MARITIME AND PORT AUTHORITY OF SINGAPORE
SHIPPING CIRCULAR TO SHIP OWNERS
NO. 24 OF 2009

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Applicable to: This circular is for the attention of ship owners, managers, operators, agents, masters, crew members and surveyors

GUIDANCE ON SHIPBOARD OPERATIONAL MATTERS APPROVED BY THE 85th AND 86th SESSIONS OF THE MARITIME SAFETY COMMITTEE (MSC 85 and MSC 86) OF IMO

1 The Maritime Safety Committee of IMO, at its 85th session (27 Nov–6 Dec 2008) and 86th (27 May–5 Jun 2009), approved a number of circulars which provide guidance to improve the safety and efficiency of some shipboard operations. This shipping circular informs the Shipping Community of the MSC circulars, as listed below. Queries should be directed to the contact officer/s concerned.

1. Long-range Identification and tracking of ships (LRIT)

- <u>MSC.1/Circ.1307 – Guidance on the survey and certification of compliance of ships with the requirement to transmit LRIT information</u>

  The circular supersedes MSC.1/Circ.1296 (see Shipping Circular No. 4 of 2009). The main change is the advice to port States not to cause undue delay to ships even if they have failed their LRIT conformance testing.

  Ship owners and Masters should carry a copy of this circular on board in the event they encounter PSC officers who may not be aware of the advice.

  Contact officer: Mr Ong Hua Siong (tel: 6375-6210)

2. Ship Stability

- MSC.1/Circ.1281 – Explanatory Notes to the International Code on Intact Stability, 2008

  MSC 85 (26 Nov–5 Dec 08), adopted the International Code on Intact Stability, 2008 (2008 IS Code). At the same time it recognised that supplementary explanatory notes were needed to ensure uniform interpretation and application and it approved the *Explanatory Notes to the Intact Stability Code, 2008*, as prepared by SLF 50.

  The *Explanatory Notes* are intended to provide the shipping industry with specific guidance to assist in the uniform interpretation and application of the intact stability requirements of the 2008 IS Code.

  (See also Shipping Circular No. 13 of 2009)

- MSC.1/Circ.1291 – Guidelines for flooding detection systems on passenger ships

  The Guidelines provide guidance for the flooding detection systems for watertight spaces below the bulkhead deck, required by SOLAS regulation II-1/22-1 for passenger ships carrying 36 or more persons and constructed on or after 1 July 2010.

- MSC.1/Circ.1292 – Early application of the International Code on Intact Stability, 2008

  MSC 85 adopted amendments to SOLAS chapter II-1 and the Loadline 88 Protocol to make part A of the International Code on Intact Stability, 2008 (2008 IS Code) mandatory, with a recommendation that Contracting Governments to the 1974 SOLAS Convention and Parties to the 1988 LL Protocol may apply, in advance, the provisions of the 2008 IS Code before it has entered into force on 1 Jul 2010.

  MPA allows the application of the new Code with effect from 5 Dec 2008 on a voluntary basis.

  (See also Shipping Circular No. 13 of 2009)

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3. Fire protection

The MSC approved a number of guidance circulars developed by the Fire Protection sub-committee on various fire fighting systems and other issues.

MPA in general accepts the guidance given in the circulars and ship owners and managers should approach the class of their vessels for further details.

The circulars are as follows:

- <u>MSC.1/Circ.1312 – Revised Guidelines for the performance and testing criteria, and surveys of foam concentrates for fixed fire-extinguishing systems</u>

  The MSC has previously approved various guidelines on performance and testing criteria for foam concentrates for fixed fire-extinguishing systems. The current guidelines revise, update and consolidate these into a single document.

  These guidelines should be applied when approving foam concentrates for fixed fire-extinguishing systems onboard Singapore-flag tankers and chemical tankers.

- <u>MSC.1/Circ.1313 – Guidance for application of chapters 4 to 7 and 9 of the FSS Code, as adopted by resolutions MSC.206(81) and MSC.217(82)</u>

  The circular clarifies that amendments to the FSS Code adopted after 1 July 2002 shall apply only to ships the keels of which are laid or which are at a similar stage of construction, on or after the date on which the amendments enter into force, unless expressly provided otherwise. The clarification affects amendments to the FSS Code adopted by resolutions MSC.206(81) and MSC.217(82).

