INTERNATIONAL MARITIME ORGANIZATION

IMO

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SUB-COMMITTEE ON BULK LIQUIDS AND GASES
13th session
Agenda item 18

BLG 13/18
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# REPORT TO THE MARITIME SAFETY COMMITTEE AND THE MARINE ENVIRONMENT PROTECTION COMMITTEE

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CLIMATE CHANGE: A CHALLENGE FOR IMO TOO!

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## 1 GENERAL

1.1 The Sub-Committee on Bulk Liquids and Gases held its thirteenth session from 2 to 6 March 2009 under the chairmanship of Mr. Z. Alam (Singapore). The Vice-Chairman, Mr. S. Oftedal (Norway), was also present.

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

ALGERIA
ARGENTINA
AUSTRALIA
BAHAMAS
BELGIUM
BRAZIL
CANADA
CHILE
CHINA
COOK ISLANDS
CUBA
CYPRUS
DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA
DENMARK
DOMINICAN REPUBLIC
ECUADOR
EGYPT
ESTONIA
FINLAND
FRANCE
GERMANY
GHANA
GREECE
INDONESIA
IRAN (ISLAMIC REPUBLIC OF)
IRELAND
ISRAEL
ITALY
JAPAN
LATVIA
LIBERIA
MALAYSIA
MALTA
MARSHALL ISLANDS
MEXICO
NETHERLANDS
NEW ZEALAND
NIGERIA
NORWAY
PANAMA
PERU
PHILIPPINES
POLAND
PORTUGAL
REPUBLIC OF KOREA
RUSSIAN FEDERATION
SAUDI ARABIA
SINGAPORE
SOUTH AFRICA
SPAIN
SWEDEN
SYRIAN ARAB REPUBLIC
TURKEY
TUVALU
UKRAINE
UNITED KINGDOM
UNITED STATES
URUGUAY
VANUATU

and the following Associate Member of IMO:

HONG KONG, CHINA

1.3 The session was also attended by observers from the following intergovernmental organizations:

EUROPEAN COMMISSION (EC)
MARITIME ORGANIZATION FOR WEST AND CENTRAL AFRICA (MOWCA)
INTERNATIONAL COUNCIL FOR THE EXPLORATION OF THE SEA (ICES)

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 TRANSPORT WORKERS' FEDERATION (ITF)
INTERNATIONAL RADIO-MARITIME COMMITTEE (CIRM)
INTERNATIONAL ASSOCIATION OF PORTS AND HARBORS (IAPH)
BIMCO
INTERNATIONAL ASSOCIATION OF CLASSIFICATION SOCIETIES (IACS)
EUROPEAN CHEMICAL INDUSTRY COUNCIL (CEFIC)
OIL COMPANIES INTERNATIONAL MARINE FORUM (OCIMF)
FRIENDS OF THE EARTH INTERNATIONAL (FOEI)
INTERNATIONAL ASSOCIATION OF DRILLING CONTRACTORS (IADC)
COMMUNITY OF EUROPEAN SHIPYARDS' ASSOCIATIONS (CESA)
INTERNATIONAL ASSOCIATION OF INDEPENDENT TANKER OWNERS (INTERTANKO)
THE INTERNATIONAL UNION FOR CONSERVATION OF NATURE (IUCN)
ADVISORY COMMITTEE ON PROTECTION OF THE SEA (ACOPS)
SOCIETY OF INTERNATIONAL GAS TANKER AND TERMINAL OPERATORS LIMITED (SIGTTO)
DANGEROUS GOODS ADVISORY COUNCIL (DGAC)
CRUISE LINES INTERNATIONAL ASSOCIATION (CLIA)
INTERNATIONAL ASSOCIATION OF DRY CARGO SHIPOWNERS (INTERCARGO)
ASSOCIATION OF EUROPEAN MANUFACTURERS OF INTERNAL COMBUSTION ENGINES (EUROMOT)
THE INSTITUTE OF MARINE ENGINEERING, SCIENCE AND TECHNOLOGY (IMarEST)
INTERNATIONAL PARCEL TANKERS ASSOCIATION (IPTA)
INTERNATIONAL SAILING FEDERATION (ISAF)
INTERNATIONAL BUNKER INDUSTRY ASSOCIATION (IBIA)
INTERNATIONAL PAINT AND PRINTING INK COUNCIL (IPPIC)

**Opening address**

1.4 The Secretary-General welcomed participants and delivered the opening address, the full text of which is reproduced in document BLG 13/INF.6.

**Chairman's remarks**

1.5 The Chairman, in thanking the Secretary-General, stated that his words of encouragement as well as the advice and requests would be given every consideration in the deliberations of the Sub-Committee.

**Adoption of the agenda and related matters**

1.6 The Sub-Committee adopted the agenda (BLG 13/1) and agreed, in general, to be guided in its work by the annotations contained in document BLG 13/1/2, also taking into account document BLG 13/1/1 concerning the arrangements for the session. The agenda, as adopted, together with the list of documents considered under each agenda item, is set out in document BLG 13/INF.7.

## 2 DECISIONS OF OTHER IMO BODIES

2.1 The Sub-Committee noted the outcomes of DE 51, STW 39, MSC 84, NAV 54, MEPC 57, MEPC 58 and MSC 85, as reported in documents BLG 13/2, BLG 13/2/1 and BLG 13/2/2 as well as information orally provided by the Secretariat on the outcome of FP 53 (16 to 20 February 2009) relevant to the work of the Sub-Committee and took them into account in its deliberations when dealing with relevant agenda items.

### Guidelines on the application of the Strategic and High-level Action Plan

2.2 The Sub-Committee noted that MSC 85 noted that C 101 had noted the progress made in developing Guidelines on the application of the Strategic and High-level Action Plan and urged Member States and the Chairmen of the MSC, MEPC and sub-committees to participate actively in the deliberations of both the Council correspondence group and the Council working group's next session; and that MSC 85 had agreed that the next Chairmen's meeting should consider the outcome of the Council working group and report to MSC 86.

## 3 EVALUATION OF SAFETY AND POLLUTION HAZARDS OF CHEMICALS AND PREPARATION OF CONSEQUENTIAL AMENDMENTS

3.1 The Sub-Committee recalled that this part of the agenda traditionally contains routine classification tasks which are normally put directly to the ESPH Working Group prior to further consideration by the Sub-Committee. On this occasion, however, it was noted that no new product classifications had been received for this session. Notwithstanding this observation, it was recognized that additionally the Sub-Committee always considers the report of the intersessional meeting of the ESPH Working Group and any documents containing matters of principle for which discussions in plenary are necessary.

3.2 The Sub-Committee thanked the ESPH Working Group and its new Chairman, Mr. David MacRae (United Kingdom), for the considerable amount of work that had been carried out at its last intersessional meeting (ESPH 14).

### Report of the fourteenth intersessional meeting of the ESPH Working Group

3.3 In considering the report of the fourteenth intersessional meeting of the ESPH Working Group (BLG 13/3), the Sub-Committee approved the report in general and took action as indicated hereunder:

.1 agreed with the evaluation of new products and consequential inclusion in the IBC Code;

.2 noted the results of the work on the evaluation of cleaning additives and, in particular, that 49 cleaning additives had been evaluated, 31 of which were approved for inclusion in the list of cleaning additives meeting the requirements of the criteria outlined in MEPC.1/Circ.590;

.3 endorsed the view that additional clarification with regard to the High-level Action Plan and the Planned outputs is required in relation to elements 1.3.3.1 and 5.2.3.1;

.4 concurred that the (5.2/5.2.3/5.2.3.1) coding for Strategic direction, High-level Action Plan and Planned outputs should be used for all future product evaluation submissions;

.5 noted that blank entries under D3 and E1 in the GESAMP/EHS composite list do not indicate missing data since the default in the database is to leave the parameter blank unless an appropriate code letter is entered and noted that GESAMP/EHS will be requested to consider this issue;

.6 concurred with the view of the Group that GESAMP/EHS should be requested to review olefin substances and mixtures as there appeared to be inconsistencies within the product family and that the review should address not only the profiles but also the names used to describe olefin mixtures;

.7 considered the view that when a toxic solid with a low vapour pressure is suspended in water, loaded and discharged under closed conditions and carried at ambient temperature then the requirement for controlled venting may not need to be applied and noted that this issue requires further consideration;

.8 noted that starting from next year (i.e. for listing in MEPC.2/Circ.15) expiry dates may be triggered for some tripartite agreements and that, accordingly, Administrations and industry should take action as appropriate;

.9 noted that GESAMP/EHS carried out a comprehensive review of all phthalate products in the composite list and as a result some hazard profiles had been amended which may impact on the carriage requirements for phthalates in the IBC Code;

.10 concurred with the view of the Group that when it is observed that a GESAMP hazard profile is not in line with the IBC Code entry, a submission needs to be made to BLG/ESPH to update the carriage requirements;

.11 noted the advice from GESAMP/EHS with regard to the key data elements required when assessing cleaning additive components;

.12 concurred with the view of the Group that an appropriate footnote should be included for cleaning additive component entries in the GESAMP/EHS composite list to indicate that they cannot be used in mixture calculations;

.13 agreed that when submitting trade-named mixtures containing confidential formulation details for evaluation as List 3 MEPC.2/Circular entries, the procedure set out in paragraph 4.18 of BLG 13/3 should be followed. In this context, it was noted by the delegation of CEFIC that to align this action with the outcome of MSC 85 on this point (MSC 85/26, paragraph 25.3), this approach could be broadened by modifying it to become "agree that when submitting documents containing confidential details for evaluation as MEPC.2/Circular entries, the procedure set out in paragraph 4.18 should be followed". This was recognized to enhance the scope of the protection and was duly endorsed by the Sub-Committee;

.14 agreed that items relating to bio-fuels and bio-fuel blends would be deferred to agenda item 4 for consideration;

.15 noted the progress made with the review of chapter 19 of the IBC Code and agreed with the decisions proposed relative to the deletion of UN numbers and the boundaries for appropriate Index names;

.16 noted the discussions regarding the carriage of vapour detection equipment; and

.17 approved the future work programme of the ESPH Working Group notwithstanding the addition of tasks given to the group during the discussion of items relevant to their work.

**Associated issues**

3.4 The Sub-Committee agreed to consider agenda item 4 (Application of the requirements for the carriage of bio-fuels and bio-fuel blends) before establishing the ESPH Working Group, since the outcome of this item was of relevance to the work of the group.

**Establishment of the working group**

3.5 Recognizing the necessity to make progress on the above issues, the Sub-Committee established the Working Group on Evaluation of Safety and Pollution Hazards of Chemicals and instructed it, taking into account the comments and decisions made in plenary, to:

.1 consider issues relating to the evaluation of new products;

.2 conduct an evaluation of cleaning additives;

.3 review MEPC.2/Circular – Provisional classification of liquid substances transported in bulk, and other related matters;

.4 give further consideration to the application of requirements for the carriage of bio-fuels and bio-fuel blends;

.5 continue the review of chapter 19 of the IBC Code;

.6 prepare the work programme and agenda for ESPH 15; and

.7 submit a report to plenary on Thursday, 5 March 2009.

**Report of the working group**

3.6 Having received and considered the report of the working group (BLG 13/WP.4), the Sub-Committee approved the report in general and took action as indicated hereunder:

.1 agreed with the view of the group that if anomalies are raised by Administrations with regard to the assigned carriage requirements and the GESAMP Hazard Profile, then a document to ESPH should be submitted in line with normal procedures;

.2 agreed further that, whenever changes are made by GESAMP/EHS (as a consequence of new data becoming available or product families being reassessed), the carriage requirements could be reviewed by the group;

.3 concurred with the evaluation of the cleaning additives;

.4 noted that some cleaning additives had been omitted from the updated listing presented in annex 10 of the last MEPC.2/Circular, and agreed that, in order to have a retrievable reference source for the cleaning additives concerned, the missing products would be listed in the BLG 13 report under annex 1;

.5 supported the view of the group that a similar list of cleaning additives assessed and approved at this session should also be included in the BLG 13 report under annex 2;

.6 noted the satisfactory progress made on the revision of chapter 19 of the IBC Code and urged Member delegations to make available the necessary expertise to review this exercise in support of the leading actions initiated by the Netherlands;

.7 approved the future work programme for the intersessional meeting of the ESPH Working Group in October 2009, as set out in annex 3; and

.8 agreed to request MSC 86 and MEPC 59 for an intersessional meeting of the ESPH Working Group in 2010.

## 4 APPLICATION OF THE REQUIREMENTS FOR THE CARRIAGE OF BIO-FUELS AND BIO-FUEL BLENDS

4.1 The Sub-Committee recalled that bio-fuels are being shipped in increasing quantities worldwide and that these products are often carried blended with mineral fuel. In such cases, there is a question as to whether the blended product should be carried under MARPOL Annex I or Annex II.

4.2 It was further recalled that BLG 10 had agreed to interim guidelines to assist industry in the movement of bio-fuel blends. These guidelines (allowing blends with up to 15% bio-fuel to be carried under MARPOL Annex I) could be used with Fatty acid methyl ester (FAME), Ethanol (Ethyl alcohol) and Vegetable oil blends but it had also been agreed at BLG 12 that the use of interim guidelines should not extend beyond 1 July 2009.

4.3 Accordingly, the ESPH Working Group had debated this matter at their fourteenth intersessional meeting and had proposed a number of actions to the Sub-Committee for consideration. In this context, in line with the decision taken at MEPC 58, it was noted that only shore blended bio-fuel blends had been addressed at this session.

4.4 The Sub-Committee took action on the points proposed as indicated hereunder:

.1 agreed that, due to concerns identified in relation to ODME functionality, the principles set out in the interim guidance established for bio-fuel blends to be shipped as Annex I cargoes should not be taken up unless it was conditional upon all residues being pumped ashore or it can be shown that ODME's function efficiently with these blends;

.2 agreed that mixtures, containing more than 1% but less than 85% petroleum oil, should be assessed in accordance with MEPC.1/Circ.512 following the procedures for mixtures with unassessed components that show a safety hazard;

.3 concurred with the view of the group that bio-fuel blend List 2 products assessed using the mineral oil multiplication factor should be revisited and re-assessed in accordance with MEPC.1/Circ.512; and

.4 noted that for bio-fuel blends with 1% or less oil, the cargo should be treated as the Annex II product contained in the blend and noted that this bio-fuel blend band currently applies only to FAME, triglyceride and ethanol mixtures.

4.5 Taking account of the above actions and comments, the Sub-Committee instructed the group to continue the development of carriage standards for bio-fuels and bio-fuel blends and to further consider any implications arising from the banding criteria proposed.

**Blending on board**

4.6 Before convening the ESPH Working Group to continue its work on bio-fuel blends, the issue of blending on board was discussed.

4.7 In reviewing document BLG 13/4 (the United Kingdom and the Netherlands), it was noted by the Sub-Committee that although there are currently no requirements to permit blending on board during the sea voyage, regulations to prohibit such activities are also lacking and no enforcement in this area is therefore possible. There was a strongly-held view by the United Kingdom and the Netherlands that this could result in both safety and pollution hazards arising and that, accordingly, there was a compelling need to consider this issue in more detail.

4.8 It was further noted that, with regard to the blending operation, there are currently three methodologies which may be employed:

.1 products are loaded into separate tanks and during the sea voyage the two products are blended into another tank, which originally was empty; or

.2 both products are loaded into separate tanks and are finally blended into one of these tanks; or

.3 the vessel loads one product at one port and the second product in another port through “load on top”.

4.9 In the context of the above, it was recognized that the expression of “blending” is used for mixing two products to give only one product (a blended mixture) and that this relates only to physical blending as distinct from any chemical processing.

4.10 Two alternative approaches were put forward for consideration by the Sub-Committee whereby blending on board during the sea voyage should either be permitted or such operations should be prohibited. In either case, it was proposed that clear guidance on this issue was now required and that a suitable IMO text reflecting this needed to be developed.

4.11 It was noted in document BLG 13/4/1 (IPTA) that, in considering the former alternative, there should be a clear distinction made between onboard blending operations carried out in port and those carried out at sea. IPTA held the view that where onboard bio-fuel blending operations are carried out in port, under supervision, and the resultant products are treated in accordance with the carriage and discharge requirements established by the Organization, there is little cause for concern, although it may be necessary to develop guidance in respect of issues such as the completion of oil and cargo record books. For blending operations conducted at sea during the voyage, however, serious concerns were expressed on both safety and compliance grounds and this was judged by IPTA to be an unacceptable practice.

4.12 In introducing document BLG 13/4/2, INTERTANKO expressed the view that, should the Sub-Committee agree to blending operations on board at sea, the process of regulating blending operations on board as a whole could be done in two stages:

.1 as an initial step, guidelines which address blending operations whilst the ship is in port could be developed with regulations, for instance in the IBC Code, subsequently following to provide formal status to the guidance; and

.2 in parallel to regulating blending operations whilst the ship is in port, guidelines and regulations for blending operations during the sea voyage could also be developed, if required.

4.13 Additionally, INTERTANKO informed the Sub-Committee that work is currently underway on the production of an industry guide for the safe carriage and blending of bio-fuels on board in order to create an interim set of operational criteria, pending any implementation of an official regulatory framework.

4.14 Having considered the issues posed in the three documents presented, the Sub-Committee unanimously agreed that the practice of blending at sea should be prohibited and that mandatory provisions should be developed under the auspices of the MSC and the MEPC.

4.15 As an interim measure, following the proposals by the delegations of Indonesia and Turkey, supported by other delegations, the Sub-Committee invited the Committees to consider issuing an MSC-MEPC circular concerning prohibition of blending operations on board at sea.

4.16 With respect to blending on board in port, the Sub-Committee decided to expand the terms of reference of the current agenda item for this topic and accordingly, requested the ESPH Working Group to include the issue of blending on board in port in their further consideration of the carriage of bio-fuel blends.

4.17 It was noted that the current scope of the group was to focus on the carriage requirements of bio-fuels and bio-fuel blends and that caution should be exercised before addressing any operational matters.

4.18 With respect to operational aspects of blending on board in port, IAPH advised that, in some cases, national guidance is available and employed by the port although this may not have been disseminated outside of the Administrations concerned.

4.19 Having received and considered the report of the group (BLG 13/WP.4), the Sub-Committee approved the report in general and took action in relation to bio-fuels and bio-fuel blends as indicated hereunder:

.1 agreed to extend the interim guidelines for the carriage of bio-fuel blends for a further 24 months from the date of expiry to permit the continued carriage of bio-fuel blends on Annex I ships;

.2 agreed that in view of the concerns noted in relation to ODME functionality, when carrying bio-fuel blends as Annex I cargoes under the extended interim guidelines then any residues and tank washings should be pumped ashore unless the ODME is approved/certified for the blend;

.3 noted the developments in relation to the three band options for shipping bio-fuel blends and the need for further discussion at ESPH 15 in order to finalize the proposals;

.4 supported the view of the group that GESAMP/EHS should be requested to generate appropriate hazard profiles for petroleum fuels leading to List 5 entries in the MEPC.2/Circular (Substances not shipped in pure form but as components in mixtures) and requested the Secretariat to initiate this accordingly;

.5 agreed that operational aspects of blending on board should not be addressed by the group but guidance should be developed in respect of the following items:

.1 documentation and administration, shipping document(s), Procedure and Arrangements Manual, Oil Record Book and Cargo Record Book;

.2 name of the final product at unloading;

.3 classification of the final product (pollution category, ship type and carriage requirements); and

.4 possible wash requirements and residue discharge after unloading, if carried under Annex I requirements;

.6 noted that the bands and conditions agreed for shore blended mixtures with respect to specifying product names and carriage requirements should also be applicable to products blended on board in port; and

.7 noted that issues involving blending in port, falling under the purview of the group, need to be developed further and requested that additional information and proposals should be submitted accordingly to the next meeting for the ESPH Working Group.

**Extension of the completion date of the item**

4.20 Having noted that further work needed to be undertaken in the context of the item, the Sub-Committee invited the MEPC to extend the target completion date of the item to 2010.

## 5 DEVELOPMENT OF GUIDELINES AND OTHER DOCUMENTS FOR UNIFORM IMPLEMENTATION OF THE 2004 BWM CONVENTION

5.1 The Sub-Committee recalled that the "International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004" (Ballast Water Management Convention)

had been open for accession by any State since 31 May 2005. Six more States (Albania, Antigua and Barbuda, France, Liberia, Mexico and South Africa) had acceded to the Convention since the last session of the Sub-Committee, which brought the number of Contracting Governments to 18 representing 15.36% of the world merchant fleet tonnage. The Sub-Committee urged other Member States to ratify this Convention at the earliest possible opportunity.

5.2 The Sub-Committee noted that MEPC 58 had adopted the Guidelines for ballast water sampling (G2) by resolution MEPC.173(58) and that, in accordance with the updated programme for the development of the ballast water management guidelines approved by MEPC 53, all the 14 sets of Guidelines have been developed and adopted.

5.3 The Sub-Committee recalled that BLG 12 had agreed to re-establish the Ballast Water Working Group at this session with the provisional Terms of Reference set out at annex 3 of document BLG 12/17 and that MEPC 58 had subsequently endorsed the Terms of Reference.

**Application of Basic Approval granted to one applicant to another applicant using the same Active Substance**

5.4 The Sub-Committee noted that MEPC 57 had adopted the revised "Procedure for approval of ballast water management systems that make use of Active Substances (G9)" by resolution MEPC.169(57) and that paragraph 8.1.2.12 of the revised Procedure (G9) provides that "Subject to evaluation against the criteria developed by the Organization, an Active Substance or Preparation may be used for Prototype or Type Approval testing for the approval of different BWMS".

5.5 In that context, the Sub-Committee further noted that the Ballast Water Review Group established at MEPC 57 had initiated the development of a draft guidance document named "Framework for determining when a Basic Approval granted to one ballast water management system may be applied to another system that uses the same Active Substance or Preparation" and that MEPC 57 had invited Members and observers to submit their contributions on which criteria should be used to further develop this guidance document to BLG 13.

5.6 In considering document BLG 13/5 (Secretariat) containing the text of the above-mentioned draft guidance document, some delegations were of the view that the guidance document should only apply to one Active Substance used in a certain dosage and not to a chemical in general.

5.7 The Sub-Committee also noted the concerns expressed by several delegations that the guidance document should carefully address the issue of intellectual properties to ensure that the commercial interests of manufacturers concerned are protected when applying the transfer of Basic Approval.

5.8 The delegation of the United Kingdom, supported by some other delegations, expressed the view that the guidance document should be built on the GESAMP-BWWG's experience in its review of ballast water management systems which make use of Active Substances and that, once approved, the guidance document would facilitate the review and approval process of the ballast water management systems, enhancing the availability and acceptability of the ballast water management technologies.

5.9 After some discussion, the Sub-Committee noted the general support for this document and agreed to refer it to the Ballast Water Working Group for detailed consideration and further development, taking into account comments made in plenary.

**Clarification regarding compliance dates under regulation B-3.1 of the BWM Convention**

5.10 The Sub-Committee recalled that MEPC 56 had instructed BLG 12 to consider documents MEPC 56/2/4 (Japan) and MEPC 56/2/12 (Republic of Korea) regarding the interpretation of compliance dates in regulation B-3.1 of the BWM Convention, taking into account comments made by IACS in plenary. The Sub-Committee also recalled that, due to time constraints, this issue could not be considered at BLG 12.

5.11 The Sub-Committee noted that IACS provided further clarification regarding the application dates of the D-2 standard contained in regulation B-3.1 of the BWM Convention at this session and, in considering document BLG 13/5/1 (IACS), concurred with the view that "the anniversary date of delivery of the ship in the year of compliance" specified in regulation B-3.2, refers to years 2014 and 2016 indicated in regulation B-3.1. Consequently, ships with a ballast water capacity between 1,500 $m^3$ and 5,000 $m^3$, inclusive, are required to comply with the D-2 standard not later than the first intermediate or renewal survey, whichever occurs first, after the anniversary date of the ship in 2014 under regulation B-3.1.1; and ships with a ballast water capacity of less than 1,500 or greater than 5,000 $m^3$ are required to comply with D-2 standard not later than the first intermediate or renewal survey, whichever occurs first, after the anniversary date of the ship in 2016 under regulation B-3.1.2.

5.12 Following a proposal by IACS, the Sub-Committee agreed to request the Secretariat to prepare a technical circular on this matter for approval by MEPC 59, with the view to facilitating the broad dissemination of this interpretation.

**Development of an IMO circular on ballast water sampling and analysis protocols**

5.13 The Sub-Committee noted that MEPC 58 had adopted the "Guidelines for ballast water sampling (G2)" and had instructed BLG 13 to develop, as a matter of high priority, an IMO circular to provide further guidance on the interpretation of the results arising from sample analysis and to give advice on the uniform application of that guidance.

5.14 In considering document BLG 13/5/2 (FOEI) on a draft procedure using the ballast water FlowCAM® analyser to determine compliance or non-compliance with the D-2 standard, a large number of delegations were of the view that the draft procedure was developed based on a single prototype product which may lead to an undesirable monopoly, without the necessary validation. Most of the delegations believed that it would be premature to include this procedure in the IMO circular on ballast water sampling and analysis. Some delegations also emphasized the need to ensure that sampling protocol should result in samples that are representative of the whole discharge of ballast water.

5.15 While welcoming the effort made by FOEI, the Sub-Committee could not support the proposed draft procedure and urged Members and observers to submit their contributions to BLG 14, bearing in mind that the development of this circular had been assigned by the MEPC as a high-priority task.

**Other information related to ballast water management**

5.16 The Sub-Committee noted the information regarding a study on ballast water uptake and discharge quantities in the port of Rotterdam provided in document BLG 13/INF.4 (the Netherlands) and invited other Members to share similar information regarding their ports.

5.17 The Sub-Committee noted the information provided in document BLG 13/INF.5 (Brazil) and, in particular, the view of the Brazilian delegation that such a questionnaire could assist interested parties in the evaluation and comparison of different ballast water management systems. In this connection, Brazil, supported by a large number of delegations, proposed that an IMO technical circular be prepared by the Ballast Water Working Group, with a view to making the information contained in the questionnaire widely available to the interested parties.

5.18 The Sub-Committee instructed the Ballast Water Working Group to prepare a technical circular regarding the Engineering Questionnaire on ballast water management systems for approval by MEPC and dissemination as appropriate.

**Establishment of the working group**

5.19 The Sub-Committee established the Working Group on Development of guidelines for uniform implementation of the 2004 BWM Convention, under the chairmanship of Mr. Chris Wiley (Canada), and instructed it, taking into consideration the comments made and decisions taken, to:

.1 continue the development of the Procedure for assessing "same levels of protection" of, and for approval of, other methods of ballast water management under regulation B-3.7 of the BWM Convention;

.2 develop a guidance document on how chemicals used to treat ballast water should be handled and stored on board, taking into account relevant existing IMO Conventions and Codes;

.3 develop a guidance document on safety procedures for ship and crew against risks associated with ballast water management systems that make use of Active Substances taking into account relevant existing IMO Conventions and Codes;

.4 initiate the development of an IMO circular to provide ballast water sampling and analysis protocols and to give advice on the uniform application of these protocols;

.5 prepare a technical circular regarding the Engineering Questionnaire on ballast water management systems for approval by MEPC and dissemination as appropriate;

.6 consider the issue of long-term effects, maintenance and reliability of ballast water management systems and report to the Sub-Committee as appropriate;

.7 continue the development of the guidance document "Framework for determining when a Basic Approval granted to one ballast water management system may be applied to another system that uses the same Active Substance or Preparation";

.8 develop a guidance document on conducting type approval of ballast water management systems using document MEPC 58/2/9 (United Kingdom) as a starting point;

.9 time permitting, discuss the need for standardized protocols to be used by testing facilities involved in the approval of ballast water management systems; and

.10 submit a written report on the work carried out, including recommendations to MEPC 59, for consideration by the Sub-Committee.

**Report of the working group**

5.20 Upon receipt of the report of the working group (BLG 13/WP.5), the Sub-Committee approved it in general and took action as outlined in the following paragraphs.

**Procedure for approving other methods of ballast water management**

5.21 The Sub-Committee noted that the Working Group had a preliminary discussion regarding the ballast water management approach described in document MEPC 56/2/11 and agreed that guidance on approving other methods of ballast water management is needed as such methods are likely to be developed in the future. The Sub-Committee further noted that some delegations were of the view that this procedure could only apply to other methods of ballast water exchange, while others suggested that, according to regulation B-3.7 of the Convention, other methods should apply to both ballast water exchange and ballast water treatment. The Sub-Committee also noted the need for any future procedure to ensure at least an equivalent level of protection as the applicable standards in regulations B-3.1 to B-3.5, and to include provisions regarding risk assessment, harmonized with the similar provisions existing in Guidelines (G7) and (G14). The Sub-Committee concurred with the view that specific benchmarks against which the performance can be measured and further consideration of the type approval process are needed and agreed that, for other methods limited to specific voyages or routes, the other methods should be subjected to Guidelines (G7), which provide details on how exemptions could be granted.

5.22 The Sub-Committee noted with appreciation that the delegation of the Netherlands offered to coordinate the development of a co-sponsored document for submission at BLG 14.

**Safe handling and storage of chemicals and preparations used to treat ballast water and safety procedures for risks to the ship and crew**

5.23 Having examined the conclusion of the working group related to guidance regarding onboard handling and storage of Active Substances and guidance on ship and crew safety procedures, the Sub-Committee agreed that the two guidance documents requested by the MEPC could be merged into one document based on document BLG 12/5/4 (United Kingdom).

5.24 Following consideration of the consolidated Guidance to ensure safe handling and storage of chemicals used to treat ballast water and the development of safety procedures for risks to the ship and crew resulting from the treatment process, the Sub-Committee agreed to invite MEPC 59 to approve this guidance and agree to its dissemination as a technical circular.

**Ballast water sampling and analysis protocol**

5.25 The Sub-Committee noted the *aide-memoire* developed by the working group to facilitate future submissions on ballast water sampling and analysis protocols and agreed to urge Members and observers to submit their contributions to BLG 14, taking into account the above-mentioned *aide-memoire*.

**Engineering questionnaire**

5.26 Having examined the draft technical circular regarding an engineering questionnaire proposed by Brazil, the Sub-Committee invited MEPC 59 to approve the dissemination of the engineering questionnaire through a technical circular.

5.27 The delegation of Brazil stated that the said technical circular has fully addressed the terms of reference (.6) of the Ballast Water Working Group, which reads "consider the issue of long-term effects, maintenance and reliability of ballast water management systems and report to the Sub-Committee as appropriate".

**Framework for determining when a Basic Approval granted to one ballast water management system may be applied to another system that uses the same Active Substance or Preparation**

5.28 Having examined the conclusions of the working group regarding the transfer of Basic Approval from one ballast water management system to another, the Sub-Committee agreed that any environmental assessments conducted in this respect should involve the entire ballast water management system and that an additional section on this should be developed.

**Outstanding issues**

5.29 Having noted that, in the time available, the working group was not able to complete its work and having examined the Action Plan for future work developed by the working group, the Sub-Committee agreed with the plan.

5.30 In order to expedite the future work, the Sub-Committee agreed to establish a correspondence group under the coordination of Canada* with the following terms of reference:

.1 continue the development of the guidance document "Framework for determining when a Basic Approval granted to one ballast water management system may be applied to another system that uses the same Active Substances or Preparation";

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.2 continue the development of a guidance document on conducting type approval of ballast water management systems based on document MEPC 58/2/9 (United Kingdom); and

.3 submit a written report to BLG 14.

5.31 Taking into consideration the significant amount of work needed for the completion of agenda item 5, the Sub-Committee agreed to re-establish the Ballast Water Working Group at BLG 14.

5.32 Bearing in mind its previous agreement to establish a working group on bio-fouling issues which would essentially be attended by the same experts involved in the ballast water working group, the Sub-Committee agreed to establish a single working group at BLG 14 and to instruct it to deal with both items 5 and 9 of the BLG 13 agenda with the provisional terms of reference contained in annex 4 of this report.

**Action requested of the Sub-Committee**

5.33 Having considered the action requested by the Working Group and the comments made by various delegations, the Sub-Committee:

.1 agreed with the decision to merge the Guidance document on how chemicals used to treat ballast water should be handled and stored on board and the Guidance document on safety procedures for ship and crew against risks associated with the ballast water management systems that make use of Active Substances in one guidance document;

.2 invited the MEPC to approve the consolidated Guidance to ensure safe handling and storage of chemicals used to treat ballast water and the development of safety procedures for risks to the ship and crew resulting from the treatment process, as contained in annex 5 of this report, and to agree with its dissemination as a technical circular;

.3 urged members and observers to submit their future contributions to the development of an IMO circular to provide ballast water sampling and analysis protocols taking into consideration the *aide-memoire* developed by the Group contained in annex 6 of this report;

.4 invited MEPC 59 to approve the dissemination of the engineering questionnaire contained in annex 7 through a BWM technical circular;

.5 agreed with the Action Plan for uniform implementation of BWM Convention contained in annex 8; and

.6 agreed to establish a correspondence group with the Terms of Reference contained in paragraph 5.30.

## 6 DEVELOPMENT OF PROVISIONS FOR GAS-FUELLED SHIPS

6.1 The Sub-Committee recalled that MSC 78 had agreed to a proposal by Norway to develop provisions for gas-fuelled ships aimed at establishing an international standard for the installation and operation of internal combustion engine installations and that work had progressed at BLG 10, BLG 11, BLG 12 and intersessionally by the correspondence groups.

6.2 The Sub-Committee also recalled that BLG 12 had noted that FP 52, having noted the relevant outcome of DE 50 and BLG 11 and having also considered the document submitted by the United States (FP 52/11/1), containing a detailed review of the fire protection-related aspects of the draft Interim guidelines, prepared by BLG 11 and proposing modifications to the draft text, had established a correspondence group, with the instruction to review the fire protection-related provisions of the draft Interim guidelines on safety for gas-fuelled engine installations in ships, as contained in the annex to document FP 52/11, taking into account document FP 52/11/1 and prepare modifications thereto, as appropriate, for consideration at FP 53.

6.3 The Sub-Committee further recalled that BLG 12 had confirmed that, in furthering the development of provisions for gas-fuelled ships, it would be appropriate to have a two-step approach, and that the first set of the provisions developed should be applicable to LNG-fuelled ships only. In that context, BLG 12 had agreed that an appropriate text to reflect the aforementioned approach should be incorporated in the preamble of the draft Interim guidelines on safety for gas-fuelled engine installations in ships.

6.4 The Sub-Committee finally recalled that BLG 12 had established a Correspondence Group on Development of provisions for gas-fuelled ships, under the coordination of Norway, with the terms of reference stated in document BLG 12/17, paragraph 7.8.

6.5 In considering the issue, the Sub-Committee took into account the relevant outcomes of DE 51, STW 39 and MSC 84 as promulgated in document BLG 13/6 and the outcome of FP 53, which met from 16 to 20 February 2009, provided orally by the Secretariat that FP 53, having considered the report of the Correspondence Group on Development of Provisions for Gas-Fuelled Ships (FP 53/11), agreed to chapters II (section 2.10) and III of the draft Interim Guidelines relating to fire protection, with minor modifications, for referral to the BLG Sub-Committee for coordination purposes.

6.6 The Sub-Committee considered the report of the correspondence group (BLG 13/6/1), submitted by Norway as coordinator of the group, whereby the group had finalized the technical and editorial review of the draft guidelines as far as possible, and noted that the outcome of FP 53 was not available to the group when the coordinator finalized the report. While considering the report of the correspondence group, the Sub-Committee took into consideration the following two submissions by Germany:

.1 document BLG 13/6/2, which, in view of the development of Interim Guidelines on safety for natural gas-fuelled engine installations in ships, proposed to amend SOLAS to provide for the option for the carriage of fuels with flashpoint of less than 60°C on board; and

.2 document BLG 13/6/3, which proposed further views and amendments to the draft Interim Guidelines on safety for natural gas-fuelled engine installations in ships,

and, having noted that the United Kingdom should be added to the list of participants to the correspondence group, took decisions as detailed in the following paragraphs.

***Retention of the text in the preamble of the draft Interim Guidelines regarding their replacement by the IGF Code in the future***

6.7 The Sub-Committee considered the need to have, or not to have, the text in square brackets regarding the replacement of the Interim Guidelines by the International Code for Safety of Gas-fuelled ships (IGF Code) in the future (documents BLG 13/6/1, paragraph 8 and annex 1 and BLG 13/6/3, paragraph 7) and agreed that the aforementioned text should be moved to the section on Framework for the development of the IGF Code.

***Inclusion of a requirement for emergency discharge of storage tanks for LNG fuel***

6.8 The Sub-Committee considered the need for the inclusion of provisions regarding emergency discharge of storage tanks for LNG fuel (documents BLG 13/6/1, paragraph 9 and BLG 13/6/3, paragraphs 8 to 10) and agreed that, for the time being, the provisions along the lines of those in paragraph 2.8.1.7 of the draft Interim Guidelines adequately addressed the issue and decided to delete the square brackets encompassing the aforementioned paragraph. The Sub-Committee instructed the drafting group to improve the wording of the paragraph, if necessary.

***Safety analysis***

6.9 Having recalled that BLG 12 had urged Member Governments to submit safety analyses performed on gas fuels to the correspondence group to facilitate its future work on the development of the IGF Code and having noted that no safety analysis had been submitted to the correspondence group, the Sub-Committee urged, once again, Member Governments to submit the safety analyses to the Correspondence Group on Development of provisions for gas-fuelled ships.

***Amendments to SOLAS and the IGC Code***

6.10 Having considered the observation of Germany (BLG 13/6/2, paragraphs 7 and 8) that, in view of the interim character of these guidelines, there is a need to clarify acceptance of these guidelines in the context of the limitations in the use of fuels contained in SOLAS chapter II-2, part B and the IGC Code, chapter 16, and that such a clarification should be provided by introducing a footnote in the most appropriate SOLAS requirements to the effect that, notwithstanding other provisions, gas-fuelled ships may be accepted, based on the interim guidelines, the Sub-Committee, having noted the status of the footnotes, i.e. that they do not form part of the Convention, invited SIGTTO to take into account the need to amend the IGC Code in the revision of the Code, and instructed the drafting group to prepare a corresponding footnote for consideration by the Sub-Committee. The Sub-Committee decided to delete the square brackets and the text within, and noted the view of the delegation of Germany, supported by the delegation of Norway, that when the IGF Code is finalized, there would be a need to revoke chapter 16 of the IGC Code.

***Proposed work plan, scope and framework for the development of the IGF Code***

6.11 The Sub-Committee agreed, in principle, to the proposed work plan, scope and framework for the development of the IGF Code, set out in document BLG 13/6/1, paragraph 12.3 and annex 2, subject to an editorial review by the drafting group (see paragraph 6.15).

**Establishment of the drafting group**

6.12 The Sub-Committee established the Drafting Group on Development of provisions for gas-fuelled ships, under the chairmanship of Ms T. Stemre (Norway), and instructed it, taking into account the relevant outcome of FP 53, the comments made and decisions taken in plenary, to:

.1 finalize the draft Interim Guidelines on safety for natural gas-fuelled engine installations in ships and prepare a draft MSC resolution for submission to MSC 86 for adoption using the annex to the report of the correspondence group (BLG 13/6/1, annex 1) as the basis;

.2 finalize the work plan, scope and framework for the development of the IGF Code;

.3 prepare a draft footnote to the relevant SOLAS requirements to the effect that, notwithstanding other provisions, gas-fuelled ships may be accepted, based on the Interim Guidelines; and

.4 develop terms of reference for the Correspondence Group on the Development of provisions for gas-fuelled ships.

**Report of the drafting group**

6.13 Having received the report of the drafting group (BLG 13/WP.6), the Sub-Committee approved the report in general and took decisions as detailed in the following paragraphs.

***Finalization of the draft text of the Interim Guidelines***

6.14 The Sub-Committee agreed to the draft Interim Guidelines on safety for natural gas-fuelled engine installations in ships and the associated draft MSC resolution, set out in annex 9, for submission to MSC 86 for adoption.

***Work plan, scope and framework for the development of the IGF Code***

6.15 The Sub-Committee approved the work plan, scope and framework for the development of the International Code of Safety for Gas-fuelled Ships (IGF Code), set out in annex 10, and invited members of the industry Working Group on Review of the IGC Code to participate in the development of the IGF Code.

***Footnote to SOLAS regulation II-1/26***

6.16 The Sub-Committee agreed to the footnote to SOLAS regulation II-1/26, prepared by the drafting group, as follows:

> "Refer to the Interim Guidelines on safety for natural gas-fuelled engine installations in ships (resolution MSC…(86))",

and requested the Secretariat to insert the footnote in the subsequent consolidated edition of the SOLAS publication. The MSC was invited to note the aforementioned course of action.

***Establishment of the correspondence group***

6.17 The Sub-Committee agreed to establish a Correspondence Group on Development of provisions for gas-fuelled ships, under the coordination of Norway*, and instructed it, taking into account the comments made and decisions taken in plenary, to:

.1 further consider document BLG 13/WP.6 and other relevant documents;

.2 develop the framework, structure and functional requirements for the IGF Code also taking into consideration developments during the revision of the IGC Code; and

.3 submit a report to BLG 14.

**Extension of the completion date of the item**

6.18 In view of the completion of the draft Interim Guidelines on safety for natural gas-fuelled engine installations in ships, and commencement of work associated with the development of the IGF Code, the Sub-Committee invited the MSC to extend the target completion date of the item to 2012.

## 7 CASUALTY ANALYSIS

**Incidents of explosions on chemical and product tankers**

7.1 The Sub-Committee recalled that BLG 12, when considering issues relevant to incidents of explosions on chemical and product tankers, had concluded that it would be appropriate to wait the outcome of FP 53 before considering the issue further.

7.2 The Sub-Committee noted that FP 53 had considered relevant issues under the item on "Measures to prevent explosions on oil and chemical tankers transporting low-flash point cargoes" and, after a detailed discussion on the issue, had:

.1 agreed that new oil tankers of below 20,000 tonnes deadweight should be fitted with inert gas systems, and that the need for application of a lower limit should be further considered based on the current proposals of [8,000] [6,000] [4,000] tonnes deadweight, recognizing that such requirements could be introduced by suitably modifying the provisions of SOLAS regulation II-2/4.5.5;

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.2 recognized that the benefits of such fitting would outweigh any negative effects of the introduction of the IG system, such as increased fuel consumption, increased $CO_2$ emissions, increased building costs, increased complexity of procedures, and possible increase of risk associated with tank entries;

.3 agreed that requirements should be developed for the installation of inert gas systems on new chemical tankers, and that, since chemical tankers presented much more complex problems than oil tankers, separate requirements may need to be developed to cover them, which would necessarily also include modifications to SOLAS regulation II-2/4.5.5.2;

.4 concluded that further intensive debate on the issue for two more sessions of the Sub-Committee is necessary and, consequently, invited the MSC to extend the target completion date of the work programme item to 2011; and

.5 invited Members and international organizations to submit proposals for concrete amendments to relevant IMO instruments and any other information regarding the matter to FP 54.

7.3 Having noted the above outcome of FP 53, the Sub-Committee urged Member Governments and international organizations to consider the relevant outcome of FP 53 and to provide comments, if any, for consideration at BLG 14.

## 8 CONSIDERATION OF IACS UNIFIED INTERPRETATIONS

8.1 Having considered the proposal by IACS (BLG 13/8) which, in order to provide parity for the application of SOLAS regulations II-2/10.2, 10.4 and 10.5 to cargo ships between 500 and 2,000 gross tonnage under SOLAS, and chemical carriers between 500 and 2,000 gross tonnage under the IBC Code, provided a Unified Interpretation of paragraphs 11.1.1.3 and 11.1.1.4 of the IBC Code, the Sub-Committee agreed to the draft MSC circular on Unified interpretations of the IBC Code, set out in annex 11, for submission to MSC 86 for approval.

## 9 DEVELOPMENT OF INTERNATIONAL MEASURES FOR MINIMIZING THE TRANSFER OF INVASIVE AQUATIC SPECIES THROUGH BIO-FOULING OF SHIPS

9.1 The Sub-Committee recalled that BLG 12, having considered a number of submissions providing details on key risks associated with the transfer of invasive aquatic species through ships' bio-fouling, together with potential management measures and implementation options for managing ships' bio-fouling, had established a Correspondence Group on the development of measures to minimize the transfer of invasive aquatic species through bio-fouling of ships under the coordination of New Zealand to facilitate future work on this newly added agenda item.

### Report of the correspondence group

9.2 In introducing the report of the correspondence group (BLG 13/9), the coordinator of the group, Dr. Naomi Parker (New Zealand), informed the Sub-Committee of the various tasks carried out by the group since BLG 12 in accordance with its terms of reference and, in particular, of the progress made in the development of measures for minimizing the transfer of invasive aquatic species through bio-fouling of ships.

9.3 In considering the report of the correspondence group, most of the delegations that spoke expressed their support for the actions proposed while some delegations expressed their intention to contribute to the future work of the group.

9.4 The Sub-Committee noted with appreciation the work carried out by the correspondence group and, after a lengthy discussion, took action as outlined in the following paragraphs.

9.5 The Sub-Committee agreed to develop Guidelines for the control and management of ships' bio-fouling to minimize the transfer of invasive aquatic species, with the view to adopting them by an MEPC resolution or an Assembly resolution as appropriate.

**Establishment of a correspondence group**

9.6 The Sub-Committee agreed to re-establish the correspondence group under the coordination of New Zealand*, and instructed it, taking into account the comments made and decisions taken in plenary, to:

.1 further develop the best practice measures for minimizing the harmful effects of bio-fouling on the marine environment, human health, property and resources;

.2 further consider the potential impacts of current or proposed bio-fouling regulations, in particular, the magnitude of the impacts and the extent to which they differ from current practice. Impacts considered should include those on the shipping industry and other industry sectors as well as on the environment;

.3 further develop practical Guidelines for the control and management of all ships' bio-fouling to minimize the transfer of invasive aquatic species, taking into account the comments received to date and incorporate best practice measures as developed under term of reference 1 above;

.4 further consider the merits of adopting the guidelines by an MEPC resolution or an Assembly resolution, and whether the guidelines should be a primary or an interim means for addressing bio-fouling internationally;

.5 develop a revised draft work plan based on the progress to date for the development of international measures for minimizing the transfer of invasive aquatic species through ships' bio-fouling; and

.6 submit a written report to BLG 14.

