	A	see ZINC CONCENTRATE
Zinc ore, concentrates	A	see ZINC CONCENTRATE
Zinc ore, crude	A	see ZINC CONCENTRATE
ZINC SINTER	A	see Mineral Concentrates
ZINC SLUDGE	A	see Mineral Concentrates
Zinc sulphide	A	see ZINC CONCENTRATE
Zinc sulphide (blende)	A	see ZINC CONCENTRATE
ZIRCON SAND	C	



SUB-COMMITTEE ON DANGEROUS
GOODS, SOLID CARGOES AND
CONTAINERS
12th session
Agenda item 19

DSC 12/19/Add.2
6 December 2007
Original: ENGLISH

REPORT TO THE MARITIME SAFETY COMMITTEE

Addendum

In document DSC 12/19, the following is added:

- .1 in the section "LIST OF ANNEXES", a new annex 15 is added as follows:

"ANNEX 15 PROPOSED REVISED WORK PROGRAMME OF THE
 SUB-COMMITTEE AND PROVISIONAL AGENDA
 FOR DSC 13";
- .2 in paragraph 16.1, the words "for DSC 12" are replaced by the words
"for DSC 13, set out in annex 15"; and
- .3 the new annex 15 is added after the existing annex 14, as attached.

For reasons of economy, this document is printed in a limited number. Delegates are kindly asked to bring their copies to meetings and not to request additional copies.
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ANNEX 15

**PROPOSED REVISED WORK PROGRAMME OF THE SUB-COMMITTEE
AND PROVISIONAL AGENDA FOR DSC 13**

PROPOSED REVISED WORK PROGRAMME OF THE SUB-COMMITTEE

		Target completion date/number of sessions needed for completion	Reference
1	Harmonization of the IMDG Code with the UN Recommendations on the Transport of Dangerous Goods	Continuous	MSC 63/23, paragraph 10.6; DSC 11/19, section 3; DSC 12/19, section 3
2	Reports on incidents involving dangerous goods or marine pollutants in packaged form on board ships or in port areas	Continuous	CDG 45/22, section 11 and paragraph 20.2; DSC 11/19, section 6
3	Amendments to the BC Code, including evaluation of properties of solid bulk cargoes	Continuous	BC 34/17, section 3; DSC 11/19, section 4
4	Casualty analysis (co-ordinated by FSI)	Continuous	MSC 70/23, paragraphs 9.17 and 20.4; DSC 11/19, section 6
H.1	Amendment (34-08) (35-10) to the IMDG Code and supplements	2007 2009	DSC 3/15, paragraph 12.6; DSC 12/19, section 3
H.2	Mandatory application of the BC Code	2007	DSC 3/15, paragraph 12.7; MSC 78/25, paragraph 13.7; DSC 11/19, section 5
H.3	Review of the SPS Code (co-ordinated by DE)	2007	MSC 78/26, paragraph 24.9; DSC 11/19, section 9

Notes:

- 1 "H" means high priority item and "L" means a low priority item. However, within the high and low priority groups, items have not been listed in any order of priority.
- 2 Items printed in bold letters have been selected for the provisional agenda for DSC 13.
- 3 The struck-out text indicates proposed deletions and the shaded text proposes additions or changes.

		Target completion date/number of sessions needed for completion	Reference
H.4 H.2	Amendments to the CSS Code	2007 2008	MSC 78/26, paragraph 24.15.3; DSC 12/19, section 8
H.5 H.3	Extension of the BLU Code to include grain	2008	MSC 79/23, paragraph 20.7; DSC 11/19, section 12
H.6 H.4	Guidance on providing safe working conditions for securing of containers	2007 2008	MSC 80/24, paragraph 21.8; DSC 12/19, section 10
H.7 H.5	Review of the Recommendations on the safe use of pesticides in ships	2007 2008	DSC 10/17, paragraph 4.23; DSC 12/19, section 11
H.8	Application of requirements for dangerous goods in packaged form in SOLAS and the 2000 HSC Code (co-ordinated by FP)	2007	MSC 81/25, paragraphs 23.9 and 23.14; DSC 11/19, section 15
H.9 H.6	Guidance on protective clothing	2008	MSC 81/25, paragraph 23.8; DSC 11/19, paragraph 16.1.3.1
H.10 H.7	Revision of the Code of Safe Practice for Ships Carrying Timber Deck Cargoes	2010	MSC 82/24, paragraph 21.11
H.11 H.8	Form and procedure for approval of the Cargo Securing Manual	2008	MSC 82/24, paragraph 21.12
[H.9]	Amendments to the International Convention for Safe Containers, 1972	2009	DSC 12/19, section 16]
[H.10]	Review of the Guidelines for packing of cargo transport units	2009	DSC 12/19, section 16]

DRAFT PROVISIONAL AGENDA FOR DSC 13*

- Opening of the session
- 1 Adoption of the agenda
 - 2 Decisions of other IMO bodies
 - 3 Amendments to the IMDG Code and supplements, including harmonization of the IMDG Code with the UN Recommendations on the Transport of Dangerous Goods
 - .1 harmonization of the IMDG Code with the UN Recommendations on the Transport of Dangerous Goods
 - .2 amendment (35-10) to the IMDG Code and supplements
 - 4 Amendments to the BC Code, including evaluation of properties of solid bulk cargoes
 - 5 Amendments to the CSS Code
 - 6 Casualty and incident reports and analysis
 - 7 Extension of the BLU Code to include grain
 - 8 Guidance on providing safe working conditions for securing of containers
 - 9 Review of the Recommendations on the safe use of pesticides in ships
 - 10 Guidance on protective clothing
 - 11 Revision of the Code of Safe Practice for Ships Carrying Timber Deck Cargoes
 - 12 Form and procedure for approval of the Cargo securing manual
 - [13 Amendments to the International Convention for Safe Containers, 1972]
 - [14 Review of the Guidelines for packing of cargo transport units]
 - 15 Work programme and agenda for DSC 14
 - 16 Election of Chairman and Vice-Chairman for 2009
 - 17 Any other business
 - 18 Report to the Maritime Safety Committee

* Agenda item numbers do not necessarily indicate priority.