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9.7 Noting the importance of ongoing exchange of information on bio-fouling and its management, the Sub-Committee encouraged Member Governments and international organizations to participate in the work of the correspondence group.

9.8 With regard to the need to expedite the work on this agenda item, the Sub-Committee noted the urgency of this task with a target completion date of 2010 and agreed to instruct the Ballast Water Working Group envisaged to be established at BLG 14 to also deal with bio-fouling issues (see paragraph 5.32).

**Research review – bio-fouling as a mechanism for invasive aquatic species transfer**

9.9 The Sub-Committee noted the information provided in document BLG 13/INF.3 (New Zealand) on research review of bio-fouling as a mechanism for invasive aquatic species transfer.

## 10 REVIEW OF THE RECOMMENDATION FOR MATERIAL SAFETY DATA SHEETS FOR MARPOL ANNEX I CARGOES AND MARINE FUEL OILS

10.1 The Sub-Committee recalled that BLG 12 had agreed that the information developed in the course of revising the Recommendation (resolution MSC.150(77)) needed to be communicated to the GHS Sub-Committee in order for it to appropriately include the needs of the maritime industry.

10.2 The Sub-Committee was advised that a member of the Secretariat attended the GHS Sub-Committee meeting in July 2008 and had advised that Sub-Committee of the ongoing developments at IMO. The GHS Sub-Committee has requested a further document from IMO after BLG 13 has considered the report of the Correspondence Group on Amendments to the Recommendation for material safety data sheets for MARPOL Annex I cargoes and marine fuel oils, established at BLG 12.

**Report of the correspondence group and establishment of the drafting group**

10.3 Having had a discussion on the report of the Correspondence Group on Amendments to the Recommendation for material safety data sheets for MARPOL Annex I cargoes and marine fuels (resolution MSC.150(77)) (BLG 13/10), coordinated by the United States, the Sub-Committee approved the report in general and, having established the Drafting Group on Amendments to recommendation for material safety data sheets for MARPOL Annex I cargoes and marine fuels under the chairmanship of Mr. M. Roldan (United States), instructed it, taking into account the comments made and decisions taken in plenary and the report of the correspondence group (BLG 13/10), to prepare draft revised Recommendations for material safety data sheets (MSDS) for MARPOL Annex I cargoes and marine fuels oils and associated draft MSC resolution.

**Inconsistency between SOLAS regulation VI/1 and new regulation VI/5-1**

10.4 The Sub-Committee recalled that, at BLG 12, the Director, Maritime Safety Division, had referred to the newly adopted SOLAS regulation VI/5-1 which is due to enter into force on 1 July 2009 and had invited the Sub-Committee to note its inconsistency with SOLAS regulation VI/1 (Application), which indicates that the chapter applies to the carriage of cargoes, except liquids and bulk, gases in bulk and those aspects of carriage covered by other chapters.

He had considered that, while chapter VI does not apply to carriage of liquid cargoes in bulk, new regulation 5-1 included in chapter VI intends to require MSDS for ships carrying MARPOL Annex I cargoes and marine fuel oils in bulk and, therefore, this anomaly needed to be resolved.

10.5 The Sub-Committee noted that MSC 85 had approved amendments to SOLAS regulations VI/1 and VI/5-1, as prepared by the Secretariat, for adoption at MSC 86, and had agreed to the associated draft MSC circular for formal approval at MSC 86 simultaneously with the adoption of the draft amendments to the aforementioned SOLAS regulations (BLG 13/2/2, paragraph 5, annexes 1 and 2).

10.6 The Sub-Committee was advised that as per the provisions of the aforementioned draft MSC circular on Guidance on the provisions for material safety data sheets when carrying oil or oil fuel, in accordance with SOLAS regulation VI/5-1, the provisions of SOLAS regulation VI/5-1 stand to indicate that notwithstanding the provisions of SOLAS regulation VI/1, ships carrying oil or oil fuel, as defined in regulation 1 of MARPOL Annex I, shall be provided with Material Safety Data Sheets, based on the recommendations developed by the Organization, prior to the loading of such oil as cargo in bulk or bunkering of oil fuel.

**Report of the drafting group**

10.7 Having considered the report of the drafting group (BLG 13/WP.7), the Sub-Committee agreed to the draft MSC resolution on Recommendations for material safety data sheets (MSDS) for MARPOL Annex I oil cargo and oil fuel, set out in annex 12, for submission to MSC 86 for adoption.

10.8 In agreeing to the above draft Recommendations, the Sub-Committee agreed that MSDS should be provided prior to the loading of MARPOL Annex I type oil as cargo in bulk and bunkering of oil fuel and that the MSDS should reflect the characteristics of the aforementioned cargo and oil fuel being loaded. The Sub-Committee also reaffirmed that testing of oils and oil fuels need not be carried out each time prior to loading as long as each MSDS reflects the properties and hazards of the product being carried, and that the physical and chemical properties in section 9 of the MSDS can be expressed in a range of values or a specific limit.

10.9 The Sub-Committee requested the Secretariat to inform the UNSCE GHS Sub-Committee accordingly.

**Deletion of the work programme item**

10.10 Having noted that work on the agenda item had been completed, the Sub-Committee invited MSC 86 to delete the item from the Sub-Committee's work programme.

## 11 REVISION OF THE IGC CODE

11.1 The Sub-Committee recalled that MSC 83 had agreed to include, in the Sub-Committee's work programme, a high-priority item on "Revision of the IGC Code", with a target completion date of 2010, in cooperation with FP, DE, SLF and STW Sub-Committees, as necessary and when requested by the BLG Sub-Committee.

11.2 The Sub-Committee further recalled that, at BLG 12, in discussing the item, it had noted the information provided by the observer from SIGTTO that the first meeting of the Steering Group on the Review of the IGC Code took place in January 2007 under the chairmanship of the United Kingdom; that SIGTTO was committed to the review of the IGC Code; and that it would keep the Sub-Committee informed of the progress made.

11.3 The Sub-Committee also recalled that BLG 12 had emphasized the ongoing development of goal-based standards at the MSC and was of the opinion that it would be appropriate to exercise caution and prudence to ensure that a goal-based approach is taken in the review of the ICG Code and not the development of goal-based standards.

11.4 Further to the above, the observer from SIGTTO advised the Sub-Committee that an industry steering group for the revision of the Code met in London, United Kingdom on Friday, 25 January 2008 under the chairmanship of the Mr. David MacRae (United Kingdom) with SIGTTO acting as secretariat, coordinator and focal point for all the groups. This first steering group consisted of 12 senior industry representatives from around the world. It was agreed that 10 working groups should be set up, to examine different sections of the Code and revise them as necessary. This also included a group to advise on "goal-based" matters. Subsequently, the steering group has been expanded to 15 members such that each of the working group chairmen is represented on the steering group. He amplified that the working groups consist of experts from classification societies, liquefied gas ship operators, shipyards specializing in constructing these ships, and other relevant bodies, each reporting back to the steering group. 129 experts from 48 different organizations and 18 countries being actively involved in this work, he took this opportunity to thank them for their dedication and enthusiasm. The first working group meeting was held in March 2008 and, to date, there have been a further 22 meetings held in 14 countries; work is progressing well. Care is being taken to document the reasons for changes made to the text for the benefit of future users and reviewers. The working group chairmen have been inviting observers from national administrations to attend the meetings. To date Hong Kong, China, and the Marshall Islands have accepted these invitations and participated in the meetings and he hoped that more will do so in the future. The intention is to produce, for the next session of the Sub-Committee, a draft text of the revised IGC Code for review by the Sub-Committee.

11.5 Having thanked the observer from SIGTTO for the update provided, the Sub-Committee invited SIGTTO to keep the Sub-Committee informed of the progress made between now and the next session of the Sub-Committee.

11.6 The delegation of the Republic of Korea (BLG 13/11) emphasized that as per the requirement of paragraph 13.6.8 of the IGC Code, the gas detection system applied to a gas compressor room should be capable of sampling and analysing from each sampling head location sequentially at intervals not exceeding 30 minutes, which was developed on the assumption that a conventional steam turbine propulsion system is adopted as a prime mover in LNG carriers with low pressure boil-off gas with a pressure of 2 bar. However, the new systems, dual-fuel diesel engine electric engine electric propulsion and dual-fuel gas turbine electric propulsion, utilize high pressure boil-off gas with pressures of approximately 6 and 40 bar respectively. As such, a gas detection system in a cargo compressor room of LNG carriers, using high pressure boil-off gas as fuel, should be a common feature.

11.7 The Sub-Committee agreed that the above proposal of the Republic of Korea had merit and invited SIGTTO to take the proposal into consideration when reviewing the IGC Code.

## 12 SAFETY REQUIREMENTS FOR NATURAL GAS HYDRATE PELLET CARRIERS

12.1 The Sub-Committee recalled that MSC 83 had agreed to include, in the Sub-Committee's work programme, a high-priority item on "Safety requirements for natural gas hydrate pellet carriers", with three sessions needed to complete the item, and instructed the Sub-Committee to include the item in the provisional agenda for BLG 13.

**Establishment of a correspondence group**

12.2 The Sub-Committee, having considered the proposals by Japan in:

.1 document BLG 13/12 which provided preliminary draft guidelines for the construction and equipment of ships carrying natural gas hydrate pellets in bulk for further consideration by the Sub-Committee and proposed the establishment of a correspondence group;

.2 document BLG 13/12/1 which provided conceptual design of natural gas hydrate pellet carriers to facilitate the consideration of the draft "guidelines for the construction and equipment of ships carrying natural gas hydrate pellets in bulk";

.3 document BLG 13/12/2 which proposed a modification of the preliminary draft guidelines for the construction and equipment of ships carrying natural gas hydrate pellets in bulk as set out in the annex to document BLG 13/12; and

.4 document BLG 13/INF.2 which informed the Sub-Committee that, on 27 and 28 August 2008, a meeting on hazard identification (HAZID) for natural gas hydrate pellet carriers was held at the Headquarters of Nippon Kaiji Kyokai for the purpose of the improvement of the conceptual design of NGHP carriers and the development of draft guidelines for the construction and equipment of ships carrying natural gas hydrate pellets in bulk (BLG 13/12),

agreed to establish a Correspondence Group on Safety requirements for natural gas hydrate pellet (NHGP) carriers, under the coordination of Japan*, and instructed it, taking into account the comments made and decisions taken in plenary, to:

.1 evaluate the information available on the design of NGHP carriers;

.2 identify the hazards involved in the carriage of NGHPs;

.3 provide and clarify necessary safety requirements for NGHP carriers;

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.4 develop guidelines for the construction and equipment of ships carrying natural gas hydrate pellets in bulk; and

.5 submit a written report to BLG 14.

## 13 REVIEW OF RELEVANT NON-MANDATORY INSTRUMENTS AS A CONSEQUENCE OF THE AMENDED MARPOL ANNEX VI AND THE $NO_x$ TECHNICAL CODE

13.1 The Sub-Committee noted that MARPOL Annex VI, regulations for the Prevention of Air Pollution from Ships, as at 31 December 2008, had 54 Parties, representing approximately 82.65% of the gross tonnage of the world's merchant shipping fleet.

13.2 The Sub-Committee recalled that MEPC 58, in October 2008, had unanimously adopted the revised MARPOL Annex VI, by resolution MEPC.176(58), and the $NO_x$ Technical Code 2008, by resolution MEPC.177(58). MEPC 58 agreed to set the expected entry-into-force date for the two revised instruments as 1 July 2010, to allow sufficient time to undertake the update of affected guidelines and to develop new guidelines to facilitate smooth implementation.

13.3 The Sub-Committee also recalled that MEPC 58 approved Terms of Reference (ToR) for the Sub-Committee to update and develop guidelines and to consider the need for further guidance on several issues relating to the implementation of the revised MARPOL Annex VI and the $NO_x$ Technical Code 2008.

13.4 Following a proposal by the Chairman, the Sub-Committee agreed that the detailed technical documents under this agenda item should not be introduced or discussed in plenary but should be forwarded directly to the working group on Review of MARPOL Annex VI and the $NO_x$ Technical Code, as no documents required decisions to be taken by the Sub-Committee.

13.5 Following a brief debate, the Sub-Committee agreed to instruct the working group to consider the different non-mandatory instruments and other elements needed for smooth implementation in accordance with relevant entry-into-force dates and the associated lead time required.

### Establishment of the working group

13.6 The Sub-Committee established the working group on the Review of MARPOL Annex VI and the $NO_x$ Technical Code, under the chairmanship of Mr. Wayne Lundy (United States) and instructed it, taking into consideration submissions and comments made in plenary, to:

.1 develop draft amendments to the existing guidelines for the implementation of MARPOL Annex VI (resolutions MEPC.82(43), MEPC.96(47), MEPC.128(53) and MEPC.129(53));

.2 develop the following new draft guidelines:

.2.1 Guidelines for replacement engines not required to meet the Tier III limit, as required under regulation 13.2.2;

.2.2 Guidelines on the provision of reception facilities, as required by regulation 17.2;

.2.3 Any relevant guidelines pertaining to the equivalents set forth in regulation 4 and not covered by other guidelines such as the Guidelines for Exhaust Gas Cleaning System (MEPC.170(57));

.2.4 Guidelines for the development of a VOC management plan, as required by regulation 15.6; and

.2.5 Guidelines called for under paragraph 2.2.5.6 of the revised $NO_x$ Technical Code 2008,

prioritized in accordance with relevant entry-into-force dates and necessary lead time; and

.3 consider, if time permits, what guidance, if any, should be developed on issues listed in paragraph 3 of annex 1 to document BLG 13/3.

**Report of the working group**

13.7 Having considered the report of the working group (BLG 13/WP.3), the Sub-Committee approved the report in general, and in particular:

.1 noted that the working group had identified and prioritized the guidelines and guidance to be considered and developed urgently, taking into account the entry-into-force dates of the relevant MARPOL Revised Annex VI regulations;

.2 approved the finalized text to amend the survey guidelines under the Harmonized System of Survey and Certification for MARPOL Annex VI and agreed to refer these to FSI 17 for review to be submitted to MEPC 59, with a view to adoption (annex 13);

.3 approved the finalized text to amend the Guidelines for port State control under MARPOL Annex VI (resolution MEPC.129(53)), and to refer the amended guidelines to FSI 17 for review to be submitted to MEPC 59, with a view to adoption (annex 14);

.4 noted the discussion by the working group regarding detainable deficiencies under section 2.3 of the draft revised guidelines and concurred that the development of guidance for sampling was needed;

.5 noted the deliberations of the working group on the development of guidance on reception facilities in connection with MARPOL Annex VI and draft framework and, recognizing that there were a number of questions to be clarified, invited submissions on this issue for further discussion at BLG 14 (annex 15);

.6 approved the text of the draft Guidelines for the development of a VOC management plan, as required by regulation 15.6, and referred the draft guidelines to MEPC 59 for adoption (annex 16);

.7 having noted that the working group had recognized that Part A of document BLG 13/13/3 regarding a model for a VOC Management Plan contained useful information, but had determined that it was not suitable for

inclusion in this guideline, requested the Secretariat to prepare the information as an MEPC circular and to submit it for approval to MEPC 59;

.8 agreed to the draft MEPC circulars addressing the appropriate usage of the $NO_x$ Technical Code for the certification of Tier I engines and related definitions concerning the use of the Cost/Effectiveness Formula and referred these to MEPC 59 for approval (annexes 17 and 18);

.9 agreed to the draft revised Guidelines for monitoring the worldwide average of sulphur for adoption at MEPC 59 and having noted the questions raised as to whether the monitoring of the worldwide sulphur average was needed and, if so, whether it should be expanded and, recognizing that this was beyond the terms of reference of the Sub-Committee, referred the matter to MEPC 59 for further consideration (annex 19);

.10 agreed to the draft revised Guidelines for the sampling of fuel oil for determination of compliance with MARPOL Annex VI (annex 20);

.11 having noted:

.1 the discussions of the group and the relevant draft amendments to the Guidelines for exhaust gas cleaning systems for the implementation of MARPOL Annex VI (resolution MEPC.170(57)), set out at annex 21;

.2 the remaining work to be carried out, some of which was outside the remit of the Sub-Committee; and

.3 that the results of the review of the GESAMP Working Group on washwater discharge criteria were still pending and, consequently, that the work could not be completed without these,

urged the GESAMP Working Group to submit the results of its review as a matter of priority and referred the matter to MEPC 59 for further consideration; and

.12 noted the deliberations of the working group on the relevant guidelines pertaining to the equivalents set forth in regulation 4 and not covered by other guidelines and encouraged delegations to submit proposals on this matter to BLG 14.

**Informal meeting of the Working Group**

13.8 Further to the above decisions, the Chairman of the working group reported orally that the group had met informally on Thursday, with a view to continuing work on those tasks assigned by MEPC 58 but that could not be completed or reported on at this session. During the informal meeting, the group focused on the development of guidelines for after-treatment devices, specifically catalytic reduction units, based on submissions by Japan (BLG 13/13/1), the United States (BLG 13/13/6 and BLG 13/13/9) and EUROMOT (BLG 13/13/5).

13.9 The group discussed issues associated with testing and certification, urea quality and experience with the use of SCRs. The group concluded its work by developing and agreeing upon a framework for the guidelines to be used for their further development. The group further

agreed that the guidelines should be universal in application, regardless of emission tier applications. The Chairman of the working group was requested to submit a report of this meeting, along with the draft framework, to BLG 14.

## 14 AMENDMENTS TO MARPOL ANNEX I ON THE USE AND CARRIAGE OF HEAVY GRADE OIL ON SHIPS IN THE ANTARCTIC AREA

14.1 The Sub-Committee had before it documents BLG 13/14 (New Zealand) and BLG 13/14/1 (Norway) addressing this new item in its work programme and agenda for this session that had been added by MEPC 58.

14.2 The Sub-Committee recalled that this issue had been considered at BLG 11 where the Sub-Committee recognized that it could not solve the many issues associated with the proposal in the short time available for discussion given that, despite majority support shown, there remained important issues that raised serious concerns for several delegations and industry observers. BLG 11 agreed to inform the MEPC accordingly, seeking its guidance as to how to pursue this matter further.

14.3 The Sub-Committee recalled also that MEPC 56 had agreed to return the issue to the Sub-Committee tasking it with examining all available options and make recommendations to MEPC 57, highlighting that each option should be thoroughly examined and that protection location of tanks above double bottom be given careful consideration.

14.4 The Sub-Committee recalled further that BLG 12, having considered the matter in depth, agreed to advise the MEPC that, while there was overwhelming support, in principle, for a ban on the use and carriage of HGO on ships in the Antarctic area, further detailed discussion was necessary before any amendments are made to MARPOL Annex I. In consequence, the Sub-Committee agreed to invite the MEPC to include a new high priority item on its work programme and agenda for BLG 13 on Amendments to MARPOL Annex I on the use and carriage of HGO on ships in the Antarctic area.

14.5 The Sub-Committee recalled, finally, that, following MSC 84's concurrent decision, MEPC 58 approved the proposed revised work programme of the Sub-Committee and the provisional agenda for BLG 13, which included a new high-priority item on the work programme and agenda for BLG 13, on Amendments to MARPOL Annex I on the use and carriage of heavy grade oil (HGO) on ships in the Antarctic area. In addition, MEPC 58 agreed that the Sub-Committee should be requested to develop draft amendments for review at MEPC 59.

14.6 In considering document BLG 13/14 (New Zealand), the Sub-Committee noted the proposal to add a new chapter 8 to MARPOL Annex I, on *Carriage in bulk and use as fuel of oils in the Antarctic area* featuring new regulation 40 on *Special requirements for the carriage and use of oils in the Antarctic area* as this would be, in the view of New Zealand, the best way to implement the proposed ban on the use and carriage of such oils.

14.7 The Sub-Committee noted the different approach put forward by Norway in document BLG 13/14/1 whereby amendments were proposed to existing regulation 15 of MARPOL Annex I on *Control of discharge of oil* which already features a ban on the discharge into the sea of oil or oily mixtures in the Antarctic area. The proposed amendments would add language banning any use and carriage of heavy grade oil in the area as well.

14.8 The Sub-Committee noted also that both proposals featured identical descriptions for heavy grade oil and that adequate wording had been included to grant an exemption for search and rescue ships.

**Discussion**

14.9 After some debate, the Sub-Committee agreed to further consider this issue based upon the proposal by New Zealand (BLG 13/14) and, following discussion, agreed that the expression "special areas" in the title of the proposed new chapter 8 should be replaced with "Antarctic area" thus reflecting the limited geographical scope of the draft amendments. It was also decided that the proposed ban should not apply to lubricating oils or ships engaged in emergency and search and rescue missions and should not be extended to Arctic waters.

14.10 The delegation of the Bahamas provided information relating to the recent grounding of the Bahamian registered vessel **Ocean Nova** on 18 February 2009 in Antarctica with 76 passengers and 30 crew on board. With the active co-operation of both the Argentine and Chilean authorities, the Spanish naval vessel **Hespérides** was able to assist and, with the help of a second Bahamian cruise ship, the **Clipper Adventure**, the **Ocean Nova** was successfully refloated.

14.11 The delegation of the Bahamas expressed its sincere thanks to all those involved in the incident, especially to the divers of the **Hespérides** who, in freezing waters, checked the stranded ship's hull and found no significant damage. No injuries were sustained and there was no pollution.

**Establishment of a group of experts**

14.12 The Sub-Committee agreed to establish a small group of experts to meet outside normal working hours, under the coordination of New Zealand, with the task of finalizing the proposed amendments.

14.13 Having received the report of the group (BLG 13/WP.9), the Sub-Committee noted that the group had been unable to find consensus on a proposed exemption for those fuel tanks protected by a double hull or equivalent under the provisions of regulation 12A of MARPOL Annex I. In that respect, relevant wording in paragraph 1 of draft regulation 43 had been put in square brackets for the Sub-Committee to decide upon.

14.14 Having discussed the issue in depth, the Sub-Committee did not agree to the proposed exemption and decided to delete the square brackets and its content.

14.15 The Sub-Committee agreed to the draft amendments to MARPOL Annex I on Special requirements for the use or carriage of oils in the Antarctic area, set out in annex 22, for submission to MEPC 59 for approval with a view to adoption.

**Deletion of the work programme item**

14.16 Since the work on the item had been completed, the Sub-Committee agreed to invite the MEPC to delete it from its work programme.

## 15 WORK PROGRAMME AND AGENDA FOR BLG 14

15.1 Taking into account the progress made during the session and the provisions of the agenda management procedure, the Sub-Committee reviewed its work programme and the draft agenda for the next session (BLG 13/WP.2) and prepared a draft revised work programme and draft provisional agenda for BLG 14. While doing so, the Sub-Committee agreed to invite the MSC and the MEPC, as appropriate, to:

.1 delete the following work programme items, as work on them has been completed:

.1.1 item H.6 – Review of the Recommendation for material safety data sheets for MARPOL Annex I cargoes and marine fuel oils; and

.1.2 item H.10 – Amendments to MARPOL Annex I on the use and carriage of heavy grade oil on ships in the Antarctic area;

.2 extend the target completion date of the following work programme items:

.2.1 item H.2 – Development of provisions for gas-fuelled ships, to 2012; and

.2.2 item H.4 – Application of the requirements for the carriage of bio-fuels and bio-fuel blends, to 2010;

.3 renumber the work programme items accordingly,

and to approve the draft revised work programme and the draft provisional agenda for BLG 14, as set out in annex 23.

### High-level Action Plan of the Organization and priorities for the 2008-2009 biennium

15.2 The Sub-Committee agreed to the status of the planned outputs of the High-level Action Plan of the Organization and priorities for the 2008-2009 biennium relating to the Sub-Committee's work, set out in annex 24 for submission to MSC 86 and MEPC 59 for consideration and endorsement.

15.3 With regard to the Strategic Plan for the Organization (for the six-year period 2008-2013) and updated High-level Action Plan of the Organization and priorities for the 2008-2009 biennium, the Sub-Committee noted the information provided by the Secretariat regarding recommendations for necessary action, endorsed by the Council, in particular that:

.1 all IMO organs should, sufficiently early in their agendas for each session, set aside adequate time for the systematic consideration of the high-level actions and their associated priorities, and their connection to the strategic directions;

.2 when considering their work programmes and provisional agendas for their next sessions, all IMO organs should, under each item, cross-reference the related strategic directions and high-level actions; and

.3 Sub-Committees should, in reporting to the Committees on their work programmes, report on the status of their planned outputs.

15.4 The Sub-Committee also noted that MSC 84 had agreed to the following procedure for reporting on the status of the planned outputs:

.1 the Sub-Committees, at each respective session, should prepare and annex to their respective reports a report on the status of their planned outputs in the High-level Action Plan for the respective biennium in the format proposed in the annex to document STW 39/WP.1, for the Committee's consideration and endorsement; and

.2 regarding the terminologies to be used to describe the status of the planned outputs, the term "ongoing" should not be used and actual progress of work must be reflected and, in addition, the status of work on the long-term work programmes should also be provided.

15.5 The Sub-Committee noted that the Committee had agreed that, if the Strategic Plan and the table of planned output are to be used to manage the work programme of the Committees and sub-committees, then proper guidelines should be developed and the Committees' Guidelines should be reviewed accordingly. In this context of the above, the Sub-Committee further noted that the Committee had agreed that the agenda management procedure specified in paragraphs 3.13 to 3.25 of the Committees' Guidelines should be applied so that the agendas of all the Sub-Committees are manageable.

**Arrangements for the next session**

15.6 The Sub-Committee agreed to establish at its next session working/drafting groups on any of the following subjects:

.1 evaluation of safety and pollution hazards of chemicals and preparation of consequential amendments;

.2 development of provisions for gas-fuelled ships;

.3 development of guidelines and other documents for uniform implementation of the 2004 BWM Convention and international measures for minimizing the transfer of aquatic species through bio-fouling of ships;

.4 review of relevant non-mandatory instruments as a consequence of the amended MARPOL Annex VI and the $NO_x$ Technical Code; and

.5 safety requirements for natural gas hydrate pellet carriers,

and further agreed that information on the arrangements for BLG 14, concerning the allocation of working and drafting groups, would be issued by the Chairman after MSC 86 and MEPC 59.

15.7 The Sub-Committee established correspondence groups on the following subjects due to report to BLG 14:

.1 development of provisions for gas-fuelled ships;

.2 safety requirements for natural gas hydrate pellet carriers;

.3 development of guidelines and other documents for uniform implementation of the 2004 BWM Convention; and

.4 development of international measures for minimizing the transfer of invasive aquatic species through bio-fouling of ships.

15.8 The delegation of the Bahamas, supported by the delegation of Cyprus, highlighted the need to maintain compliance with the Committees' Guidelines on the number of correspondence groups.

**Intersessional meetings**

15.9 The Sub-Committee, having recalled its respective decision under agenda item 3 (see paragraph 3.6.8), invited MSC 86 and MEPC 59 to approve the holding of the intersessional meeting of the ESPH Working Group in 2010.

**Date of the next session**

15.10 The Sub-Committee noted that its fourteenth session had been tentatively scheduled to take place from 8 to 12 February 2010.

## 16 ELECTION OF CHAIRMAN AND VICE-CHAIRMAN FOR 2010

16.1 The Sub-Committee, in accordance with the Rules of Procedure of the Maritime Safety Committee and the Marine Environment Protection Committee, unanimously elected Mr. S. Oftedal (Norway) as Chairman, and Mr. R. Zhang (China) as Vice-Chairman, both for 2010.

16.2 Regarding the procedure of elections of officers, upon the request of the delegation of Hong Kong, China, the Director, Maritime Safety Division clarified that an Associate Member has the right to express its views and opinions under Article 9 of the IMO Convention, as far as the procedure does not involve voting in the secret ballot.

**Expression of appreciation**

16.3 The Sub-Committee expressed its gratitude to the outgoing Chairman, Mr. Z. Alam (Singapore) for his long, outstanding and exemplary service, and wished him every success in his future endeavours.

## 17 ANY OTHER BUSINESS

**Codes, recommendations, guidelines and other non-mandatory instruments**

17.1 The Sub-Committee, having referred to the annex to document BLG 13/7, which provided a list of codes, recommendations, guidelines and other safety- and security-related non-mandatory instruments which MSC 83 had requested the Sub-Committee to review, with a view to identifying those instruments on which information on implementation should be collected, also providing an input on potential users and requirements of the data scheme to be established, invited interested delegations and observers to provide comments for consideration at BLG 14.

**Revised Code on Alarms and Indicators**

17.2 The Sub-Committee recalled that it had been requested by DE 50, taking into account the outcome of DE 51, to consider the draft revised Code set out in document DE 50/10/2/Rev.1 (BLG 13/17/1) and provide comments as appropriate to DE 52, and, noting that no comments had been submitted to the session, agreed to invite interested delegations and observers to provide comments, relevant to the work of the BLG Sub-Committee, directly to DE 52, scheduled to take place from 16 to 20 March 2009.

**Device to prevent passage of flame into cargo tanks**

17.3 The Sub-Committee recalled that MSC 83 had discussed the interpretation reached by FP 51 and the different interpretation concluded by BLG 11, concerning the application of MSC/Circ.677, as amended by MSC/Circ.1009, to devices fitted on board chemical carriers which are dedicated to the carriage of products with a MESG less than 0.9 mm.

17.4 The Sub-Committee further recalled that MSC 83, in view of the different interpretation, had agreed that a clarification on the issue was needed and referred the matter to BLG 12 for further consideration, with a view to amending circular MSC/Circ.677, after taking into account the conclusions of FP 51.

17.5 The Sub-Committee had for consideration the submissions by:

.1 IACS (BLG 13/17/2) which proposed a revision of the standards contained in MSC/Circ.677, as amended by MSC/Circ.1009, with respect to the Maximum Experimental Safe Gap (MESG) for the medium used to test devices to prevent passage of flame ("devices") into cargo tanks and further actions that are considered necessary in the event the Sub-Committee agreed on the need to ensure that the Maximum Experimental Safe Gap (MESG) value for the medium to be used to test the device does not exceed the MESG value of the product carried in the tank fitted with such device. Following on from the aforementioned, IACS also invited the Sub-Committee to consider the interim scope of certification, and the issues related to the scope of application of any new requirements that may be developed.

.2 IPTA (BLG 13/17/3) which pointed out that information on low flashpoint cargoes was missing in the IBC Code and proposed that the Sub-Committee, in considering the proposal by IACS (BLG 13/17/2), take into consideration the following:

.1 the fact that most tanks are likely to carry a far higher number of cargoes with an MESG of over 0.9 mm than those with an MESG of less than 0.9 mm;

.2 dangers presented by blockage of devices to prevent the passage of flame when used in conjunction with products which would solidify or polymerize;

.3 potential for a widespread necessity for retrofit, and whether this would be justified, given the relatively small number of cargoes that would be involved; and

.4 practical problems associated with implementing such changes, not least the difficulty of obtaining the necessary information; and

.3 Denmark (BLG 13/17/4) which agreed with the proposal made by IACS in relation to the proposed amendments to MSC/Circ.677 and the IBC Code and, furthermore, finds that there is a compelling need to check, and where necessary, retrofit existing chemical carriers with devices as per the criteria proposed by IACS.

17.6 In the course of the ensuing discussion, the observer from IAPH highlighted that devices to prevent the passage of flames into cargo tanks are divided into two main groups which, for ease of understanding, may be referred to as the dynamic versus the static group. In the dynamic type, an exit velocity in excess of the flame propagation speed is maintained at the device, thus preventing any flame from entering a tank. As a group they are referred to as the high velocity vent valves. The static type makes use of the flame-quenching properties of some material, in most cases a crimped metal ribbon, and is known as a flame arrester. Depending on where the devices are to be fitted in the cargo tank venting system, various scenarios have been defined in which the devices are exposed to tests, including flash-back testing and, where appropriate, additional endurance burning testing. Generally speaking, in chemical tankers, the over-pressure relief is performed through high-velocity vent valves that are flash-back and endurance burning tested, with under-pressure being adjusted through vacuum valves whose inlets are protected by flame screens that are flash-back tested. In this way, it was ensured from inception of the standards that the devices would not be prone to the phenomenon of blocking, etc. High-velocity vent valves, by their very design, rely on high-speed movement of air and gasses that will prevent any build-up of material, and flame arresters at vacuum side inlets are exposed to flows of air only.

In view of the above, he emphasized that it would be unusual to suggest that, at the time of drafting the original text, the FP Sub-Committee would willingly and knowingly have agreed upon a text in which certain chemical tankers, particularly those carrying products with an MESG lower than 0.9 mm, would have been allowed to operate at a lower level of safety where, on the contrary, a higher level would be justified.

17.7 The Sub-Committee, having thanked the observer from IAPH for a detailed comment on the item, invited interested parties to meet outside plenary hours to consider issues surrounding the maximum experimental safe gap for medium used to test devices to prevent passage of flame into cargo tanks and to prepare amendments to the standards contained in MSC/Circ.677.

17.8 Having considered the report of the group of interested parties (BLG 13/WP.8), the Sub-Committee took decisions as detailed in the following paragraphs.

17.9 The Sub-Committee agreed to:

.1 the draft MSC circular on Amendments to the Revised Standards for the design, testing and locating of devices to prevent the passage of flame into cargo tanks in tankers (MSC/Circ.677, as amended by MSC/Circ.1009), set out in annex 25, for submission to MSC 86 for approval; and

.2 the draft MSC circular on Missing information on apparatus groups in column i″ of chapter 17 of the IBC Code, set out in annex 26, for submission to MSC 86 for approval.

17.10 Having noted the concern expressed by the delegation of France that the application of the provisions of the draft MSC circular, stated in paragraph 17.9.1 above, is recommendatory in nature and that steps need to be taken for corresponding amendments to the IBC Code so that, in due course, the provisions would become mandatory, the Sub-Committee confirmed that appropriate amendments along with other proposals, if any, will be considered by the Sub-Committee for the next set of amendments to IBC Code envisaged to enter into force from 1 January 2013.

17.11 Having recalled an earlier concern that had been reaffirmed by BLG 11 of the dangers presented by blockage of devices to prevent the passage of flame when used in conjunction with products which would solidify or polymerize, the Sub-Committee was of the view that relevant discussions had put those concerns to rest.

**Amendments to the IBC Code**

17.12 Regarding proposed amendments to the IBC Code, set out in paragraph 9 of document BLG 13/17/2, the Sub-Committee agreed to them, in principle, and decided to reconsider them in detail, when considering a consolidated set of amendments to the Code.

**Revision of the Recommendations for entering enclosed spaces aboard ships**

17.13 The Sub-Committee noted that MSC 85 had agreed to include in the work programme of the Sub-Committee, a high-priority item on "Revision of the Recommendations for entering enclosed spaces aboard ships", with the target completion date of 2010. The MSC had assigned the DSC Sub-Committee as coordinator and instructed BLG 13 to give a preliminary consideration to the matter and to include the item in the provisional agenda for BLG 14.

17.14 Having noted that the above Recommendations had been adopted by means of resolution A.864(20), the Sub-Committee invited delegations and observers to consider the provisions of the aforementioned Recommendations falling under the purview of this Sub-Committee and to submit associated proposals for consideration at BLG 14.

**Drainage of shore lines**

17.15 The Sub-Committee, having recalled the proposal of INTERTANKO (BLG 12/16/3), concerning the drainage of shore lines, which was considered at BLG 12 (BLG 12/17, paragraph 3.7), noted the intention of INTERTANKO to submit a proposal, containing additional information, for consideration at BLG 14.

**Expressions of appreciation**

17.16 The Sub-Committee expressed appreciation to the following delegates who had recently relinquished their duties, retired or were transferred to other duties or were about to, for their invaluable contribution to its work and wished them a long and happy retirement or, as the case might be, every success in their new duties:

.1 Mr. E. Liberopoulos (Greece), on his return home; and
.2 Mr. R. Raksnis (United States), on retirement.

## 18 REPORT TO THE COMMITTEES

18.1 The Maritime Safety Committee, at its eighty-sixth session, is invited to:

.1 consider the Sub-Committee's recommendation to issue an MSC-MEPC circular concerning prohibition of blending operation on board at sea and take action as appropriate (paragraph 4.15);

.2 adopt the draft MSC resolution on Interim Guidelines on safety for natural gas-fuelled engine installations in ships (paragraph 6.14 and annex 9);

.3 note the Sub-Committee's action with regard to the footnote to SOLAS regulation II-I/26 (paragraph 6.16);

.4 approve draft MSC circular on Unified interpretation of the IBC Code (paragraph 8.1 and annex 11);

.5 adopt the draft MSC resolution on Recommendations for material safety data sheets (MSDS) for MARPOL Annex I oil cargo and oil fuel (paragraph 10.7 and annex 12);

.6 approve, subject to the concurrent decision of MEPC 59, the holding of an intersessional meeting of the ESPH Working Group in 2010 (paragraph 15.8);

.7 approve the draft MSC circular on Amendments to the Revised Standards for the design, testing and locating of devices to prevent the passage of flame into cargo tanks in tankers (MSC/Circ.677) (paragraph 17.9.1 and annex 25);

.8 approve the draft MSC circular on Missing information on apparatus groups in column i" of chapter 17 of the IBC Code (paragraph 17.9.2 and annex 26); and

.9 approve the report in general.

18.2 The Marine Environment Protection Committee, at its fifty-ninth session, is invited to:

.1 note the Sub-Committee's agreement that if anomalies are raised by Administrations with regard to the assigned carriage requirements and the GESAMP Hazard Profile, then a document to ESPH Working Group should be submitted in line with normal procedures (paragraph 3.6.1);

.2 further note the Sub-Committee's agreement that, whenever changes are made by GESAMP/EHS (as a consequence of new data becoming available or product families being reassessed), the carriage requirements could be reviewed by the ESPH Working Group at meetings where the GESAMP/EHS report is considered (paragraph 3.6.2);

.3 approve the future work programme for the intersessional meeting of the ESPH Working Group in October 2009 (paragraph 3.6.7 and annex 3);

.4 approve, subject to MSC 86's concurrent decision, the holding of an intersessional meeting of the ESPH Working Group in 2010 (paragraph 3.6.8);

.5 consider the Sub-Committee's recommendation to issue an MSC-MEPC circular concerning prohibition of blending operation on board at sea (paragraph 4.15);

.6 agree to extend the interim guidelines for the carriage of bio-fuel blends for a further 24 months from the date of expiry to permit the continued carriage of bio-fuel blends on Annex I ships (paragraph 4.19.1);

.7 agree that in view of the concerns noted in relation to ODME functionality, when carrying bio-fuel blends as Annex I cargoes under the extended interim guidelines then any residues and tank washings should be pumped ashore unless the ODME is approved/certified for the blend (paragraph 4.19.2);

.8 note the developments in relation to the three band options for shipping bio-fuel blends and the need for further discussion in order to finalize the proposals (paragraph 4.19.3);

.9 endorse the view of the Sub-Committee that GESAMP/EHS should be requested to generate appropriate hazard profiles for petroleum fuels leading to List 5 entries in the MEPC.2/Circular (Substances not shipped in pure form but as components in mixtures) and that the Secretariat should initiate this accordingly (paragraph 4.19.4);

.10 agree that operational aspects of blending on board should not be addressed by the ESPH Working Group but guidance should be developed in respect of the following items (paragraph 4.19.5):

.1 documentation and administration, shipping document(s), Procedure and Arrangements Manual, Oil Record Book and Cargo Record Book;

.2 name of the final product at unloading;

.3 classification of the final product (pollution category, ship type and carriage requirements); and

.4 possible wash requirements and residue discharge after unloading, if carried under Annex I requirements;

.11 endorse the Sub-Committee's decision to merge the Guidance document on how chemicals used to treat ballast water should be handled and stored on board and the Guidance document on safety procedures for ship and crew against risks associated with the ballast water management systems that make use of Active Substances in one guidance document (paragraph 5.23);

.12 approve the consolidated Guidance to ensure safe handling and storage of chemicals used to treat ballast water and the development of safety procedures for risks to the ship and crew resulting from the treatment process, and to agree with its dissemination as a technical circular (paragraph 5.33.2 and annex 5);

.13 note that Members and observers were urged to submit their future contributions to the development of an IMO circular to provide ballast water sampling and analysis protocols taking into consideration the *aide-memoire* prepared by the Sub-Committee to BLG 14 (paragraph 5.33.3 and annex 6);

.14 approve the dissemination of an engineering questionnaire developed by Brazil through a BWM technical circular (paragraph 5.33.4 and annex 7);

.15 endorse the Action Plan for uniform implementation of the BWM Convention and Sub-Committee's arrangements for Correspondence and Working Groups (paragraph 5.33.5 and annex 8);

.16 note that the Sub-Committee approved the finalized text to amend the Survey guidelines under the Harmonized System of Survey and Certification for the revised MARPOL Annex VI and agreed to refer these to FSI 17 for review to be submitted to MEPC 59 with a view to adoption (paragraph 13.7.2 and annex 13);

.17 note that the Sub-Committee approved the finalized text to amend the guidelines for port State control under MARPOL Annex VI (resolution MEPC.129(53)), referred the amended guidelines to FSI 17 for review to be submitted to MEPC 59, with a view to adoption (paragraph 13.7.3 and annex 14);

.18 consider, with a view to adoption by an MEPC resolution, the draft Guidelines for the development of a VOC management plan, (paragraph 13.7.6 and annex 16);

.19 note the request to the Secretariat to prepare a draft MEPC circular, on the basis of document BLG 13/3/3 (Norway and INTERTANKO), for submission to MEPC 59 for approval (paragraph 13.7.7);

.20 approve the draft MEPC circulars addressing the appropriate usage of the $NO_x$ Technical Code for the certification of Tier I engines and definitions concerning the use of the Cost/Effectiveness Formula (paragraph 13.7.8 and annexes 17 and 18);

.21 consider, with a view to adoption by an MEPC resolution, the draft revised guidelines for monitoring the worldwide average of sulphur; and further consider whether the monitoring of the worldwide sulphur average is needed and, if so, whether it should be expanded – taking into account the Sub-Committee's view that this is beyond its terms of reference – and decide as appropriate (paragraph 13.7.9 and annex 19);

.22 consider, with a view to adoption by an MEPC resolution, the draft revised Guidelines for the sampling of fuel oil for determination of compliance with MARPOL Annex VI (paragraph 13.7.10 and annex 20);

.23 note that the Sub-Committee, having noted:

.1 the discussions of the Working Group and the relevant draft amendments to the Guidelines for exhaust gas cleaning systems for the implementation of MARPOL Annex VI (resolution MEPC.170(57));

.2 the remaining work to be carried out, some of which was outside the remit of the Sub-Committee; and

.3 that the results of the review of the GESAMP Working Group on washwater discharge criteria were still pending and, consequently, that the work could not be completed without these,

urged the GESAMP Working Group to submit the results of its review as a matter of priority and referred the matter to MEPC 59 for further consideration (paragraph 13.7.11 and annex 21);

.24 consider draft amendments to MARPOL Annex I on Special requirements for the use or carriage of oils in the Antarctic area with a view to subsequent adoption (paragraph 14.15 and annex 22);

.25 approve, subject to MSC 86's concurrent decision, the proposed revised work programme of the Sub-Committee and provisional agenda for BLG 14 (paragraph 15.1 and annex 23);

.26 note the status of the planned output of the High-level Action Plan of the Organization and priorities for 2008-2009 biennium relating to the Sub-Committee's work (paragraph 15.2 and annex 24); and

.27 approve the report in general.

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# ANNEX 1

## CLEANING ADDITIVES OMITTED FROM MEPC.2/CIRC.14 (EVALUATED DURING BLG 12)

| Name of cleaning additive | Name of manufacturer | Reporting country | Evaluated in accordance with MEPC.1/Circ.590 |
|---|---|---|---|
| CR AQUA CLEANER M | CRAMOIL SINGAPORE PTE LTD | SGP | X |
| CR DEGEASER B | | | X |
| CR DEGREASER B PLUS | | | X |
| CR DEGREASER C | | | X |
| CR DEGREASER D | | | X |
| CR DEGREASER E | | | X |
| CR DEGREASER HCF | | | X |
| CR DEGREASER LAC | | | X |
| CR DEGREASER X | | | X |
| CR ENVIROCLEAN | | | X |
| CR LEADCLEAN | | | X |
| CR SPARKLECLEAN 8.4 | | | X |
| CR ZINC SAFE NEUTRAL HCF | | | X |
| MARCLEAN H60 | A/S EIVIND BROSSTAD | NOR | X |
| B.T.S. HCF Water Based | Blutec srl | ITA | X |
| Alkaclean S. | | | X |
| Cleanbreak | | | X |
| Genepol | | | X |
| Cold Wash C. | | | X |
| NAVACLEAN 803 – ALKATUFF PHS | NAVADAN APS | DNK | X |
| NAVACLEAN 809 – TEEPOL PLUS | | | X |
| NAVACLEAN 848 – NEUTRAL CLEANING CONCENTRATE | | | X |
| NAVACLEAN 873 – RUST & STAIN REMOVER | | | X |

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# ANNEX 2

## CLEANING ADDITIVES EVALUATED AND FOUND TO MEET THE REQUIREMENTS OF REGULATION 13.5.2 OF MARPOL ANNEX II

| Name of cleaning additive | Name of manufacturer | Reporting country | Evaluated in accordance with MEPC.1/Circ.590 |
|---|---|---|---|
| NAVACLOR 812 | NAVADAN APS | DNK | X |
| NAVACLEAN 814 – DYESTUFF REMOVER | NAVADAN APS | DNK | X |
| NAVACLEAN 897 – IGS CLEANER | NAVADAN APS | DNK | X |
| Alkasafe Cleaner | CHEMO | GRC | X |
| Alkasolvent Liquid | CHEMO | GRC | X |
| Enviropower HD | CHEMO | GRC | X |
| Fresh Force Kleen | CHEMO | GRC | X |
| Oil & Sludge Remover | CHEMO | GRC | X |
| Super Red | CHEMO | GRC | X |
| Super Red Plus | CHEMO | GRC | X |
| Tank & Bilge Cleaner | CHEMO | GRC | X |
| Tank Super Cleaner | CHEMO | GRC | X |
| Tank Cleaner A | Marichem Marigases Worldwide Services | GRC | X |
| HAIZEN S-100 | KAO CORP. | JPN | X |
| Ion and Alkali Cleaning Agent of Jpal | Jpec Co. Ltd | JPN | X |
| SC-1000 | Infinity Enterprises, Inc | JPN | X |
| ALOHA SWING | New Shin Young Co., Ltd. | KOR | X |
| TCS – 3 | New Shin Young Co., Ltd. | KOR | X |
| TCS – 3T | New Shin Young Co., Ltd. | KOR | X |
| TCS – 5 | New Shin Young Co., Ltd. | KOR | X |
| Careclean AF | Marine Care B.V. – The Netherlands | NLD | X |
| Careclean Aquawash (Teepol) | Marine Care B.V. – The Netherlands | NLD | X |
| Careclean Neutral HCF | Marine Care B.V. – The Netherlands | NLD | X |
| Solvent Cleaner | Star Marine Chemicals BV | NLD | X |
| TankCleaner | Star Marine Chemicals BV | NLD | X |
| Alkleen Safety Liquid | Unitor Chemicals AS | NOR | X |
| Aquabreak PX | Unitor Chemicals AS | NOR | X |
| Tankleen Advance | Unitor Chemicals AS | NOR | X |
| Unipol | Unitor Chemicals AS | NOR | X |

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# ANNEX 3

## PROPOSED FUTURE WORK PROGRAMME FOR THE ESPH WORKING GROUP

| | | | |
|---|---|---|---|
| 1 | Evaluation of new products | | Ongoing |
| 2 | Cleaning additives: | | |
| | .1 | Evaluation of new cleaning additives | Ongoing |
| | .2 | Re-evaluation of cleaning additives in annex 10 to MEPC.2/Circular | 2010 |
| 3 | Review of MEPC.2/Circular – Provisional classification of liquid substances transported in bulk and other related matters | | Ongoing |
| 4 | Consideration of the outcome of the most recent session of GESAMP/EHS | | Ongoing |
| 5 | Consideration of the application of requirements for the carriage of bio-fuels and bio-fuel blends | | 2009 |
| 6 | Review of chapter 19 of the IBC Code | | 2009 |
| 7 | Any other business | | |

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# ANNEX 4

## TERMS OF REFERENCE FOR THE BALLAST WATER AND BIO-FOULING WORKING GROUP ENVISAGED TO BE ESTABLISHED AT BLG 14

The Ballast Water [and Bio-fouling] Working Group is instructed to:

.1 continue the development of the Procedure for assessing "same levels of protection" of, and approval for, other methods of ballast water management under regulation B-3.7 of the BWM Convention;

.2 develop an IMO circular to provide ballast water sampling and analysis protocols and to give advice on the uniform application of these protocols;

.3 continue the development of the guidance document "Framework for determining when a Basic Approval granted to one ballast water management system may be applied to another system that uses the same Active Substance or Preparation";

.4 develop a guidance document on conducting type approval of ballast water management systems;

.5 discuss the need for standardized protocols to be used by testing facilities involved in the approval of ballast water management systems;

.6 continue work on the development of measures to minimize the transfer of invasive aquatic species through bio-fouling of ships based on the outputs of the Bio-fouling Correspondence Group; and

.7 submit a written report on the work carried out, including recommendations to MEPC 61, for consideration by the Sub-Committee.

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# ANNEX 5

# GUIDANCE TO ENSURE SAFE HANDLING AND STORAGE OF CHEMICALS AND PREPARATIONS USED TO TREAT BALLAST WATER AND THE DEVELOPMENT OF SAFETY PROCEDURES FOR RISKS TO THE SHIP AND CREW RESULTING FROM THE TREATMENT PROCESS

## INTRODUCTION

1 The purpose of this guidance is to provide technical advice on the development of a methodology to ensure the safe handling and storage of chemicals used to treat ballast water, and the development of safety procedures addressing risks to the ship's crew resulting from the installation of a ballast water management system on a specific ship.

2 This guidance provides a framework for ensuring that these risks are addressed by the ballast water treatment or chemical/preparation* supplier and the owner and master of a ship, so that they can be included in the onboard Safety Management System as appropriate.

## METHODOLOGY FOR ADDRESSING RISK

3 In order to ensure the safe handling and storage of chemicals used to treat ballast water and the development of safety procedures to address the risks to the ship and its crew arising from the treatment process, the following subjects, as appropriate, should be subject to a safety assessment (please note this is not an exhaustive list):

- The loading and storage of chemicals or preparations onto the ship;
- The transfer and application of chemicals or preparations from storage to the ballast water management system;
- The position of the ballast water management system and associated piping;
- Operation of the ballast water management system;
- Maintenance of the ballast water management system;
- Spillages from the ballast water management system; and
- Exposure to treated ballast water, chemicals or preparations.

4 The safety assessment should be undertaken by the owner/master of the ship in conjunction with the supplier of the ballast water management system and the supplier of the chemical or preparation. This will allow:

- the specific design of the ship;
- the design of the ballast water management system (especially important if the technology is being retrofitted);

* Chemicals and preparations can be defined as Active Substances as defined in regulation A-1 of the BWM Convention.

- the provisions of any servicing/maintenance contracts; and

- the specific properties and risk of any treatment chemical or preparation,

to be identified, assessed and addressed in this appraisal.

5 The role of the supplier of the ballast water management system and the supplier of the chemical or preparation should provide the owner/master with the following information, as appropriate:

- a safety data sheet of the chemicals or preparations used;

- instructions on how any chemical should be loaded on the ship, stored and transferred/applied to the ballast water management system;

- health and safety information on the risks involved in operating the ballast water management system;

- health and safety information on exposure risks associated with operation of the ballast water management system and the use of chemicals or preparations; and

- details of personal protective equipment to be provided on board for use during any of these operations and during emergency situations, including spillage of the chemicals or preparations.

6 Based on the information provided by the supplier of the ballast water management system and the chemicals or preparations, the role of the owner/master in this process is to:

- identify the position and facilities needed to store chemicals, taking into account the risks involved in storing the chemicals and transferring and applying them to the ballast water management system, including fire protection and extinction;

- develop ship specific health and safety procedures for loading ballast water treatment chemicals onto the ship;

- develop ship specific health and safety procedures for handling and applying chemicals/preparations into the ballast water management system;

- develop ship specific health and safety procedures for normal operation of the ballast water management system;

- develop ship specific health and safety procedures for use in the event of a spillage on board vessels or crew exposure to treated ballast water, chemicals or preparations; and

- provide adequate personal and protective equipment for all operations covered in this guidance.

7 A safety assessment should be undertaken prior to installation of the ballast water management system, so that any mitigation measures identified can be incorporated either prior to, or during, installation.

8 The Safety Management System should be updated when appropriate, to take account of lessons learned during operation of the treatment technology or after any hazardous occurrence.

9 Shipowners and masters should ensure crew are instructed and trained appropriately, specifically to familiarize themselves with the Safety Data Sheet for any chemicals or preparations used in the course of ballast water treatment. Crew should also be made aware of any potentially hazardous by-products (aqueous or gaseous) which may be produced during the ballast water treatment process.

10 Notwithstanding the fact that the International Maritime Dangerous Goods (IMDG) Code does not apply to these chemicals in this context, the Code contains provisions that can be relevant to the safe stowage, handling and carriage of dangerous goods. The IMDG Code also contains requirements for electrical equipment, wiring, fire fighting equipment, ventilation, smoking provisions and requirements for any special equipment. This could be a good source of information for ballast water treatment chemicals that are also categorized as dangerous goods to ensure appropriate construction, loading, stowage, segregation and carriage provisions are put into place. However it should be noted that the provisions of the IMDG Code are based on intact and unopened packaging. This aspect should be taken into account when carrying out the safety assessment to ensure an equivalent level of safety is maintained when dangerous goods remain after use.

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# ANNEX 6

## *AIDE-MEMOIRE* TO INITIATE DEVELOPMENT OF AN IMO CIRCULAR TO PROVIDE BALLAST WATER SAMPLING ANALYSIS PROTOCOLS AND TO GIVE ADVICE ON UNIFORM APPLICATION OF THE PROTOCOLS

MEPC 58 instructed the BLG Sub-Committee, to develop, as a matter of high priority, an IMO Circular on the uniform application of sampling and analysis guidance to be followed with respect to the "Guidelines for Ballast Water Sampling (G2)".

While one paper was submitted (BLG 13/5/2) by FOEI, it was not deemed by Plenary to meet the intent of the direction from the MEPC, therefore, the Ballast Water Working Group had no background to start the development of the circular.

In the absence of the discussion paper to start with, the discussion centred on how to move forward on the item. After considerable discussion, it was decided to formulate an outline of the information that would be required in submissions to BLG 14, to enable the development of the circular.

The intent of soliciting papers is the analysis of samples obtained from ships under Guidelines (G2). Existing protocols from Guidelines (G8) were NOT the intent of this item, although if they are found appropriate for this application, and validated for this specific application, that would be acceptable.

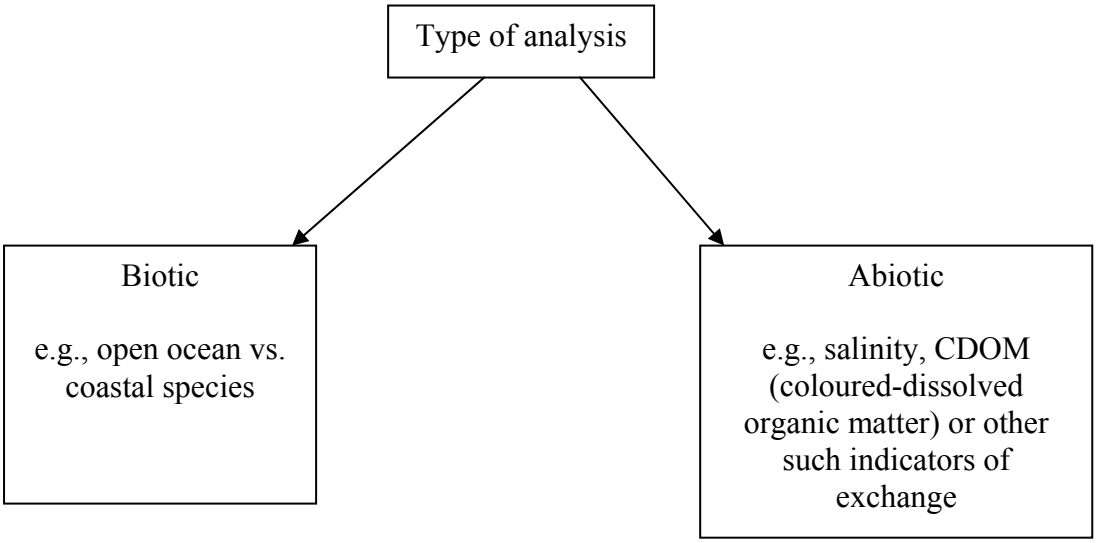
The circular would comprise a collated list of analysis protocols that are consistent with the Guidelines (G2) and could be used by port States to assess non compliance with the standards in the Ballast Water Management Convention.

There are a number of different types of analysis that may be used. The two major groups of analyses are indicative (as defined in section 6.3 in Guidelines (G2)) and detailed testing for compliance with the D-2 Standard. Submissions should identify where types of analysis can be:

> Completed rapidly (such as those conducted by 1 or 2 port State inspectors in the time frame of routine inspections).
>
> Completed in a more comprehensive manner (as are likely to be more time and/or labour intensive, and may require expert personnel with specialist training and access to specialized laboratory capabilities and that provide quantitative results).

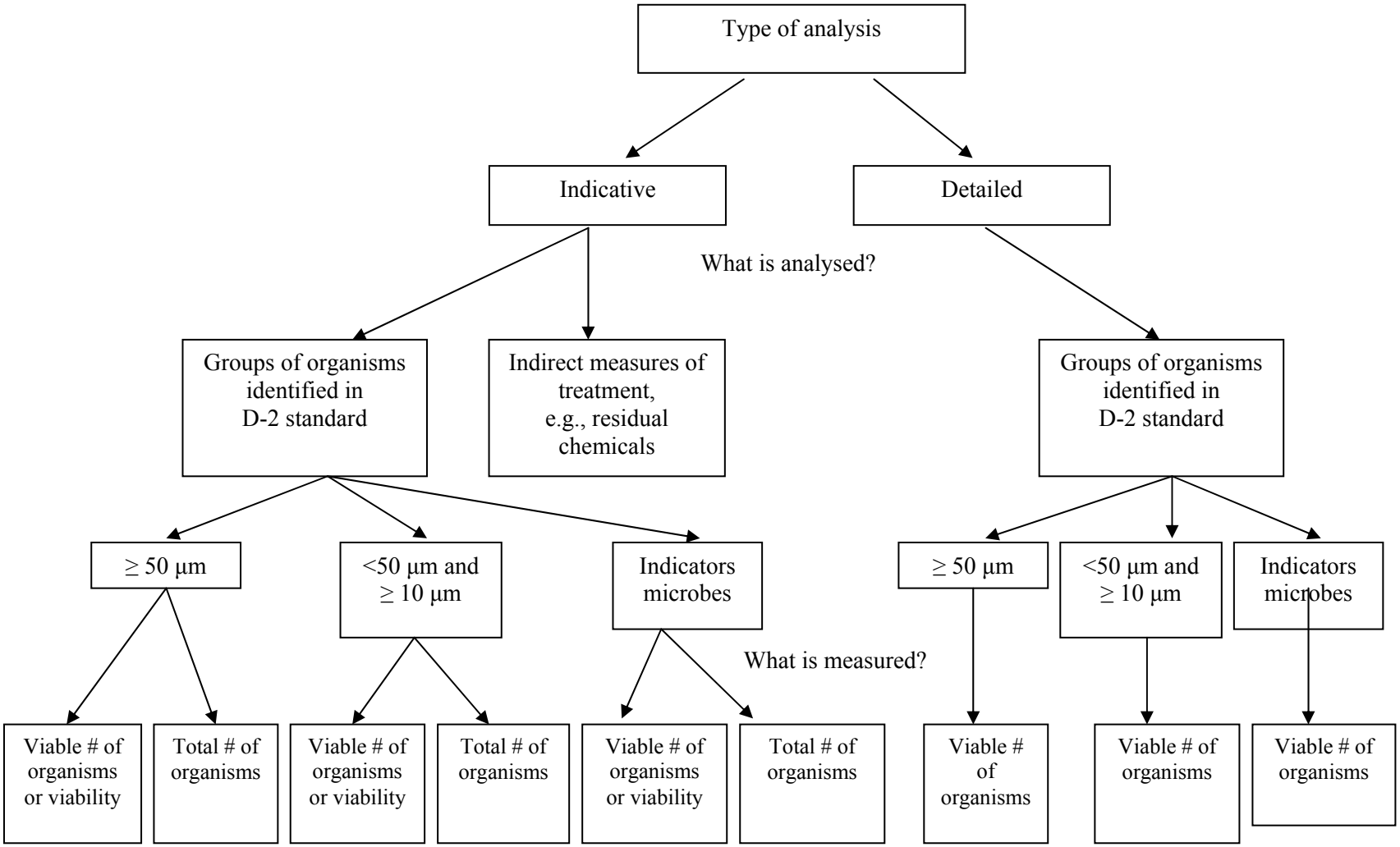
For D-1 standard, the types of analysis may include both biotic and abiotic tests – see Figure 1.

**Figure 1: Types of analysis for D-1 standard**




For D-2 standard, the types of analysis may include either indicative or detailed analysis – see Figure 2. Protocols may address one, some or all of the groups of organisms identified in the D-2 standard.

**Figure 2: Types of analysis for D-2 standard**



**Information requested for protocols**

Submissions should clearly state the type of the analysis (i.e. indicative or detailed) and specify what is measured in the analysis, e.g., viable number of organisms greater than 50 microns. The more information that can be provided in submissions, the more assistance the submissions will provide in developing the circular.

The following information is requested for each analysis protocol:

- A detailed description of the protocol and detailed documentation of the validation testing, including but not limited to; data, experimental design, statistical analysis, etc.

- A detailed description of how the protocol is consistent with the principles outlined in section 6 of Guidelines (G2).

- And in particular responses to the following questions:

  1. How long does the protocol take for
     - Collection; and
     - Analysis?

  2. How much does the analysis cost
     - Per sample (operational cost); and
     - Equipment (capital cost)?

  3. What level of expertise or skills are required (e.g., no training, some training, extensive training)?

  4. What volume of sample is required?

  5. What is the level of precision and accuracy of the analysis?

  6. Where is the analysis undertaken (e.g., onboard or in a land-based laboratory)?

  7. Is a specific sampling methodology (e.g., a net or grab sample) or location (e.g., through a top-side tank or the discharge line) required (this is only relevant to the D-1 standard or indicative sampling for the D-2 standard)?

**Text of regulations D-1 and D-2 of the Convention**

***Regulation D-1*** *Ballast Water Exchange Standard*

1 Ships performing Ballast Water exchange in accordance with this regulation shall do so with an efficiency of at least 95 per cent volumetric exchange of Ballast Water.

2 For ships exchanging Ballast Water by the pumping-through method, pumping through three times the volume of each Ballast Water tank shall be considered to meet the standard described in paragraph 1. Pumping through less than three times the volume may be accepted provided the ship can demonstrate that at least 95 per cent volumetric exchange is met.

**Regulation D-2** *Ballast Water Performance Standard*

1 Ships conducting Ballast Water Management in accordance with this regulation shall discharge less than 10 viable organisms per cubic metre greater than or equal to 50 micrometres in minimum dimension and less than 10 viable organisms per millilitre less than 50 micrometres in minimum dimension and greater than or equal to 10 micrometres in minimum dimension; and discharge of the indicator microbes shall not exceed the specified concentrations described in paragraph 2.

2 Indicator microbes, as a human health standard, shall include:

.1 Toxicogenic *Vibrio cholerae* (O1 and O139) with less than 1 colony forming unit (cfu) per 100 millilitres or less than 1 cfu per 1 gram (wet weight) zooplankton samples;

.2 *Escherichia coli* less than 250 cfu per 100 millilitres;

.3 Intestinal Enterococci less than 100 cfu per 100 millilitres.

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# ANNEX 7

## DRAFT BWM.2 CIRCULAR

## INTERNATIONAL CONVENTION FOR THE CONTROL AND MANAGEMENT OF SHIPS' BALLAST WATER AND SEDIMENTS, 2004

### Engineering Questionnaire on Ballast Water Management Systems

1 The Sub-Committee on Bulk Liquids and Gases, at its thirteenth session (2 to 6 March, 2009), noted the information provided in document BLG 13/INF.5 (Brazil) regarding an engineering questionnaire on the ballast water management systems.

2 Recognizing that the questionnaire, contained in the annex of document BLG 13/INF.5, might assist interested parties in the evaluation and comparison of different ballast water management systems, BLG 13 agreed that it would be beneficial to prepare a technical circular containing the engineering questionnaire for the information of the interested parties and their future reference.

3 The Marine Environment Protection Committee, at its fifty-ninth session (13 to 17 July 2009), endorsed the view of BLG Sub-Committee and approved the dissemination of the above-mentioned questionnaire through this circular.

4 Member Governments are invited to bring this circular to the attention of all parties concerned.

* * *

ANNEX

## ENGINEERING QUESTIONNAIRE ON BALLAST WATER MANAGEMENT SYSTEMS

The purpose of this Engineering Questionnaire on ballast water management systems is to provide a source of reference to be used by interested parties in order to: select and acquire these systems; develop technical specifications for the purchase and installation of a ballast water management system on board a vessel; design the installation of the ballast water management system for a ship or a group of ships; enable the comparison among different alternatives of ballast water treatment technologies and/or ballast water management systems (applying the same conceptual basis for such purpose); and obtain assistance on other related technical matters.

It is intended to assist ballast water management system manufacturers, vendors or suppliers, and ship designers, shipping companies, shipowners, shipbuilders, ship operators, classification societies, Administrations, etc., to better deal with such tasks, improving and speeding up communication between clients and vendors or manufacturers, which is vital to the required technical consultation and negotiation process. Vendors and manufacturers may opt for the confidentiality of some information collected or provided through the questionnaire (by means of setting confidentiality terms and conditions for the interested parties).

Comments: The questionnaire is not intended to be answered by manufacturers and forwarded to IMO for appraisal. Consequently, it does not require the establishment of a large database to be collated by the Organization, containing all the answers to the questionnaire. The purpose of this questionnaire is merely to provide a source of reference to potential buyers, serving as a technical guide only, so as to enable the required consultation, evaluation and comparison between different alternatives of ballast water treatment technologies.

### Part 1 Technical form highlighting the basic characteristics and main data about the ballast water management system

The purpose of this form is to present the main characteristics of the ballast water management system to enable a clear and prompt understanding of its more relevant information. Thus, consideration of the group of questions set bellow will be facilitated, containing more technical details, when addressing engineering tasks.

The following data should be provided by the ballast water management system manufacturer, vendor or supplier:

1.1 System: official, commercial and other name;

1.2 Manufacturer and supplier: Name(s), full address(es), including electronics;

1.3 Ballast water management system description: main components, materials, technologies, treatment processes, functioning ways and basic diagram;

1.4 Flow-rate capacities that can be supplied in $m^3/h$; normal and maximum flow rate of the system under consideration to be installed on board a particular ship;

1.5 Footprint needed for each flow-rate in $m^2$, including the footprint required for the particular ship under consideration on board which the installation is intended; system and components weight.

1.6 As regards water treatment, provide the following information on how the system operates:

1.6.1 online during ballasting;

1.6.2 online during deballasting;

1.6.3 both the conditions above;

1.6.4 during voyage, either re-circulating the water or not (give details);

1.6.5 directly in the ballast tanks;

1.6.6 other (explain).

1.7 Regarding the ballast water treatment principle:

1.8 Does the system use an Active Substance(s)?

1.8.1 If so: What are such Active Substances? Are they generated on board ship or supplied to the ship?

1.8.2 If the system does not use an Active Substance(s) but produces/generates such substances, provide details about this process, pertinent safety precautions and recommendations, as well as technical reference about IMO document(s) on system approval, where more details can be obtained.

1.8.3 If the system does not use or produce an Active Substance(s), please provide details on the following:

1.8.4 Does it modify the composition of the treated ballast water?

1.9 Does it require storage and handling of chemical products on board for ballast water treatment purposes?

Note: The above information is related to the concern about potential impact on the environment (deballasting site).

1.10 Regarding the possible assembling arrangements for the system on board ship:

1.10.1 Should the system be placed in a concentrated and unique area? Or

1.10.2 Does it allow for the installation of its modules in different locations, optimizing the existing ship's free spaces? Or

1.10.3 Both assembly arrangements are possible.

1.11 Is the system adequate to be installed in dangerous zones or spaces in tankers (such as pump room and/or main deck)?

1.12 Regarding the process required to obtain the type approval certification for the ballast water management system, provide the following information, dates and reference details related to:

1.12.1 The ballast water management system Basic Approval by IMO/MEPC, informing the GESAMP-BWWG meeting when the system, after the evaluation of its active(s) substance(s), was recommended for this approval, the identification numbers of the related IMO/MEPC report that granted this approval and of the non-confidential IMO document submitted to the MEPC, as well as other available pertinent technical references.

1.12.2 The ballast water management system Final Approval by IMO/MEPC, informing the GESAMP-BWWG meeting when the system, after the evaluation of its active(s) substance(s), was recommended for this approval, the identification numbers of the related IMO/MEPC report that granted this approval and of the non-confidential IMO document submitted to the MEPC, as well as other available pertinent technical references.

Note: It is recommended to also include information that corroborates that all the GESAMP-BWWG and MEPC recommendations were properly attended.

1.12.3 The Type Approval Certification by the Administration, informing the Administration and recognized organization/classification society involved and/or responsible for the approval process, providing copy of the granted Type Approval Certificate.

1.12.4 Specify the last versions of Guidelines (G8) and Procedure (G9) applied in the system approval.

1.12.5 Indicate where the land-based tests required by Guidelines (G8) were carried out (place and name of the responsible institution or laboratory).

1.12.6 Indicate the name, type and deadweight of the ship (or ships) where the shipboard tests required by Guidelines (G8) were carried out.

1.13 On what types of ship this ballast water management system can be used? On what types of vessel, and under what conditions, has the system been tested on board?

1.14 What is the deadweight tonnage and ballast capacity that the system can be applied to? (Specify the minimum and maximum values.)

1.15 Provide a reference list about the ships, shipowners, ship operators and shipyards that have already acquired the ballast water management system (confidential treatment is suggested between the parties in negotiation for this kind of information).

1.16 What kind of information is available, i.e. video, technical leaflet or catalogue, computer presentation (with animation) or other source, such as the manufacturer website, to better describe how the ballast water management system, its equipment, and components operates to treat ballast water? Can this material be provided for the interested clients? (Provide comments and details.)

**Part 2 Practicability and compatibility with the ship's design, operation and existing systems, as well as other technical details**

2.1 What are the performance parameters of the system? (Essential to its control.)

2.2 Does the system allow for controlling the performance of the treated water as regards the D-2 Standard during the treatment process? If so, describe it.

2.3 How long does it take to treat a given volume of ballast water? At what temperatures?

2.4 Are post-treatment residence times required before discharge, and if so, what are the required times?

2.5 Does the system require complete re-circulation of the ballast water? If complete re-circulation is needed, how many re-circulations are required to meet the requirements of regulation D-2 of the BWM Convention?

2.6 Is the system automated? Completely or partially? (Make comments, providing technical details on the automation level and scope and on the system's controls.)

2.7 In case yes, how to control? (Algae and/or organisms detector or monitor, corresponding recorder, etc.)

2.8 Would this control system be reliable, accurate and sufficiently capable of dispensing with the collection of ballast water samples to check compliance with the D-2 requirements in the laboratory? (With the understanding and acknowledgement of such capacity by port State control inspectors, and with a pertinent certification for this purpose.)

2.9 Is the control system also suitable for adjusting the treatment process (such as, for instance, to intensify or reduce the electric current supply to an electrolytic cell used to generate the Active Substance and/or to dose the Active Substance or chemical injection for water treatment)? (In case yes, please provide details.)

2.10 In the case of a ballast water management system that requires the Active Substance to be supplied to the ship, is there a dosing pump for the injection of such substance? Is the control of such injection by the dosing pump automatic?

2.11 Is the system supplied with devices that facilitate collecting more representative samples of ballast water (in compliance with the Guidelines (G2))? In case yes, provide details.

2.12 When the system needs to receive the Active Substance or chemical, indicate the tank capacity required for that (in cubic metres), show the product supply arrangements to the ship and to the system, as well as other related details.

2.13 Provide information about the worldwide net of suppliers capable to provide the required Active Substances used by this ballast water management system to the ship. Inform the main ports where this supply can be effectively and promptly done.

2.14 Which were the results of the system's environmental tests required by the Guidelines (G8)? Summarize them.

2.15 How the shipboard tests required by Guidelines (G8) were performed? Inform the trip conditions, mentioning the ship's route, the ocean areas and latitudes involved, as well as the season and the total period of time for performing these tests. Inform also on which type of ship the shipboard tests were performed and how many trips were made for this purpose.

2.16 Inform if there were some failures during the system's environmental, land-based (these performed at a land-based testing facility) and shipboard tests, which implied on certain modifications and corrections of the ballast water management system under development, and which were the adjustments done to solve them and to obtain the type approval certification for the system.

2.17 What are the additional workload on board introduced by the ballast water management system and the staffing requirements for the system?

2.18 What is the highest sea state in the Beaufort scale in which the system can still operate?

2.19 Does the ballast water management system's operation affect the corrosion rate and the wastage of tanks, pipelines or any other equipment of the ship's ballast system associated with it?

2.20 Can the system be affected by incrustation that could lead to a drop in pressure and/or to a reduction in the flow rate? If so, indicate the percentages.

2.21 Is the system applicable to existing ships?

2.22 What are the installation requirements for the system? What are the system's requirements for deck space, weather-tight space or machinery room space?

2.22.1 Can the system only be installed during a dry-docking period?

2.22.2 Can the system be installed and evaluated while the vessel is alongside the pier, in service or removed from service?

2.23 What are the maintenance requirements for the system?

2.23.1 Can the system only be maintained during a dry-docking period?

2.23.2 Can the system be maintained available dockside?

2.23.3 Is specialist maintenance expertise required and is this available worldwide?

2.24 Are the ship's other functions and systems independent from the ballast water management system's operation?

2.25 Could the system be integrated into the other ship systems?

2.26 What are the calibration requirements of the system?

2.27 What are the results of the following system's environmental tests and evaluations?

2.27.1 exposure to various environmental extremes conditions including heat, cold, humidity, vibration, more critical conditions of ship's list and trim, and power fluctuations?

2.27.2 reliability and durability?

2.28 What is the expected life of the system?

2.29 Regarding land-based and full-scale shipboard tests, describe the experiments, equipment, and system configurations which were used, as well as provide a list of technical documents to be consulted to get additional information on these issues.

2.30 Has the system been assessed, by a competent Authority and/or by a recognized organization, as suitable for onboard application?

2.30.1 for new ships?

2.30.2 for existing ships?

2.30.3 In affirmative case, list all installation approvals that have been granted with the correspondent granting authority (or recognized organization)? (This question is a complement to the question of Part 1 related to "ballast water management system list of reference".)

2.31 Are there any individual system requirements, which affect the existing layout of the ship, like watertight envelope, generator capacity, etc.?

2.32 What are the requirements for on board storage of component spares and consumables?

2.33 What are the consistency results of multiple manufactured units of a system?

2.34 What type of supply shall the system need for its functioning on board – such as: electric energy (voltage; frequency; expected power required); compressed air (defining the pressure and flow rate); fresh and/or salt water (respective pressures and flow rates), etc?

2.35 Can the system be considered or categorized as an alternative ballast water management system in accordance with the provisions and purposes of the regulation B-3.7 of the BWM Convention? If so, provide further comments and considerations about this issue.

2.36 Can the system be installed on ships with special arrangements of ballast system, such as: bulk carriers with various overboard discharge points for deballasting; and tankers with one submerged pump inside each ballast tank (ships which do not have pump room too)? If so, indicate how and provide details of these special arrangements for installation of the ballast water management system.

**Part 3 Safety**

3.1 Do the system and its treatment processes present any risks to the health or safety of the crew, in particular to those responsible for operating the system, or even to the passengers, or risks to ship's safety? If so, describe the risks involved and specify the risk level as either: High; Medium, Low; Negligible; No Risk.

3.2 Are there, for instance, high voltage components, processes involving high heat, cryogenic processes, use of radiation or lasers, chemical reactions whose constituents or by-products present any risks, or high pressure liquids or gases? If so, what safety provisions are incorporated into the design and operating procedures for the system?

3.3 Does the system involve the use of Active Substances or components with special storage or handling needs? If so, how have these needs been addressed, in the system's operation and maintenance manuals? Furthermore, provide information on the applicable care to be followed and pertinent precautions to be taken into consideration.

3.4 Has a complete risk assessment, related to the installation of the ballast water management system in the intended ship, such as a HAZOP review, been conducted, by a specialized and competent organization? In affirmative case, what were the major safety findings?

3.5 Are there components with dissimilar metals exposed to saltwater? If so, what safeguards have been incorporated to protect the ship's structures, pipelines, equipment, valves and accessories against corrosion and excessive wastage? How have these needs been addressed, by the system and in the operation and maintenance manuals?

3.6 If the system operates during ballast operations, including uptake, discharge or transfer, are there adequate safety interlocks and failsafe measures to ensure vessel stability and structure is not compromised?

3.7 In the event of a vessel casualty does the system pose any additional risks?

3.7.1 Are there additional risks in the event of flooding?

3.7.2 Does vessel power loss present any additional risks?

**Part 4 Biological efficacy, including pathogens**

4.1 Present the findings of the system's biological efficacy tests, related to its approval process to type approval certification and compliance with D-2 standard.

4.2 Beyond D-2 requirements, when additional data are available, provide also the following useful information (considering possible additional/unilateral measures to be met).

4.2.1 System capability for the removal, elimination or inactivation of aquatic organisms for the various taxonomic groups, phytoplankton and zooplankton, beyond standard contained in regulation D-2.1, and for pathogens, beyond standard contained in regulation D-2.2 of BWM Convention.

4.2.2 Does the system eliminate:

4.2.2.1 Cysts? If so, describe and quantify.

4.2.2.2 All species or life stages which may present hazard to the aquatic environment? (A uniform way of presenting this information needs to be established.)

4.3 In case of ballast water management is carried out during ballasting:

4.3.1 Could there be a re-growth of the organisms already treated during ballasting within the ballast tanks during the ship's subsequent voyage or time?

4.3.2 If so, what could be the estimated progression of the re-growth after 1, 2, 3, 4, 5 and 6 weeks after treatment? What is the recommended solution to ensure the performance standard of the ballast water at deballasting, as required by regulation D-2?

4.4 Can the system's efficacy be compromised if there is an increase in the ballast water's turbidity? If so, please describe the decrease in system's efficacy and performance.

4.5 Inform the percentage of the reduction in sediments that the system allows.

4.6 Concerning the concentration of solids in suspension in ballast water, what were the worst environmental conditions under which the ballast water management system was tested for approval?

4.7 What type(s) of adjustment(s) shall be required to the ballast water management system when it has to operate in environmental conditions more severe than those it was tested for approval? All the steps of these procedures need to be clearly specified.

**Part 5 Cost-benefits, economic aspects and efficiency**

5.1 What is the system's Capex (capital expenditure; in US$)? This answer is to be related to one or more specific flow rates (in $m^3/h$) that the system can contemplate.

5.2 Regarding the composition of Capex, what is the known or estimated cost of the system purchase and installation for vessels at the time of construction, and for the retrofitting of an existing vessel?

5.3 What is the system's Opex (operating expenditure; in US$/1000 $m^3$)? This answer is to be related to the cost of the system to treat a volume unit of ballast water.

5.4 In case of ballast water management system to be installed on board a ship in dangerous areas, such as the pump room and the main deck of oil carriers, there will be an additional cost in relation to the informed Capex? Provide further comments and details about this, inclusive if the ballast water management system, or part of its modulus and components, will have to be adapted and certified for this purpose as explosion proof or intrinsically safe system / equipment. Furthermore, indicate if such adaptation can take some time and what time is estimated for this entire process to be duly carried out and successfully concluded.

5.5 What is the increase of fuel or oil consumption that is introduced by the use of this system on board? (According to ship's type and ballast capacity.)

5.6 What are the known or estimated maintenance costs on an annual basis?

5.7 What are the estimated costs of component spares and consumables on an annual basis?

5.8 What are the known or estimated disposal costs of any wastes, residuals, components or replacement parts?

5.9 When the treatment is done during ballasting, can all ballast water be treated to meet D-2 standard during the ship ballasting without delaying the ballasting operations? If delays to the ballasting operations are caused, indicate the time percentage or the additional hours needed to complete the ballasting operation.

5.10 What are the ship staffing requirements for system operation?

5.11 Could the system be considered efficient in energetic terms?

5.11.1 Which is its efficiency in terms of energy (expressed as units of energy required for treating each cubic metre of ballast water)?

5.11.1.1 Should the energetic efficiency be expressed as a function of the amount of energy required to treat a determined volume of water, or as a function of the power required to treat a determined flow rate of ballast?

5.11.1.2 Another conceptual way to express this energetic efficiency would be in terms of a percentage related to the energy supplied to the system and the energy effectively used in the treatment process.

5.11.1.3 An equipment certification like that used for refrigerators and a few other domestic appliances, in relation to greater or lower energy consumption, could also be considered.

5.11.1.4 Another current concern is to minimize the emission of pollutants, GHG and, mainly, $CO_2$, to the atmosphere. Present comments and technical details on the system about this.

5.11.2 It is suggested that the supplier of the ballast water management system gives due technical consideration to these above aspects and provides the best information about these issues.

Note: Lloyd's Register Guide on Ballast Water Treatment Technologies uses power in kW/1000 $m^3$ of treated BW.

5.12 When the ballast system is operating at a flow rate lower than its rated capacity (for instance, using only one of two ballast pumps for deballasting), does the ballast water management system allow for adjustments for operating under these conditions in order to be more economic and efficient from the energy standpoint?

5.13 Can the ballast water management system be considered as a process that uses a more advanced, cleaner and environmentally sound technology? (It can be effective, but, also, it can be effective and efficient.)

**Part 6 Environmental acceptability and possible impacts of the system's by-products on the environment, crew, passengers and general public health, and resources**

6.1 Does the system generate by-products that can have an adverse impact:

6.1.1 on the environment?

6.1.2 on human health: (a) ship's crew? (b) ship's passengers? (c) general public health in the areas where the ship operates?

6.1.3 on resources: (a) natural resources? (b) industrial resources? (c) other?

6.2 Does the system require any conditioning/neutralization of treated ballast water, prior to discharge it into the environment? If so, include details.

6.3 What are the characteristics of any additional air emissions, which result from the use of the treatment system?

6.4 Are there waste streams such as the residue of any filtering process or centrifugal concentrate? If so, inform:

6.4.1 What are the characteristics of the waste streams?

6.4.2 Are they suitable for discharge or must they be disposed of on shore?

6.4.3 What is the planned disposition of the waste streams?

6.4.4 When BW treatment is done during ship's ballasting, can waste streams be promptly and simultaneously discharged at the ship's ballasting site/port with the ballast water treatment?

6.4.5 When it is adequate to be discharged at sea, how quickly do the waste streams dissipate after discharge; and at what waste flow rate, sea state, marine current speed, tide regime, the discharge dissipation was tested/verified?

6.5 What are the system's possible impacts to the environmental, public health and resources, related to?

6.5.1 the interaction of the components and processes of its treatment with the environment, as a function of its ordinary use?

6.5.2 an eventual system failure?

6.5.3 its components or processes which, if damaged/affected due to an eventual vessel casualty, could cause problems and losses?

6.6 Does the use of the treatment system result in the discharge of ballast water at other than ambient temperature? If so, provide details.

6.7 Does the system have components or processes which use or produce Active Substances, produce residuals or by-products which present problems in handling, storage or disposal? If so, provide details. What system's components, such as batteries or lead-containing fixtures, causes special disposal concerns?

6.8 The total time required for ballast water management on board should be recorded according to the following table:

**Information and monitoring of the time and re-circulation required for ballast water management**

| Ballast Water Treatment Time | Total time required to treat BW (in hours) | Normal time for (in hours) | | Additional time required for the BW Treatment (in hours) | |
|---|---|---|---|---|---|
| During ballasting | | Ship's unloading | | Interference beyond the ship discharge normal time | |
| On voyage | | Ship's ballast voyage | | Interference beyond the ballast voyage normal time | |
| During deballasting | | Ship's loading | | Interference beyond the ship loading time | |
| Number of times required to re-circulate the BW on board for treatment | | | | Correspondent time for applying the total BW re-circulation | |

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# ANNEX 8

## ACTION PLAN FOR UNIFORM IMPLEMENTATION OF THE BWM CONVENTION

| SUBJECT | REF. | CURRENT STATUS | TYPE OF ACTION | TIMELINE |
|---|---|---|---|---|
| Procedure for assessing other methods of BWM | Reg. B-3.7 BWMC | The Netherlands to coordinate the development of a co-sponsored document for submission at BLG 14 following the principles agreed by the Group | Sub-Committee to develop the Procedure for assessing other methods of BWM at BLG 14 (BWWG needed)<br>MEPC 61 adopts the Procedure for assessing other methods of BWM by an MEPC resolution | February 2010<br>October 2010 |
| Onboard handling and storage of Active Substances | MEPC 56, para 2.45.5 and BLG 12 | BLG 13 completed the work on the consolidated guidance document | MEPC 59 to approve the consolidated Guidance to ensure safe handling and storage of chemicals used to treat ballast water and the development of safety procedures for risks to the ship and crew resulting from the treatment process and to agree with its dissemination as a technical circular | July 2009 |
| Ship and crew safety procedures when using Active Substances | MEPC 56, para 2.45.5 and BLG 12 | BLG 13 agrees with the decision to merge the Guidance document on how chemicals used to treat ballast water should be handled and stored on board and the Guidance document on safety procedures for ship and crew against risks associated with ballast water management that make use of Active Substances in one single document | MEPC 59 to approve the consolidated Guidance to ensure safe handling and storage of chemicals used to treat ballast water and the development of safety procedures for risks to the ship and crew resulting from the treatment process and to agree with its dissemination as a technical circular | July 2009 |
| Ballast water sampling and analysis protocols | MEPC 58, para 2.43 | Members and observers to submit their future contributions to the development of the IMO circular, taking into consideration the *aide-memoire* developed by the Group | Input from Member States and other interested parties invited<br>Sub-Committee to develop the Ballast water sampling and analysis protocols at BLG 14 (BWWG needed)<br>The MEPC approves the Ballast water sampling and analysis protocols and instructs the Secretariat to issue an MEPC circular | March 2009 to December 2009<br>February 2010<br>October 2010 |

| SUBJECT | REF. | CURRENT STATUS | TYPE OF ACTION | TIMELINE |
|---|---|---|---|---|
| Framework for determining when a Basic Approval granted to one ballast water management system may be applied to another system that uses the same Active Substance or Preparation | MEPC 57, para 2.50.4 | BLG 13/5 (Secretariat) as a basis | Further input from Member States and other interested parties invited<br><br>Sub-Committee to further develop the guidance document regarding application of Basic Approval granted to one applicant to another applicant using the same Active Substance, with a view to finalizing at BLG 14<br><br>MEPC 61* approves the guidance document regarding application of Basic Approval granted to one applicant to another applicant using the same Active Substance at MEPC 59 and instructs the Secretariat to issue an MEPC circular | March 2009 to December 2009<br><br>February 2010<br><br>October 2010 |
| Type approval of ballast water management systems | MEPC 58, para 2.50 | MEPC 58/2/9 (United Kingdom) as a starting point | Further input from Member States and other interested parties invited<br><br>Sub-Committee to develop the Ballast water sampling and analysis protocols at BLG 14 (BWWG needed)<br><br>MEPC 61 approves the guidance document regarding type approval of ballast water management systems and instructs the Secretariat to issue an MEPC circular | March 2009 to December 2009<br><br>February 2010<br><br>October 2010 |
| Standardized protocols to be used by testing facilities involved in the approval of ballast water management system | BLG 13/18, paragraph 5.19.5 | Due to the time constraints, this item could not be addressed at BLG 13 | GloBallast Partnerships Project to pursue this aspect and inform the Sub-Committee as appropriate<br><br>Comments and views from Member States and other interested parties are invited | March 2009 to December 2009 |

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* Subject to prior consideration by the GESAMP-Ballast Water Working Group.

# ANNEX 9

## DRAFT MSC RESOLUTION

## INTERIM GUIDELINES ON SAFETY FOR NATURAL GAS-FUELLED ENGINE INSTALLATIONS IN SHIPS

THE MARITIME SAFETY COMMITTEE,

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

NOTING that the International Convention of Safety of Life at Sea, 1974 currently does not have any provisions for use of gas as fuel on ships other than gas carriers,

RECOGNIZING a need for the development of a code for gas-fuelled ships,

ACKNOWLEDGING that, in the interim, there is an urgent need to provide guidance to the Administrations on the gas-fuelled engine installations in ships,

HAVING CONSIDERED the Interim Guidelines prepared by the Sub-Committee on Bulk Liquids and Gases at its thirteenth session,

1. ADOPTS the Interim Guidelines on safety for natural gas-fuelled engine installations in ships, the text of which is set out in the Annex to the present resolution;

2. INVITES Governments to apply the Interim Guidelines to gas-fuelled ships other than those covered by the IGC Code;

3. URGES Member Governments and the industry to submit information, observations, comments and recommendations based on the practical experience gained through the application of these Interim Guidelines and submit relevant safety analysis on gas-fuelled installations;

4. AGREES to continue the work on the development of the International Code of Safety for Gas-fuelled Ships (IGF Code).

ANNEX

# INTERIM GUIDELINES ON SAFETY FOR NATURAL GAS-FUELLED ENGINE INSTALLATIONS IN SHIPS

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## PREAMBLE

1 These Interim Guidelines have been developed to provide an international standard for ships, other than vessels covered by the IGC Code, with natural gas-fuelled engine installations.

2 The goal of these Interim Guidelines is to provide criteria for the arrangement and installation of machinery for propulsion and auxiliary purposes, using natural gas as fuel, which will have an equivalent level of integrity in terms of safety, reliability and dependability as that which can be achieved with a new and comparable conventional oil fuelled main and auxiliary machinery.

3 To achieve this goal, the functional requirements described below are embodied in the relevant parts of these Interim Guidelines:

.1 Minimize hazardous areas as far as is practicable to reduce the potential risks that might affect the safety of the ship, personnel and equipment.

.2 Minimize equipment installed in hazardous areas to that required for operational purposes. Equipment installed in hazardous areas should be suitable and appropriately certified.

.3 Arrange hazardous areas to ensure pockets of gas cannot accumulate under normal and foreseeable failure conditions.

.4 Arrange propulsion and electrical power generating installation to be capable of sustained or restored operation in the event that a gas-fuelled essential service becomes inoperative.

.5 Provide ventilation to protect personnel from an oxygen deficient atmosphere in the event of a gas leakage.

.6 Minimize the number of ignition sources in hazardous spaces by design, arrangements and selection of suitable equipment.

.7 Arrange safe and suitable gas fuel storage and bunkering arrangements capable of taking on board and containing the gas fuel in the required state without leakage and overpressure.

.8 Provide gas piping systems, containment and overpressure relief arrangements that are of suitable design, construction and installation for their intended application.

.9 Design, construct, install, operate and protect gas-fuelled machinery, gas system and components to achieve safe and reliable operation consistent with that of oil-fuelled machinery.

.10 Arrange and locate gas storage tank rooms and machinery spaces such that a fire or explosion in either will not render the machinery/equipment in other compartments inoperable.

.11 Provide safe and reliable gas-fuel control engineering arrangements consistent with those of oil-fuelled machinery.

.12 Provide appropriate selection of certified equipment and materials that are suitable for use within gas systems.

.13 Provide gas detection systems suitable for the space concerned together with monitoring, alarm and shutdown arrangements.

.14 Provide protection against the potential effects of a gas-fuel explosion.

.15 Prevent explosion and hazardous consequences.

.16 Provide fire detection, protection and extinction measures appropriate to the hazards concerned.

.17 Provide a level of confidence in a gas-fuelled unit that is equivalent to that for an oil-fuelled unit.

.18 Ensure that commissioning, trials and maintenance of gas utilization machinery satisfy the goal in terms of reliability, availability and safety.

.19 Provide provision for procedures detailing the guidelines for safe routine and unscheduled inspection and maintenance.

.20 Provide operational safety through appropriate training and certification of crew.

.21 Provide for submission of technical documentation in order to permit an assessment of the compliance of the system and its components with the applicable rules and guidelines.

4 The Interim Guidelines address the safety of ships utilizing natural gas as fuel.

5 Natural gas (dry) is defined as gas without condensation at common operating pressures and temperatures where the predominant component is methane with some ethane and small amounts of heavier hydrocarbons (mainly propane and butane).

6 The gas composition can vary depending on the source of natural gas and the processing of the gas. Typical composition in volume (%):

| | |
|---|---|
| Methane ($C_1$) | 94.0% |
| Ethane ($C_2$) | 4.7% |
| Propane ($C_3$) | 0.8% |
| Butane ($C_4$+) | 0.2% |
| Nitrogen | 0.3% |
| Density gas | 0.73 kg/Sm$^3$ |
| Density liquid | 0.45 kg/dm$^3$ |
| Calorific value (low) | 49.5 MJ/kg |
| Methane number | 83 |

The gas may be stored and distributed as Compressed Natural Gas (CNG) or Liquefied Natural Gas (LNG).

# CHAPTER 1

# GENERAL

## 1.1 Application

1.1.1 These Interim Guidelines apply to internal combustion engine installations in ships using natural gas as fuel. The engines may use either a single fuel (gas) or dual fuel (gas and oil fuel), and the gas may be stored in gaseous or liquid state.

1.1.2 These Interim Guidelines are to be applied in addition to the relevant provisions of the International Convention for the Safety of Life at Sea (SOLAS) 1974 and its Protocol of 1988, as amended.

1.1.3 The Interim Guidelines are applicable to new ships. Application to existing ships should be decided by the Administration to the extent it deems necessary.

## 1.2 Hazards

These Guidelines address the hazards related to the arrangements for the storage, distribution and use of natural gas as a fuel.

## 1.3 Definitions

***Note:*** Unless otherwise stated below, definitions are as defined in SOLAS chapter II-2.

1.3.1 *Accidents* mean uncontrolled events that may entail the loss of human life, personal injuries, environmental damage or the loss of assets and financial interests.

1.3.2 *Certified safe type* means electrical equipment that is certified safe by a recognized body based on a recognized standard[1]. The certification of electrical equipment is to correspond to the category and group for methane gas.

1.3.3 *CNG* means compressed natural gas.

1.3.4 *Control stations* mean those spaces defined in SOLAS chapter II-2 and additionally for these Guidelines, the engine control room.

1.3.5 *Double block and bleed valve* means a set of three automatic valves located at the fuel supply to each of the gas engines.

1.3.6 *Dual fuel engines* mean engines that can burn natural gas and fuel oil oil fuel simultaneously or operate on oil fuel or gas only.

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[1] Refer to IEC 60079 series, Explosive atmospheres and IEC 60092-502:1999 Electrical Installations in Ships – Tankers – Special Features.

1.3.7 *Enclosed space* means any space within which, in the absence of artificial ventilation, the ventilation will be limited and any explosive atmosphere will not be dispersed naturally[2].

1.3.8 *ESD* means emergency shutdown.

1.3.9 *Explosion* means a deflagration event of uncontrolled combustion.

1.3.10 *Explosion pressure relief* means measures provided to prevent the explosion pressure in a container or an enclosed space exceeding the maximum overpressure the container or space is designed for, by releasing the overpressure through designated openings.

1.3.11 *Gas* means a fluid having a vapour pressure exceeding 2.8 bar absolute at a temperature of 37.8°C.

1.3.12 *Hazardous area* means an area in which an explosive gas atmosphere or a flammable gas (flashpoint below 60°C) is or may be expected to be present, in quantities such as to require special precautions for the construction, installation and use of electrical apparatus.

Hazardous areas are divided into zones 0, 1 and 2 as defined below[3]:

.1 *Zone 0* is an area in which an explosive gas atmosphere or a flammable gas with a flashpoint below 60°C is present continuously or is present for long periods.

.2 *Zone 1* is an area in which an explosive gas atmosphere or a flammable gas with a flashpoint below 60°C is likely to occur in normal operation.

.3 *Zone 2* is an area in which an explosive gas atmosphere or a flammable gas with a flashpoint below 60°C is not likely to occur in normal operation and, if it does occur, is likely to do so only infrequently and will exist for a short period only.

1.3.13 *Non-hazardous area* means an area which is not considered to be hazardous, i.e. gas safe, provided certain conditions are being met.

1.3.14 *High-pressure piping* means gas fuel piping with maximum working pressure greater than 10 bar.

1.3.15 *IEC* means the International Electrotechnical Commission.

1.3.16 *IGC Code* means the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk, as amended.

1.3.17 *LEL* means the lower explosive limit.

1.3.18 *LNG* means liquefied natural gas (ref. 1.3.22).

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2 See also definition in IEC 60092-502:1999.

3 Refer also to the area classification specified in Sec. 2.5 of IEC 60079-10-1:2008 Explosive atmospheres – Part 10-1: Classification of areas – Explosive gas atmospheres.

1.3.19 *Main tank valve* means a remote operated valve on the gas outlet from a gas storage tank, located as close to the tank outlet point as possible.

1.3.20 *MARVS* means the maximum allowable relief valve setting of a gas tank.

1.3.21 *Master gas fuel valve* means an automatic valve in the gas supply line to each engine located outside the machinery space for gas-fuelled engines and as close to the gas heater (if fitted) as possible.

1.3.22 *Natural gas* means a gas without condensation at common operating pressures and temperatures where the predominant component is methane with some ethane and small amounts of heavier hydrocarbons (mainly propane and butane).

1.3.23 *Open deck* means a deck that is open on both ends, or is open on one end and equipped with adequate natural ventilation that is effective over the entire length of the deck through permanent openings distributed in the side panels or in the deck above.

1.3.24 *Organization* means the International Maritime Organization (IMO).

1.3.25 *Risk* means the expression of the danger that an undesired event represents to persons, to the environment or to material property. The risk is expressed by the probability and consequences of an accident.

1.3.26 *Recognized standards* means applicable international or national standards acceptable to the Administration or standards laid down and maintained by an organization which complies with the standards adopted by the Organization and which is recognized by the Administration.

1.3.27 *Safety management system* means the international safety management system as described in the ISM Code.

1.3.28 *Second Barrier* means a technical measure which prevents the occurrence of a hazard if the first barrier fails, e.g., second housing of a tank protecting the surroundings from the effect of tank leaks.

1.3.29 *Semi-enclosed space* means a space limited by decks and or bulkheads in such manner that the natural conditions of ventilation are notably different from those obtained on open deck[4].

1.3.30 *Single gas fuel engine* means a power generating engine capable of operating on gas-only, and not able to switch over to oil fuel operation.

1.3.31 *SOLAS Convention* means the International Convention for the Safety of Life at Sea, 1974, as amended.

1.3.32 *Source of release* means any valve, detachable pipe joint, pipe packing, compressor or pump seal in the gas fuel system.

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[4] Refer also to IEC 60092-502:1999 Electrical Installations in Ships – Tankers – Special Features.

1.3.33 *Tank room* means the gastight space surrounding the bunker tank, containing all tank connections and all tank valves.

### 1.4 Survey requirements

1.4.1 Surveys should be performed and certification issued in accordance with the provisions of SOLAS 1974, as modified by its 1988 Protocol and as amended, chapter 1, part B, regulation 6 or 7, as applicable[5].

## CHAPTER 2

## SHIP ARRANGEMENTS AND SYSTEM DESIGN

### 2.1 General

2.1.1 For any new or altered concept or configuration a risk analysis should be conducted in order to ensure that any risks arising from the use of gas-fuelled engines affecting the structural strength and the integrity of the ship are addressed. Consideration should be given to the hazards associated with installation, operation, and maintenance, following any reasonably foreseeable failure.

2.1.2 The risks should be analysed using acceptable and recognized risk analysis techniques and loss of function, component damage, fire, explosion and electric shock should as a minimum be considered. The analysis should ensure that risks are eliminated wherever possible. Risks which cannot be eliminated should be mitigated as necessary. Details of risks, and the means by which they are mitigated, should be included in the operating manual.

2.1.3 An explosion in any space containing open gas sources should not:

.1 cause damage to any space other than that in which the incident occurs;

.2 disrupt the proper functioning of other zones;

.3 damage the ship in such a way that flooding of water below the main deck or any progressive flooding occur;

.4 damage work areas or accommodation in such a way that people who stay in such areas under normal operating conditions are injured;

.5 disrupt the proper functioning of control stations and switchboard rooms for necessary power distribution;

.6 damage life-saving equipment or associated launching arrangements;

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[5] Refer to resolution A.997(25) on Revised survey guidelines under the harmonized system of survey and certification.

.7 disrupt the proper functioning of fire-fighting equipment located outside the explosion-damaged space; or

.8 affect other areas in the vessel in such a way that chain reactions involving, *inter alia*, cargo, gas and bunker oil may arise.

## 2.2 Material requirements

2.2.1 Materials used in gas tanks, gas piping, process pressure vessels and other components in contact with gas should be in accordance with IGC Code, chapter 6, Materials of construction. For CNG tanks, the use of materials not covered by the IGC Code may be specially considered by the Administration.

2.2.2 Materials for piping system for liquefied gases should comply with the requirements of the IGC Code, section 6.2. Some relaxation may, however, be permitted in the quality of the material of open-ended vent piping, provided the temperature of the gas at atmospheric pressure is -55°C or higher, and provided no liquid discharge to the vent piping can occur. Materials should in general be in accordance with recognized standards.

2.2.3 Materials having a melting point below 925°C should not be used for piping outside the gas tanks except for short lengths of pipes attached to the gas tanks, in which case the low melting point materials should be wrapped in class A-60 insulation.

## 2.3 Location and separation of spaces

### 2.3.1 *The arrangement and location of spaces*

The arrangement and location of spaces for gas fuel storage, distribution and use should be such that the number and extent of hazardous areas is kept to a minimum.

### 2.3.2 *Gas compressor room*

2.3.2.1 Compressor rooms, if arranged, should be located above freeboard deck, unless those rooms are arranged and fitted in accordance with the requirements of these Guidelines for tank rooms.

2.3.2.2 If compressors are driven by shafting passing through a bulkhead or deck, the bulkhead penetration should be of gastight type.

### 2.3.3 *Machinery spaces containing gas-fuelled engines*

2.3.3.1 When more than one machinery space is required for gas-fuelled engines and these spaces are separated by a single bulkhead, the arrangements should be such that the effects of a gas explosion in either space can be contained or vented without affecting the integrity of the adjacent space and equipment within that space.

2.3.3.2 ESD-protected machinery spaces for gas-fuelled engines should have as simple a geometrical shape as possible.

### 2.3.4 *Tank rooms*

2.3.4.1 Tank room boundaries including access doors should be gastight.

2.3.4.2 The tank room should not be located adjacent to machinery spaces of category A. If the separation is by means of a cofferdam the separation should be at least 900 mm and insulation to class A-60 should be fitted on the engine-room side.

## 2.4 Arrangement of entrances and other openings

2.4.1 Direct access through doors, gastight or otherwise, should generally not be permitted from a gas-safe space to a gas-dangerous space. Where such openings are necessary for operational reasons, an air lock which complies with the requirements of chapter 3.6 (2 to 7) of the IGC Code should be provided.

2.4.2 If the compressor room is approved located below deck, the room should, as far as practicable, have an independent access direct from the open deck. Where a separate access from deck is not practicable, an air lock which complies with the requirements of chapter 3.6 (2 to 7) of the IGC Code should be provided.

2.4.3 The tank room entrance should be arranged with a sill height of at least 300 mm.

2.4.4 Access to the tank room should as far as practicable be independent and direct from open deck. If the tank room is only partially covering the tank, this requirement should also apply to the room surrounding the tank and where the opening to the tank room is located. Where a separate access from deck is not practicable, an air lock which complies with the requirements of chapter 3.6 (2 to 7) of the IGC Code should be provided. The access trunk should be fitted with separate ventilation. It should not be possible to have unauthorized access to the tank room during normal operation of the gas system.

2.4.5 If the access to an ESD-protected machinery space is from another enclosed space in the ship, the entrances should be arranged with self-closing doors. An audible and visual alarm should be provided at a permanent manned location. Alarm should be given if the door is open continuously for more than 1 min. As an alternative, an arrangement with two self-closing doors in series may be acceptable.

## 2.5 General pipe design

2.5.1 The requirements of this section apply to gas piping. The Administration may accept relaxation from these requirements for gas piping inside gas tanks and open-ended piping after special consideration, such as risk assessment.

2.5.2 Gas piping should be protected against mechanical damage and the piping should be capable of assimilating thermal expansion without developing substantial tension.

2.5.3 The piping system should be joined by welding with a minimum of flange connections. Gaskets should be protected against blow-out.

2.5.4 The wall thickness of pipes should not be less than:

$$t = \frac{t_0 + b + c}{1 - \frac{a}{100}} \text{ (mm)}$$

where:

$t_0$ = theoretical thickness
$t_0$ = $pD/(20Ke + p)$

where:

$p$ = design pressure (bar), refer to 2.5.5

$D$ = outside diameter (mm)

$K$ = allowable stress ($N/mm^2$), refer to 2.5.6

e = efficiency factor equal to 1 for seamless pipes and for longitudinally or spirally welded pipes, delivered by approved manufacturers of welded pipes, which are considered equivalent to seamless pipes when non-destructive testing on welds is carried out in accordance with recognized standards. In other cases an efficiency factor value depending on the manufacturing process may be determined by the Administration.

b = allowance for bending (mm). The value of b should be chosen so that the calculated stress in the bend, due to internal pressure only, does not exceed the allowable stress. Where such justification is not give, b should be:

$$b = \frac{Dt_0}{2.5r} \text{ (mm)}$$

with:

r = mean radius of the bend (mm).

c = corrosion allowance (mm). If corrosion allowance or erosion is expected, the wall thickness of the piping should be increased over that required by other design requirements. This allowance should be consistent with the expected life of the piping.

a = negative manufacturing tolerance for thickness (%).

The minimum wall thickness should be in accordance with Recognized Standards.

2.5.5 The greater of the following design conditions should be used for piping, piping system and components as appropriate:

.1 for systems or components which may be separated from their relief valves and which contain only vapour at all times, the superheated vapour pressure at 45°C or higher or lower if agreed upon by the Administration (ref. IGC Code, paragraph 4.2.6.2), assuming an initial condition of saturated vapour in the system at the system operating pressure and temperature; or

.2 the MARVS of the gas tanks and gas processing systems; or

.3 the pressure setting of the associated pump or compressor discharge relief valve if of sufficient capacity; or

.4 the maximum total discharge or loading head of the gas piping system; or

.5 the relief valve setting on a pipeline system if of sufficient capacity; or

.6 a pressure of 10 bar except for open-ended lines where it is not to be less than 5 bar.

2.5.6 For pipes made of steel including stainless steel, the allowable stress to be considered in the formula of the strength thickness in 2.5.4 is the lower of the following values:

$$\frac{R_m}{A} \text{ or } \frac{R_e}{B}$$

where:

$R_m$ = specified minimum tensile strength at room temperature (N/mm²)

$R_e$ = specified lower minimum yield stress or 0.2% proof stress at room temperature (N/mm²)

A = 2.7

B = 1.8

For pipes made of materials other than steel, the allowable stress should be considered by the Administration.

2.5.7 Where necessary for mechanical strength to prevent damage, collapse, excessive sag or buckling of pipe due to superimposed loads from supports, ship deflection or other causes, the wall thickness should be increased over that required by 2.5.4 or, if this is impractical or would cause excessive local stresses, these loads should be reduced, protected against or eliminated by other design methods.

2.5.8 Gas piping systems should have sufficient constructive strength. For high pressure gas piping systems this should be confirmed by carrying out stress analysis and taking into account:

.1 stresses due to the weight of the piping system;

.2 acceleration loads when significant; and

.3 internal pressure and loads induced by hog and sag of the ship.

2.5.9 Flanges, valves, fittings, etc., should be in accordance with Recognized Standards taking into account the design pressure defined in 2.5.5. For bellows and expansion joints used in vapour service, a lower minimum design pressure than defined in 2.5.5 may be accepted.

2.5.10 All valves and expansion joints used in high pressure gas systems should be of an approved type.

2.5.11 The following types of connections may be considered for direct connection of pipe lengths (without flanges):

.1 Butt welded joints with complete penetration at the root may be used in all applications. For design temperature below -10°C, butt welds should be either double welded or equivalent to a double welded butt joint. This may be accomplished by use of a backing ring, consumable insert or inert gas back-up on the first pass. For design pressures in excess of 10 bar and design temperatures -10°C or lower, backing rings should be removed.

.2 Slip-on welded joints with sleeves and related welding, having dimensions satisfactory to the Administration, should only be used for open-ended lines with external diameter of 50 mm or less and design temperatures not lower than -55°C.

.3 Screwed couplings should only be used for accessory lines and instrumentation lines with external diameters of 25 mm or less.

2.5.12 Flanges should be of the welding neck, slip-on or socket welding type. For all piping (except open-ended lines), the following apply:

.1 For design temperatures < -55°C only welding neck flanges should be used.

.2 For design temperatures < -10°C slip-on flanges should not be used in nominal sizes above 100 mm and socket welding flanges should not be used in nominal sizes above 50 mm.

2.5.13 Piping connections other than those mentioned above may be accepted upon consideration in each case.

2.5.14 Postweld heat treatment should be required for all butt welds of pipes made with carbon, carbon-manganese and low-alloy steels. The Administration may waive the requirement for thermal stress relieving of pipes having wall thickness less than 10 mm in relation to the design temperature and pressure of the piping system concerned.

2.5.15 When the design temperature is -110°C or lower, a complete stress analysis for each branch of the piping system should be submitted. This analysis should take into account all stresses due to weight of pipes with cargo (including acceleration if significant), internal pressure, thermal contraction and loads induced by movements of the ship. For temperatures above -110°C, a stress analysis may be required by the Administration. In any case, consideration should be given to thermal stresses, even if calculations need not be submitted. The analysis should be carried out according to a recognized code of practice.

2.5.16 Gas pipes should not be located less than 760 mm from the ship's side.

2.5.17 Gas piping should not be led through other machinery spaces. Alternatively, double gas piping may be approved, provided the danger of mechanical damage is negligible, the gas piping has no discharge sources and the room is equipped with a gas alarm.

2.5.18 An arrangement for purging gas bunkering lines and supply lines (only up to the double block and bleed valves if these are located close to the engine) with nitrogen should be provided.

2.5.19 The gas piping system should be installed with sufficient flexibility. Arrangement for provision of the necessary flexibility should be demonstrated to maintain the integrity of the piping system in all foreseen service situations.

2.5.20 Gas pipes should be colour marked based on a recognized standard[6].

2.5.21 If the fuel gas contains heavier components that may condense in the system, knock out drums or equivalent means for safely removing the liquid should be fitted.

2.5.22 All pipelines and components which may be isolated containing liquid gas should be provided with relief valves.

2.5.23 Where tanks or piping are separated from the ship's structure by thermal isolation, provision should be made for electrically bonding to the ship's structure both the piping and the tanks. All gasketed pipe joints and hose connections should be electrically bonded.

## 2.6 System configuration

### 2.6.1 *Alternative system configurations*

2.6.1.1 Two alternative system configurations may be accepted:

.1 *Gas safe machinery spaces*: Arrangements in machinery spaces are such that the spaces are considered gas safe under all conditions, normal as well as abnormal conditions, i.e. inherently gas safe.

.2 *ESD-protected machinery spaces*: Arrangements in machinery spaces are such that the spaces are considered non-hazardous under normal conditions, but under certain abnormal conditions may have the potential to become hazardous. In the event of abnormal conditions involving gas hazards, emergency shutdown (ESD) of non-safe equipment (ignition sources) and machinery is to be automatically executed while equipment or machinery in use or active during these conditions are to be of a certified safe type.

### 2.6.2 *Gas safe machinery spaces*

2.6.2.1 All gas supply piping within machinery space boundaries should be enclosed in a gastight enclosure, i.e. double wall piping or ducting.

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[6] Refer to EN ISO 14726:2008 Ships and marine technology – Identification colours for the content of piping systems.

2.6.2.2 In case of leakage in a gas supply pipe making shutdown of the gas supply necessary, a secondary independent fuel supply should be available. Alternatively, in the case of multi-engine installations, independent and separate gas supply systems for each engine or group of engines may be accepted.

2.6.2.3 For single fuel installations (gas only), the fuel storage should be divided between two or more tanks of approximately equal size. The tanks should be located in separate compartments.

### 2.6.3 *ESD-protected machinery spaces*

2.6.3.1 Gas supply piping within machinery spaces may be accepted without a gastight external enclosure on the following conditions:

.1 Engines for generating propulsion power and electric power should be located in two or more machinery spaces not having any common boundaries unless it can be documented that the common boundary can withstand an explosion in one of the rooms. Distribution of engines between the different machinery spaces should be such that in the case of shutdown of fuel supply to any one machinery space it is possible to maintain at least 40% of the propulsion power plus normal electrical power supply for sea-going services. Incinerators, inert gas generators or other oil fired boilers should not be located within an ESD-protected machinery space.

.2 The gas machinery, tank and valve installation spaces should contain only a minimum of such necessary equipment, components and systems as are required to ensure that any piece of equipment in each individual space maintains its principal function.

.3 Pressure in gas supply lines within machinery spaces should be less than 10 bar, e.g., this concept can only be used for low pressure systems.

.4 A gas detection system arranged to automatically shutdown the gas supply (also oil fuel supply if dual fuel) and disconnect all non-explosion protected equipment or installations should be fitted, as outlined in 5.5 and 5.6.

2.6.3.2 For single fuel installations (gas only), the fuel storage should be divided between two or more tanks of approximately equal size. The tanks should be located in separate compartments.

## 2.7 Gas supply system in gas machinery spaces

### 2.7.1 *Gas supply system for gas safe machinery spaces*

2.7.1.1 Gas supply lines passing through enclosed spaces should be completely enclosed by a double pipe or duct. This double pipe or duct should fulfil one of the following:

.1 The gas piping should be a double wall piping system with the gas fuel contained in the inner pipe. The space between the concentric pipes should be pressurized with inert gas at a pressure greater than the gas fuel pressure. Suitable alarms should be provided to indicate a loss of inert gas pressure between the pipes. When the inner pipe contains high pressure gas, the system should be so arranged that the pipe between the master gas valve and the engine is automatically purged with inert gas when the master gas valve is closed; or

.2 The gas fuel piping should be installed within a ventilated pipe or duct. The air space between the gas fuel piping and the wall of the outer pipe or duct should be equipped with mechanical under pressure ventilation having a capacity of at least 30 air changes per hour. This ventilation capacity may be reduced to 10 air changes per hour provided automatic filling of the duct with nitrogen upon detection of gas is arranged for. The fan motors should comply with the required explosion protection in the installation area. The ventilation outlet should be covered by a protection screen and placed in a position where no flammable gas-air mixture may be ignited.

2.7.1.2 The connecting of gas piping and ducting to the gas injection valves should be so as to provide complete coverage by the ducting. The arrangement should facilitate replacement and/or overhaul of injection valves and cylinder covers. The double ducting should be required also for gas pipes on the engine itself, and all the way until gas is injected into the chamber.[7]

2.7.1.3 For high-pressure piping the design pressure of the ducting should be taken as the higher of the following:

.1 the maximum built-up pressure: static pressure in way of the rupture resulting from the gas flowing in the annular space;

.2 local instantaneous peak pressure in way of the rupture: this pressure is to be taken as the critical pressure and is given by the following expression:

$$p^* = p_0 \left( \frac{2}{k+1} \right)^{\frac{k}{k-1}}$$

where:

$p_0$ = maximum working pressure of the inner pipe

k = $C_p/C_v$ constant pressure specific heat divided by the constant volume specific heat

k = 1.31 for $CH_4$

The tangential membrane stress of a straight pipe should not exceed the tensile strength divided by 1.5 ($R_m/1.5$) when subjected to the above pressures. The pressure ratings of all other piping components should reflect the same level of strength as straight pipes.

As an alternative to using the peak pressure from the above formula, the peak pressure found from representative tests can be used. Test reports should then be submitted.

2.7.1.4 For low pressure piping the duct should be dimensioned for a design pressure not less than the maximum working pressure of the gas pipes. The duct should also be pressure tested to show that it can withstand the expected maximum pressure at gas pipe rupture.

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[7] If gas is supplied into the air inlet on a low pressure engine, double ducting may be omitted on the air inlet pipe on the condition that a gas detector is fitted above the engine.

2.7.1.5 The arrangement and installation of the high-pressure gas piping should provide the necessary flexibility for the gas supply piping to accommodate the oscillating movements of the main engine, without running the risk of fatigue problems. The length and configuration of the branch lines are important factors in this regard.

### 2.7.2 *Gas supply system for ESD-protected machinery spaces*

2.7.2.1 The pressure in the gas supply system should not exceed 10 bar.

2.7.2.2 The gas supply lines should have a design pressure not less than 10 bar.

## 2.8 Gas fuel storage

### 2.8.1 *Liquefied gas storage tanks*

2.8.1.1 The storage tank used for liquefied gas should be an independent tank designed in accordance with the IGC Code, chapter 4.

2.8.1.2 Pipe connections to the tank should normally be mounted above the highest liquid level in the tanks. However, connections below the highest liquid level may be accepted after special consideration by the Administration.

2.8.1.3 Pressure relief valves as required in the IGC Code chapter 8 should be fitted.

2.8.1.4 The outlet from the pressure relief valves should normally be located at least B/3 or 6 m, whichever is greater, above the weather deck and 6 m above the working area and gangways, where B is the greatest moulded breadth of the ship in metres. The outlets should normally be located at least 10 m from the nearest:

.1 air intake, air outlet or opening to accommodation, service and control spaces, or other gas safe spaces; and

.2 exhaust outlet from machinery or from furnace installation.

2.8.1.5 Storage tanks for liquid gas should not be filled to more than 98% full at the reference temperature, where the reference temperature is as defined in the IGC Code, paragraph 15.1.4. A filling limit curve for actual filling temperatures should be prepared from the formula given in the IGC Code, paragraph 15.1.2. However, when the tank insulation and tank location makes the probability very small for the tank contents to be heated up due to external fire, special considerations may be made to allow a higher filling limit than calculated using the reference temperature, but never above 95%.

2.8.1.6 Means that are not dependent on the gas machinery system should be provided whereby liquid gas in the storage tanks can be emptied.

2.8.1.7 It should be possible to empty, purge gas and vent bunker tanks with gas piping systems. Procedures should be prepared for this. Inerting should be performed with, for instance, nitrogen, $CO_2$ or argon prior to venting to avoid an explosion hazardous atmosphere in tanks and gas pipes.

**2.8.2** ***Compressed gas storage tanks***

2.8.2.1 The storage tanks to be used for compressed gas should be certified and approved by the Administration.

2.8.2.2 Tanks for compressed gas should be fitted with pressure relief valves with a set point below the design pressure of the tank and with outlet located as required in 2.8.1.4.

**2.8.3** ***Storage on open deck***

2.8.3.1 Both gases of the compressed and the liquefied type may be accepted stored on open deck.

2.8.3.2 The storage tanks or tank batteries should be located at least B/5 from the ship's side. For ships other than passenger ships a tank location closer than B/5 but not less than 760 mm from the ship's side may be accepted.

2.8.3.3 The gas storage tanks or tank batteries and equipment should be located to assure sufficient natural ventilation, so as to prevent accumulation of escaped gas.

2.8.3.4 Tanks for liquid gas with a connection below the highest liquid level (see 2.8.1.2) should be fitted with drip trays below the tank which should be of sufficient capacity to contain the volume which could escape in the event of a pipe connection failure. The material of the drip tray should be stainless steel, and there should be efficient separation or isolation so that the hull or deck structures are not exposed to unacceptable cooling, in case of leakage of liquid gas.

**2.8.4** ***Storage in enclosed spaces***

2.8.4.1 Gas in a liquid state may be stored in enclosed spaces, with a maximum acceptable working pressure of 10 bar. Storage of compressed gas in enclosed spaces and location of gas tanks with a higher pressure than 10 bar in enclosed spaces is normally not acceptable, but may be permitted after special consideration and approval by the Administration provided the following is fulfilled in addition to 2.8.4.3:

.1 adequate means are provided to depressurize the tank in case of a fire which can affect the tank; and

.2 all surfaces within the tank room are provided with suitable thermal protection against any lost high-pressure gas and resulting condensation unless the bulkheads are designed for the lowest temperature that can arise from gas expansion leakage; and

.3 a fixed fire-extinguishing system is installed in the tank room.

2.8.4.2 The gas storage tank(s) should be placed as close as possible to the centreline:

.1 minimum, the lesser of B/5 and 11.5 m from the ship side;

.2 minimum, the lesser of B/15 and 2 m from the bottom plating;

.3 not less than 760 mm from the shell plating.

For ships other than passenger ships and multi-hulls, a tank location closer than B/5 from the ship side may be accepted.

2.8.4.3 The storage tank and associated valves and piping should be located in a space designed to act as a second barrier, in case of liquid or compressed gas leakage. The material of the bulkheads of this space should have the same design temperature as the gas tank, and the space should be designed to withstand the maximum pressure build-up. Alternatively, pressure relief venting to a safe location (mast) can be provided. The space should be capable of containing leakage, and is to be isolated thermally so that the surrounding hull is not exposed to unacceptable cooling, in case of leakage of the liquid or compressed gas. This second barrier space is in other parts of these Guidelines called "tank room". When the tank is double walled and the outer tank shell is made of cold resistant material, a tank room could be arranged as a box fully welded to the outer shell of the tank, covering all tank connections and valves, but not necessarily all of the outer tank shell.

2.8.4.4 The tank room may be accepted as the outer shell of a stainless steel vacuum insulated tank in combination with a stainless steel box welded to the outer shell, containing all tank pipe connections, valves, piping, etc. In this case the requirements for ventilation and gas detection should be made applicable to the box, but not to the double barrier of the tank.

2.8.4.5 Bilge suctions from the tank room, if provided, should not be connected to the bilge system for the rest of the ship.

## 2.9 Fuel bunkering system and distribution system outside machinery spaces

### 2.9.1 *Fuel bunkering station*

2.9.1.1 The bunkering station should be so located that sufficient natural ventilation is provided. Closed or semi-enclosed bunkering stations should be subject to special consideration. The bunkering station should be physically separated or structurally shielded from accommodation, cargo/working deck and control stations. Connections and piping should be so positioned and arranged that any damage to the gas piping does not cause damage to the vessel's gas storage tank arrangement leading to uncontrolled gas discharge.

2.9.1.2 Drip trays should be fitted below liquid gas bunkering connections and where leakage may occur. The drip trays should be made of stainless steel, and should be drained over the ship's side by a pipe that preferably leads down near the sea. This pipe could be temporarily fitted for bunkering operations. The surrounding hull or deck structures should not be exposed to unacceptable cooling, in case of leakage of liquid gas. For compressed gas bunkering stations, low temperature steel shielding should be provided to prevent the possible escape of cold jets impinging on surrounding hull structure.

2.9.1.3 Control of the bunkering should be possible from a safe location in regard to bunkering operations. At this location tank pressure and tank level should be monitored. Overfill alarm and automatic shutdown should also be indicated at this location.

### 2.9.2 *Bunkering system*

2.9.2.1 The bunkering system should be so arranged that no gas is discharged to air during filling of storage tanks.

2.9.2.2 A manually-operated stop valve and a remote operated shutdown valve in series, or a combined manually-operated and remote valve should be fitted in every bunkering line close to the shore connecting point. It should be possible to release the remote-operated valve in the control location for bunkering operations and or another safe location.

2.9.2.3 If the ventilation in the ducting around the gas bunkering lines stops, an audible and visual alarm should be provided at bunkering control location.

2.9.2.4 If gas is detected in the ducting around the bunkering lines an audible and visual alarm should be provided at the bunkering control location.

2.9.2.5 Means should be provided for draining the liquid from the bunkering pipes at bunkering completion.

2.9.2.6 Bunkering lines should be arranged for inerting and gas freeing. During operation of the vessel the bunkering pipes should be gas free.

### 2.9.3 *Distribution outside of machinery spaces*

2.9.3.1 Gas fuel piping should not be led through accommodation spaces, service spaces or control stations.

2.9.3.2 Where gas pipes pass through enclosed spaces in the ship, they should be enclosed in a duct. This duct should be mechanically under pressure ventilated with 30 air changes per hour, and gas detection as required in 5.5 should be provided.

2.9.3.3 The duct should be dimensioned according to 2.7.1.3 and 2.7.1.4.

2.9.3.4 The ventilation inlet for the duct should always be located in open air, away from ignition sources.

2.9.3.5 Gas pipes located in open air should be so located that they are not likely to be damaged by accidental mechanical impact.

2.9.3.6 High-pressure gas lines outside the machinery spaces containing gas-fuelled engines should be installed and protected so as to minimize the risk of injury to personnel in case of rupture.

## 2.10 Ventilation system

### 2.10.1 *General*

2.10.1.1 Any ducting used for the ventilation of hazardous spaces should be separate from that used for the ventilation of non-hazardous spaces. The ventilation should function at all temperature conditions the ship will be operating in. Electric fan motors should not be located in

ventilation ducts for hazardous spaces unless the motor is certified for the same hazard zone as the space served.

2.10.1.2 Design of ventilation fans serving spaces containing gas sources should fulfil the following:

.1 Electric motors driving fans should comply with the required explosion protection in the installation area. Ventilation fans should not produce a source of vapour ignition in either the ventilated space or the ventilation system associated with the space. Ventilation fans and fan ducts, in way of fans only, should be of non-sparking construction defined as:

.1 impellers or housings of non-metallic material, due regard being paid to the elimination of static electricity;

.2 impellers and housings of non-ferrous metals;

.3 impellers and housing of austenitic stainless steel;

.4 impellers of aluminium alloys or magnesium alloys and a ferrous (including austenitic stainless steel) housing on which a ring of suitable thickness of non-ferrous materials is fitted in way of the impeller, due regard being paid to static electricity and corrosion between ring and housing; or

.5 any combination of ferrous (including austenitic stainless steel) impellers and housings with not less than 13 mm tip design clearance.

.2 In no case should the radial air gap between the impeller and the casing be less than 0.1 of the diameter of the impeller shaft in way of the bearing but not less than 2 mm. The gap need not be more than 13 mm.

.3 Any combination of an aluminium or magnesium alloy fixed or rotating component and a ferrous fixed or rotating component, regardless of tip clearance, is considered a sparking hazard and should not be used in these places.

.4 The installation on board of the ventilation units should be such as to ensure the safe bonding to the hull of the units themselves.

2.10.1.3 Any loss of the required ventilating capacity should give an audible and visual alarm at a permanently manned location.

2.10.1.4 Required ventilation systems to avoid any gas accumulation should consist of independent fans, each of sufficient capacity, unless otherwise specified in these Guidelines.

2.10.1.5 Air inlets for hazardous enclosed spaces should be taken from areas which, in the absence of the considered inlet, would be non-hazardous. Air inlets for non-hazardous enclosed spaces should be taken from non-hazardous areas at least 1.5 m away from the boundaries of any hazardous area. Where the inlet duct passes through a more hazardous space, the duct should have over-pressure relative to this space, unless mechanical integrity and gastightness of the duct will ensure that gases will not leak into it.

2.10.1.6 Air outlets from non-hazardous spaces should be located outside hazardous areas.

2.10.1.7 Air outlets from hazardous enclosed spaces should be located in an open area which, in the absence of the considered outlet, would be of the same or lesser hazard than the ventilated space.

2.10.1.8 The required capacity of the ventilation plant is normally based on the total volume of the room. An increase in required ventilation capacity may be necessary for rooms having a complicated form.

2.10.1.9 Non-hazardous spaces with opening to a hazardous area should be arranged with an air-lock and be maintained at overpressure relative to the external hazardous area. The overpressure ventilation should be arranged according to the following requirements:

.1 During initial start-up or after loss of overpressure ventilation, before energizing any electrical installations not certified safe for the space in the absence of pressurization, it should be required to:

.1 proceed with purging (at least 5 air changes) or confirm by measurements that the space is non-hazardous; and

.2 pressurize the space.

.2 Operation of the overpressure ventilation should be monitored.

.3 In the event of failure of the overpressure ventilation:

.1 an audible and visual alarm should be given at a manned location; and

.2 if overpressure cannot be immediately restored, automatic or programmed disconnection of electrical installations according to a recognized standard[8].

**2.10.2** ***Tank room***

2.10.2.1 The tank room for gas storage should be provided with an effective mechanical forced ventilation system of the under pressure type, providing a ventilation capacity of at least 30 air changes per hour. The rate of air changes may be reduced if other adequate means of explosion protection are installed. The equivalence of alternative installations should be demonstrated by a safety analysis.

2.10.2.2 Approved automatic fail-safe fire dampers should be fitted in the ventilation trunk for tank room.

**2.10.3** ***Machinery spaces containing gas-fuelled engines***

2.10.3.1 The ventilation system for machinery spaces containing gas-fuelled engines should be independent of all other ventilation systems.

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[8] Refer to IEC 60092-502:1999 Electrical Installations in Ships – Tankers – Special Features, table 5.

2.10.3.2 ESD-protected machinery spaces should have ventilation with a capacity of at least 30 air changes per hour. The ventilation system should ensure a good air circulation in all spaces, and in particular ensure that any formation of gas pockets in the room are detected. As an alternative, arrangements whereby under normal operation the machinery spaces is ventilated with at least 15 air changes an hour is acceptable provided that, if gas is detected in the machinery space, the number of air changes will automatically be increased to 30 an hour.

2.10.3.3 The number and power of the ventilation fans should be such that the capacity is not reduced by more than 50% of the total ventilation capacity, if a fan with a separate circuit from the main switchboard or emergency switchboard or a group of fans with common circuit from the main switchboard or emergency switchboard, is out of action.

**2.10.4** ***Pump and compressor rooms***

2.10.4.1 Pump and compressor rooms should be fitted with effective mechanical ventilation system of the under pressure type, providing a ventilation capacity of at least 30 air changes per hour.

2.10.4.2 The number and power of the ventilation fans should be such that the capacity is not reduced by more than 50%, if a fan with a separate circuit from the main switchboard or emergency switchboard or a group of fans with common circuit from the main switchboard or emergency switchboard, is out of action.

2.10.4.3 Ventilation systems for pump and compressor rooms should be in operation when pumps or compressors are working.

2.10.4.4 When the space is dependent on ventilation for its area classification, the following should apply:

.1 During initial start-up, and after loss of ventilation, the space should be purged (at least 5 air changes), before connecting electrical installations which are not certified for the area classification in absence of ventilation. Warning notices to this effect should be placed in an easily visible position near the control stand.

.2 Operation of the ventilation should be monitored.

.3 In the event of failure of ventilation, the following should apply:

.1 an audible and visual alarm should be given at a manned location;

.2 immediate action should be taken to restore ventilation; and

.3 electrical installations should be disconnected[9] if ventilation cannot be restored for an extended period. The disconnection should be made outside the hazardous areas, and be protected against unauthorized reconnection, e.g., by lockable switches.

[9] Intrinsically safe equipment suitable for zone 0 is not required to be switched off. Certified flameproof lighting may have a separate switch-off circuit.

# CHAPTER 3

# FIRE SAFETY

## 3.1 General

3.1.1 The requirements in this chapter are additional to those given in SOLAS chapter II-2.

3.1.2 A compressor room should be regarded as a machinery space of category A for fire protections purposes.

## 3.2 Fire protection

3.2.1 Tanks or tank batteries located above deck should be shielded with class A-60 insulation towards accommodation, service stations, cargo spaces and machinery spaces.

3.2.2 The tank room boundaries and ventilation trunks to such spaces below the bulkhead deck should be constructed to class A-60. However, where the room is adjacent to tanks, voids, auxiliary machinery spaces of little or no fire risk, sanitary and similar spaces, the insulation standard may be reduced to class A-0.

3.2.3 The fire and mechanical protection of gas pipes lead through ro-ro spaces on open deck should be subject to special consideration by the Administration depending on the use and expected pressure in the pipes. Gas pipes lead through ro-ro spaces on open deck should be provided with guards or bollards to prevent vehicle collision damage.

3.2.4 The bunkering station should be separated by class A-60 divisions towards other spaces, except for spaces such as tanks, voids, auxiliary machinery spaces of little or no fire risk, sanitary and similar spaces where the insulation standard may be reduced to class A-0.

3.2.5 When more than one machinery space is required and these spaces are separated by a single bulkhead, the bulkhead should be class A-60.

3.2.6 A compressor room in a ship not subject to the IGC Code should be regarded as a machinery space of category A for fire insulation requirements.

## 3.3 Fire extinction

### 3.3.1 *Fire main*

3.3.1.1 The water spray system required below may be part of the fire main system provided that the required fire pump capacity and working pressure is sufficient to operation of both the required numbers of hydrants and hoses and the water spray system simultaneously.

3.3.1.2 When the storage tank is located on open deck, isolating valves should be fitted in the fire main in order to isolate damage sections of the main. Isolation of a section of fire main shall not deprive the fire line ahead of the isolated section of water.

### 3.3.2 *Water spray systems*

3.3.2.1 A water spray system should be fitted for cooling and fire prevention and to cover exposed parts of gas storage tank located above deck.

3.3.2.2 The system should be designed to cover all areas as specified above with an application rate of 10 *l*/min/m$^2$ for horizontal projected surfaces and 4 *l*/min/m$^2$ for vertical surfaces.

3.3.2.3 For the purpose of isolating damage sections, stop valves should be fitted at least every 40 m or the system may be divided into two or more sections with control valves located in a safe and readily accessible position not likely to be cut-off in case of fire.

3.3.2.4 The capacity of the water spray pump should be sufficient to deliver the required amount of water to the hydraulically most demanding area as specified above in the areas protected.

3.3.2.5 A connection to the ship's fire main through a stop valve should be provided.

3.3.2.6 Remote start of pumps supplying the water spray system and remote operation of any normally closed valves to the system should be located in a readily accessible position which is not likely to be cut off in case of fire in the areas protected.

3.3.2.7 The nozzles should be of an approved full bore type and they should be arranged to ensure an effective distribution of water throughout the space being protected.

3.3.2.8 An equivalent system to the water spray system may be fitted provided it has been tested for its on-deck cooling capability to the satisfaction of the Administration.

### 3.3.3 *Dry chemical powder fire-extinguishing system*

3.3.3.1 In the bunkering station area a permanently installed dry chemical powder extinguishing system should cover all possible leak points. The capacity should be at least 3.5 kg/s for a minimum of 45 s discharges. The system should be arranged for easy manual release from a safe location outside the protected area.

3.3.3.2 One portable dry powder extinguisher of at least 5 kg capacity should be located near the bunkering station.

## 3.4 Fire detection and alarm system

### 3.4.1 *Detection*

3.4.1.1 An approved fixed fire detection system should be provided for the tank room and the ventilation trunk for tank room below deck.

3.4.1.2 Smoke detectors alone should not be considered sufficient for rapid fire detection.

3.4.1.3 Where the fire detection system does not include means of remotely identifying each detector individually, the detectors should be arranged on separate loops.

### 3.4.2 *Alarms and safety actions*

3.4.2.1 Required safety actions at fire detection in the machinery space containing gas-fuelled engines and tank room are given in table 1 of chapter V. In addition, the ventilation should stop automatically and fire dampers are to close.

## CHAPTER 4

## ELECTRICAL SYSTEMS

### 4.1 General

4.1.1 The provisions of this chapter should be applied in conjunction with applicable electrical requirements of part D of SOLAS chapter II-1.

4.1.2 Hazardous areas on open deck and other spaces not defined in this chapter should be decided based on a recognized standard[10]. The electrical equipment fitted within hazardous areas should be according to the same standard.

4.1.3 Electrical equipment and wiring should in general not be installed in hazardous areas unless essential for operational purposes based on a recognized standard[11].

4.1.4 Electrical equipment fitted in an ESD-protected machinery space should fulfil the following:

.1 In addition to fire and hydrocarbon detectors and fire and gas alarms, lighting and ventilation fans should be certified safe for hazardous area zone 1.

.2 All electrical equipment in a machinery space containing gas-fuelled engines, and not certified for zone 1 should be automatically disconnected, if gas concentrations above 20% LEL is detected on two detectors in the space containing gas-fuelled engines.

4.1.5 There should be an equalization connection between the bunker supplier and the bunkering station on the ship when a flammable gas/liquid is transferred.

4.1.6 Cable penetrations should satisfy the requirements regulating the dispersion of gas.

### 4.2 Area classification

#### 4.2.1 *General*

4.2.1.1 Area classification is a method of analysing and classifying the areas where explosive gas atmospheres may occur. The object of the classification is to allow the selection of electrical apparatus able to be operated safely in these areas.

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[10] Refer to IEC standard 60092-502, part 4.4: Tankers carrying flammable liquefied gases as applicable.

[11] The type of equipment and installation requirements should comply with IEC standard 60092-502: IEC 60092-502:1999 Electrical Installations in Ships – Tankers – Special Features and IEC 60079-10-1:2008 Explosive atmospheres – Part 10-1: Classification of areas – Explosive gas atmospheres, according to the area classification.

4.2.1.2 In order to facilitate the selection of appropriate electrical apparatus and the design of suitable electrical installations, hazardous areas are divided into zones 0, 1 and 2[12]. See also 4.3 below.

4.2.1.3 Area classification of a space may be dependent on ventilation[13].

4.2.1.4 A space with opening to an adjacent hazardous area on open deck, may be made into a less hazardous or non-hazardous space, by means of overpressure. Requirements to such pressurization are given in 2.10.

4.2.1.5 Ventilation ducts should have the same area classification as the ventilated space.

## 4.3 Definition of hazardous area zones

### 4.3.1 *Hazardous area zone 0*

This zone includes:

.1 the interiors of gas tanks, any pipework of pressure-relief or other venting systems for gas tanks, pipes and equipment containing gas.[14]

### 4.3.2 *Hazardous area zone 1*

This zone includes:

.1 tank room;

.2 gas compressor room arranged with ventilation according to 2.10.4;

.3 areas on open deck, or semi-enclosed spaces on deck, within 3 m of any gas tank outlet, gas or vapour outlet[15], bunker manifold valve, other gas valve, gas pipe flange, gas pump-room ventilation outlets and gas tank openings for pressure release provided to permit the flow of small volumes of gas or vapour mixtures caused by thermal variation;

.4 areas on open deck or semi-enclosed spaces on deck, within 1.5 m of gas compressor and pump room entrances, gas pump and compressor room ventilation inlets and other openings into zone 1 spaces;

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12 Refer to standards IEC 60079-10-1:2008 Explosive atmospheres – Part 10-1: Classification of areas – Explosive gas atmospheres and guidance and informative examples given in IEC 60092-502:1999, Electrical Installations in Ships – Tankers – Special Features for tankers.

13 Refer to standard IEC 60092-502:1999 Electrical Installations in Ships – Tankers – Special Features for tankers, table 1.

14 Instrumentation and electrical apparatus in contact with the gas or liquid gas should be of a type suitable for zone 0. Temperature sensors installed in thermo wells, and pressure sensors without additional separating chamber should be of intrinsically safe type Ex-ia.

15 Such areas are, for example, all areas within 3 m of gas tank hatches, ullage openings or sounding pipes for gas tanks located on open deck and gas vapour outlets.

.5 areas on the open deck within spillage coamings surrounding gas bunker manifold valves and 3 m beyond these, up to a height of 2.4 m above the deck;

.6 enclosed or semi-enclosed spaces in which pipes containing gas are located, e.g., ducts around gas pipes, semi-enclosed bunkering stations; and

.7 the ESD-protected machinery space is considered as non-hazardous area during normal operation, but changes to zone 1 in the event of gas leakage.

**4.3.3** ***Hazardous area zone 2***

This zone includes:

.1 areas within 1.5 m surrounding open or semi-enclosed spaces of zone 1[16].

## CHAPTER 5

## CONTROL, MONITORING AND SAFETY SYSTEMS

### 5.1 General

5.1.1 A local reading pressure gauge should be fitted between the stop valve and the connection to shore at each bunker pipe.

5.1.2 Pressure gauges should be fitted to gas pump discharge lines and to the bunkering lines.

5.1.3 A bilge well in each tank room surrounding an independent liquid gas storage tank should be provided with both a level indicator and a temperature sensor. Alarm should be given at high level in bilge well. Low temperature indication is to lead to automatic closing of main tank valve.

### 5.2 Gas tank monitoring

5.2.1 Gas tanks should be monitored and protected against overfilling as required in the IGC Code, sections 13.2 and 13.3.

5.2.2 Each tank should be monitored with at least one local indicating instrument for pressure and remote pressure indication at the control position. The pressure indicators should be clearly marked with the highest and lowest pressure permitted in the tank. In addition, high-pressure alarm, and if vacuum protection is required, low pressure alarm should be provided on the bridge. The alarms should be activated before the set pressures of the safety valves are reached.

[16] Refer to IEC 60092-502:1999 Electrical Installations in Ships – Tankers – Special Features or IEC 60079-10-1:2008 Explosive atmospheres – Part 10-1: Classification of areas, according to the area classification., as applicable if not otherwise specified in this standard.

### 5.3 Gas compressor monitoring

Gas compressors should be fitted with audible and visual alarms both on the bridge and in the engine-room. As a minimum the alarms should be in relation to low gas input pressure, low gas output pressure, high gas output pressure and compressor operation.

### 5.4 Gas engine monitoring

5.4.1 Additional to the instrumentation provided in accordance with SOLAS chapter II-1, Part C, indicators should be fitted on the navigation bridge, the engine control room and the manoeuvring platform for:

.1 operation of the engine in case of gas-only engines; or

.2 operation and mode of operation of the engine in the case of dual fuel engines.

5.4.2 Auxiliary systems where gas may leak directly into the system medium (lubricating oil, cooling water) should be equipped with appropriate gas extraction measures fitted directly after the outlet from the engine in order to prevent gas dispersion. The gas extracted from auxiliary systems media should be vented to a safe location in the open.

### 5.5 Gas detection

5.5.1 Permanently installed gas detectors should be fitted in the tank room, in all ducts around gas pipes, in machinery spaces of the ESD-protected type, compressor rooms and other enclosed spaces containing gas piping or other gas equipment without ducting. In each ESD-protected machinery space, two independent gas detector systems should be required.

5.5.2 The number of detectors in each space should be considered taking size, layout and ventilation of the space into account.

5.5.3 The detection equipment should be located where gas may accumulate and/or in the ventilation outlets. Gas dispersal analysis or a physical smoke test should be used to find the best arrangement.

5.5.4 An audible and visible alarm should be activated before the vapour concentration reaches 20% of the lower explosion limit (LEL). For ventilated ducts around gas pipes in the machinery spaces containing gas-fuelled engines, the alarm limit can be set to 30% LEL. The protective system should be activated at a LEL of 40%.

5.5.5 Audible and visible alarms from the gas detection equipment should be located on the bridge and in the engine control room.

5.5.6 Gas detection for gas pipe ducts and machinery spaces containing gas-fuelled engines should be continuous without delay.

### 5.6 Safety functions of gas supply systems

5.6.1 Each gas storage tank should be provided with a tank valve capable of being remote operated and is to be located as close to the tank outlet as possible.

5.6.2 The main gas supply line to each engine or set of engines should be equipped with a manually operated stop valve and an automatically operated "master gas fuel valve" coupled in series or a combined manually and automatically operated valve. The valves should be situated in the part of the piping that is outside machinery space containing gas-fuelled engines, and placed as near as possible to the installation for heating the gas, if fitted. The master gas-fuel valve should automatically cut off the gas supply as given in table 1.

5.6.2.1 The automatic master gas fuel valve should be operable from a reasonable number of places in the machinery space containing gas-fuelled engines, from a suitable location outside the space and from the bridge.

5.6.3 Each gas consuming equipment should be provided with a set of "double block and bleed" valves. These valves should be arranged as outlined in .1 or .2 (respectively shown as alternatives 1 and 2 in figure 1) so that when automatic shutdown is initiated as given in table 1, this will cause the two gas fuel valves that are in series to close automatically and the ventilation valve to open automatically and:

.1 two of these valves should be in series in the gas fuel pipe to the gas consuming equipment. The third valve should be in a pipe that vents to a safe location in the open air that portion of the gas fuel piping that is between the two valves in series; or

.2 the function of one of the valves in series and the ventilation valve can be incorporated into one valve body, so arranged that the flow to the gas utilization unit will be blocked and the ventilation opened.

5.6.3.1 The two block valves should be of the fail-to-close type, while the ventilation valve should be fail-to-open.

5.6.3.2 The double block and bleed valves should also be used for normal stop of the engine.

5.6.4 In cases where the master gas fuel valve is automatically shutdown, the complete gas supply branch downstream of the double block and bleed valve should be ventilated, if reverse flow from the engine to the pipe must be assumed.

5.6.5 There should be one manually operated shutdown valve in the gas supply line to each engine upstream of the double block and bleed valves to assure safe isolation during maintenance on the engine.

5.6.6 For one-engine installations and multi-engine installations, where a separate master valve is provided for each engine, the master gas fuel valve and the double block and bleed valve functions can be combined. Examples for the high-pressure system are shown in figures 1 and 2.

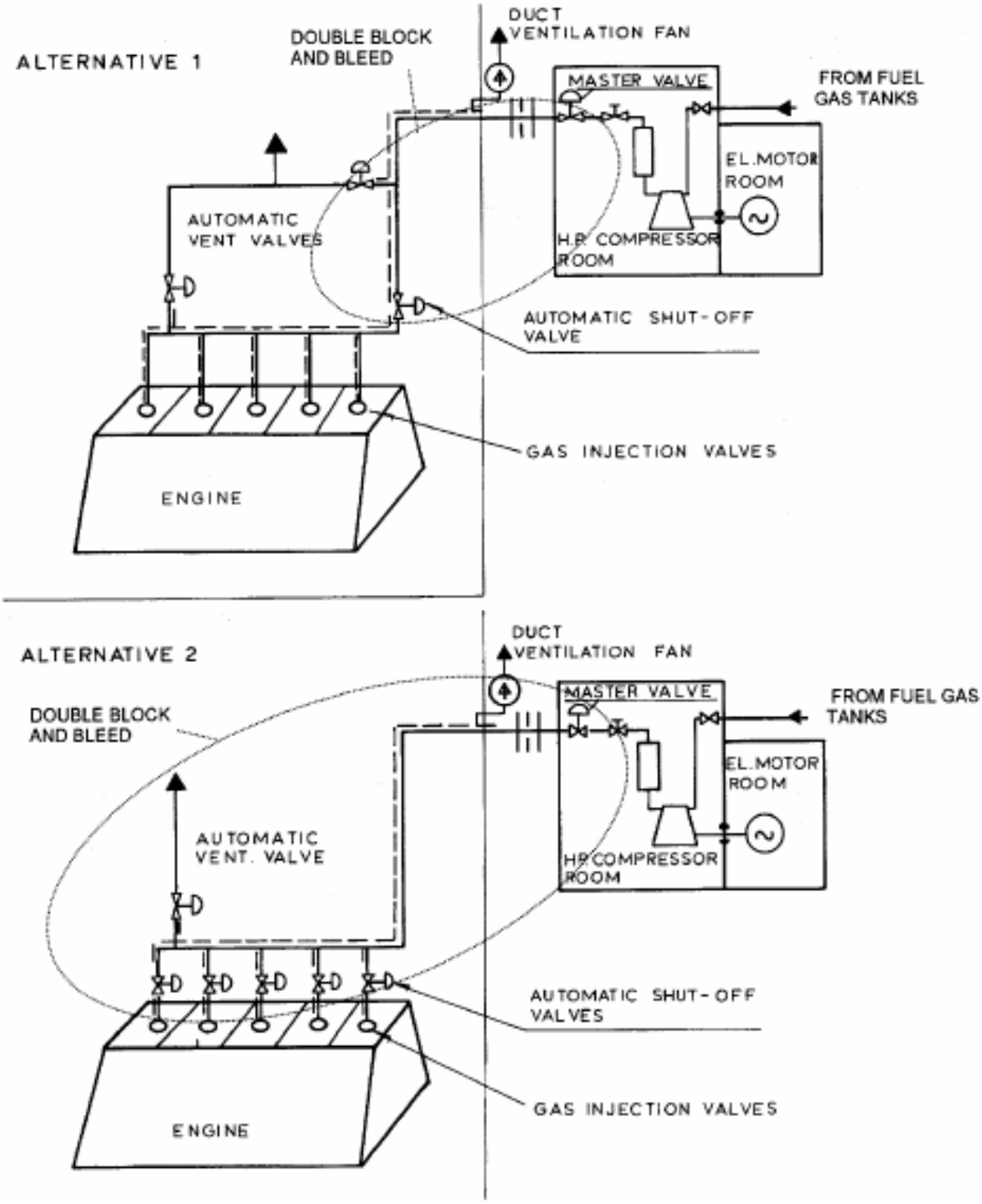


**Figure 1**

**Alternative supply valve arrangements for high-pressure installations (single engine or separate master valve arrangement)**

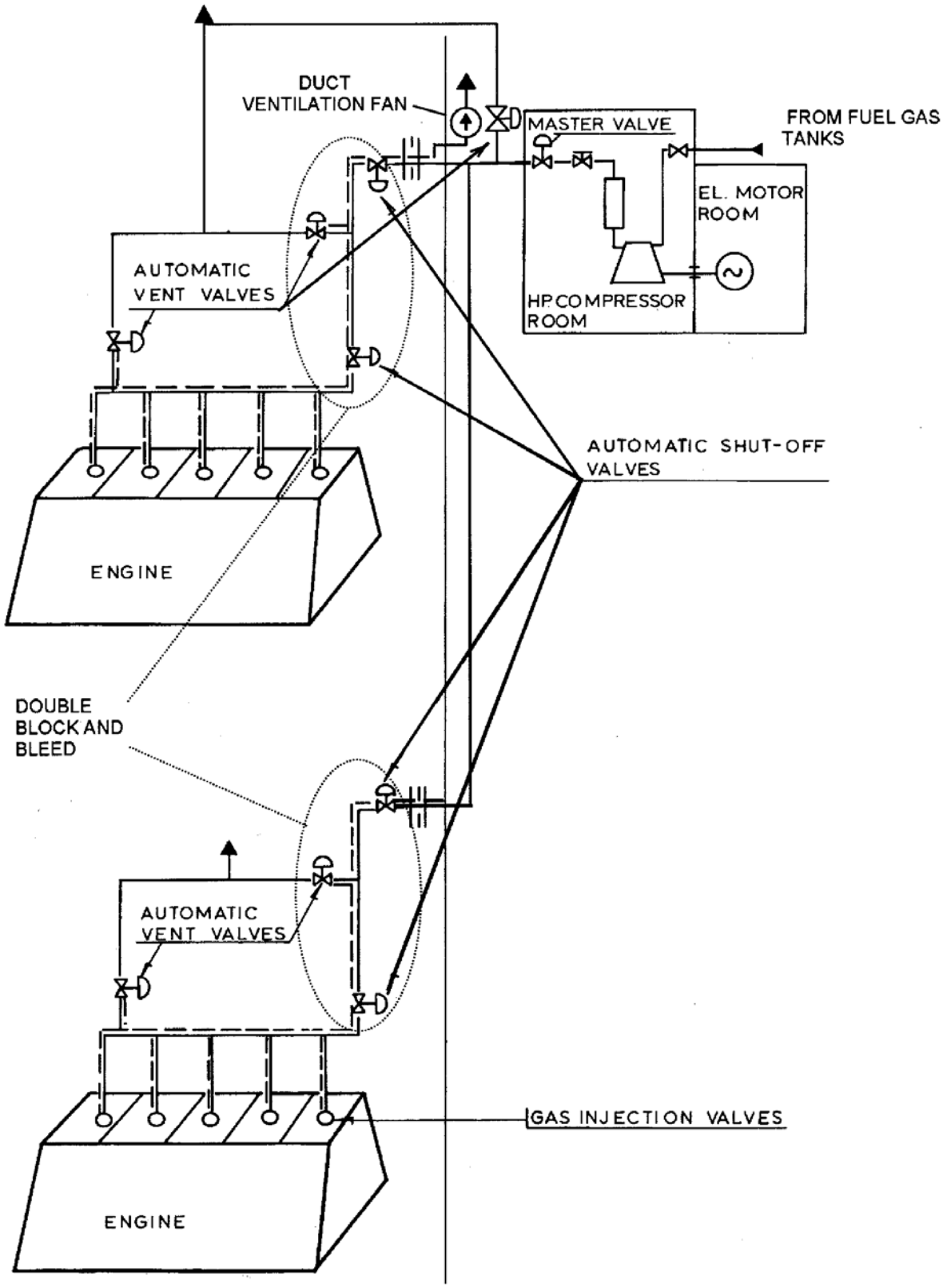


**Figure 2**

**Alternative supply valve arrangements for high-pressure installations (multi-engine installation)**

5.6.7 The total loss of ventilation in a machinery space for a single fuelled gas system should, additionally to what is given in table 1, lead to one of the following actions:

.1 *For a gas electric propulsion system with more than one machinery space*: Another engine should start. When the second engine is connected to bus-bar, the first engine should be shutdown automatically.

.2 *For a direct propulsion system with more than one machinery space*: The engine in the room with defect ventilation should be manually shutdown, if at least 40% propulsion power is still available after such a shutdown.

If only one machinery space for gas-fuelled engines is fitted and ventilation in one of the enclosed ducts around the gas pipes is lost, the master gas fuel and double block and bleed valves in that supply line should close automatically provided the other gas supply unit is ready to deliver.

5.6.8 If the gas supply is shut off due to activation of an automatic valve, the gas supply should not be opened until the reason for the disconnection is ascertained and the necessary precautions taken. A readily visible notice giving instruction to this effect should be placed at the operating station for the shut-off valves in the gas supply lines.

5.6.9 If a gas leak leading to a gas supply shutdown occurs, the gas fuel supply should not be operated until the leak has been found and dealt with. Instructions to this effect should be placed in a prominent position in the machinery space.

5.6.10 A signboard should be permanently fitted in the machinery space containing gas-fuelled engines stating that heavy lifting, implying danger of damage to the gas pipes, should not be done when the engine(s) is running on gas.

**Table 1 – Monitoring of gas supply system to engines**

| **Parameter** | **Alarm** | **Automatic shutdown of main tank valve** | **Automatic shutdown of gas supply to machinery space containing gas-fuelled engines** | **Comment** |
|---|---|---|---|---|
| Gas detection in tank room above 20% LEL | X | | | |
| Gas detection on two detectors [1)] in tank room above 40% LEL | X | X | | |
| Fire detection in tank room | X | X | | |
| Bilge well high level tank room | X | | | |
| Bilge well low temperature in tank room | X | X | | |
| Gas detection in duct between tank and machinery space containing gas-fuelled engines above 20% LEL | X | | | |

| **Parameter** | **Alarm** | **Automatic shutdown of main tank valve** | **Automatic shutdown of gas supply to machinery space containing gas-fuelled engines** | **Comment** |
|---|---|---|---|---|
| Gas detection on two detectors [1)] in duct between tank and machinery space containing gas-fuelled engines above 40% LEL | X | X [2)] | | |
| Gas detection in compressor room above 20% LEL | X | | | |
| Gas detection on two detectors[1)] in compressor room above 40% LEL | X | X [2)] | | |
| Gas detection in duct inside machinery space containing gas-fuelled engines above 30% LEL | X | | | If double pipe fitted in machinery space containing gas-fuelled engines |
| Gas detection on two detectors[1)] in duct inside machinery space containing gas-fuelled engines above 40% LEL | X | | X [3)] | If double pipe fitted in machinery space containing gas-fuelled engines |
| Gas detection in machinery space containing gas-fuelled engines above 20% LEL | X | | | Gas detection only required for ESD protected machinery space. |
| Gas detection on two detectors[1)] in machinery space containing gas-fuelled engines above 40% LEL | X | | X | Gas detection only required for ESD protected machinery space containing gas-fuelled engines. It should also disconnect non certified safe electrical equipment in machinery space containing gas-fuelled engines. |
| Loss of ventilation in duct between tank and machinery space containing gas-fuelled engines [6)] | X | | X [2) 4)] | |
| Loss of ventilation in duct inside machinery space containing gas-fuelled engines [6)] | X | | X [3) 4)] | If double pipe fitted in machinery space containing gas-fuelled engines |
| Loss of ventilation in machinery space containing gas-fuelled engines | X | | X | ESD protected machinery space containing gas-fuelled engines only |
| Fire detection in machinery space containing gas-fuelled engines | X | | X | |
| Abnormal gas pressure in gas supply pipe | X | | X [4)] | |
| Failure of valve control actuating medium | X | | X[5)] | Time delayed as found necessary |

| Parameter | Alarm | Automatic shutdown of main tank valve | Automatic shutdown of gas supply to machinery space containing gas-fuelled engines | Comment |
|---|---|---|---|---|
| Automatic shutdown of engine (engine failure) | X | | X[5)] | |
| Emergency shutdown of engine manually released | X | | X | |

1) Two independent gas detectors located close to each other are required for redundancy reasons. If the gas detector is of self monitoring type the installation of a single gas detector can be permitted.
2) If the tank is supplying gas to more than one engine and the different supply pipes are completely separated and fitted in separate ducts and with the master valves fitted outside of the duct, only the master valve on the supply pipe leading into the duct where gas or loss of ventilation is detected is to close.
3) If the gas is supplied to more than one engine and the different supply pipes are completely separated and fitted in separate ducts and with the master valves fitted outside of the duct and outside of the machinery space containing gas-fuelled engines, only the master valve on the supply pipe leading into the duct where gas or loss of ventilation is detected is to close.
4) This parameter is not to lead to shutdown of gas supply for single fuel gas engines, only for dual fuel engines.
5) Only double block and bleed valves to close.
6) If the duct is protected by inert gas (see 2.7.1) then loss of inert gas overpressure is to lead to the same actions as given in this table.

# CHAPTER 6

# COMPRESSORS AND GAS ENGINES

## 6.1 Gas compressors

6.1.1 The fuel gas compressor should be fitted with accessories and instrumentation necessary for efficient and reliable function.

6.1.2 The gas compressor and fuel gas supply should be arranged for manual remote emergency stop from the following locations:

.1 cargo control room (relevant for cargo ships only);
.2 navigation bridge;
.3 engine control room; and
.4 fire control station.

## 6.2 Gas engine design general

6.2.1 The last gas valve prior to the gas engine should be controlled by the engine control system or by the engine gas demand.

All gas engine components, gas engine systems and gas engine subsystems should be designed to:

.1 exclude any explosion at all possible situations; or

.2 to allow explosions without detrimental effect and to discharge to a safe location. The explosion event should not interrupt the safe operation of the engine unless other safety measures allow the shutdown of the affected engine.

6.2.1.1 When gas is supplied in a mixture with air through a common manifold, sufficient flame arrestors should be installed before each cylinder head. The mixture inlet system should be designed to withstand explosions of mixture by means of:

.1 explosion relief venting to prevent excessive explosion pressures. It should be ensured that the explosion relief venting is installed in a way that it discharges to a safe location; or

.2 documentation demonstrating that the mixture inlet system has sufficient strength to contain the worst case explosion.

6.2.1.2 The exhaust system should be designed to withstand explosions of unburned mixture by means of:

.1 explosion relief venting to prevent excessive explosion pressures. It should be ensured that the explosion relief venting is installed such that they discharge to a safe location; or

.2 documentation showing that the exhaust system has sufficient strength to contain the worst case explosion.

6.2.1.3 The crankcase of gas engines should be provided with:

.1 crankcase explosion relief valves of a suitable type with sufficient relief area. The relief valves should be installed in way of each crank throw and should be arranged or provided with means to ensure that discharge from them is so directed as to minimize the possibility of injury to personnel. Refer to SOLAS regulations II-1/27 and 47.2; or

.2 documentation showing that the crankcase has sufficient strength to contain the worst case explosion.

6.2.1.4 It should be ensured that the explosion of unburned mixture within the exhaust system or the crankcase or the explosion of mixture within the mixture inlet is allowed without detrimental effect.

6.2.2 The design of piping on gas engines should follow the requirements in chapter 2.6 “System configuration” and chapter 2.7 “Gas supply system in gas machinery spaces”.

6.2.3 The combustion of the gas mixture should be monitored. This can be achieved by monitoring of the exhaust gas or combustion chamber temperature.

6.2.4 The exhaust pipes of gas-fuelled engines should not be connected to the exhaust pipes of other engines or systems.

### 6.3 Requirements dual fuel engines

6.3.1 Start and normal stop should be on oil fuel only. Gas injection should not be possible without a corresponding pilot oil injection. The amount of pilot fuel fed to each cylinder should be sufficient to ensure a positive ignition of the gas mixture.

6.3.2 In case of shut-off of the gas fuel supply, the engines should be capable of continuous operation by oil fuel only.

6.3.3 Changeover to and from gas fuel operation should only be possible at a power level and under conditions where it can be done with acceptable reliability as demonstrated through testing. On power reduction the changeover to oil fuel is to be automatic. The changeover process itself from and to gas operation should be automatic. Manual interruption should be possible in all cases.

6.3.4 On normal stop as well as emergency shutdown, gas fuel supply should be shut off not later than simultaneously with the oil fuel. It should not be possible to shut off the supply pilot fuel without first or simultaneously closing the gas supply to each cylinder or to the complete engine.

### 6.4 Requirements gas-only engines

6.4.1 The starting sequence should be such that fuel gas is not admitted to the cylinders until ignition is activated and the engine has reached an engine and application specific minimum rotational speed.

6.4.2 If ignition has not been detected by the engine monitoring system within an engine specific time after opening of the gas supply valve the gas supply valve should be automatically shut off and the starting sequence terminated. It should be ensured by any mean that any unburned gas mixture is flushed away from the exhaust system.

6.4.3 On normal stop as well as emergency shutdown, gas fuel supply should be shut off not later than simultaneously with the ignition. It should not be possible to shut off the ignition without first or simultaneously closing the gas supply to each cylinder or to the complete engine.

6.4.4 For constant speed engines the shut down sequence should be such that the engine gas supply valve closes at idle speed and that the ignition system is kept active until the engine is down to standstill.

## CHAPTER 7

## MANUFACTURE, WORKMANSHIP AND TESTING

### 7.1 General

The manufacture, testing, inspection and documentation should be in accordance with recognized standards and the specific requirements given in these Guidelines.

### 7.2 Gas tanks

Tests related to welding and tank testing should be in accordance with the IGC Code, sections 4.10 and 4.11.

### 7.3 Gas piping systems

7.3.1 The requirements for testing should apply to gas piping inside and outside the gas tanks. However, relaxation from these requirements may be accepted for piping inside gas tanks and open-ended piping.

7.3.2 Welding procedure tests should be required for gas piping and should be similar to those required for gas tanks in the IGC Code, paragraph 6.3.3. Unless otherwise especially agreed with the Administration, the test requirements should be in accordance with 7.3.3 below.

7.3.3 Test requirements:

.1 Tensile tests: Generally, tensile strength should not be less than the specified minimum tensile strength for the appropriate parent materials. The Administration may also require that the transverse weld tensile strength should not be less than the specified tensile strength for the weld metal, where the weld metal has a lower tensile strength than that of the parent metal. In every case, the position of fracture should be reported for information.

.2 Bend tests: No fracture should be acceptable after a 180° bend over a former of a diameter four times the thickness of the test piece, unless otherwise specially required or agreed with the Administration.

.3 Charpy V-notch impact tests: Charpy tests should be conducted at the temperature prescribed for the base material being joined. The results of the weld impact tests, minimum average energy (*E*), should be no less than 27 J. The weld metal requirements for sub-size specimens and singe energy values should be in accordance with the IGC Code paragraph 6.1.4. The results of fusion line and heat affected zone impact tests should show a minimum average energy (*E*) in accordance with the transverse or longitudinal requirements of the base material, whichever applicable, and for sub-size specimens, the minimum average energy (*E*) should be in accordance with the IGC Code, paragraph 6.1.4. If the material thickness does not permit machining either full-sized or standard sub-size specimens, the testing procedure and acceptance standards should be in accordance with recognized standards.

Impact testing is not required for piping with thickness less than 6 mm.

7.3.4 In addition to normal controls before and during the welding and to the visual inspection of the finished welds, the following tests should be required:

.1 For butt welded joints for piping systems with design temperatures lower than -10°C and with inside diameters of more than 75 mm or wall thicknesses greater than 10 mm, 100% radiographic testing should be required.

.2 When such butt welded joints of piping sections are made by automatic welding processes in the pipe fabrication shop, upon special approval, the extent of radiographic inspection may be progressively reduced but in no case to less than 10% of the joints. If defects are revealed the extent of examination should be increased to 100% and shall include inspection of previously accepted welds. This special approval should only be granted if well-documented quality assurance procedures and records are available to enable the Administration to assess the ability of the manufacturer to produce satisfactory welds consistently.

.3 For other butt welded joints of pipes, spot radiographic tests or other non-destructive tests should be carried out at the discretion of the Administration depending upon service, position and materials. In general, at least 10% of butt welded joints of pipes should be radiographed.

Butt welded joints of high-pressure gas pipes and gas supply pipes in ESD-protected machinery spaces should be subjected to 100% radiographic testing.

The radiographs should be assessed according to a recognized standard[17].

7.3.5 After assembly, all gas piping should be subjected to a hydrostatic test to at least 1.5 times the design pressure. However, when piping systems or parts of systems are completely manufactured and equipped with all fittings, the hydrostatic test may be conducted prior to installation aboard ship. Joints welded on board should be hydrostatically tested to at least 1.5 times the design pressure. Where water cannot be tolerated and the piping cannot be dried prior to putting the system into service, proposals for alternative testing fluids or testing methods should be submitted for approval.

7.3.6 After assembly on board, each gas piping system should be subjected to a leak test using air, halides or other suitable medium.

7.3.7 All gas piping systems including valves, fittings and associated equipment for handling gas should be tested under normal operating condition before set into normal operation.

## 7.4 Ducting

If the gas piping duct contains high-pressure pipes the ducting should be pressure tested to at least 10 bar.

## 7.5 Valves

Each size and each type of valve intended to be used at a working temperature below -55°C should be prototype tested as follows. It should be subjected to a tightness test at the minimum design temperature or lower and to a pressure not lower than the design pressure for the valves. During the test, the good operation of the valve should be ascertained.

## 7.6 Expansion bellows

7.6.1 The following prototype tests should be performed on each type of expansion bellows intended for use in gas piping, primarily on those used outside the gas tank:

.1 An overpressure test. A type element of the bellows, not pre-compressed, should be pressure tested to a pressure not less than 5 times the design pressure without bursting. The duration of the test should not be less than 5 min.

[17] Refer to ISO 5817:2003, Arc-welded joints in steel – Guidance on quality levels for imperfections, and should at least meet the requirements for quality level B.

.2 A pressure test on a type expansion joint complete with all the accessories (flanges, stays, articulations, etc.) at twice the design pressure at the extreme displacement conditions recommended by the manufacturer. No permanent deformations should be allowed. Depending on materials the test may be required to be performed at the minimum design temperature.

.3 A cyclic test (thermal movements). The test should be performed on a complete expansion joint, which is to successfully withstand at least as many cycles, under the conditions of pressure, temperature, axial movement, rotational movement and transverse movement, as it will encounter in actual service. Testing at room temperature, when conservative, is permitted.

.4 A cyclic fatigue test (ship deformation). The test should be performed on a complete expansion joint, without internal pressure, by simulating the bellow movement corresponding to a compensated pipe length for at least 2 x $10^6$ cycles at a frequency not higher than 5 Hz. This test is only required when, due to the piping arrangement, ship deformation loads are actually experienced.

7.6.2 The Administration may waive performance of the tests specified in 7.6.1, provided that complete documentation is supplied to establish the suitability of the expansion joints to withstand the expected working conditions. When the maximum internal pressure exceeds 1 bar, this documentation should include sufficient tests data to justify the design method used, with particular reference to correlation between calculation and test results.

## CHAPTER 8

## OPERATIONAL AND TRAINING REQUIREMENTS

### 8.1 Operational requirement

8.1.1 The whole operational crew of a gas-fuelled cargo and a passenger ship should have necessary training in gas-related safety, operation and maintenance prior to the commencement of work on board.

8.1.2 Additionally, crew members with a direct responsibility for the operation of gas-related equipment on board should receive special training. The company should document that the personnel have acquired the necessary knowledge and that this knowledge is maintained at all times.

8.1.3 Gas-related emergency exercises should be conducted at regular intervals. Safety and response systems for the handling of defined hazards and accidents should be reviewed and tested.

8.1.4 A training manual should be developed and a training programme and exercises should be specially designed for each individual vessel and its gas installations.

## 8.2 Gas-related training

### 8.2.1 *Training in general*

The training on gas-fuelled ships is divided into the following categories:

.1 category A: Basic training for the basic safety crew;
.2 category B: Supplementary training for deck officers; and
.3 category C: Supplementary training for engineer officers.

#### 8.2.1.1 *Category A training*

.1 The goal of the category A training should provide the basic safety crew with a basic understanding of the gas in question as a fuel, the technical properties of liquid and compressed gas, explosion limits, ignition sources, risk reducing and consequence reducing measures, and the rules and procedures that must be followed during normal operation and in emergency situations.

.2 The general basic training required for the basic safety crew is based on the assumption that the crew does not have any prior knowledge of gas, gas engines and gas systems. The instructors should include one or more of the suppliers of the technical gas equipment or gas systems, alternatively other specialists with in-depth knowledge of the gas in question and the technical gas systems that are installed on board.

.3 The training should consist of both theoretical and practical exercises that involve gas and the relevant systems, as well as personal protection while handling liquid and compressed gas. Practical extinguishing of gas fires should form part of the training, and should take place at an approved safety centre.

#### 8.2.1.2 *Categories B and C training*

.1 Deck and engineer officers should have gas training beyond the general basic training. Category B and category C training should be divided technically between deck and engineer officers. The Company's training manager and the Master should determine what comes under deck operations and what comes under engineering.

.2 Those ordinary crew members who are to participate in the actual bunkering work, as well as gas purging, or are to perform work on gas engines or gas installations, etc., should participate in all or parts of the training for category B/C. The Company and the Master are responsible for arranging such training based on an evaluation of the concerned crew member's job instructions/area of responsibility on board.

.3 The instructors used for such supplementary training should be the same as outlined for category A.

.4 All gas-related systems on board should be reviewed. The ship's maintenance manual, gas supply system manual and manual for electrical equipment in explosion hazardous spaces and zones should be used as a basis for this part of the training.

.5 This regulation should be regularly reviewed by the Company and onboard Senior Management team as part of the SMS system. Risk analysis should be emphasized, and any risk analysis and sub-analyses performed should be available to course participants during training.

.6 If the ship's own crew will be performing technical maintenance of gas equipment, the training for this type of work should be documented.

.7 The Master and the Chief engineer officer should give the basic safety crew on board their final clearance prior to the entry into service of the ship. The clearance document should only apply to gas-related training, and it should be signed by both the Master/Chief engineer officer and the course participant. The clearance document for gas-related training may be integrated in the ship's general training programme, but it should be clearly evident what is regarded as gas-related training and what is regarded as other training.

.8 The training requirements related to the gas system should be evaluated in the same manner as other training requirements on board at least once a year. The training plan should be evaluated at regular intervals.

## 8.3 Maintenance

8.3.1 A special maintenance manual should be prepared for the gas supply system on board.

8.3.2 The manual should include maintenance procedures for all technical gas-related installations, and shall comply with the recommendations of the suppliers of the equipment. The intervals for and the extent of the replacement/approval of gas valves should be established. The maintenance procedure should specify who is qualified to carry out maintenance.

8.3.3 A special maintenance manual should be prepared for electrical equipment that is installed in explosion hazardous spaces and areas. The inspection and maintenance of electrical installations in explosion hazardous spaces should be performed in accordance with a recognized standard.[18]

8.3.4 Any personnel that should carry out inspections and maintenance of electrical installations in explosion hazardous spaces should be qualified [pursuant to IEC 60079-17, item 4.2].

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[18] Refer to IEC 60079-17:2007 Explosive atmospheres – Part 17: Electrical installations inspection and maintenance.

# ANNEX 10

## WORK PLAN, SCOPE AND FRAMEWORK FOR THE DEVELOPMENT OF THE INTERNATIONAL CODE OF SAFETY FOR GAS-FUELLED SHIPS (IGF CODE)

**Work plan:**

At BLG 14:

1 Establish a working group to:

.1 consider the outcome of the correspondence group and further develop the IGF Code;

.2 consider referral of various chapters of the first draft to relevant sub-committees; and

.3 invite the STW Sub-Committee to develop training requirements for officers and ratings serving on board gas-fuelled ships for inclusion in the STCW Convention and/or Code.

2 Establish a correspondence group to further develop the IGF Code.

At BLG 15:

1 Establish a working group to:

.1 consider the outcome of the correspondence group and further develop the IGF Code;

.2 consider referral of various chapters of the first draft to relevant sub-committees; and

.3 invite the STW Sub-Committee to develop training requirements for officers and ratings serving on board gas-fuelled ships for inclusion in the STCW Convention and/or Code.

2 Establish a correspondence group to further develop the IGF Code.

At BLG 16:

1 Establish a working group to finalize the IGF Code taking into account the output of other sub-committees; and if necessary

2 establish a correspondence group to finalize the IGF Code.

The latter will depend on the meeting frequencies of the various sub-committees.

**Scope:**

1 The International Code of Safety for Gas-fuelled Ships (IGF Code) should provide safety measures for ships using various gases as fuel. The relationship between the ICG Code and the IGF Code should be defined.

2 The IGF Code is intended to address not only natural gas fuel, but also other gas fuel types, such as butane, hydrogen, propane. Other energy converters such as fuel cells, high pressure direct injection engines, etc., should also be covered.

3 The IGF Code should only address issues not already covered by SOLAS and serve as an addition to SOLAS.

4 The IGF Code when finalized should revoke the Interim Guidelines.

5 The IGF Code may address particular requirements for particular ship types.

6 Additional training requirements for officers and ratings should be addressed in the STCW Convention and/or Code. The need for development of a model training course should be considered. Should be carried out by the STW Sub-Committee.

**Framework:**

Principles:

1 In order to facilitate the application to all ship types in a flexible way without inhibiting technical innovation the provisions of the IGF Code will be developed to the extent possible in a functional manner.

2 The Interim Guidelines already developed may serve as guidance for the issues to be addressed, but are not intended to preempt the development of the IGF Code with regard to the scope of application or regulatory style.

3 Two concepts should be considered:

- Gas safe
- Emergency shut down (ESD).

Structure:

PART A, applicable to all fuel installations except for oil fuel and [installations covered by the IGC Code].

**Goals:**

1 The goal of the International Code of Safety for Gas-fuelled Ships (IGF Code) to be developed is to provide criteria for the equipment arrangement and installation of machinery for propulsion and auxiliary purposes, using various gases as fuel.

2 Any system design should have an equivalent level of integrity in terms of safety, reliability and dependability as that which can be achieved with new and comparable conventional oil fuelled main and auxiliary machinery or existing gas-fuelled installations covered by the IGC Code.

Functional requirements to achieve the goals (see also document DE 50/7/1):

.1 Minimize hazardous areas as far as is practicable to reduce the potential risks that might affect the safety of the ship, personnel and equipment.

.2 Minimize equipment installed in hazardous areas to that required for operational purposes. Equipment installed in hazardous areas should be suitable and appropriately certified.

.3 Arrange hazardous areas to ensure pockets of gas cannot accumulate under normal and foreseeable failure conditions.

.4 Arrange propulsion and electrical power generating installation to be capable of sustained or restored operation in the event that a gas-fuelled essential service becomes inoperative.

.5 Provide ventilation to protect personnel from an oxygen deficient atmosphere in the event of a gas leakage.

.6 Minimize the number of ignition sources in hazardous spaces by design, arrangements and selection of suitable equipment.

.7 Arrange safe and suitable gas fuel storage and bunkering arrangements capable of taking on board and containing the gas fuel in the required state without leakage and overpressure.

.8 Provide gas piping systems, containment and over-pressure relief arrangements that are of suitable design, construction and installation for their intended application.

.9 Design, construct, install, operate and protect gas-fuelled machinery, gas system and components to achieve safe and reliable operation consistent with that of oil-fuelled machinery.

.10 Arrange and locate gas storage tank rooms and machinery spaces such that a fire or explosion in either will not render the machinery/equipment in other compartments inoperable.

.11 Provide safe and reliable gas-fuel control engineering arrangements consistent with those of oil-fuelled machinery.

.12 Provide appropriate selection of certified equipment and materials that are suitable for use within gas systems.

.13 Provide gas detection and sampling systems suitable for the space concerned together with monitoring, alarm and shutdown arrangements.

.14 Provide protection against the potential effects of a gas-fuel explosion.

.15 Prevent explosion and hazardous consequences.

.16 Provide fire detection, protection and extinction measures appropriate to the hazards concerned.

.17 Provide a level of confidence in a gas-fuelled unit that is equivalent to that for an oil-fuelled unit. (covered by "goals"?)

.18 Ensure that commissioning, trials and maintenance of gas utilization machinery satisfy the goal in terms of reliability, availability and safety.

.19 Provide provision for procedures detailing the guidelines for safe routine and unscheduled inspection and maintenance.

.20 Provide operational safety through appropriate training and certification of crew.

.21 Provide for submission of technical documentation in order to permit an assessment of the compliance of the system and its components with the applicable rules and guidelines.

Chapter 1 – General
Chapter 2 – Ship arrangements and system design
Chapter 3 – Fire safety
Chapter 4 – Electrical systems
Chapter 5 – Control, monitoring and safety systems
Chapter 6 – Compressors and engines
Chapter 7 – Manufacture, workmanship and testing

PART B, Special requirements for various installations

1. Low density gas (Interim Guidelines as amended)
2. High density gas
3. Fuel cells
4. ……..
5. ……..

Issues to be considered:

1. Interaction between the IGC Code and the new [IGF] code.
2. Amendments to SOLAS to make the IGF Code mandatory.
3. ……..
4. ……..

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# ANNEX 11

## DRAFT MSC CIRCULAR

## UNIFIED INTERPRETATION OF THE IBC CODE

1 The Maritime Safety Committee, at its [eighty-sixth session (27 May to 6 June 2009)], with a view to providing more specific guidance for application of the relevant requirements of the IBC Code, approved the unified interpretation of chapter 11 of the IBC Code, as amended by resolution MSC.219(82) and resolution MEPC.166(56), prepared by the Sub-Committee on Bulk Liquids and Gases, as set out in the annex.

2 Member Governments are invited to use the annexed unified interpretation as guidance when applying relevant provisions of chapter 11 of the IBC Code, as amended by resolutions MSC.219(82) and MEPC.166(56) for ships constructed on or after [*date of approval of the circular*] and to bring the unified interpretation to the attention of all parties concerned.

ANNEX

## UNIFIED INTERPRETATION OF THE IBC CODE

### Chapter 11, paragraphs 11.1.1.3 and .4 – Application

1 SOLAS regulations II-2/10.2 and 10.4 apply to cargo ships of 500 gross tonnage and over under SOLAS and to chemical carriers, regardless of size, under the IBC Code.

2 SOLAS regulation II-2/10.5, except for paragraph 10.5.6, applies to chemical tankers, regardless of size, constructed on or after 1 July 1986.

3 SOLAS regulation II-2/10.5.6 applies only to chemical tankers constructed on or after 1 July 2002 and of 2,000 gross tonnage and above.

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**ANNEX 12**

**DRAFT MSC RESOLUTION**

**RECOMMENDATIONS FOR MATERIAL SAFETY DATA SHEETS (MSDS) FOR MARPOL ANNEX I OIL CARGO AND OIL FUEL**

THE MARITIME SAFETY COMMITTEE,

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

RECALLING ALSO that, at its seventy-sixth session, it approved the Recommendation for the use of a standard format for the cargo information required by chapter 16 of the IBC Code,

RECALLING FURTHER that, at its seventy–seventh session, it adopted the Recommendation for material safety data sheets for MARPOL Annex I cargoes and marine fuel oils (MSC.150(77)),

NOTING that, at its eighty–third session, it adopted amendments to SOLAS regulation VI/5-1, by means of resolution MSC.239(83), making the provision of material safety data sheets (MSDS) mandatory prior to the loading of MARPOL Annex I type cargo in bulk and oil fuel,

RECOGNIZING the importance of providing seafarers with clear, concise and accurate information on the health and the environmental effects of toxic substances carried on board tankers,

RECOGNIZING ALSO the need to ensure a common understanding for an unambiguous implementation of SOLAS regulation VI/5-1,

HAVING CONSIDERED the recommendation made by the Sub-Committee on Bulk Liquids and Gases at its thirteenth session,

1. ADOPTS:

.1 the Recommendations for material safety data sheets (MSDS) for marine use suitable to meet the particular needs of the marine industry containing safety, handling, and environmental information to be supplied to a ship prior to the loading of MARPOL Annex I type oil as cargo in bulk and the bunkering of oil fuel, as set out in Annex 1 to the present resolution; and

.2 the Guidelines for the completion of MSDS for the MARPOL Annex I type oil as cargo in bulk and oil fuel, as set out in Annex 2 to the present resolution;

2. URGES Governments to ensure the supply and carriage of the material safety data sheets (MSDS) for MARPOL Annex I type oil as cargo in bulk and oil fuel, as from [*date of adoption*];

3. REVOKES resolution MSC.150(77).

ANNEX 1

**RECOMMENDATIONS FOR MATERIAL SAFETY DATA SHEETS (MSDS) FOR MARINE USE SUITABLE TO MEET THE PARTICULAR NEEDS OF THE MARINE INDUSTRY CONTAINING SAFETY, HANDLING, AND ENVIRONMENTAL INFORMATION TO BE SUPPLIED TO A SHIP PRIOR TO THE LOADING OF MARPOL ANNEX I TYPE OIL AS CARGO IN BULK AND THE BUNKERING OF OIL FUEL**

| Section | Heading | Content |
|---|---|---|
| **1** | **Identification of the substance or mixture and of the supplier** | • Name of the category – see guidance in annex 2 for MARPOL Annex I type oil cargoes and oil fuels<br>• The name of the substances.<br>• Trade name of the substances.<br>• Description on Bill of Lading (B/L), Bunker Delivery Note or other shipping document.<br>• Other means of identification.<br>• Supplier's details (including name, address, telephone number, etc.).<br>• Emergency telephone number. |
| **2** | **Hazards identification** | • GHS* classification of the substance/mixture and any regional information.<br>• Other hazards which do not result in classification (e.g., hydrogen sulphide) or are not covered by the GHS.See Guidelines in annex 2. |
| **3** | **Composition/information on ingredients** | • Common name, synonyms, etc.<br>• Impurities and stabilizing additives which are themselves classified and which contribute to the classification of the substances.<br>• The chemical identity and concentration or concentration ranges of all ingredients which are hazardous within the meaning of GHS and are present above their cut-off levels. Cut-off level for reproductive toxicity, carcinogenicity and category 1 mutagenicity is 0.1%. Cut-off level for all other hazard classes is 1%.See Guidelines in annex 2. |
| **4** | **First aid measures** | • Description of necessary measures, subdivided according to the different routes of exposure, i.e. inhalation, skin and eye contact and ingestion.<br>• Most important symptoms/effects, acute and delayed.<br>• Indication of immediate medical attention and special treatment, if necessary. |

* Globally Harmonized System of Classification and Labelling of Chemicals (GHS), United Nations (2007 edition, as revised).

| Section | Heading | Content |
|---|---|---|
| 5 | **Fire-fighting measures** | • Suitable extinguishing media.<br>• Specific hazards arising from the chemical (e.g., nature of any hazardous combustion products).<br>• Special protective equipment and precautions for fire-fighters. |
| 6 | **Accidental release measures** | • Personal precautions, protective equipment and emergency procedures.<br>• Environmental precautions.<br>• Methods and materials for containment and clean-up. |
| 7 | **Handling and storage** | • Precautions for safe handling.<br>• Conditions for safe storage, including any incompatibilities. |
| 8 | **Exposure controls/personal protection** | • Control parameters (e.g., occupational exposure limit values).<br>• Appropriate technical precautions.<br>• Individual protection measures, such as personal protective equipment. |
| 9 | **Physical and chemical properties** | • See Guidelines in annex 2. |
| 10 | **Stability and reactivity** | • Chemical stability.<br>• Possibility of hazardous reactions.<br>• Conditions to avoid (e.g., static discharge). |
| 11 | **Toxicological information** | • Concise but complete and comprehensible description of the various toxicological (health) effects and the available data used to identify those effects, including:<br>  o Information on the likely routes of exposure (inhalation, ingestion, skin and eye contact);<br>  o Symptoms related to the physical, chemical and toxicological characteristics;<br>  o Delayed and immediate effects and also chronic effects from short- and long-term exposure.<br>• Numerical measures of toxicity (such as acute toxicity estimates).<br>• See Guidelines in annex 2. |
| 12 | **Ecological information** | • Ecotoxicity (aquatic and terrestrial, where available).<br>• Persistence and degradability.<br>• Bioaccumulation potential.<br>• Mobility in soil.<br>• Other adverse effects.<br>• See Guidelines in annex 2. |

| Section | Heading | Content |
|---|---|---|
| **13** | **Disposal considerations** | • Description of waste residues and information on their safe handling and methods of disposal, in line with MARPOL requirements. |
| **14** | **Transport information** | • UN number, where applicable.<br>• UN Proper shipping name, where applicable.<br>• Transport Hazard class(es), where applicable.<br>• Special precautions which a user needs to be aware of or needs to comply with in connection with transport (e.g., heating and carriage temperatures).<br>• Note that this product is being carried under the scope of MARPOL Annex I. |
| **15** | **Regulatory information** | • Safety, health and environmental regulations specific for the product in question. |
| **16** | **Other information including information on preparation and revision of the MSDS** | • Version No.<br>• Date of issue.<br>• Issuing source. |

ANNEX 2

# GUIDELINES FOR THE COMPLETION OF MSDS FOR THE MARPOL ANNEX I TYPE OIL AS CARGO IN BULK AND OIL FUEL

## 1 Categories of liquids

The following categories subdivide the full scope of substances covered by Annex I of MARPOL 73/78 and set in groups specific products for general identification purposes.

.1 crude oils;

.2 fuel and residual oils, including ship's bunkers*;

.3 unfinished distillates, hydraulic oils and lubricating oils;

.4 gas oils, including ship's bunkers**;

.5 kerosenes;

.6 naphthas and condensates;

.7 gasoline blending stocks;

.8 gasoline and spirits; and

.9 asphalt solutions.

## 2 Properties and information

In addition to properties and information specified in annex 1, the following properties and information should be reported:

.1 for the following provide appropriate hazards identification in section 2, composition/information on ingredients in section 3, and toxicological information in section 11 of the MSDS:

.1 Benzene – if present ≥ 0.1% by weight (even if naturally occurring ingredient of the material);

.2 Hydrogen sulphide – if present at any concentration, in liquid and vapour phases, or if possible to accumulate in a tank's vapour space; and

.3 Total Sulphur – if present ≥0.5% by weight, identify in section 3 and warn of potential for hydrogen sulphide evolution in sections 2 and 11;

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* Refer to standard ISO 8217:2005, Petroleum products – Fuels (class F) – Specifications of marine fuels, table 2.

** Refer to standard ISO 8217:2005, Petroleum products – Fuels (class F) – Specifications of marine fuels, table 1.

.2 for physical and chemical properties in section 9 of the MSDS:

.1 appearance (physical state, colour, etc.);

.2 odour;

.3 pour point;

.4 boiling range;

.5 flashpoint;

.6 upper/lower flammability or explosive limits;

.7 vapour pressure (Reid vapour pressure (RVP) when appropriate);

.8 vapour density;

.9 density;

.10 auto-ignition temperature; and

.11 kinematic viscosity; and

.3 for ecological information in section 12 of the MSDS: Persistent or non-persistent oil as per the International Oil Pollution Compensation (IOPC) Fund definition*.

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* International Oil Pollution Compensation (IOPC) Fund definition: "A non-persistent oil is oil, which, at the time of shipment, consists of hydrocarbon fractions, (a) at least 50% of which, by volume, distils at a temperature of 340ºC (645ºF) and (b) at least 95% of which, by volume, distils at a temperature of 370ºC (700ºF) when tested by the ASTM Method D-86/78 or any subsequent revision thereof".

# ANNEX 13

# DRAFT AMENDMENTS TO THE SURVEY GUIDELINES UNDER THE HARMONIZED SYSTEM OF SURVEY AND CERTIFICATION FOR THE REVISED MARPOL ANNEX VI

## GENERAL

### 1 INTRODUCTION

1.1 These Guidelines supersede the guidelines adopted by resolution A.997(25) and take account of the Harmonized System of Survey and Certification in the following instruments:

.1 International Convention for the Safety of Life at Sea, 1974 (SOLAS 1974), as modified by its 1988 Protocol and as amended (SOLAS 74/88/00/04);

.2 International Convention on Load Lines, 1966 (LLC 1966) as amended and as modified by its 1988 Protocol (LL 66/88/04);

.3 International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto, as mended (MARPOL 73/78);

.4 Protocol of 1997 to amend the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto, as amended (MARPOL PROT 1997);

.5 International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (IBC Code), as amended (IBC Code 83/90/00/04);

.6 International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC Code), as amended, (IGC Code 83/90/00/04);

.7 Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (BCH Code), as amended (BCH Code 85/90/00);

1.2 These Guidelines contain amendments to statutory instruments which have entered into force up to and including 1st August 2007 (see appendix 1):

.1 Survey Guidelines under the 1974 SOLAS Convention, as modified by the 1988 Protocol relating thereto (annex 1);

.2 Survey Guidelines under the 1966 Load Line Convention, as modified by the 1988 Protocol relating thereto (annex 2);

.3 Survey Guidelines under the MARPOL Convention (annex 3); and

.4 Survey Guidelines under the mandatory Codes (annex 4).

1.3 The harmonized system, a diagrammatic arrangement of which is given in the appendix 2, provides for:

.1 a one-year standard interval between surveys, based on initial, annual, intermediate, periodical and renewal surveys, as appropriate, except for MARPOL Annex IV which is based on initial and renewal surveys;

.2 a scheme providing the necessary flexibility to execute each survey, with provision for:

- completion of the renewal survey within 3 months before the expiry date of the existing certificate with no loss of its period of validity;

- a "time window" of 6 months – from 3 months before to 3 months after the anniversary date of the certificate for annual, intermediate and periodical surveys;

.3 a maximum period of validity of five years for all cargo ship certificates;

.4 a maximum period of validity of 12 months for the Passenger Ship Safety Certificate;

.5 a system for the extension of certificates limited to three months, enabling a ship to complete its voyage, or one month for ships engaged on short voyages;

.6 when an extension has been granted, the period of validity of the new certificate starting from the expiry date of the existing certificate before its extension;

.7 a flexible system for inspection of the outside of the ship's bottom on the following conditions:

- a minimum of two inspections during any five-year period of validity of the Cargo Ship Safety Construction Certificate or the Cargo Ship Safety Certificate;

- the interval between any two such inspections shall not exceed 36 months;

.8 a Cargo Ship Safety Certificate under SOLAS 74/88/00/04, as an alternative to separate Cargo Ship Safety Construction, Cargo Ship Safety Equipment and Cargo Ship Safety Radio Certificates;

.9 a flexible system concerning the frequency and the period of validity of certificates, subject to the minimum pattern of surveys being maintained.

1.4 In implementing the harmonized system, the following principal changes have been made to the survey and certification requirements of SOLAS 74/88/00/04:

.1 unscheduled inspections are no longer included and annual surveys are mandatory for cargo ships;

.2 intervals between the periodical surveys of equipment covered by the Cargo Ship Safety Equipment Certificate are alternatively two and three years instead of two years;

.3 intermediate surveys are required for all ships under the Cargo Ship Safety Construction Certificate;

.4 inspection of the outside of the ship's bottom is required for all cargo ships;

.5 intermediate surveys for the Cargo Ship Safety Construction Certificate are held within three months of either the second or third anniversary date;

.6 all cargo ship certificates may be issued for any period of validity up to and including five years;

.7 there is provision for a Cargo Ship Safety Certificate;

.8 the extension provisions have been reduced from five months to three months to enable a ship to complete its voyage and the extension for one month for a period of grace is limited to ships engaged on short voyages.

1.5 With regard to LLC 66/88/04, the principal changes to the requirements for survey and certification are the introduction of similar extension provisions (see 1.4.8) and linking of the period of validity of the new certificate to the expiry date of the previous certificate (see 1.3.6).

1.6 With regard to MARPOL 90/04 and the IBC Code 83/90/00/04, the IGC Code 83/90/00/04 and the BCH Code 85/90/00, the main changes are the linking of the period of validity of the new certificate to the expiry date of the previous certificate (see 1.3.6), the holding of the intermediate survey within three months of the second or third anniversary date and the introduction of the same extension provisions (see 1.4.8).

## 2 TYPES OF SURVEY

The types of survey used in the harmonized system are as follows:

(I) 2.1 *An initial survey* is a complete inspection before a ship is put into service of all the items relating to a particular certificate, to ensure that the relevant requirements are complied with and that these items are satisfactory for the service for which the ship is intended.

(P) 2.2 *A periodical survey* is an inspection of the items relating to the particular certificate to ensure that they are in a satisfactory condition and fit for the service for which the ship is intended.

(R) 2.3 *A renewal survey* is the same as a periodical survey but also leads to the issue of a new certificate.

(In) 2.4 *An intermediate survey* is an inspection of specified items relevant to the particular certificate to ensure that they are in a satisfactory condition and fit for the service for which the ship is intended.

(A) 2.5 *An annual survey* is a general inspection of the items relating to the particular certificate to ensure that they have been maintained and remain satisfactory for the service for which the ship is intended.

(B) 2.6 *An inspection of the outside of the ship's bottom* is an inspection of the underwater part of the ship and related items to ensure that they are in a satisfactory condition and fit for the service for which the ship is intended.

(Ad) 2.7 *An additional survey* is an inspection, either general or partial according to the circumstances, to be made after a repair resulting from investigations or whenever any important repairs or renewals are made.

**2.8 List of types of survey in conventions and codes**

(I) 2.8.1 *Initial surveys*

SOLAS 74/88/04, chapter I, regulation 7(a)(i)
**chapter I, regulation 8(a)(i)**
**chapter I, regulation 9(a)(i)**
**chapter I, regulation 10(a)(i)**
LLC 66/88/04, article 14(1)(a)
MARPOL 90/04, Annex I, regulation 6.1.1
MARPOL 90/04, Annex II, regulation 8.1.1
MARPOL Annex IV, regulation 4.1.1
MARPOL Annex VI, regulation 5.1.1
IBC Code 83/90/04, regulation 1.5.2.1.1
IGC Code 83/90/04, regulation 1.5.2.1.1
BCH Code 85/90/00, regulation 1.6.2.1.1

(P) 2.8.2 *Periodical surveys*

SOLAS 74/88/04, chapter I, regulation 8(a)(iii)
chapter I, regulation 9(a)(iii)

(R) 2.8.3 *Renewal surveys*

SOLAS 74/88/04, chapter I, regulation 7(a)(ii)
chapter I, regulation 8(a)(ii)
chapter I, regulation 9(a)(ii)
chapter I, regulation 10(a)(ii)
LLC 66/88/04 article 14(1)(b)
MARPOL 90/04, Annex I, regulation 6.1.2
MARPOL 90/04, Annex II, regulation 8.1.2
MARPOL Annex IV, regulation 4.1.2

MARPOL Annex VI, regulation 5.1.2
IBC Code 83/90/04, regulation 1.5.2.1.2
IGC Code 83/90/04, regulation 1.5.2.1.2
BCH Code 85/90/00, regulation 1.6.2.1.2

(In) 2.8.4 *Intermediate surveys*

SOLAS 74/88/04, chapter I, regulation 10(a)(iii)
MARPOL 90/04, Annex I, regulation 6.1.3
MARPOL 90/04, Annex II, regulation 8.1.3
MARPOL Annex VI, regulation 5.1.3
IBC Code 83/90/04, regulation 1.5.2.1.3
IGC Code 83/90/04, regulation 1.5.2.1.3
BCH Code 85/90/00, regulation 1.6.2.1.3

(A) 2.8.5 *Annual surveys*

SOLAS 74/88, chapter I, regulation 8(a)(iv), regulation 10(a)(iv)
LLC 66/88, article 14(1)(c)
MARPOL 90/04, Annex I, regulation 6.1.4
MARPOL 90/04, Annex II, regulation 8.1.4
MARPOL Annex VI, regulation 5.1.4
IBC Code 83/90, regulation 1.5.2.1.4
IGC Code 83/90, regulation 1.5.2.1.4
BCH Code 85/90, regulation 1.6.2.1.4

(B) 2.8.6 *Inspection of the outside of the ship's bottom*

SOLAS 74/88, chapter I, regulation 10(a)(v)

(Ad) 2.8.7 *Additional surveys*

SOLAS 74/88/04, chapter I, regulation 8(a)(iv)
chapter I, regulation 10(a)(iv)
LLC 66/88/04, article 14(1)(c)
MARPOL 90/04, Annex I, regulation 6.1.5
MARPOL 90/04, Annex II, regulation 8.1.5
MARPOL Annex IV, regulation 4.1.3
MARPOL Annex VI, regulation 5.1.5
IBC Code 83/90/04, regulation 1.5.2.1.4
IGC Code 83/90/04, regulation 1.5.2.1.4
BCH Code 85/90/00, regulation 1.6.2.1.4

## 3 APPLICATION AND ARRANGEMENT OF THE GUIDELINES

3.1 The Guidelines provide a general framework upon which Administrations will be able to base their arrangements for carrying out surveys. It is recognized that survey provisions contained in the Guidelines are not necessarily applicable to all types and sizes of ship.

3.2 Whilst the Guidelines are intended to cover instruments listed in 1.1, they should be applied, as appropriate, to drilling rigs and other platforms covered by MARPOL 90/04, Annex I, regulation 39 and Annex VI, regulation 5.

3.3 A description of the various types of survey is given in section 4 and, as shown on the contents page, this is followed by the detailed requirements for the various surveys for each of the certificates.

3.4 When appropriate, the detailed requirements for the various surveys contain a section that is applicable to all cargo ships followed by a section that only applies to oil tankers.

3.5 Whilst the Convention or Code references are included, when possible, it should be noted that, in general, it has not been possible to indicate where there are differing requirements dependent upon the ship's year of build. Consequently, care should be taken in applying specific requirements, particularly where there have been amendments that are only applicable to ships built after a certain date.

3.6 Although also part of the requirements for the Cargo Ship Safety Construction Certificate, a separate section is provided for inspection of the outside of the ship's bottom.

3.7 SOLAS 74/88/04, regulation I/12(v) provides for a Cargo Ship Safety Certificate to be issued as an alternative to the Cargo Ship Safety Equipment Certificate, the Cargo Ship Safety Construction Certificate and the Cargo Ship Safety Radio Certificate. Consequently, the surveys for the issue and renewal of the Cargo Ship Safety Certificate should be in accordance with the certificates it replaces and, similarly, the annual and intermediate surveys should be the same as those required for the replaced certificates and the appropriate sections of the Cargo Ship Safety Certificate, endorsed accordingly.

3.8 On the left-hand side of each item to be surveyed may be found two letters in brackets, the first indicating the certificate to which the survey relates, as follows:

(E) for the Cargo Ship Safety *Equipment* Certificate;

(C) for the Cargo Ship Safety *Construction* Certificate;

(R) for the Cargo Ship Safety *Radio* Certificate;

(L) for the International *Load Line* Certificate;

(O) for the International *Oil Pollution* Prevention Certificate;

(N) for the International Pollution Prevention Certificate for Carriage of *Noxious Liquid Substances* in Bulk;

(S) for the International Sewage Pollution Prevention Certificate;

(A) for the International Air Pollution Prevention Certificate;

(D) for the International Certificate of Fitness for the Carriage of *Dangerous Chemicals* in Bulk or the Certificate of Fitness for the Carriage of *Dangerous Chemicals* in Bulk;

(G) for the International Certificate of Fitness for the Carriage of Liquefied *Gases* in Bulk;

(P) for the *Passenger* Ship Safety Certificate;

and the second for the type of survey, as follows:

(I) for the *initial* survey;

(A) for the *annual* survey;

(In) for the *intermediate* survey;

(P) for the *periodical* survey;

(R) for the *renewal* survey;

(B) for inspection of the outside of the *ship's bottom*;

(Ad) for *additional* survey.

Consequently, for example, "(EI)", "(OIn)" and "(PR)" indicate the initial survey for the Cargo Ship Safety Equipment Certificate, the intermediate survey for the International Oil Pollution Prevention Certificate and the renewal survey for the Passenger Ship Safety Certificate respectively.

3.9 The amplification of various terms and conditions are given in section 5.

## 4 DESCRIPTION OF THE VARIOUS TYPES OF SURVEYS

### (I) 4.1 Initial surveys

4.1.1 *Frequency*

4.1.1.1 The initial survey, as required by the relevant regulations (see 2.8.1), should be held before the ship is put in service and the appropriate certificate is issued for the first time.

4.1.2 *General*

4.1.2.1 The initial survey before the ship is put into service should include a complete inspection, with tests when necessary, of the structure, machinery and equipment to ensure that the requirements relevant to the particular certificate are complied with and that the structure, machinery and equipment are fit for the service for which the ship is intended.

4.1.2.2 The initial survey should consist of:

.1 an examination of the plans, diagrams, specifications, calculations and other technical documentation to verify that the structure, machinery and equipment comply with the requirements relevant to the particular certificate;

.2 an inspection of the structure, machinery and equipment to ensure that the materials, scantlings, construction and arrangements, as appropriate, are in accordance with the approved plans, diagrams, specifications, calculations and other technical documentation and that the workmanship and installation are in all respects satisfactory;

.3 a check that all the certificates, record books, operating manuals and other instructions and documentation specified in the requirements relevant to the particular certificate have been placed on board the ship.

4.1.3 *Examination of plans and designs*

4.1.3.1 An application for an initial survey should be accompanied by plans and designs referred to in sections 1, 2, 4 and 5 of Annex 1 and in Annexes 2, 3 and 4, as appropriate, together with:

.1 the particulars of the ship;

.2 any exemptions sought;

.3 any special conditions.

(A) **4.2 Annual surveys**

4.2.1 *Frequency*

4.2.1.1 The annual survey, as required by the relevant regulations (see 2.8.5) and as shown diagrammatically in the appendix 2, should be held within three months before or after each anniversary date of the certificate.

4.2.2 *General*

4.2.2.1 An annual survey should enable the Administration to verify that the condition of the ship, its machinery and equipment is being maintained in accordance with the relevant requirements.

4.2.2.2 In general, the scope of the annual survey should be as follows:

.1 it should consist of a certificate examination, a visual examination of a sufficient extent of the ship and its equipment, and certain tests to confirm that their condition is being properly maintained;

.2 it should also include a visual examination to confirm that no unapproved modifications have been made to the ship and its equipment;

.3 the content of each annual survey is given in the respective guidelines. The thoroughness and stringency of the survey should depend upon the condition of the ship and its equipment;

.4 should any doubt arise as to the maintenance of the condition of the ship or its equipment, further examination and testing should be conducted as considered necessary.

4.2.3 Where an annual survey has not been carried out within the due dates, reference should be made to 5.6.

(In) **4.3 Intermediate surveys**

4.3.1 *Frequency*

4.3.1.1 The intermediate survey, as required by the relevant regulations (see 2.8.4) and as shown diagrammatically in the appendix 2, should be held within three months before or after the second anniversary date or within three months before or after the third anniversary date of the appropriate certificate and should take the place of one of the annual surveys.

4.3.2 *General*

4.3.2.1 The intermediate survey should be an inspection of items relevant to the particular certificate to ensure that they are in a satisfactory condition and are fit for the service for which the ship is intended.

4.3.2.2 When specifying items of hull and machinery for detailed examination, due account should be taken of any continuous survey schemes that may be applied by classification societies.

4.3.2.3 Where an intermediate survey has not been carried out within the due dates, reference should be made to 5.6.

(P) **4.4 Periodical surveys**

4.4.1 *Frequency*

4.4.1.1 The periodical survey, as required by the relevant regulations (see 2.8.2) and as shown diagrammatically in the appendix 2, should be held within three months before or after the second anniversary date or within three months before or after the third anniversary date in the case of the cargo ship safety equipment certificate and should take the place of one of the annual surveys and within three months before or after each anniversary date in the case of the cargo ship safety radio certificate.

4.4.2 *General*

4.4.2.1 The periodical survey should consist of an inspection, with tests when necessary, of the equipment to ensure that requirements relevant to the particular certificate

are complied with and that they are in a satisfactory condition and are fit for the service for which the ship is intended.

4.4.2.2 The periodical survey should also consist of a check that all the certificates, record books, operating manuals and other instructions and documentation specified in the requirements relevant to the particular certificate are on board the ship.

4.4.2.3 Where a periodical survey has not been carried out within the due dates, reference should be made to 5.6.

(R) **4.5 Renewal surveys**

4.5.1 *Frequency*

4.5.1.1 The renewal survey, as required by the relevant regulations (see 2.8.3) and as shown diagrammatically in the appendix 2, should be held before the appropriate certificate is renewed.

4.5.2 *General*

4.5.2.1 The renewal survey should consist of an inspection, with tests when necessary, of the structure, machinery and equipment to ensure that the requirements relevant to the particular certificate are complied with and that they are in a satisfactory condition and are fit for the service for which the ship is intended.

4.5.2.2 The renewal survey should also consist of a check that all the certificates, record books, operating manuals and other instructions and documentation specified in the requirements relevant to the particular certificate are on board the ship.

(B) **4.6 Inspections of the outside of the ship's bottom of cargo ships**

4.6.1 *Frequency*

4.6.1.1 There should be a minimum of two inspections of the outside of the ship's bottom during any five-year period (see 5.7), except where SOLAS 74/88/04, regulation I/14(e) or (f) is applicable. One such inspection should be carried out on or after the fourth annual survey in conjunction with the renewal of the Cargo Ship Safety Construction Certificate or the Cargo Ship Safety Certificate. Where the Cargo Ship Safety Construction Certificate or the Cargo Ship Safety Certificate has been extended under SOLAS 74/88/04, regulation I/14(e) or (f), this five-year period may be extended to coincide with the validity of the certificate. In all cases the interval between any two such inspections should not exceed 36 months.

4.6.2 *General*

4.6.2.1 The inspection of the outside of the ship's bottom and the survey of related items (see 5.1) should include an inspection to ensure that they are in a satisfactory condition and fit for the service for which the ship is intended.

4.6.2.2 Inspections of the outside of the ship's bottom should normally be carried out with the ship in a dry dock. However, consideration may be given to alternate inspections being carried out with the ship afloat. Special consideration should be

given before ships of 15 years of age and over other than bulk carriers and oil tankers are permitted to have such surveys afloat. Inspection of the outside of the ship's bottom of bulk carriers and oil tankers of 15 years of age and over should be carried out with the ship in dry dock. Inspections with the ship afloat should only be carried out when the conditions are satisfactory and the proper equipment and suitably trained staff are available. For ships subject to enhanced survey, the provisions of paragraphs 2.2.2* of Annexes A or B, as applicable, of resolution A.744(18), as amended, should apply.

4.6.3 Where an inspection of the ships bottom has not been carried out before the due dates reference should be made to 5.6.

(Ad) **4.7 Additional surveys**

4.7.1 Whenever an accident occurs to a ship or a defect is discovered which affects the safety or integrity of the ship or the efficiency or completeness of its equipment, the master or owner should make a report at the earliest opportunity to the Administration, the nominated surveyor or recognized organization responsible for issuing the relevant certificate. The Administration, the nominated surveyor or recognized organization responsible for issuing the relevant certificate should then initiate an investigation to determine whether a survey, as required by the regulations applicable to the particular certificate, is necessary. This additional survey, which may be general or partial according to the circumstances, should be such as to ensure that the repairs and any renewals have been effectively made and that the ship and its equipment continue to be fit for the service for which the ship is intended.

**4.8 Completion of surveys**

4.8.1 If a survey shows that the condition of the ship or its equipment is unsatisfactory, the officer of the Administration, nominated surveyor or recognized organization should be guided by the requirements of SOLAS 74/88/04, regulation I/6(c), MARPOL 90/04, Annex I, regulation 3.4, MARPOL 90/04 Annex II, regulation 8.2.5, MARPOL Annex IV regulation 4.5, MARPOL Annex VI, regulation 5.3.3, the IBC Code 83/90/04, regulation 1.5.1.3, the IGC Code 83/90/04 regulation 1.5.1.3 and the BCH Code 85/90/00, regulation 1.6.1.3. These instruments require that corrective action be taken immediately and the Administration notified in due course. In cases where the corrective action has not been undertaken the relevant certificate should be withdrawn and the Administration notified immediately. If the ship is in the port of another Party, the appropriate authorities of the port State should also be notified immediately.

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* 2.2.2 For ships 15 years of age and over, inspection of the outside of the ship's bottom should be carried out with the ship in dry dock. For ships less than 15 years of age, alternate inspections of the ship's bottom not conducted in conjunction with the renewal survey may be carried out with the ship afloat. Inspections with the ship afloat should only be carried out when the conditions are satisfactory and the proper equipment and suitably trained staff are available.

4.8.2 Although LLC 66/88/04 does not contain specific requirements, if a load line survey shows the condition of the ship or its equipment is unsatisfactory, the officer of the Administration, nominated surveyor or recognized organization should, nevertheless, should be guided by 4.8.1.

## 5 AMPLIFICATION OF TERMS AND CONDITIONS

### 5.1 Definition of related items

**Reference: SOLAS 74/88/04, regulation I/10(b)(v).**

Related items mean those items which may only be inspected when the ship is in dry dock or undergoing an in-water examination of the outside of its bottom. For oil tankers, chemical tankers and gas carriers, this may mean that the ship has to be specially prepared by, for example, being cleaned and gas-freed. Then the survey of items such as the internal examination of cargo tanks, as referred to in (CIn) 2.3.2 and (CIn) 2.3.3 in Annex 1 may be undertaken at the same time.

### 5.2 Extending to five years a certificate issued for less than five years

References: SOLAS regulation I/14(c), LLC 66/88/04, A.19(3), MARPOL 90/04, Annex I, regulation 10.3, MARPOL 90/04 Annex II, regulation 10.3, MARPOL Annex IV, regulation 8.1, MARPOL Annex VI, regulation 9.3, the IBC Code 83/90/04, regulation 1.5.6.3, the IGC Code 83/90/04, regulation 1.5.6.3, BCH Code 85/90/00, regulation 1.6.6.3.

Where a certificate has been issued for a period of less than five years, it is permissible under these regulations or article to extend the certificate so that its maximum period of validity is five years provided that the pattern of surveys for a certificate with a five-year period of validity is maintained (see appendix 2). This means that, for example, if a request is made to extend a two-year Cargo Ship Safety Equipment Certificate to five years, then a periodical and two further annual surveys, as detailed in SOLAS 74/88/04, regulation I/8, would be required. Also, for example, if it was intended to extend a four-year Cargo Ship Safety Construction Certificate to five years, then an additional annual survey would be required, as detailed in SOLAS 74/88/04, regulation I/10. Where a certificate has been so extended, it is still permissible to also extend the certificate under SOLAS 74/88/04 regulations I/14(e) and (f), LLC 66/88/04 articles 19(5) and (6), MARPOL 90/04, Annex I, regulations 10.5 and .6, MARPOL 90/04 Annex II, regulations 10.5 and 6, MARPOL Annex IV, regulations 8.5 and 8.6, MARPOL Annex VI, regulations 9.5 and 9.6, the IBC Code 83/90/04, regulations 1.5.6.5 and 1.5.6.6, the IGC Code 83/90/04, regulations 1.5.6.5 and 1.5.6.6, the BCH Code 85/90/00, regulations 1.6.6.5 and 1.6.6.6, when no additional surveys would be required but, of course, the new certificate issued after the renewal survey would date from the five-year expiry of the existing certificate, in accordance with SOLAS 74/88/04, regulation I/14(b)(ii), LLC 66/88/04, article 19(2)(b), MARPOL 90/04, Annex I, regulation 10.2.2, MARPOL 90/04 Annex II, regulation 10.2.2, MARPOL Annex VI, regulation 8.2.2, MARPOL Annex VI, regulation 9.2.2, the IBC Code 83/90/04, regulation 1.5.6.6.2, the IGC Code 83/90/04, regulation 1.5.6.2.2 and the BCH Code 85/90/00, regulation 1.6.6.2.2.

### 5.3 Extending the period between inspections of the outside of the ship's bottom

Reference: SOLAS 74/88/04, regulation I/10(a)(v).

This permits the period of five years in which two inspections of the ship's bottom are to be carried out to be extended when the Cargo Ship Safety Construction Certificate is extended under regulation I/14(e) and (f). However, no extension should be permitted on the period of 36 months between any two such inspections. If the first ship's bottom inspection is carried out between 24 and 27 months then the 36-month limitation may prevent the certificate being extended by the periods permitted in regulation I/14(e) and (f).

### 5.4 Definition of "short voyage"

SOLAS 74/88/04, regulation I/14(f), LLC 66/88 /04, article 19(6), MARPOL 90/04, Annex I, regulation 10.6, MARPOL 90/04, Annex II, regulation 10.6, MARPOL Annex IV, regulation 8.6, MARPOL Annex VI, regulation 9.6, the IBC Code 83/90/04, regulation 1.5.6.6, the IGC Code 83/90/04, regulation 1.5.6.6 and the BCH Code 85/90/00, regulation 1.6.6.6.

For the purpose of these regulations or article, a "short voyage" means a voyage where neither the distance from the port in which the voyage begins and the final port of destination nor the return voyage exceeds 1,000 miles.

### 5.5 Application of "special circumstances"

References: SOLAS 74/88/04 regulation I/14(g), LLC 66/88, article 19(7), MARPOL 90/04, Annex I, regulation 10.7, MARPOL 90/04, Annex II, regulation 10.7, MARPOL Annex IV, regulation 8.7, MARPOL Annex VI, regulation 9.7, the IBC Code 83/90/04, regulation 1.5.6.7, the IGC Code 83/90/04, regulation 1.5.6.7 and the BCH Code 85/90/00, regulation 1.6.6.7.

The purpose of these regulations or article is to permit Administrations to waive the requirement that a certificate issued following a renewal survey that is completed after the expiry of the existing certificate should be dated from the expiry date of the existing certificate. The special circumstances when this could be permitted are where the ship has been laid-up or has been out of service for a considerable period because of a major repair or modification. Whilst the renewal survey would be as extensive as if the ship had continued in service, the Administration should consider whether additional surveys or examinations are required depending on how long the ship was out of service and the measures taken to protect the hull and machinery during this period. Where this regulation is invoked, it is reasonable to expect an examination of the outside of the ship's bottom to be held at the same time as the renewal survey when it would not be necessary to include any special requirements for cargo ships for the continued application of SOLAS 74/88, regulation I/10(a)(v).

### 5.6 Revalidation of certificates

References: SOLAS 74/88/04, regulation I/14(i)(i), LLC 66/88/04, article 19(9)(a), MARPOL 90/04, Annex I, regulation 10.9.1, MARPOL 90/04 Annex II, regulation 10.9.1, MARPOL Annex IV, regulation 8.8, MARPOL Annex VI, regulation 9.9.1, the IBC Code 83/90/04, regulation 1.5.6.9.1, the IGC Code 83/90/04, regulation 1.5.6.9.1 and the BCH Code 85/90/00, regulation 1.6.6.9.1.

A certificate ceases to be valid if the periodical, intermediate or annual survey, as appropriate, or the inspection of the outside of the ship's bottom is not completed within the periods specified in the relevant regulation or article. The validity of the certificate should be restored by carrying out the appropriate survey which, in such circumstances, should consist of the requirements of the survey that was not carried out, but its thoroughness and stringency should have regard to the time this survey was allowed to lapse. The Administration concerned should then ascertain why the survey was allowed to lapse and consider further action.

### 5.7 Meaning of "any five-year period"

Reference: SOLAS 74/88/04, regulation I/10(a)(v).

*Any five-year period* is the five-year period of validity of the Cargo Ship Safety Construction Certificate or the Cargo Ship Safety Certificate.

### 5.8 Surveys required after transfer of the ship to the flag of another State

The certificates cease to be valid when a ship transfers to the flag of another State and it is required that the Government of the State to which the ship transfers shall not issue new certificates until it is fully satisfied that the ship is being properly maintained and that there have been no unauthorized changes made to the structure, machinery and equipment. When so requested, the Government of the State whose flag the ship was formally entitled to fly is obliged to forward, as soon as possible, to the new Administration copies of certificates carried by the ship before the transfer and, if available, copies of the relevant survey reports and records, such as record of safety equipment and conditions of assignment for load line. When fully satisfied by an inspection that the ship is being properly maintained and that there have been no unauthorized changes, in order to maintain the harmonization of the surveys the new Administration may give due recognition to initial and subsequent surveys carried out by, or on behalf of, the former Administration and issue new certificates having the same expiry date as the certificates that ceased to be valid because of the change of flag.

### 5.9 Recommended conditions for extending the period of validity of a certificate

In SOLAS and other mandatory IMO instruments the following provision applies: "If a ship at the time when a certificate expires is not in a port in which it is to be surveyed, the Administration may extend the period of validity of a certificate but this extension shall be granted only for the purpose of allowing the ship to complete its voyage to the port in which it is to be surveyed, and then only in cases *where it appears proper and reasonable to do so*. No certificate shall be extended for a period longer than three months, and a ship to which an extension is granted shall not, on its arrival in the port in which is to be surveyed, be entitled by virtue of such extension to leave that port without having a new certificate."

If a ship is in a port where the required survey cannot be completed, and where the Convention allows the Administration to extend the certificate when it is proper and reasonable to do so, the Administration should be guided by the following:

.1 an additional survey, equivalent to at least the same scope of an annual survey required by the relevant certificate(s) should be carried out;

.2 the renewal survey should be carried out to the maximum extent possible;

.3 in cases where a dry-docking is required, but cannot be carried out, an underwater inspection of the ship's bottom should be carried out;

.4 in cases where an underwater inspection is not possible (e.g., poor water visibility, draft restrictions, excessive current, refusal by the port Authority), an internal inspection of the ship's bottom structure, to the maximum extent practicable, should be carried out;

.5 the ship should be allowed to sail directly to a named final agreed cargo discharge port and then directly to a named agreed port to complete the survey and/or dry-docking;

.6 the extension period should be for the minimum amount of time needed to complete the survey and/or dry-docking under the relevant certificate(s);

.7 the condition of the ship found by the surveys indicated above should be considered in determining the duration, distance and operational restrictions, if any, of the voyage needed to complete the survey and/or dry-docking; and

.8 the extension period of the relevant statutory certificate(s) should not exceed the period of validity of the certificate which may be issued to document compliance with the structural, mechanical and electrical requirements of the recognized classification society.

**5.10 Inspection of the outside of the passenger ship's bottom**

A minimum of two of the inspections of the outside of the ship's bottom during any five-year period should be conducted in dry-dock. In all cases, the maximum interval between any two dry-dock bottom inspections should not exceed 36 months.

Note: The definition of "any five-year period" is the five-year period of validity of the International Load Line Certificate.

Inspections of the ship's bottom required for the renewal survey that are not conducted in dry-dock may be carried out with the ship afloat. The bottom inspection, regardless of method, should be carried out within the allowable time window for the Passenger Ship Safety Certificate renewal survey (i.e., within the 3 months time window before the expiry date of the certificate). Additionally, inspections of the outside of the ship's bottom conducted afloat should only be carried out when the conditions are satisfactory and the proper equipment and suitably qualified staff is available. Rudder bearing clearances specified in (PR) 5.2.2.1 need not be taken at the afloat inspections.

Special consideration should be given to ships 15 years of age or over before being permitted to credit inspections afloat.

If a survey in dry-dock is not completed within the maximum intervals referred to above, the Passenger Ship Safety Certificate should cease to be valid until the survey in dry-dock is completed.

### 5.11 Survey of radio installations

The survey of the radio installation, including those used in life-saving appliances, should always be carried out by a qualified radio surveyor who has necessary knowledge of the requirements of the 1974 SOLAS Convention, the International Telecommunication Union's Radio Regulations and the associate performance standards for radio equipment. The radio survey should be carried out using suitable test equipment capable of performing all the relevant measurements required by these guidelines. On satisfactory completion of the survey, the radio surveyor should forward a report of the survey, which should also state the organization he represents, to the authorities responsible for the issue of the ship's Cargo Ship Safety Radio Certificate or Passenger Ship Safety Certificate.

### 5.12 Survey of the automatic identification system (AIS)

The survey of the automatic identification system should always be carried out by a qualified radio surveyor who has necessary knowledge of the requirements of the 1974 SOLAS Convention, the International Telecommunication Union's Radio Regulations and the associated performance standards for radio equipment. The survey of the automatic identification system should be carried out using suitable test equipment capable of performing all the relevant measurements required by these guidelines.

* * *

ANNEX 3

## SURVEY GUIDELINES UNDER THE MARPOL CONVENTION

(A) **4** **GUIDELINES FOR THE SURVEYS FOR THE INTERNATIONAL AIR POLLUTION PREVENTION CERTIFICATE AND THE $NO_X$ TECHNICAL CODE**

(AI) **4.1** **Initial surveys** – see part "General", section 4.1

(AI) 4.1.1 For air pollution prevention the examination of plans and designs should consist of:

(AI) 4.1.1.1 examining the arrangements for systems using ozone-depleting substances (regu1ation 12 of Annex VI);

(AI) 4.1.1.2 examining the arrangements for $NO_x$ emission control, if applicable (regulation 13 of Annex VI);

(AI) 4.1.1.3 examining the arrangements for $SO_x$ control, if applicable (regulation 14 of Annex VI);

(AI) 4.1.1.4 examining the arrangements for vapour collection systems, if applicable (regulation 15 of Annex VI and MSC/Circ.585);

(AI) 4.1.1.5 examining the arrangements for shipboard incinerators, if applicable (regulation 16 of Annex VI).

(AI) 4.1.2 For air pollution prevention the survey should consist of:

(AI) 4.1.2.1 Ozone-depleting substances (regulation 12 of Annex VI):

(AI) 4.1.2.1.1 confirming, if applicable, the satisfactory installation and operation of systems using ozone depleting substances;

(AI) 4.1.2.1.2 confirming that no installation or equipment containing ozone depleting substances has been installed after 19 May 2005, other than hydro-chlorofluorocarbons (regulation 12.3.1 of Annex VI);

(AI) 4.1.2.1.3 confirming that no installation or equipment containing hydro-chlorofluorocarbons are fitted after 1 January 2020 (regulation 12.3.2 of Annex VI).

(AI) 4.1.2.2 Nitrogen oxide emissions from diesel engines (regulation 13 of Annex VI):

(AI) 4.1.2.2.1 confirming that all engines which are required to be certified are pre-certified in accordance with section 2.2 of the $NO_x$ Technical Code and installed with the approved duty cycle

(AI) 4.1.2.2.1.1 *If engine parameter check method is used:*

(AI) 4.1.2.2.1.1.1 an onboard verification survey in accordance with section 6.2 of the $NO_x$ Technical Code.

(AI) 4.1.2.2.1.2 *If the simplified method is used:*

(AI) 4.1.2.2.1.2.1 an onboard verification survey in accordance with section 6.3 of the $NO_x$ Technical Code.

(AI) 4.1.2.2.1.3 *If direct measurement and monitoring method is used (for existing ships only):*

(AI) 4.1.2.2.1.3.1 an onboard verification survey, in accordance with section 6.4 of the $NO_x$ Technical Code.

(AI) 4.1.2.2.1.4 For engines of an output more than 5000 kW and a per cylinder displacement at or above 90 litres/cylinder installed on ships constructed between 1 January 1990 and 31 December 1999, check whether:

.1 an approved method exists;
.2 an approved method is not commercially available; or
.3 that an approved method is installed and where this is the case, that there is an approved method file.

(AI) 4.1.2.3 Sulphur Oxides and Particulate Matter (regulation 14 of Annex VI):

(AI) 4.1.2.3.1 confirming, if appropriate, that:

.1 satisfactory arrangements are in place for using compliant fuel as required; or

.2 satisfactory installation and operation of the fuel switching arrangements are in place when tanks are provided for different grades of fuel; or

.3 satisfactory installation and operation of the exhaust gas cleaning system or other technological methods are examined, (regulation 4 of Annex VI).

(AI) 4.1.2.4 Volatile Organic Compounds (regulation 15 of Annex VI) (if applicable):

(AI) 4.1.2.4.1 confirming the satisfactory installation of the vapour collection piping;

(AI) 4.1.2.4.2 confirming the satisfactory installation and operation of the means provided to eliminate the collection of condensation in the system, such as drains in low points of the line end;

[(AI) 4.1.2.4.3 confirming the satisfactory installation of the piping to ensure it is electrically continuous and electrically bonded to the hull;]

(AI) 4.1.2.4.4 confirming the satisfactory installation and operation of the isolation valves at the vapour manifolds;

(AI) 4.1.2.4.5 confirming that the ends of each line are properly identified as vapour collection lines;

(AI) 4.1.2.4.6 confirming that the vapour collection flanges are in accordance with the IMO guidelines and industrial standards;

[(AI) 4.1.2.4.7 confirming that, where portable vapour lines are provided, they are electrically continuous;

(AI) 4.1.2.4.8 confirming the satisfactory installation and operation of the closed gauging system and the readouts in the cargo control area;

(AI) 4.1.2.4.9 confirming the satisfactory installation and operation of the overflow control system;

(AI) 4.1.2.4.10 confirming the satisfactory installation and operation of both the audible and visual alarms, that the alarms are properly labelled that the power failure alarm operates and that there is a means to check the operation of the alarms;

(AI) 4.1.2.4.11 confirming the satisfactory installation and operation of the high and low pressure alarms provided for each main vapour line and that these alarms operate at the correct set points;]

(AI) 4.1.2.5 Shipboard Incinerators (regulation 16 of Annex VI) (installed on or after 1 January 2000):

(AI) 4.1.2.5.1 confirming the satisfactory installation and operation of each incinerator;

[(AI) 4.1.2.5.2 confirming that warning and instruction plates are satisfactorily secured in prominent positions on or near the incinerator;]

(AI) 4.1.2.5.3 confirming that the manufacturer's name, incinerator model number/type and capacity in heat units per hour is permanently marked on the incinerator;

[(AI) 4.1.2.5.4 confirming the satisfactory operation of the following alarms and safety devices and that they are in good condition and fully operational:

(AI) 4.1.2.5.4.1 flue gas high temperature alarms and shutdowns;

(AI) 4.1.2.5.4.2 combustion temperature controls and shutdowns;

(AI) 4.1.2.5.4.3 combustion chamber negative pressure;

(AI) 4.1.2.5.4.4 flame safeguard control, alarms and shutdowns;

(AI) 4.1.2.5.4.5 confirming that all alarms both visual and audible are functioning and that they indicate the cause of their failure;

(AI) 4.1.2.5.4.6 power loss alarms and auto shutdown arrangements;

(AI) 4.1.2.5.4.7 charging arrangements;

(AI) 4.1.2.5.4.8 low fuel oil pressure alarm/shutdown;

(AI) 4.1.2.5.4.9 emergency stop switch and electrical isolating arrangements;

(AI) 4.1.2.5.4.10 interlocks;

(AI) 4.1.2.5.5 confirming the satisfactory installation of drip trays under each burner, pump, and strainer.]

(AI) 4.1.3 For air pollution prevention the check that certificates and other relevant documentation have been placed on board should consist of:

(AI) 4.1.3.1 review (AA) 4.2.2.2 as applicable;

(AI) 4.1.4 or air pollution prevention the completion of the initial survey should consist of:

(AI) 4.1.4.1 after satisfactory survey, issuing the International Air Pollution Prevention Certificate.

(AA) **4.2** **Annual surveys** – see "General", section 4.2

(AA) 4.2.1 For air pollution prevention the examination of current certificates and other records should consist of:

(AA) 4.2.1.1 checking the validity, as appropriate, of the Cargo Ship Safety Equipment Certificate, the Cargo Ship Safety Radio Certificate and the Cargo Ship Safety Construction Certificate or the Cargo Ship Safety Certificate;

(AA) 4.2.1.2 checking the validity of the Safety Management Certificate (SMC) and that a copy of the Document of Compliance (DOC) is on board, where applicable;

(AA) 4.2.1.3 checking the validity of the International Load Line Certificate or International Load Line Exemption Certificate;

(AA) 4.2.1.4 checking the validity of the International Oil Pollution Prevention Certificate;

(AA) 4.2.1.5 checking the certificates of class, if the ship is classed with a classification society;

(AA) 4.2.1.6 checking, when appropriate, the validity of the International Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk or the Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk;

(AA) 4.2.1.7 checking that the ship's complement complies with the Minimum Safe Manning Document (SOLAS 74/88, regulation V/13(b));

(AA) 4.2.1.8 checking that the master, officers and ratings are certificated as required by the STCW Convention;

(AA) 4.2.1.9 checking whether any new equipment has been fitted and, if so, confirming that it has been approved before installation and that any changes are reflected in the appropriate certificate.

(AA) 4.2.2 For air pollution prevention the annual survey should consist of the following:

(AA) 4.2.2.1 General:

(AA) 4.2.2.1.1 confirm that no changes have been made or any new equipment installed which would affect the validity of the certificate;

(AA) 4.2.2.2 Documentation:

(AA) 4.2.2.2.1 confirm that there is an Ozone Depleting Substances Record Book, if applicable (regulation 12.6 of Annex VI);

(AA) 4.2.2.2.2 confirm that there are Engine International Air Pollution Prevention (EIAPP) Certificates for each engine, required to be certified, as described in Chapter 2.1 of the $NO_x$ Technical Code;

(AA) 4.2.2.2.3 confirm that there is on board an approved technical file or approved method file for each engine required to be certified;

(AA) 4.2.2.2.4 confirm that there is a record book of engine parameters for each engine required to be certified in the case where the engine parameter check method is used as a mean of onboard $NO_x$ verification ($NO_x$ Technical Code, paragraph 6.2.3);

(AA) 4.2.2.2.5 confirm that there is a record of fuel changeover, where applicable, and that this record should take form of a log-book as described by the Administration (regulation 14.6 of Annex VI)[*];

(AA) 4.2.2.2.6 confirm that there is for each Exhaust Gas Cleaning System (EGCS)-$SO_x$ either a $SO_x$ Emission Control Area (SECA[**]) Compliance Certificate for the EGCS-$SO_x$, or an Onboard Monitoring Manual (OMM) as appropriate, plus in either cases a SECA Compliance Plan (regulation 4 of Annex VI) or approved documentation in respect of other technological means of achieving compliance;

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[*] This information could be contained in the engine room log-book, the deck log-book, the official log-book, the oil record book or a separate log-book solely for this purpose.

[**] This will need to be updated when the exhaust gas cleaning system guidelines (MEPC….) are updated to take into account the revised Annex VI for consistency against for the terminology used in the revised guideline.

(AA) 4.2.2.2.7 confirm that there is a VOC Management Plan, if required (regulation 15.6 of Annex VI);

(AA) 4.2.2.2.8 confirm that there is a transfer procedure for the VOC collection system;

(AA) 4.2.2.2.9 confirm that there is, if required, an IMO Type Approval Certificate for each incinerator on board (regulation 16.6.1 of Annex VI);

(AA) 4.2.2.2.10 confirm that there is an instruction manual for each incinerator if required (regulation 16.7 of Annex VI);

(AA) 4.2.2.2.11 confirm that records documenting training of the crew in operating each incinerator, if required;

(AA) 4.2.2.2.12 confirm that there are bunker delivery notes on board and fuel oil samples are kept under the ships control (regulation 18 of Annex VI);

(AA) 4.2.2.3 Systems containing Ozone-depleting substances, if fitted:

(AA) 4.2.2.3.1 confirm that no new installation or equipment containing ozone depleting substances except those covered by (AA) 4.2.2.3.2 have been fitted to the ship after 19 May 2005. (regulation 12.3.1 of Annex VI);

(AA) 4.2.2.3.2 confirm that no installations containing hydro-chlorofluocarbons have been fitted after 1 January 2020 (regulation 12.3.2);

(AA) 4.2.2.3.3 examine externally any installation or equipment as far as practicable to ensure satisfactory maintenance and that there are no emission's of ozone-depleting substances;

(AA) 4.2.2.3.4 confirm through documentary evidence that there has been no deliberate emission of Ozone-depleting substance.

(AA) 4.2.2.4 Nitrogen oxide emissions from each diesel engine:

(AA) 4.2.2.4.1 confirm that each engine has been operated in accordance with its applicable $NO_x$ emission limit(s);

(AA) 4.2.2.4.2 confirm that no engine been subject to major conversion in the intervening period.

(AA) 4.2.2.4.3 *If engine parameter check method is used:*

(AA) 4.2.2.4.3.1 review engine documentation contained in the technical file and the record book of engine parameters to check, as far as practicable, engine rating, duty and limitation/restrictions as given in the technical file;

(AA) 4.2.2.4.3.2 confirm that the engine has not undergone any modifications or adjustments outside the options and ranges permitted in the technical file since the last survey;

(AA) 4.2.2.4.3.3 conduct survey as detailed in the technical file;

(AA) 4.2.2.4.4 *If the simplified method is used:*

(AA) 4.2.2.4.4.1 review engine documentation contained in the technical file;

(AA) 4.2.2.4.4.2 confirm that the test procedure is acceptable to the Administration;

(AA) 4.2.2.4.4.3 confirm that the analysers, engine performance sensors, ambient condition measurement equipment, span check gases and other test equipment are the correct type and have been calibrated in accordance with the $NO_x$ Technical Code;

(AA) 4.2.2.4.4.4 confirm that the correct test cycle, as defined in the engine's technical file, is used for this onboard confirmation test measurements;

(AA) 4.2.2.4.4.5 ensure that a fuel sample is taken during the test and submitted for analysis;

(AA) 4.2.2.4.4.6 witness the test and confirm that a copy of the test report has been submitted for approval on completion of the test.

(AA) 4.2.2.4.5 *If the direct measurement and monitoring method is used:*

(AA) 4.2.2.4.5.1 review engine documentation method and technical file and verify that the direct measurement and monitoring manual is approved by the Administration;

(AA) 4.2.2.4.5.2 the procedures to be checked in the direct monitoring and measure method and the data obtained as given in the approved onboard monitoring manual should be followed.

(AA) 4.2.2.4.6 For an engine with an output of more than 5000 kW and a per cylinder displacement at or above 90 litres/cylinder installed on ships constructed between 1 January 1990 and 31 December 1999, check whether:

.1 an approved method exists;
.2 an approved method is not commercially available; or
.3 that an approved method is installed and where this is the case, that there is an approved method file.

(AA) 4.2.2.5 Sulphur Oxides and Particulate Matter:

confirming, if appropriate, that:

.1 satisfactory arrangements are in place for using compliant fuel as required; or

.2 satisfactory installation and operation of the fuel switching arrangements are in place when tanks are provided for different grades of fuel, including records of the changeover to and from low

sulphur fuel during transit through an emission control area established for $SO_x$ and particulate matter control; or

.3 satisfactory installation and operation of the exhaust gas cleaning system or other technological methods are examined, (regulation 4 of Annex VI).

(AA) 4.2.2.6 Volatile Organic Compounds (VOCs):

(AA) 4.2.2.6.1 confirm that the vapour collect system, if required, is maintained in accordance with its approved arrangement;

[(AA) 4.2.2.6.2 confirm from a general examination that the vapour collection piping is in a satisfactory condition;

(AA) 4.2.2.6.3 confirm that there is a means provided to eliminate the collection of condensation in the system, such as drains in low points of the line end. The drains should be checked to ensure they function correctly;

(AA) 4.2.2.6.4 confirm that the piping is electrically bonded to the hull and that the bonding is intact;

(AA) 4.2.2.6.5 confirm that the isolation valves at the vapour manifolds are operational and that the valve position indicators operate correctly;

(AA) 4.2.2.6.6 confirm that the ends of each line are properly identified as vapour collection lines;

(AA) 4.2.2.6.7 confirm that the vapour collection flanges are in accordance with the IMO guidelines and industrial standards;

(AA) 4.2.2.6.8 confirm that where portable vapour lines are provided that they are in good condition;

(AA) 4.2.2.6.9 confirm that the closed gauging system is operational and the readouts in the cargo control area are functional;

(AA) 4.2.2.6.10 confirm that there is an overflow control system provided and that it is operational;

(AA) 4.2.2.6.11 confirm that the alarm system is operational, both audible and visual alarms operate, the alarms are properly labelled, the power failure alarm operates and that there is a means to check the operation of the alarms and that this means is operational;

(AA) 4.2.2.6.12 confirm that there are high and low pressure alarms provided for each main vapour line and that these alarms operate at the correct set points;

(AA) 4.2.2.6.13 confirm that the high level and high high level (overfill) alarms act independently of each other.]

(AA) 4.2.2.6.14 for ships carrying crude oil, confirm the VOC management plan has been implemented as appropriate.

(AA) 4.2.2.7 Incinerators (installed on or after 1 January 2000):

(AA) 4.2.2.7.1 confirm that operators have been trained as required;

(AA) 4.2.2.7.2 confirm from an external examination that each incinerator is in a generally satisfactory condition and free from leaks of gas or smoke;

[(AA) 4.2.2.7.3 confirm that the warning and instruction plates are legible and secured in prominent positions on or near the incinerator;

(AA) 4.2.2.7.4 confirm that the manufacturer's name, incinerator model number/type and capacity in heat units per hour is permanently marked on the incinerator;

(AA) 4.2.2.7.5 confirm that the incinerator casing insulation arrangements are in good condition;

(AA) 4.2.2.7.6 confirm, as far as practicable, that the following alarms and safety devices are in good condition and fully operational:

(AA) 4.2.2.7.6.1 flue gas high temperature alarms and shutdowns;

(AA) 4.2.2.7.6.2 combustion temperature controls and shutdowns;

(AA) 4.2.2.7.6.3 combustion chamber negative pressure;

(AA) 4.2.2.7.6.4 flame safeguard control, alarms and shutdowns;

(AA) 4.2.2.7.6.5 confirm that all alarms both visual and audible are functioning and that they indicate the cause of their failure;

(AA) 4.2.2.7.6.6 power loss alarms and auto shutdown arrangements;

(AA) 4.2.2.7.6.7 charging arrangements;

(AA) 4.2.2.7.6.8 low fuel oil pressure alarm/shutdown;

(AA) 4.2.2.7.6.9 emergency stop switch and electrical isolating arrangements;

(AA) 4.2.2.7.6.10 interlocks;

(AA) 4.2.2.7.7 confirm that drip trays are fitted under each burner, pump, and strainer and that they are in good condition.]

(AA) 4.2.2.7.8 confirm that each incinerator is maintained according to its approved arrangement.

(AA) 4.2.3 Fuel Oil Quality

(AA) 4.2.3.1 confirm that Bunker Delivery Notes conform to the requirements of MARPOL Annex VI, Appendix V;

(AA) 4.2.3.2 confirm that MARPOL samples are retained onboard and labels duly completed;

(AA) 4.2.3.3 confirm that alternative documentation in lieu of that required by 3.2.3.1 or 3.2.3.3 is available on board.

(AA) 4.2.4 For air pollution prevention the completion of the annual survey should consist of:

(AA) 4.2.4.1 after a satisfactory survey, endorsing the International Prevention of Air Pollution certificate;

(AA) 4.2.4.2 if a survey shows that the condition of the ship or its equipment is unsatisfactory – see "General", section 4.8.

(Ain) **4.3** **Intermediate surveys** – see "General", section 4.3

(Ain) 4.3.1 For air pollution prevention the examination of current certificates and other records should consist of:

(Ain) 4.3.1.1 the provisions of (AA) 4.2.1.

(Ain) 4.3.2 For air pollution prevention the intermediate survey should consist of:

(Ain) 4.3.2.1 the provisions of (AA) 4.2.2.

(Ain) 4.3.3 For air pollution prevention the completion of the intermediate survey should consist of:

(Ain) 4.3.3.1 after a satisfactory survey, endorsing the International Prevention of Air Pollution Certificate;

(Ain) 4.3.3.2 if a survey shows that the condition of the ship or its equipment is unsatisfactory see "General", section 4.4.

(AR) **4.4** **Renewal surveys** – see "General", section 4.5

(AR**)** 4.4.1 For air pollution prevention the examination of current certificates and other records should consist of:

(AR) 4.4.1.1 the provisions of (AA) 4.2.1 except the validity of the International Air Pollution Prevention Certificate.

(AR) 4.4.2 For air pollution prevention the renewal survey should consist of:

(AR) 4.4.2.1 the provisions of (AA) 4.2.2;

(AR) 4.4.2.2 for VOC systems the renewal survey should consist of:

[(AR) 4.4.2.2.1 confirming, if necessary by simulated test or equivalent, the satisfactory operation of the vapour collection system's closed gauging system and associated readouts;

(AR) 4.4.2.2.2 confirming, if necessary by simulated test or equivalent, the satisfactory operation of the vapour collection system's overflow control and its audible and visual alarms;

(AR) 4.4.2.2.3 confirming, if necessary by simulated test or equivalent, the satisfactory operation of the vapour collection system's high and low pressure alarms for each main vapour line;

(AR) 4.4.2.2.4 confirming that the vapour collection systems piping is electrically continuous;

(AR) 4.4.2.2.5 confirming that the portable vapour lines are electrically continuous;]

(AR) 4.4.2.3 for each incinerator the renewal survey should consist of;

(AR) 4.4.2.3.1 confirming, if necessary by simulated test or equivalent, the satisfactory operation of the following alarms and safety devices;

[(AR) 4.4.2.3.2 flue gas high temperature alarms and shutdowns;

(AR) 4.4.2.3.3 combustion temperature controls and shutdowns;

(AR) 4.4.2.3.4 combustion chamber negative pressure;

(AR) 4.4.2.3.5 flame safeguard control, alarms and shutdowns;

(AR) 4.4.2.3.6 confirming that all alarms both visual and audible are functional and that they indicate the cause of their failure;

(AR) 4.4.2.3.7 power loss alarms and auto shutdown arrangements;

(AR) 4.4.2.3.8 charging arrangements;

(AR) 4.4.2.3.9 low fuel oil pressure alarm/shutdown;

(AR) 4.4.2.3.10 emergency stop switch and electrical isolating arrangements;

(AR) 4.4.2.3.11 interlocks.]

(AR) 4.4.3 For air pollution prevention the completion of the renewal survey should consist of:

(AR) 4.4.3.1 after satisfactory survey the International Prevention of Air Pollution Certificate should be issued.

* * *

APPENDIX 1

## SUMMARY OF AMENDMENTS TO MANDATORY INSTRUMENTS REFLECTED IN THE SURVEY GUIDELINES UNDER HSSC

The amendments of mandatory instruments reflected in the Annex 1 are summarized below to facilitate the amendment of the Survey Guidelines under the HSSC in the future.

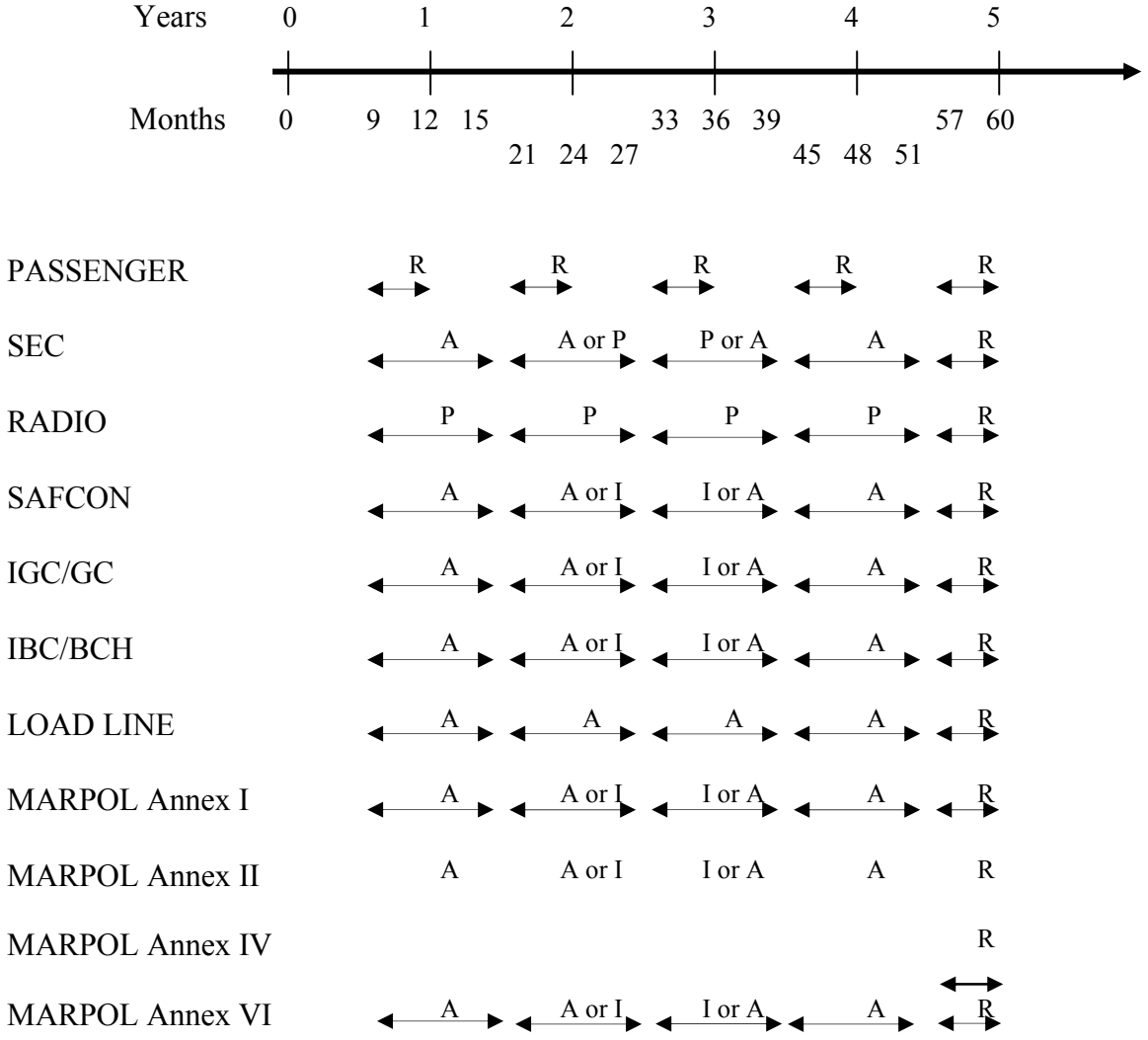
| | |
|---|---|
| SOLAS 1974 | up to and including the 2004 amendments (Res. MSC.170(79) and Res. MSC.194(80)) |
| SOLAS PROT 1988 | up to and including the 2004 amendments (Res. MSC.171(79)) |
| LL 1966 | no amendment yet in force |
| LL PROT 1988 | up to and including the 2004 amendments (Res. MSC.172(79)) |
| MARPOL | up to and including the 2008 amendments (Res. MEPC.176(58)) |
| $NO_x$ Code | up to and including the 2008 amendments (Res. MEPC.177(58)) |
| IBC Code | up to and including the 2004 amendments (Res. MSC.176(79) and Res. MEPC.119(52)) |
| IGC Code | up to and including the 2004 amendments (Res. MSC.179(79)) |
| BCH Code | up to and including the 2000 amendments (Res. MEPC.91(45)) |

* * *

APPENDIX 2

**THE HARMONIZED SYSTEM OF SURVEY AND CERTIFICATION**

**DIAGRAMMATIC ARRANGEMENT**




Code of types of survey:

R – Renewal

P – Periodical

I – Intermediate

A – Annual

***

# ANNEX 14

## DRAFT MEPC RESOLUTION

## REVISED GUIDELINES FOR PORT STATE CONTROL UNDER THE REVISED MARPOL ANNEX VI

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee conferred upon it by the international conventions for the prevention and control of marine pollution,

NOTING that the revised MARPOL Annex VI was adopted at MEPC 58 by resolution MEPC.176(58) which are expected to enter into force on 1 July 2010,

NOTING ALSO that articles 5 and 6 of the MARPOL Convention and regulations 10 and 11 of MARPOL Annex VI provide control procedures to be followed by a Party to the 1997 Protocol with regard to foreign ships visiting its ports,

RECOGNIZING the need to provide basic guidance on the conduct of port State control inspections for the revised MARPOL Annex VI and ensure consistency in the conduct of these inspections, the recognition of deficiencies of a ship, its equipment, or its crew, and the application of control procedures,

HAVING CONSIDERED the Revised Guidelines for port State control for MARPOL Annex VI prepared by the Sub-Committee on Bulk Liquids and Gases at its thirteenth session,

1. ADOPTS the Revised Guidelines for port State control for the revised MARPOL Annex VI, as set out in the Annex to this resolution;

2. INVITES Governments, when exercising port State control for MARPOL Annex VI, to apply the aforementioned Guidelines and to provide the Organization with information on their application; and

3. AGREES that, at a later stage, the Guidelines be adopted as amendments to resolution A.787(19) on Procedures for port State control, as amended by resolution A.882(21).

ANNEX

# REVISED GUIDELINES FOR PORT STATE CONTROL UNDER THE REVISED MARPOL ANNEX VI

## Chapter 1 GENERAL

1.1 This document is intended to provide basic guidance on the conduct of port State control inspections for compliance with MARPOL Annex VI (hereinafter referred to as "the Annex") and afford consistency in the conduct of these inspections, the recognition of deficiencies and the application of control procedures.

1.2 The regulations of MARPOL Annex VI contain the following compliance provisions:

.1 an IAPP Certificate is required for all ships of 400 GT or above engaged in international voyages. Administrations may establish alternative appropriate measures to demonstrate the necessary compliance in respect of ships under 400 GT engaged in international voyages;

.2 new installations which contain ozone depleting substances, other than hydro-chlorofluorocarbons, are prohibited on or after 19 May 2005. Each ship which has rechargeable systems that contain ozone depleting substances is required to maintain an Ozone Depleting Substances Record Book;

.3 in the case of the $NO_x$ controls, Tier I emission limits are applied to all applicable marine diesel engines over 130 kW installed on ships constructed on or after 1 January 2000 and prior to 1 January 2011, and marine diesel engines subject to 'major conversion' (as defined by the Annex).

Tier I emission limits may apply to marine diesel engines with a power output of more than 5,000 kW and a per cylinder displacement at or above 90 litres installed on a ship constructed on or after 1 January 1990 but prior to 1 January 2000 according to regulation 13.7,

Tier II emission limits are applied to all applicable marine diesel engines over 130 kW installed on ships constructed on or after 1 January 2011 and prior to 1 January 2016,

subject to the review set forth in regulation 13.10, Tier III emission limits are applied to all applicable marine diesel engines over 130 kW installed on ships constructed on or after 1 January 2016. However, while these ships are operating outside of an Emission Control Area[1] established for $NO_x$ control, Tier II limits are applied.

[1] As of DD/MM/YYYY, there is no area designated as Emission Control Area under regulation 13.

.4 $SO_x$ and particulate matter control should be achieved by either:

.1 the sulphur content of any fuel oil used on board ships, subject to the provisions of regulation VI/18.2, is required not to exceed the following limits:

.1 4.50% m/m prior to 1 January 2012;

.2 3.50% m/m on and after 1 January 2012; and

.3 0.50% m/m on and after 1 January 2020, subject to the review set forth in regulation 14.8, 14.9 and 14.10.

However, while ships are operating within an Emission Control Area established for $SO_x$ and particulate matter control, the sulphur content of fuel oil used on board ships is required not to exceed the following limits:

.1 1.50% m/m prior to 1 July 2010;

.2 1.00% m/m on and after 1 July 2010; and

.3 0.10% m/m on and after 1 January 2015;

or

.2 equivalent method as approved (regulation 4).

.5 only those incinerators installed on or after 1 January 2000 are required to comply with the associated requirements (appendix IV to the Annex), however, the restrictions as to which materials may be incinerated apply to all incinerators; and

.6 a tanker carrying crude oil is required to have onboard and implement a VOC Management Plan approved by the Administration. Tanker vapour emission control systems are only required where their fitting is specified by the relevant authority.

1.3 Chapters 1 (General), 4 (Contravention and detention), 5 (Reporting requirements) and 6 (Review procedures) of the Procedures for Port State Control adopted by resolution A.787(19), as amended by resolution A.882(21), also apply to these Guidelines.

## Chapter 2 INSPECTIONS OF SHIPS REQUIRED TO CARRY THE IAPP CERTIFICATE

### 2.1 Initial inspections

2.1.1 On boarding and introduction to the master or responsible ship's officer, the port State control officer (PSCO) should examine the following documents, where applicable:

.1 the International Air Pollution Prevention Certificate (IAPP Certificate) (regulation VI/6), including its Supplement[2];

.2 the Engine International Air Pollution Prevention Certificate (EIAPP Certificate) (section 2.2 of the $NO_x$ Technical Code) including its Supplement, for each applicable marine diesel engine;

.3 the Technical File (paragraph 2.3.4 of the $NO_x$ Technical Code) for each applicable marine diesel engine;

.4 depending on the method used for demonstrating $NO_x$ compliance for each applicable marine diesel engine:

.1 the record book of engine parameters for each marine diesel engine (paragraph 6.2.2.7 of the $NO_x$ Technical Code) demonstrating compliance with regulation VI/13 by means of the marine diesel engine parameter check method; or

.2 documentation relating to the simplified measurement method; or

.3 documentation related to the direct measurement and monitoring method;

.5 the Approved Method File (regulation 13.7);

.6 approved documentation relating to any installed exhaust gas cleaning systems, or equivalent means, to reduce $SO_x$ emissions (regulation VI/4);

.7 the bunker delivery notes and associated samples (regulation VI/18);

.8 the copy of the type approval certificate of any shipboard incinerator installed on or after 1 January 2000 (for the incinerators with capacities up to 1,500 kW) (resolutions MEPC.76(40) and MEPC.93(45));

.9 the Ozone Depleting Substances Record Book (regulation 12.6);

.10 the VOC Management Plan (regulation 15.6); and

.11 any notification to the ship's flag Administration issued by the master or officer in charge of the bunker operation together with any available commercial documentation relevant to non-compliant bunker delivery.

The PSCO should ascertain the date of ship construction and the date of installation of equipment on board which are subject to the provisions of the Annex, in order to confirm which regulations of the Annex are applicable.

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[2] Under regulation 6.2 of MARPOL Annex VI, for a ship constructed before the date of entry into force of MARPOL Annex VI for that the ship's Administration that ship shall be issued with an International Air Pollution Prevention Certificate no later than the first scheduled dry-docking after the date of such entry into force, but in no case later than three years after this date.

2.1.2 As a preliminary check, the IAPP Certificate's validity should be confirmed by verifying that the Certificate is properly completed and signed and that required surveys have been performed.

2.1.3 Through examining the Supplement to the IAPP Certificate, the PSCO may establish how the ship is equipped for the prevention of air pollution.

2.1.4 If the certificates and documents are valid and appropriate, and the PSCO's general impressions and visual observations on board confirm a good standard of maintenance, the PSCO should generally confine the inspection to reported deficiencies, if any.

2.1.5 In the case where the bunker delivery note or the representative sample as required by regulation 18 of this Annex presented to the ship are not in compliance with the relevant requirements, the master or officer in charge of the bunker operation should have documented that through a Notification to the ship's flag Administration with copies to the port Authority under whose jurisdiction the ship did not receive the required documentation pursuant to the bunkering operation and to the bunker deliverer. A copy should be retained onboard the ship, together with any available commercial documentation, for the subsequent scrutiny of port State control.

2.1.6 If, however, the PSCO's general impressions or observations on board give clear grounds (see paragraph 2.1.7) for believing that the condition of the ship or its equipment do not correspond substantially with the particulars of the certificates or the documents, the PSCO should proceed to a more detailed inspection.

2.1.7 "Clear grounds" to conduct a more detailed inspection include:

.1 evidence that certificates required by the Annex are missing or clearly invalid;

.2 evidence that documents required by the Annex are missing or clearly invalid;

.3 the absence of principal equipment or arrangements specified in the certificates or documents;

.4 the presence of equipment or arrangements not specified in the certificates or documents;

.5 evidence from the PSCO's general impressions or observations that serious deficiencies exist in the equipment or arrangements specified in the certificates or documents;

.6 information or evidence that the master or crew are not familiar with essential shipboard operations relating to the prevention of air pollution, or that such operations have not been carried out;

.7 evidence that the quality of fuel oil, delivered to and used on board the ship, appears to be substandard; or

.8 receipt of a report or complaint containing information that the ship appears to be substandard.

## 2.2 More detailed inspections

2.2.1 The PSCO should verify that:

.1 there are effectively implemented maintenance procedures for the equipment containing ozone-depleting substances; and

.2 there are no deliberate emissions of ozone-depleting substances.

2.2.2 In order to verify that each installed marine diesel engine with a power output of more than 130 kW is approved by the Administration in accordance with the $NO_x$ Technical Code and maintained appropriately, the PSCO should pay particular attention to the following:

.1 examine such marine diesel engines to be consistent with the EIAPP Certificate and its Supplement, Technical File and, if applicable, Record Book of Engine Parameters;

.2 examine marine diesel engines specified in the Technical Files to verify that no unapproved modifications, which may affect on $NO_x$ emission, have been made to the marine diesel engines;

.3 examine marine diesel engines with a power output of more than 5,000 kW and a per cylinder displacement at or above 90 litres installed on a ship constructed on or after 1 January 1990 but prior to 1 January 2000 according to regulation 13.7;

.4 in the case of ships constructed before 1 January 2000, verify that any marine diesel engine which has been subject to a major conversion, as defined in regulation VI/13, has been approved by the Administration; and

.5 emergency marine diesel engines intended to be used solely in case of emergency are still in use for this purpose.

2.2.3 The PSCO should check whether the quality of fuel oil used on board the ship conforms to the provisions of regulations VI/14 and VI/18[3], taking into account appendix IV to the Annex. Furthermore, the PSCO should pay attention to the record required in regulation VI/14.6 in order to identify the sulphur content of fuel oil used while the ship is within $SO_x$ emission control areas, or that other equivalent approved means have been applied as required.

2.2.4 If the ship is a tanker, as defined in regulation VI/2.21, the PSCO should verify that the vapour collection system approved by the Administration, taking into account MSC/Circ.585, is installed, if required under regulation VI/15 and, if a tanker carrying crude oil, an effectively implemented VOC Management Plan.

[3] It should be noted that in the case where bunker delivery note or representative sample as required by regulation VI/18 are not in compliance with the relevant requirements, the master or crew should have documented that fact. Where fuel oil supply was undertaken in a port under the jurisdiction of a Party to the 1997 Protocol, the PSCO should report that non-compliance to the appropriate authority responsible for the registration of fuel oil suppliers (regulation VI/18.10.1).

2.2.5 The PSCO should verify that shipboard incineration of sewage sludge or sludge oil in boilers or marine power plants is not undertaken while the ship is inside ports, harbours or estuaries (regulation VI/16.4).

2.2.6 The PSCO should verify that the shipboard incinerator, if required by regulation VI/16.6.1, is approved by the Administration. For these units, it should be verified that the incinerator is properly maintained, therefore the PSCO should examine whether:

.1 the shipboard incinerator is consistent with the certificate of shipboard incinerator;

.2 the operational manual, in order to operate the shipboard incinerator within the limits provided in appendix IV to the Annex, is provided; and

.3 the combustion chamber flue gas outlet temperature is monitored as required (regulation VI/16.9).

2.2.7 If there are clear grounds as defined in paragraph 2.1.6, the PSCO may examine operational procedures by confirming that:

.1 the master or crew are familiar with the procedures to prevent emissions of ozone-depleting substances;

.2 the master or crew are familiar with the proper operation and maintenance of marine diesel engines, in accordance with their Technical Files or Approved Method file, as applicable, and with due regard for emission control areas for $NO_x$ control;

.3 the master or crew have undertaken the necessary fuel oil changeover procedures, or equivalent, associated with demonstrating compliance within an emission control area for $SO_x$ and particulate matter control;

.4 the master or crew are familiar with the garbage screening procedure to ensure that prohibited garbage is not incinerated;

.5 the master or crew are familiar with the operation of the shipboard incinerator, as required by regulation VI/16.6, within the limits provided in appendix IV to the Annex, in accordance with its operational manual;

.6 the master or crew are familiar with the regulation of emissions of volatile organic compounds (VOCs), when the ship is in ports or terminals under the jurisdiction of a Party to the 1997 Protocol to MARPOL 73/78 in which VOCs emissions are to be regulated, and are familiar with the proper operation of a vapour collection system approved by the Administration (in case the ship is a tanker as defined in regulation VI/2.21); and

.7 the master or crew are familiar with bunker delivery procedures in respect of bunker delivery notes and retained samples as required by regulation VI/18.

## 2.3 Detainable deficiencies

2.3.1 In exercising his/her functions, the PSCO should use professional judgment to determine whether to detain the ship until any noted deficiencies are corrected or to allow it to sail with certain deficiencies which do not pose an unreasonable threat of harm to the marine environment. In doing this, the PSCO should be guided by the principle that the requirements contained in the Annex, with respect to the construction, equipment and operation of the ship, are essential for the protection of the marine environment and that departure from these requirements could constitute an unreasonable threat of harm to the marine environment.

2.3.2 In order to assist the PSCO in the use of these guidelines, there follows a list of deficiencies, which are considered, taking into account the provisions of regulation 3, to be of such a serious nature that they may warrant the detention of the ship involved:

.1 absence of valid IAPP Certificate, EIAPP Certificates or Technical Files[4];

.2 a marine diesel engine, with a power output of more than 130 kW, which is installed on board a ship constructed on or after 1 January 2000, or a marine diesel engine having undergone a major conversion on or after 1 January 2000, which does not comply with the $NO_x$ Technical Code or that does not comply with the relevant $NO_x$ emission limit;

.3 a marine diesel engine, with a power output of more than 5,000 kW and a per cylinder displacement at or above 90 litres, which is installed on board a ship constructed on or after 1 January 1990 but prior to 1 January 2000, and an Approved Method for that engine has been certified by an Administration, for which an Approved Method is not installed after the first renewal survey specified in regulation VI/13.7.2;

.4 depending on the method used for demonstrating $SO_x$ compliance, the sulphur content of any fuel oil being used on board exceeds 4.50% m/m prior to 1 January 2012, 3.50% m/m on and after 1 January 2012 and 0.50% m/m on and after 1 January 2020[5], taking into account the provisions of regulation 18.2;

.5 non-compliance with the relevant requirements while operating within an emission control area for $SO_x$ and particulate matter control;

.6 an incinerator installed on board the ship on or after 1 January 2000 does not comply with requirements contained in appendix IV to the Annex, or the standard specifications for shipboard incinerators developed by the Organization (resolutions MEPC.76(40) and MEPC.93(45)); and

---

4 Under regulation 6.2 of MARPOL Annex VI, ships constructed before 19 May 2005 shall be issued with the IAPP Certificate no later than the first scheduled dry-docking after 19 May 2005, but in no case later than 19 May 2008. Ships flying the flag of a State which is not a Party to MARPOL Annex VI and which do not carry an IAPP Certificate after the above dates should be treated in accordance with chapter 3 of these Guidelines.

5 Or 2025, depending on the results of the review of regulation 14.1.3, as described in regulation 14.8.

.7 the master or crew are not familiar with essential procedures regarding the operation of air pollution prevention equipment as defined in paragraph 2.2.7 above.

## Chapter 3 INSPECTIONS OF SHIPS OF NON-PARTIES TO THE ANNEX AND OTHER SHIPS NOT REQUIRED TO CARRY THE IAPP CERTIFICATE

3.1 As this category of ships is not provided with the IAPP Certificate, the PSCO should judge whether the condition of the ship and its equipment satisfies the requirements set out in the Annex. In this respect, the PSCO should take into account that, in accordance with article 5(4) of the MARPOL Convention, no more favourable treatment is to be given to ships of non-Parties.

3.2 In all other respects the PSCO should be guided by the procedures for ships referred to in chapter 2 and should be satisfied that the ship and crew do not present a danger to those on board or an unreasonable threat of harm to the marine environment.

3.3 If the ship has a form of certification other than the IAPP Certificate, the PSCO may take such documentation into account in the evaluation of the ship.

***

# ANNEX 15

## DRAFT FRAMEWORK FOR POSSIBLE GUIDANCE ON RECEPTION FACILITIES IN CONNECTION WITH THE REVISED MARPOL ANNEX VI

**BASIC ELEMENTS TO BE INCLUDED**

## 2 TITLE

2.1 The proposed title is "Guidelines for the provision of Annex VI reception facilities".

## 3 INTRODUCTION

3.1 **Purpose**: need a descriptive paragraph summarizing the intent and relevance of regulation 17.

3.2 **Application**: description is needed of the scope of application, such as those residues identified under regulation 17.1.1 and regulation 17.1.2 only, or any other substances which may be specifically defined elsewhere in Annex VI – see Annex V, regulation 1 – *Garbage* means all kinds of victual, domestic and operational waste excluding fresh fish and parts thereof, generated during the normal operation of the ship and liable to be disposed of continuously or periodically except those substances which are defined or listed in other Annexes to the present Convention.

## 4 DEFINITIONS

.1 remotely located;
.2 process (in the context of regulation 17);
.3 appropriate action;
.4 EGCS residues; and
.5 reference to definitions for ODS in Convention.

## 5 GENERAL REQUIREMENTS FOR MARPOL ANNEX VI RECEPTION FACILITIES

.1 treatment and disposal of ODS and EGCS residues;
.2 ODS banking facilities;
.3 composition of EGCS residues;
.4 training/certification of personnel;
.5 sufficient capacity for the throughput of trade and the likely volumes to be handled; and
.6 the provision of documentation for custody transfer from ship to reception facility.

## 6 GENERAL REQUIREMENTS APPLICABLE WHEN MARPOL ANNEX VI RECEPTION FACILITIES ARE NOT AVAILABLE

6.1 Where reception facilities are not provided:

.1 alternative measures should be provided such as:

.1 use of regional/bi-lateral agreements; or
.2 alternative facilities (required to be reported in accordance with regulation 17.2);

.2 criteria for those alternative measures for reception facilities should:

.1 not cause undue delay to ships; and
.2 include:

.1 an environmentally acceptable method for processing/handling;
.2 cost/logistics limitations;
.3 required notifications (IMO); and
.4 explanatory text of why facilities cannot be provided.

## 7 GENERAL REQUIREMENTS FOR SHIPS USING PORTS WHERE RECEPTION FACILITIES ARE NOT AVAILABLE

.1 voyage planning and onboard retention; and
.2 notifications (according to regulation 17.3)

***

# ANNEX 16

## DRAFT GUIDELINES FOR THE DEVELOPMENT OF A VOC MANAGEMENT PLAN

### 1 Objectives

.1 The purpose of the VOC management plan is to ensure that the operation of a tanker, to which regulation 15 of MARPOL Annex VI applies, prevents or minimizes VOC emissions to the extent possible.

.2 Emissions of VOCs can be prevented or minimized by:

.1 optimizing operational procedures to minimize the release of VOC emissions; and/or

.2 using devices, equipment, or design changes to prevent or minimize VOC emissions.

.3 To comply with this plan, the loading and carriage of cargoes which generate VOC emissions should be evaluated and procedures written to ensure that the operations of a ship follow best management practices for preventing or minimizing VOC emissions to the extent possible. If devices, equipment, or design changes are implemented to prevent or minimize VOC emissions, they shall also be incorporated and described in the VOC management plan as appropriate.

.4 While maintaining the safety of the ship, the VOC management plan should encourage and, as appropriate, set forth the following best management practices:

.1 the loading procedures should take into account potential gas releases due to low pressure and, where possible, the routing of oil from crude oil manifolds into the tanks should be done so as to avoid or minimize excessive throttling and high flow velocity in pipes;

.2 the ship should define a target operating pressure for the cargo tanks. This pressure should be as high as safely possible and the ship should aim to maintain tanks at this level during the loading and carriage of relevant cargo;

.3 when venting to reduce tank pressure is required, the decrease in the pressure in the tanks should be as small as possible to maintain the tank pressure as high as possible;

.4 the amount of inert gas added should be minimized. Increasing tank pressure by adding inert gas does not prevent VOC release but it may increase venting and therefore increased VOC emissions; and

.5 when crude oil washing is considered, its effect on VOC emissions should be taken into account. VOC emissions can be reduced by shortening the duration of the washing or by using a closed cycle crude oil washing programme.

## 2 Additional considerations

.1 A person in charge of carrying out the plan

.1 A person shall be designated in the VOC management plan to be responsible for implementing the plan and that person may assign appropriate personnel to carry out the relevant tasks;

.2 Procedures for preventing or minimizing VOC emissions

.1 Ship-specific procedures should be written or modified to address relevant VOC emissions, such as the following operations:

.1 Loading;

.2 Carriage of relevant cargo; and

.3 Crude oil washing;

.2 If the ship is equipped with VOC reduction devices or equipment, the use of these devices or equipment should be incorporated into the above procedures as appropriate.

.3 Training

.1 The plan should describe the training programmes to facilitate best management practices for the ship to prevent or minimize VOC emissions.

***

# ANNEX 17

## DRAFT MEPC CIRCULAR

## GUIDELINES FOR THE APPLICATION OF THE $NO_x$ TECHNICAL CODE RELATIVE TO CERTIFICATION AND AMENDMENTS OF TIER I ENGINES

1 The Marine Environment Protection Committee, at its fifty-eighth session (6 to 10 October 2008), adopted, in resolutions MEPC.176(58) and MEPC.177(58), a revised version of MARPOL Annex VI and a revised Technical Code on Control of Emission of Nitrogen Oxides from Marine Diesel Engines (the $NO_x$ Technical Code 2008).

2 The purpose of the $NO_x$ Technical Code, 2008 is to provide mandatory procedures for the certification, testing, and measurement procedures for the standards set forth in regulation 13 of the revised Annex VI. These procedures will enable engine manufacturers, shipowners, and Administrations comply with regulation 13 of the revised Annex VI.

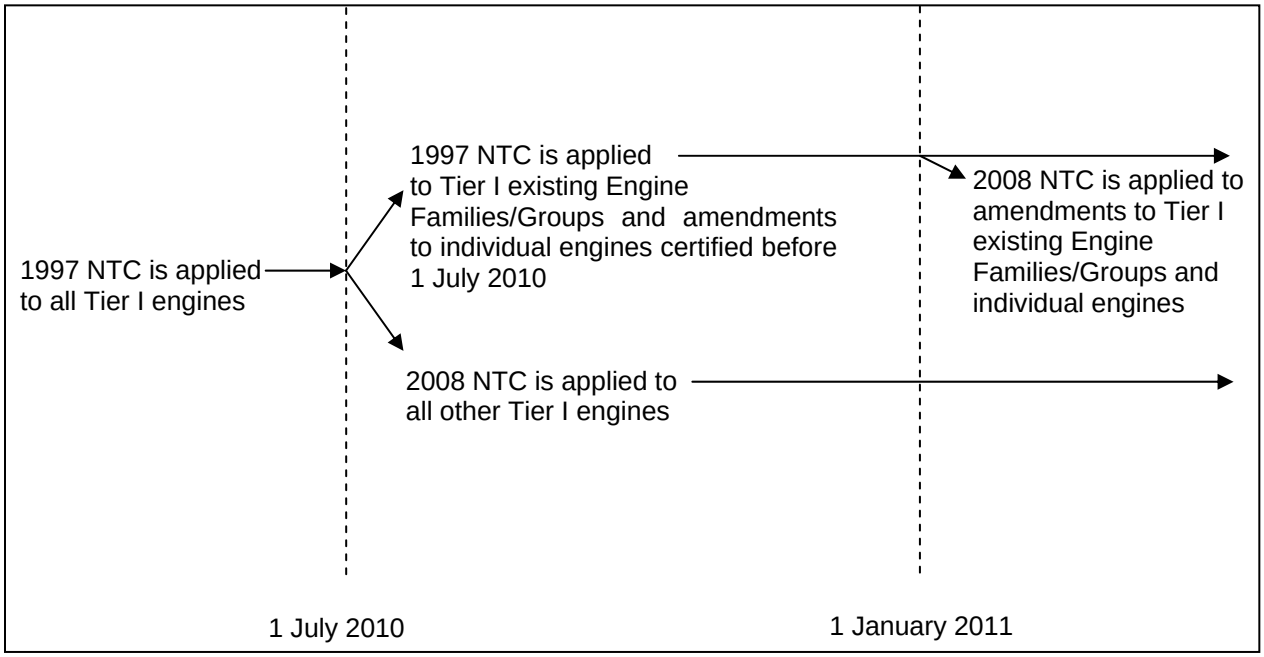
3 On July 1, 2010, the $NO_x$ Technical Code, 2008 is expected to enter into force. However, beyond this date, there are circumstances applicable to Tier I certification and amendments where the $NO_x$ Technical Code (1997) should be applied.

4 In order to assist Administrations regarding the application of the appropriate version of the $NO_x$ Technical Code with respect to Tier I engine certification and amendments, for engines installed on ships constructed before 1 January 2011, a flow chart providing guidance is attached as an Annex to this circular and is recommended to be considered by Administrations.

* * *

ANNEX

**APPLICATION OF $NO_X$ TECHNICAL CODE RELATIVE TO CERTIFICATION AND AMENDMENTS OF TIER I ENGINES INTENDED FOR SHIPS CONSTRUCTED ON OR BEFORE 31 DECEMBER 2010**




**Note:**

- 1997 NTC refers to the $NO_x$ Technical Code 1997 adopted by Resolution 2 of the 1997 MARPOL Conference.
- 2008 NTC refers to the $NO_x$ Technical Code 2008 adopted by MEPC.177(58).

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# ANNEX 18

## DRAFT MEPC CIRCULAR

## DEFINITIONS FOR THE COST EFFECTIVENESS FORMULA IN REGULATION 13.7.5 OF THE REVISED MARPOL ANNEX VI

This circular is being made available for use by engine manufacturers, shipowners, designers, naval architects and Administrations, to provide guidance in the use of the Cost/Effectiveness Formula, as set out in regulation 13.7 to MARPOL Annex VI.

This circular will assist those identified in assessing whether approved methods for existing engines, as described in regulation 13.7 of MARPOL Annex VI, could be approved.

The values as identified in the aforementioned Formula are defined as follows:

**$\Delta NO_x$**: The difference between the engine's designed weighted specific $NO_x$ value and the applicable Tier I limit as stated in regulation 13.7.4.

**Power**: The rated power (kW) of the engine(s) as defined on the application for an Approved Method.

**Cost**: The sale price of the components plus any installation cost above that of regular maintenance.

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# ANNEX 19

## DRAFT MEPC RESOLUTION

## REVISED GUIDELINES FOR MONITORING THE WORLDWIDE AVERAGE SULPHUR CONTENT OF RESIDUAL FUEL OILS SUPPLIED FOR USE ON BOARD SHIPS

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the function of the Committee conferred upon it by international conventions for the prevention and control of marine pollution,

BEING AWARE that the Conference of Parties to MARPOL 73/78 was held in September 1997 and that the Conference adopted the Protocol of 1997 to amend the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto, which sets out in its annex the new Annex VI, regulations for the Prevention of Air Pollution from Ships, and eight conference resolutions including resolution 4, which provides for the development of guidelines for monitoring the worldwide average sulphur content of residual fuels oil supplied for use on board ships,

NOTING amendments to MARPOL Annex VI adopted by resolution MEPC.176(58),

RECOGNIZING regulation 14.2 of Annex VI to MARPOL which requires monitoring of the world-wide average sulphur content of residual fuel oil supplied for use on board ships, taking into account guidelines developed by the Organization,

HAVING CONSIDERED, [at its fifty-ninth session], the Revised Guidelines for monitoring the worldwide average sulphur content of residual fuel oils supplied for use on board ships developed by the Sub-Committee on Bulk Liquids and Gases,

1. ADOPTS the Revised Guidelines for Monitoring the World-wide Average Sulphur Content of Residual Fuel Oils Supplied for Use on Board Ships as set out in the Annex to the present resolution;

2. URGES Member Governments and interested organizations to make available the resources and expertise necessary for the implementation of these guidelines.

* * *

ANNEX

# REVISED GUIDELINES FOR MONITORING THE WORLD-WIDE AVERAGE SULPHUR CONTENT OF RESIDUAL FUEL OILS SUPPLIED FOR USE ON BOARD SHIPS

## Preface

1 The objective of the guidelines is to establish an agreed method to monitor the average sulphur content of residual fuel oils supplied for use on board ships.

## Introduction

2 The basis for these guidelines is provided in regulation 14.2 of Annex VI of MARPOL and in Conference Resolution 4 (in MP/CONF.3/35), on monitoring the worldwide average sulphur content of residual fuel oil supplied for use on board ships. Among the emissions addressed by Annex VI are emissions resulting from the combustion of fuels containing sulphur. An upper limit for the sulphur content of fuels was set and it was further decided to monitor the average sulphur content of fuel.

3 The independent testing companies analyse over 100,000 samples annually, which cover between 25% and 35% of all deliveries. From the data gathered by these testing services, the current average figures for the sulphur content of residual fuels can be derived. These figures are publicised regularly and are currently in the order of 2.37% by mass[1].

## Definitions

4 For the purpose of these guidelines the following definitions shall apply:

.1 *Residual fuel:*

Fuel oil for combustion purposes delivered to and used on board ships with a kinematic viscosity at 100ºC greater than or equal to 10.0 centistoke.[2]

.2 *Provider of sampling and testing services:*

A company that, on a commercial basis, provides testing and sampling services of bunker fuels delivered to ships for the purpose of assessing quality parameters of these fuels, including the sulphur content.

.3 *Reference value $A_w$:*

The value of the world-wide average sulphur content in residual fuel oils supplied for use on board ships, based on the first three years of data collected and as determined on the basis of paragraphs 4 and 5 of these guidelines.

---

1 See MEPC 59/4/1.

2 Reference is made to ISO Standard 8217, 1996.

**Monitoring and calculation of yearly and three-year rolling average**

*Monitoring*

5 Monitoring shall be based on the calculation of average sulphur content of residual fuels on the basis of sampling and testing by independent testing services. Every year the average sulphur content of residual fuels shall be calculated. After three years the reference value for monitoring will be set as described in paragraph 11.

*Calculation of yearly average*

6 At the basis of monitoring is the calculation, on an annual basis, of the average sulphur content of residual fuel.

7 The calculation of the average sulphur content is executed as follows: For a certain calendar year, the sulphur contents of the samples analysed (one sample for each delivery of which the sulphur content is determined by fuel oil analysis) are recorded. The sulphur contents of the samples analysed are added up and divided by the number of samples. The outcome of that division is the average sulphur content of residual fuel for that year.

8 As a basis for well informed decisions a graphical representation of the distribution of the global sulphur content in residual fuels in terms of the % sulphur in increments of 0.5% sulphur plotted against the quantity of fuel associated with each incremental sulphur content range shall be made available by 31 January of each year.

9 The mathematical formula for the method of calculation described, is given in appendix 1 to this guideline.

*Three-year rolling average*

10 A three-year rolling average shall be calculated as follows:

$$A_{cr} = (A_{c1} + A_{c2} + A_{c3})/3$$

in which:

$A_{cr}$ = rolling average S-content of all deliveries tested over a 3-year period

$A_{c1}$, $A_{c2}$, $A_{c3}$ = individual average S-contents of all deliveries tested for each year under consideration

$A_{cr}$ is to be recalculated each year by adding the latest figure for $A_c$ and deleting the oldest.

*Setting of the reference value*

11 The reference value of the world wide average sulphur content of residual fuel oils supplied for use on board ships shall be $A_w$, where $A_w = A_{cr}$ as calculated in January of the year following the first three years in which data were collected on the basis of these guidelines. $A_w$ shall be expressed as a percentage.

*Agenda setting of consideration of measures to reduce $SO_x$ emissions*

12 If in any given year following the setting of the reference value, $A_{cr}$ exceeds $A_w$ by a number equal to or greater than 0.2%, the Marine Environment Protection Committee shall consider the need for further measures to reduce $SO_x$ emissions from ships, so as to decide whether it should be considered a high priority item for the Committee. MEPC shall continually review this excess value (now 0.2%) once the reference value has been set.

**Providers of sampling and testing services**

13 For the purpose of the initial five years operational period, there are presently 3 providers of sampling and testing services under these guidelines.

14 Any additional providers of sampling and testing services shall be subject to the following criteria:

.1 They shall preferably be IACS members, but shall in any way be subject to the approval of the Marine Environment Protection Committee, which shall apply these criteria.

.2 They shall be provided with a technical and managerial staff of qualified professionals providing adequate geographical coverage and local representation to ensure quality services in a timely manner.

.3 They shall provide services governed by a documented Code of Ethics.

.4 They shall be independent as regards to commercial interest in the outcome of monitoring.

.5 They shall implement and maintain an internationally recognized quality system, certified by an independent auditing body, which ensures reproducibility and repeatability of services which are internally audited, monitored and carried out under controlled conditions.

.6 They shall take a significant number of samples on an annual basis for the purpose of globally monitoring average sulphur content of residual fuels.

**Standardized method of calculation**

15 Each of the providers of sampling and testing services shall provide the necessary information for the calculation of the average sulphur content of the residual fuels to the Secretariat of IMO or another agreed third party on the basis of a mutually agreed format, approved by MEPC. This party will process the information and will provide the outcome in the agreed format to MEPC. From the viewpoint of competitive positions the information involved shall be considered sensitive. Therefore, the third party involved shall treat such information as indicated by any party involved as confidential, without prejudice to the information required by the Committee for the purposes of monitoring and related decision-making.

***

# ANNEX 20

## DRAFT MEPC RESOLUTION

## GUIDELINES FOR THE SAMPLING OF FUEL OIL FOR DETERMINATION OF COMPLIANCE WITH THE REVISED MARPOL ANNEX VI

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee (the Committee) conferred upon it by international conventions for the prevention and control of marine pollution,

RECALLING ALSO that the Conference of Parties to the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78), held in September 1997, adopted the Protocol of 1997 to amend MARPOL 73/78 with a new Annex VI on the Prevention of Air Pollution from Ships, which was then amended by resolution MEPC.176(58),

NOTING that regulation 18.1.1 on fuel oil quality within MARPOL Annex VI requires that the bunker delivery note shall be accompanied by a representative sample of the fuel oil delivered taking into account guidelines developed by the Organization,

HAVING CONSIDERED the draft Guidelines prepared by the Sub-Committee on Bulk Liquids and Gases Sub-Committee at its thirteenth session,

1. ADOPTS the Guidelines for the sampling of fuel oil for determination of compliance with MARPOL Annex VI, as set out in the Annex to this resolution;

2. INVITES Governments to apply the Guidelines.

ANNEX

# GUIDELINES FOR THE SAMPLING OF FUEL OIL FOR DETERMINATION OF COMPLIANCE WITH THE REVISED MARPOL ANNEX VI

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## 1 Preface

The primary objective of these Guidelines is to establish an agreed method to obtain a representative sample of the fuel oil for combustion purposes delivered for use on board ships.

## 2 Introduction

The basis for these Guidelines is regulation 18.5 of Annex VI to MARPOL 73/78, as amended by MEPC.176(58), which provides that for each ship subject to regulations 5 and 6 of that Annex, details of fuel oil for combustion purposes delivered to, and used on board the ship, shall be recorded by means of a bunker delivery note which shall contain at least the information specified in appendix V to that Annex. In accordance with regulation 18.8.1 of Annex VI, the bunker delivery note shall be accompanied by a representative sample of the fuel oil delivered. This sample is to be used solely for determination of compliance with Annex VI of MARPOL 73/78.

## 3 Definitions

For the purpose of these Guidelines:

3.1 *Supplier's representative* is the individual from the bunker tanker who is responsible for the delivery and documentation or, in the case of deliveries direct from the shore to the ship, the person who is responsible for the delivery and documentation.

3.2 *Ship's representative* is the ship's master or officer in charge who is responsible for receiving bunkers and documentation.

3.3 *Representative sample* is a product specimen having its physical and chemical characteristics identical to the average characteristics of the total volume being sampled.

3.4 *Primary sample* is the representative sample of the fuel delivered to the ship collected throughout the bunkering period obtained by the sampling equipment positioned at the bunker manifold of the receiving ship.

3.5 *Retained sample* is the representative sample, in accordance with regulation 18.8.1 of Annex VI to MARPOL 73/78, of the fuel delivered to the ship derived from the primary sample.

## 4 Sampling methods

The primary sample should be obtained by one of the following methods:

.1 manual valve-setting continuous-drip sampler; or

.2 time-proportional automatic sampler; or

.3 flow-proportional automatic sampler.

4.2 Sampling equipment should be used in accordance with manufacturer's instructions, or guidelines, as appropriate.

## 5 Sampling and sample integrity

5.1 A means should be provided to seal the sampling equipment throughout the period of supply.

5.2 Attention should be given to:

.1 the form of set up of the sampler;

.2 the form of the primary sample container;

.3 the cleanliness and dryness of the sampler and the primary sample container prior to use;

.4 the setting of the means used to control the flow to the primary sample container; and

.5 the method to be used to secure the sample from tampering or contamination during the bunker operation.

5.3 The primary sample receiving container should be attached to the sampling equipment and sealed so as to prevent tampering or contamination of the sample throughout the bunker delivery period.

## 6 Sampling location

6.1 For the purpose of these Guidelines a sample of the fuel delivered to the ship should be obtained at the receiving ship's inlet bunker manifold and should be drawn continuously throughout the bunker delivery period.*

## 7 Retained sample handling

7.1 The retained sample container should be clean and dry.

7.2 Immediately prior to filling the retained sample container, the primary sample quantity should be thoroughly agitated to ensure that it is homogenous.

7.3 The retained sample should be of sufficient quantity to perform the tests required but should not be less than 400 ml. The container should be filled to 90% ± 5% capacity and sealed.

## 8 Sealing of the retained sample

8.1 Immediately following collection of the retained sample, a tamper proof security seal with a unique means of identification should be installed by the supplier's representative in the presence of the ship's representative. A label containing the following information should be secured to the retained sample container:

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* The phrase "be drawn continuously throughout the bunker delivery period" in paragraph 6 of the Guidelines should be taken to mean continuous collection of drip sample throughout the delivery of bunker fuel covering each bunker delivery note. In case of receiving an amount of bunker fuel necessitating two or more delivery notes, the sampling work may be temporarily stopped to change sample bags and bottles and then resumed as necessary.

.1 location at which, and the method by which, the sample was drawn;
.2 date of commencement of delivery;
.3 name of bunker tanker/bunker installation;
.4 name and IMO number of the receiving ship;
.5 signatures and names of the supplier's representative and the ship's representative;
.6 details of seal identification; and
.7 bunker grade.

8.2 To facilitate cross-reference details of the seal, identification may also be recorded on the bunker delivery note.

## 9 Retained sample storage

9.1 The retained sample should be kept in a safe storage location, outside the ship's accommodation, where personnel would not be exposed to vapours which may be released from the sample. Care should be exercised when entering a sample storage location.

9.2 The retained sample should be stored in a sheltered location where it will not be subject to elevated temperatures, preferably at a cool/ambient temperature, and where it will not be exposed to direct sunlight.

9.3 Pursuant to regulation 18.8.1 of Annex VI of MARPOL 73/78, the retained sample should be retained under the ship's control until the fuel oil is substantially consumed, but in any case for a period of not less than 12 months from the time of delivery.

9.4 The ship's master should develop and maintain a system to keep track of the retained samples.

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# ANNEX 21

## PROPOSED DRAFT EDITORIAL AMENDMENTS TO SPECIFIC PARAGRAPHS OF THE GUIDELINES FOR EXHAUST GAS CLEANING SYSTEMS, RESOLUTION MEPC.170(57)

## 1 INTRODUCTION

1.1 Regulation 14 of Annex VI to MARPOL requires ships within $SO_x$ emission control areas to use fuel oil with a sulphur content not exceeding that stipulated in regulation 14.1 or 14.4. Regulation 4 allows the use of an alternative compliance method at least as effective in terms of emission reductions as that required by the Annex, including the standards set forth in regulation 14 the Administration of a Party should take into account any relevant guidelines developed by the Organization pertaining to alternatives provided for in regulation 4.

1.2 Similar to a $NO_x$ emission reduction system, an EGC unit may be approved subject to periodic parameter and emission checks or the system may be equipped with a continuous emission monitoring system. These guidelines have been developed with the intention of being objective and performance oriented. As an alternative, introduction of the $SO_2$ (ppm)/$CO_2$ (%) ratio method will simplify the monitoring of $SO_x$ emission and facilitate approval of an EGC unit. See Appendix I for the rationale explaining the use of $SO_2$ (ppm)/$CO_2$ (%) as the basis for system monitoring.

1.3 For ships using an EGCS under the provisions of regulation 4 as an alternative to the fuel oil sulphur content requirements of regulation 14.1 and 14.4, total sulphur oxides emissions from both auxiliary and main propulsion engines calculated as the total weight of sulphur dioxide emission using the assumptions and methodology in Appendix I, and assuming a specific fuel consumption of 200 g/kWh, should in no case exceed the values in the following table for each fuel oil sulphur content listed. Compliance may be demonstrated on the basis of either the g $SO_2$/kWh or the $SO_2$ (ppm) /$CO_2$ (% V/V) ratio values.

*Table 1*
Fuel oil sulphur limits and corresponding emission values

| Fuel Oil Sulphur Content % m/m | Power specific Emission rate g $SO_2$/kWh | Ratio $SO_2$ (ppm)/$CO_2$ (% V/V) |
|---|---|---|
| 4.50 | 18.0 | 195.0 |
| 3.50 | 14.0 | 152.0 |
| 1.50 | 6.0 | 65.0 |
| 1.00 | 4.0 | 43.0 |
| 0.50 | 2.0 | 22.0 |
| 0.10 | 0.40 | 4.0 |

Note: The $SO_2$/$CO_2$ values can be found in Appendix I, Figure 1, after amendment of Appendix I to reflect the full range of S values as recommended in paragraph 4.4 of this submission.

1.4 These Guidelines are recommendatory in nature; however, Administrations are invited to base their implementation on these guidelines.

## 2 GENERAL

### 2.1 Purpose

2.1.1 The purpose of these Guidelines is to specify the requirements for the testing, survey certification and verification of exhaust gas cleaning (EGC) systems to ensure that they comply with the requirements of regulations 4 and 14 of Annex VI of MARPOL 73/78.

2.1.2 The Guidelines permit two schemes; Scheme A (Unit Certification with Parameter and Emission Checks), and Scheme B (Continuous Emission Monitoring with Parameter Checks).

2.1.3 For ships which are to use an exhaust gas cleaning system in part or in total in order to comply with regulations 4 and 14 of MARPOL Annex VI there should be an approved SECA Compliance Plan (SCP).

## 4 SCHEME A – EGC SYSTEM APPROVAL, SURVEY AND CERTIFICATION USING PARAMETER AND EMISSION CHECKS

4.1.2.1 An EGC unit should be certified as capable of meeting the limit value, (the certified value), specified by the manufacturer (e.g., the emission level the unit is capable of achieving on a continuous basis) with fuel oils of any % m/m sulphur content so long as the EGC unit reduces the total emission of g $SO_x$/kWh to within the limits specified in paragraph 1.3; and, for the range of operating parameters, as listed in 4.2.2.1(b), for which they are to be approved.

4.1.2.2 Where testing is not to be undertaken with fuel oils of the highest allowable global % m/m sulphur content, the use of two test fuels with a lower % m/m sulphur content is permitted. The two fuels selected should have a difference in % m/m sulphur content sufficient to demonstrate the operational behaviour of the EGC unit and to demonstrate that the requirements of MARPOL Annex VI regulations 4, 14.1 and .4 can be met if the EGC unit were to be operated with a fuel of the highest allowable global % m/m sulphur content under MARPOL Annex VI, regulation 14.1 and .4. In such cases a minimum of two tests, in accordance with section 4.3 as appropriate, should be performed. These need not be sequential and could be undertaken on two different, but identical, EGC units.

4.2.2.5 As an alternative to the maximum emission rate stipulated in 1.3 a comparable $SO_2$ (ppm)/$CO_2$ (%) ratio as prescribed in Figure 1 of the Appendix I measured downstream of EGCS unit may be used.

## 5 SCHEME B – EGC SYSTEM APPROVAL, SURVEY, AND CERTIFICATION USING CONTINUOUS MONITORING OF $SO_x$ EMISSIONS

### 5.1 General

This Scheme should be used to demonstrate that the emissions from a fuel oil combustion unit fitted with an EGC will, with that system in operation, result in the required emission value (e.g., as stated in the SCP) or below at any load point, including during transient operation and thus compliance with the requirements of regulations 4, 14.1 and .4 of MARPOL Annex VI.

## 9.1 SECA Compliance Plan (SCP)

9.1.1 For all ships which are to use an EGC unit, in part or in total, in order to comply with the requirements of regulations 4, 14.1 and .4 of MARPOL Annex VI there should be a SCP for the ship, approved by the Administration.

9.1.4 Under Scheme B, the SCP should present how continuous exhaust gas emissions monitoring will demonstrate that the ship total $SO_2$ (ppm)/$CO_2$ (%) ratio is comparable to the requirements of regulation 14.1 or .4 or below as prescribed in Figure 1 of Appendix I. Under Scheme A, this would be demonstrated using daily exhaust gas emission recordings.

9.1.5 There may be some equipment such as small engines and boilers to which the fitting of EGC units would not be practical, particularly where such equipment is located in a position remote from the main machinery spaces. All such fuel oil combustion units should be listed in the SCP. For these fuel oil combustion units which are not to be fitted with EGC units, compliance may be achieved by means of regulation 14.1 and .4 of MARPOL Annex VI, while operating within a SECA. Alternatively, compliance may be achieved based on total ship emissions as described in paragraphs 9.1.7 and 9.1.8.

9.1.7 If each fuel oil combustion unit meets the requirements of either regulation 14.1 or of MARPOL Annex VI, the ship is considered to be in compliance with the requirements.

9.1.8.1 Recognizing that the limit given in 1.3 is for the ship, not each individual item of combustion equipment, the shipowner should have the opportunity to balance performance which considerably exceeds that stipulated in 1.3 or the comparable $SO_2$ (ppm)/$CO_2$ (%) ratio as prescribed in Figure 1 of Appendix I against that of equipment, potentially not fitted with EGC units, which does not meet that requirement. These cases should be subject to special consideration by the administration. In particular the SCP should detail how the actual emissions from each fuel oil combustion unit are to be aggregated together to obtain an overall, real time, emission value for the ship which does not exceed that stipulated in 1.3 or the comparable $SO_2$ (ppm)/$CO_2$ (%) ratio as prescribed in Figure 1 of Appendix I.

9.1.8.2 Since the emission value in 1.3 is an alternative to that given in regulation 14.1 and .4 of MARPOL Annex VI, not an equivalent, compliance in excess of that required by means of regulation 14.1 or .4 of MARPOL Annex VI, in respect of fuel oil combustion units, such as given in section 9.1.8.1, should only be set against the requirements of 1.3 where it can be clearly documented as to the actual sulphur content of the fuel oil being used at any time together with the requirement that the specific fuel consumption rate (g fuel/kWh) of that equipment is capable of determination on a real time basis (calibration requirements of such equipment to comply with those as given in the $NO_x$ Technical Code).

9.1.9 At no time during operation in a SECA should the total ship emissions, as described in paragraph 9.1.5, exceed that stipulated in 1.3 or exceed the comparable $SO_2$ (ppm)/$CO_2$ (%) ratio as prescribed in Figure 1 of Appendix I. Shipowners are advised to consider worst case operating scenarios, such as manoeuvring or high power operation, in their $SO_x$ control strategies.

APPENDIX I

## $SO_2$ OVER $CO_2$ MONITORING METHOD

Note that the S/C mass ratios calculated above, based on 6.0 g/kWh and 200 g/kWh BSFC, are both within 0.10% of the S/C mass ratios in the emissions table (Table 2). Therefore, 65 ppm/$CO_2$ corresponds well to 6.0 g/kWh.

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# ANNEX 22

## DRAFT AMENDMENTS TO MARPOL ANNEX I

### Addition of new chapter 9

*Chapter 9 – Special requirements for the use or carriage of oils in the Antarctic area*

**Regulation 43**
*Special requirements for the use or carriage of oils in the Antarctic area*

1 With the exception of vessels engaged in securing the safety of ships or in a search and rescue operation, the carriage in bulk as cargo or carriage and use as fuel of the following:

.1 crude oils having a density at 15°C higher than 900 kg/m$^3$;

.2 oils, other than crude oils, having a density at 15°C higher than 900 kg/m$^3$ or a kinematic viscosity at 50°C higher than 180 mm$^2$/s; or

.3 bitumen, tar and their emulsions,

shall be prohibited in the Antarctic area.

2 When prior operations have included the carriage or use of oils listed in paragraphs 1.1 to 1.3 of this regulation, the cleaning or flushing of tanks or pipelines shall not be required.

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# ANNEX 23

## PROPOSED REVISED WORK PROGRAMME OF THE SUB-COMMITTEE AND PROVISIONAL AGENDA FOR BLG 14

### PROPOSED REVISED WORK PROGRAMME OF THE SUB-COMMITTEE

| | | Target completion date/number of sessions needed for completion | Reference |
|---|---|---|---|
| 1 | **Evaluation of safety and pollution hazards of chemicals and preparation of consequential amendments**<br>*Strategic direction: 7.2 ~~and 1.3~~*<br>*High-level action: 7.2.2 ~~and 1.3.3~~*<br>*Planned output: 7.2.2.1 ~~and 1.3.3.1~~* | Continuous | BLG 10/19, section 3;<br>BLG 11/16, section 3 |
| 2 | **Casualty analysis** (coordinated by FSI)<br>*Strategic direction: 12.1*<br>*High-level action: 12.1.2*<br>*Planned output: 12.1.2.1 to .2* | Continuous | MSC 70/23, paragraphs 9.17 and 20.4;<br>MSC 80/24, paragraph 21.6;<br>BLG 12/17, section 9 |
| 3 | **Consideration of IACS unified interpretations**<br>*Strategic direction: 1.1*<br>*High-level action: 1.1.2*<br>*Planned output: 1.1.2.1* | Continuous | MSC 78/26, paragraph 22.12;<br>BLG 12/17, section 10 |
| H.1 | Environmental and safety aspects of alternative tanker designs under MARPOL, Annex I, regulation 19<br>*Strategic direction: 7.2*<br>*High-level action: 7.2.2*<br>*Planned output: 7.2.2.1* | | BLG 3/18, paragraph 15.7 |
| | .1 assessment of alternative tanker designs, if any (as necessary) | Continuous | BLG 1/20, section 16;<br>BLG 4/18, paragraph 15.3 |

**Notes:**
1 "H" means a 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 Struck-out text indicates proposed deletions and the shaded text shows proposed additions or changes.
3 Items printed in bold letters have been selected for the provisional agenda for BLG 14.

**Proposed revised work programme of the Sub-Committee (cont'd)**

| | | Target completion date/number of sessions needed for completion | Reference |
|---|---|---|---|
| H.2 | **Development of provisions for gas-fuelled ships** (in cooperation with FP and DE)<br>*Strategic direction: 5.2*<br>*High-level action: 5.2.1*<br>*Planned output: 5.2.1.1* | ~~2009~~<br>2012 | MSC 78/26, paragraph 24.11;<br>~~BLG 12/17, section 7;~~<br>BLG 13/18, section 6 |
| H.3 | **Development of guidelines and other documents for uniform implementation of the 2004 BWM Convention**<br>*Strategic direction: 7.1*<br>*High-level action: 7.1.2*<br>*Planned output: 7.1.2.2 to .5* | 2010 | ~~MEPC 52/24, paragraph 2.21.6;~~<br>BLG 12/17, section 5;<br>MEPC 57/21, paragraph 18.11 |
| H.4 | **Application of the requirements for the carriage of bio-fuels and bio-fuel blends**<br>*Strategic direction: 7.2*<br>*High-level action: 7.2.2*<br>*Planned output: 7.2.2.1* | ~~2009~~<br>2010 | MEPC 55/23,<br>paragraphs 19.4 and 19.5;<br>~~BLG 12/17, section 4;~~<br>BLG 13/18, section 4 |
| H.5 | **Development of international measures for minimizing the transfer of invasive aquatic species through bio-fouling of ships**<br>*Strategic direction: 7.1*<br>*High-level action: 7.1.1*<br>*Planned output: -* | 2010 | MEPC 56/23, paragraph 19.12;<br>BLG 12/17, section 11 |
| ~~H.6~~ | ~~**Review of the Recommendation for material safety data sheets for MARPOL Annex I cargoes and marine fuel oils**~~<br>~~*Strategic direction: 5.2*~~<br>~~*High-level action: 5.2.3*~~<br>~~*Planned output: 5.2.3.1*~~ | ~~2009~~ | ~~BLG 11/16, paragraph 14.14;~~<br>~~MSC 83/28, paragraph 25.8;~~<br>~~BLG 12/17, section 12~~ |

**Proposed revised work programme of the Sub-Committee (cont'd)**

| | | Target completion date/number of sessions needed for completion | Reference |
|---|---|---|---|
| ~~H.7~~ H.6 | **Revision of the IGC Code** (in cooperation with FP, DE, SLF and STW as necessary)<br>*Strategic direction: 5.2*<br>*High-level action: 5.2.1*<br>*Planned output: -* | 2010 | MSC 83/28, paragraph 25.7; BLG 12/17, section 13 |
| ~~H.8~~ H.7 | **Safety requirements for natural gas hydrate pellet carriers**<br>*Strategic direction: 5.2*<br>*High-level action: 5.2.1*<br>*Planned output: -* | 2011 | MSC 83/28, paragraph 25.6 |
| ~~H.9~~ H.8 | **Review of relevant non-mandatory instruments as a consequence of the amended MARPOL Annex VI and the $NO_x$ Technical Code**<br>*Strategic direction: 7.3*<br>*High-level action: 7.3.1*<br>*Planned output: -* | 2010 | BLG 12/17, paragraph 6.88.9; MEPC 57/21, paragraph 18.11 |
| ~~H.10~~ | ~~**Amendments to MARPOL Annex I on the use and carriage of heavy grade oil on ships in the Antarctic area**~~<br>~~*Strategic direction: 7.2*~~<br>~~*High-level action: 7.2.2*~~<br>~~*Planned output: -*~~ | ~~2010~~ | ~~BLG 12/17, paragraph 16.12~~ |
| ~~H.11~~ H.9 | **Revision of the Recommendations for entering enclosed spaces aboard ships** (coordinated by DSC)<br>*Strategic direction: 5.2*<br>*High-level action: 5.2.3*<br>*Planned output: -* | 2010 | MSC 85/26, paragraph 23.4 |

## PROPOSED PROVISIONAL AGENDA FOR BLG 14*

1 Adoption of the agenda

2 Decisions of other IMO bodies

3 Evaluation of safety and pollution hazards of chemicals and preparation of consequential amendments

4 Application of the requirements for the carriage of bio-fuels and bio-fuel blends

5 Development of guidelines and other documents for uniform implementation of the 2004 BWM Convention

6 Development of provisions for gas-fuelled ships

7 Casualty analysis

8 Consideration of IACS unified interpretations

9 Development of international measures for minimizing the transfer of invasive aquatic species through bio-fouling of ships

10 Revision of the IGC Code

11 Safety requirements for natural gas hydrate pellet carriers

12 Review of relevant non-mandatory instruments as a consequence of the amended MARPOL Annex VI and the $NO_x$ Technical Code

13 Revision of the Recommendations for entering enclosed spaces aboard ships

14 Work programme and agenda for BLG 15

15 Election of Chairman and Vice-Chairman for 2011

16 Any other business

17 Report to the Committees

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* Agenda item numbers do not necessarily indicate priority.

# ANNEX 24

## STATUS OF PLANNED OUTPUTS (2008-2009) SPECIFIED IN THE HIGH-LEVEL ACTION PLAN

## RELEVANT TO THE SUB-COMMTTEE

| Strategic Directions (SDs) (A.989(25)) | | | | High-level Actions (HLAs) | | Planned outputs for 2008-2009 | |
|---|---|---|---|---|---|---|---|
| **ENHANCING THE STATUS AND EFFECTIVENESS OF IMO** | | | | | | | |
| **1** | IMO is the primary international forum for technical matters of all kinds affecting international shipping and legal matters related thereto. An inclusive and comprehensive approach to such matters will be a hallmark of IMO. In order to maintain that primacy, it will: | 1.1 | Further develop its role in maritime affairs *vis-à-vis* other intergovernmental organizations, so as to be able to deal effectively and comprehensively with complex cross-agency issues | 1.1.2 | Co-operate with the United Nations and other international bodies on matters of mutual interest | 1.1.2.1 | Co-operation with:<br>Safety and security topics (MSC):<br>- IACS: consideration of unified interpretations<br>**ongoing** |
| **2** | IMO will foster global compliance with its instruments governing international shipping and will promote their uniform implementation by Member States | | | 2.1.1 | Monitor and improve conventions, etc., and provide interpretation thereof if requested by Member States | 2.1.1.5 | - Promotion of the implementation of mandatory and non-mandatory instruments (MSC)<br>**continuous**<br>- Provision for information relative to adherence to regulations 12 and 18 of MARPOL Annex II (Drainage of shore lines) (MEPC)<br>**completed** |
| **DEVELOPING AND MAINTAINING A COMPREHENSIVE FRAMEWORK FOR SAFE, SECURE, EFFICIENT AND ENVIRONMENTALLY SOUND SHIPPING** | | | | | | | |
| **5** | IMO's highest priority will be the safety of human life at sea. In particular, greater emphasis will be accorded to: | 5.2 | Enhancing technical, operational and safety management standards | 5.2.1 | Keep under review the technical and operational safety aspects of all types of ships, including fishing vessels | 5.2.1.1 | New or amended mandatory IMO instruments (MSC):<br>- Interim guidelines for gas-fuelled engine installations in ships<br>**completed**<br>- Safety requirements for natural gas hydrate pellet carriers<br>**progressed**<br>- Revision of the IGC Code<br>**progressed**<br>- Development of IGF Code<br>**progressed**<br>- Revision of the Recommendation for entering enclosed spaces aboard ship<br>**progressed** |
| | | | | 5.2.3 | Keep under review standards for safe handling and carriage by sea of solid and liquid cargoes carried in bulk and packaged form | 5.2.3.1 | New or amended mandatory IMO instruments:<br>Safety and security topics (MSC):<br>- Review of MSDS for MARPOL Annex I cargoes and marine fuels<br>**completed**<br>- Device to prevent passage of flame into cargo tanks<br>**completed**<br>- Revision of the recommendations for entering enclosed spaces onboard ships<br>**progressed** |

| Strategic Directions (SDs) (A.989(25)) | | | | High-level Actions (HLAs) | | Planned outputs for 2008-2009 | |
|---|---|---|---|---|---|---|---|
| 7 | IMO will focus on reducing and eliminating any adverse impact by shipping on the environment by: | 7.1 | Identifying and addressing possible adverse impacts | 7.1.1 | Monitor pollution and adverse impact on the marine environment caused by ships and their cargoes | | - Development of international measures for minimizing the translocation of invasive aquatic species through bio-fouling of ships<br>**progressed** |
| | | | | 7.1.2 | Keep under review measures to reduce adverse impact on the marine environment by ships and their cargoes | 7.1.2.2 | New or amended non-mandatory IMO instruments (MEPC):<br>- Consolidated guidelines on ballast water management<br>**progressed** |
| | | | | | | 7.1.2.3 | Approved ballast water management systems (MEPC)<br>**progressed** |
| | | | | | | 7.1.2.4 | Approved list of active substances used by ballast water management systems<br>**progressed** |
| | | | | | | 7.1.2.5 | Production of a manual entitled "Ballast Water Management – How to do it" (MEPC)<br>**work to be commenced** |
| | | 7.2 | Developing effective measures for mitigating and responding to the impact on the environment caused by shipping incidents and operational pollution from ships | 7.2.2 | Keep under review the adequacy of the legal framework | 7.2.2.1 | - Evaluation of safety and pollution hazards of chemicals and preparation of consequential amendments (MEPC)<br>**ongoing**<br>- Environmental and safety aspects of alternative tanker designs under MARPOL Annex I, regulation 19 (assessment of alternative tanker designs, if any)<br>**work to be commenced**<br>- Amendments to MARPOL Annex I for the prevention of marine pollution during oil transfer operations between ships at sea (MEPC)<br>**completed**<br>- Application of the requirements for the carriage of bio-fuels and bio-fuel blends (MEPC)<br>**progressed**<br>- Use and carriage of heavy grade oil (HGO) on ships in the Antarctic Area (MEPC)<br>**completed**<br>- Requirements for the carriage of gas-to-liquid oils (MEPC)<br>**completed**<br>- Limiting cargo loss from tank vessels involved in collision or grounding incidents (MEPC)<br>**work to be commenced** |
| | | 7.3 | Contributing to international efforts to reduce atmospheric pollution and address global warming | 7.3.1 | Keep under review IMO measures to reduce atmospheric pollution and address global warming | 7.3.1.1 | New or amended mandatory IMO instruments (MEPC):<br>- Revised MARPOL Annex VI and $NO_x$ Technical Code<br>**completed**<br>- Guidelines on other technological methods verifiable or enforceable to limit $SO_x$ emissions<br>**progressed**<br>- Review of relevant non-mandatory instruments as a consequence of the revised MARPOL Annex VI<br>**progressed** |
| | | | | | | 7.3.1.2 | Updated study on greenhouse gas (GHG) emissions from ships (MEPC)<br>**to be discussed at MEPC** |
| | | | | | | 7.3.1.3 | Completed work plan to identify and develop mechanisms needed to achieve the limitation or reduction of $CO_2$ emissions from international shipping (MEPC)<br>**completed** |

| Strategic Directions (SDs) (A.989(25)) | | | | High-level Actions (HLAs) | | Planned outputs for 2008-2009 | |
|---|---|---|---|---|---|---|---|
| **ENHANCING THE PROFILE OF SHIPPING AND INSTILLING A QUALITY CULTURE AND ENVIRONMENTAL CONSCIENCE** | | | | | | | |
| **12** | IMO will take the lead in enhancing the quality of shipping by: | 12.1 | Encouraging the utilization of the best available techniques not entailing excessive costs, in all aspects of shipping | 12.1.2 | Use risk-based tools that take account of costs and the human elements in the development of operational standards | 12.1.2.1 | Guidelines for all sub-committees on the casualty analysis process (MSC) **completed** |
| | | | | | | 12.1.2.2 | A casualty analysis process effectively implemented and monitored (MSC) **progressed** |

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# ANNEX 25

## DRAFT MSC CIRCULAR

## AMENDMENTS TO THE REVISED STANDARDS FOR THE DESIGN, TESTING AND LOCATION OF DEVICES TO PREVENT THE PASSAGE OF FLAME INTO CARGO TANKS IN TANKERS (MSC/CIRC.677, AS AMENDED BY MSC/CIRC.1009)

1 The Maritime Safety Committee, at its [eighty-sixth session (27 May to 5 June 2009)], noting that the provisions in paragraphs 1.2.3 and 4.1.4 of the Revised standards for the design, testing and location of devices to prevent the passage of flame into cargo tanks in tankers (MSC/Circ.677), needed clarification to ensure that the Maximum Experimental Safe Gap (MESG) value for the medium to be used to test the device is appropriate for the product certified to be carried in the tank fitted with such a device, approved the following amendments to MSC/Circ.677:

.1 Paragraph 1.2.3 is replaced with the following:

"1.2.3 These Standards are intended for devices protecting cargo tanks containing crude oil, petroleum products and flammable chemicals. In the case of the carriage of chemicals, the test media referred to in section 3 can be used for products having an MESG of 0.9 mm and greater. However, devices for chemical tankers certified for the carriage of products with an MESG* less than 0.9 mm should be tested with the following media based on the apparatus group assigned as per column i" of the IBC Code, chapter 17:

.1 Apparatus Group II B – ethylene (MESG = 0.65 mm); and
.2 Apparatus Group II C – hydrogen (MESG = 0.28 mm).

Where no apparatus group is assigned in column i", the device should be tested in accordance with the requirements for Apparatus Group II B."

.2 Paragraph 4.1.4 is replaced with the following:

"4.1.4 approved location for installation, including maximum or minimum length of pipe, if any, between the device and the atmosphere and the apparatus group assigned to the tested device;"

2 Member Governments are invited to apply the amendments to the Revised standards, as amended, to ships constructed on or after 1 January 2013 and to ships constructed before 1 January 2013, no later than the first scheduled dry-docking carried out on or after 1 January 2013.

3 Member Governments are also invited to bring the above amendments to the Revised Standards to the attention of masters, ship operators, shipowners, cargo manufacturers and other parties involved in the design, construction and operation of tankers.

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* Reference is made to IEC – Publication 79-1.

# ANNEX 26

## DRAFT MSC CIRCULAR

## MISSING INFORMATION ON APPARATUS GROUPS IN COLUMN i" OF CHAPTER 17 OF THE IBC CODE

1 The Maritime Safety Committee, at its [eighty-sixth session (27 May to 5 June 2009)], noting that the provisions in paragraphs 1.2.3 and 4.1.4 of the Revised standards for the design, testing and location of devices to prevent the passage of flame into cargo tanks in tankers (MSC/Circ.677), needed clarification to ensure that the Maximum Experimental Safe Gap (MESG) value for the medium to be used to test the device is appropriate for the product certified to be carried in the tank fitted with such a device, approved the following amendments to MSC/Circ.677:

.1 Paragraph 1.2.3 is replaced with the following:

"1.2.3 These Standards are intended for devices protecting cargo tanks containing crude oil, petroleum products and flammable chemicals. In the case of the carriage of chemicals, the test media referred to in section 3 can be used for products having an MESG of 0.9 mm and greater. However, devices for chemical tankers certified for the carriage of products with an MESG* less than 0.9 mm should be tested with the following media based on the apparatus group assigned as per column i" of the IBC Code, chapter 17:

.1 Apparatus Group II B – ethylene (MESG = 0.65 mm); and
.2 Apparatus Group II C – hydrogen (MESG = 0.28 mm)."

2 Member Governments are invited to apply the above amendments, as promulgated by MSC/Circ.[…], to the Revised standards, to ships constructed on or after 1 January 2013 and to ships constructed before 1 January 2013, no later than the first scheduled dry-docking carried out on or after 1 January 2013.

3 Attention is drawn to the fact that information on apparatus groups in column i'' is missing in relation to a large number of products listed in chapter 17 of the IBC Code, as set out in annex 1. In order to allow sufficient time for the ESPH Working Group to receive and review the aforementioned missing information and to prepare corresponding amendments to the IBC Code, missing data needed to determine the electrical apparatus group should be sent to IMO, in the format specified in annex 2, no later than 31 December 2010.

4 Member Governments are invited to bring this circular to the attention of the parties concerned.

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* Reference is made to IEC – Publication 79-1.

ANNEX 1

## LIST OF PRODUCTS THAT HAVE A 'NO' IN COLUMN i''' AND DO NOT HAVE AN ENTRY IN COLUMN i'' AND IS INDICATED AS BEING FLAMMABLE VAPOUR IN COLUMN 'K' OF CHAPTER 17 OF THE IBC CODE

Alkanes (C6-C9)
Alkyl acrylate-vinylpyridine copolymer in toluene
Alkyl (C3-C4) benzenes
Alkyl(C8-C9) phenylamine in aromatic solvents
Ammonium sulphide solution (45% or less)
Amyl acetate (all isomers)
n-Amyl alcohol
Amyl alcohol, primary
sec-Amyl alcohol
tert-Amyl alcohol
tert-Amyl methyl ether
Aviation alkylates (C8 paraffins and iso-paraffins BPT 95-120º)
Butyl acetate (all isomers)
tert-Butyl alcohol
Butylamine (all isomers)
Butylbenzene (all isomers)
Butyl butyrate (all isomers)
n-Butyl propionate
m-Chlorotoluene
o-Chlorotoluene
p-Chlorotoluene
Chlorotoluenes (mixed isomers)
Cycloheptane
Cyclohexane
Cyclohexyl acetate
1,3-Cyclopentadiene dimer(molten)
Cyclopentane
Cyclopentene
p-Cymene
Decahydronaphthalene
Decene
Diacetone alcohol
3,4-Dichloro-1-butene
1,6-Dichlorohexane
1,1-Dichloropropane
Dichloropropene/Dichloropropane mixtures
Diethylbenzene
Diisobutylamine
Diisobutylene
Diisobutyl ketone
Dimethylamine solution(greater than 45% but not greater than 55%)
Dimethylamine solution(greater than 55% but not greater than 65%)
N,N-Dimethylcyclohexylamine
Dipentene
Di-n-propylamine
Dodecane (all isomers)
2-Ethoxyethyl acetate
Ethyl acetate
Ethylamine solutions (72% or less)
Ethyl amyl ketone
Ethylbenzene
Ethyl tert-butyl ether
Ethyl butyrate
Ethylcyclohexane
N-Ethylcyclohexylamine
Ethylene glycol monoalkyl ethers
Ethyl-3-ethoxypropionate
2-Ethylhexylamine
Ethylidene norbornene
Ethyl propionate
Ethyl toluene
Heptane (all isomers)
Heptanol (all isomers) (d)
Heptene (all isomers)
Hexamethyleneimine
Hexane (all isomers)
Hexene (all isomers)
Hexyl acetate
Isoamyl alcohol
Isobutyl alcohol
Isobutyl formate
Isopropyl acetate
Isopropylamine(70% or less) solution
Isopropylcyclohexane
Isopropyl ether
Liquid chemical wastes
Methacrylonitrile
3-Methoxy-1-butanol
Methyl acetate
Methyl alcohol
Methylamine solutions (42% or less)
Methylamyl acetate
Methylamyl alcohol
Methyl amyl ketone
Methylbutenol
Methyl tert-butyl ether
Methyl butyl ketone
Methylbutynol
Methyl butyrate
Methylcyclohexane
Methylcyclopentadiene dimer
Methyl ethyl ketone
Methyl formate

Methyl isobutyl ketone
2-Methylpyridine
3-Methylpyridine
4-Methylpyridine
Nitropropane(60%)/Nitroethane(40%) mixture
Nonane (all isomers)
Nonene (all isomers)
Octane (all isomers)
Octene (all isomers)
Olefin mixtures(C5-C7)
Olefin mixtures(C5-C15)
alpha-Olefins(C6-C18) mixtures
Paraldehyde-ammonia reaction product
1,3-Pentadiene
Pentane (all isomers)
Pentene (all isomers)
n-Pentyl propionate
alpha-Pinene
beta-Pinene
Polyalkyl (C18-C22)acrylate in Xylene
Polyolefinamine in alkyl(C2-C4)benzenes
Polyolefinamine in aromatic solvent
Polysiloxane
Propionaldehyde
n-Propyl acetate
n-Propyl alcohol
Propylbenzene (all isomers)
Propylene glycol methyl ether acetate
Propylene glycol monoalkyl ether
Propylene tetramer
Propylene trimer
Sodium hydrosulphide/Ammnonium sulphide solution
Toluene
Triethyl phosphite
Trimethylamine solution (30% or less)
Trimethylbenzene (all isomers)
1,3,5-Trioxane
Turpentine
White spirit, low (15-20%) aromatic
Xylenes

Chapter 18 Products considered as Flammable ,< 60ºC

Acetone
Alcoholic beverages, n.o.s.
n-Butyl alcohol
sec-Butyl alcohol
Ethyl alcohol
Isopropyl alcohol
Methyl propyl ketone
Tetraethyl silicate monomer/oligomer(20% in ethanol)

ANNEX 2

## INFORMATION REQUESTED TO DETERMINE THE ELECTRICAL APPARATUS GROUP

| | Units | QUAL | Lower value | Upper value |
|---|---|---|---|---|
| Flash Point (cc) (°C ) | | | | |
| Boiling Point (°C ) | | | | |
| Melting Point/Pour Point (°C) | | | | |
| AutoIgnitionTemp (°C) | | | | |
| Carriage Temperature (ºC ) | | | | |
| Unloading Temperature (ºC ) | | | | |
| * MESG (mm) | | | | |

* Criteria for assigning Column '*i*' Electrical Equipment – IBC Code, chapter 21.4.9.