  MPA accepts the application dates as clarified in the circular for Singapore flag ships.

- <u>MSC.1/Circ.1315 – Guidelines for the approval of fixed dry chemical powder fire-extinguishing systems for the protection of ships carrying liquefied gases in bulk</u>

  These Guidelines apply to fixed dry chemical powder fire-extinguishing systems for the protection of on-deck cargo areas of ships carrying liquefied gases in bulk in accordance with SOLAS regulation II-2/1.6.2 and chapter 11 of the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC Code).

- <u>MSC.1/Circ.1316 – Guidelines on determining the No Observed Adverse Effect Level (NOAEL) and Lowest Observed Adverse Effect Level (LOAEL) values for halocarbon fire-extinguishing agents</u>

  This circular supplements MSC/Circ.848 and MSC.1/Circ.1267, which permit halocarbon agents to be used in concentrations up to the No Observed Adverse Effect Level (NOAEL) without additional safety measures and in no case be used at concentrations above the Lowest Observed Adverse Effect Level (LOAEL). These Guidelines prescribe the method to determine the NOAEL and LOAEL values referred to in the previous circulars.

  The Guidelines should be used when approving fixed gas fire-extinguishing systems in accordance with MSC/Circ.848 and MSC.1/Circ.1267 on or after 29 May 2009.

* MSC.1/Circ.1317 – Application for approvals given in accordance with the Revised Guidelines for the approval of equivalent fixed gas fire-extinguishing systems, as referred to in SOLAS 74, for machinery spaces and cargo pump-rooms (MSC/Circ.848)

  The circular clarifies that type approvals conducted in accordance with the *Revised Guidelines for approval of equivalent fixed gas fire-extinguishing systems*, as referred to in SOLAS 74, for machinery spaces and cargo pump-rooms (MSC/Circ.848) should remain valid until 1 July 2012.

* MSC.1/Circ.1318 – Guidelines for maintenance and inspections of fixed carbon dioxide fire-extinguishing systems

  These Guidelines provide the minimum recommended level of maintenance and inspections for fixed carbon dioxide fire-extinguishing systems on all ships, and are intended to demonstrate that the system is kept in good working order as specified in SOLAS regulation II-2/14.2.1.2.

  Ship owners should note that these Guidelines are intended to supplement *the fire-extinguishing system manufacturer's approved maintenance instructions. Certain maintenance procedures and inspections may be performed by competent crew members, while others should be performed by persons specially trained in the maintenance of such systems. The onboard maintenance plan should indicate which parts of the recommended inspections and maintenance should be completed by trained personnel.*

* MSC.1/Circ.1319 – Recommendation for the evaluation of fire performance and approval of large fire doors

  The circular provides guidance for the testing of doors larger than those which can be accommodated in the standard specimen size (e.g., 2,440 mm wide and 2,500 mm high), as specified in the FTP Code.

* MSC.1/Circ.1320 – Guidelines for the drainage of fire-fighting water from closed vehicle and ro-ro spaces and special category spaces of passenger and cargo ships

  These Guidelines apply to the design of drainage systems in closed vehicle and ro-ro spaces and special category spaces required by SOLAS regulation II-2/20.6.1.4, and to the protection of drain openings required by SOLAS regulation II-2/20.6.1.5. The purpose is to ensure that these spaces have adequate drainage facilities to prevent the accumulation of significant quantities of water on decks and the build-up of free surfaces.

* MSC.1/Circ.1321 – Guidelines for measures to prevent fires in engine-rooms and cargo pump-rooms

  These Guidelines are a consolidation of the measures to prevent fire in engine-rooms, cargo pump-rooms and other fire-prone spaces based on present engineering and shipbuilding technology, including resolutions, circulars and other documents developed by IMO.

  The purpose of these Guidelines is to provide uniform and harmonized guidance in a single document to shipowners, ship designers, shipmasters, inspectors and surveyors and to minimize the deviation of interpretation or application standards among inspectors, surveyors and Member States.

In addition, the Marine Accident Investigators' International Forum (MAIIF) has submitted for discussion to the Dangerous Goods, Solid Cargoes and Containers (DSC) subcommittee a historical record of all incidents involving entry into enclosed spaces since 1998 (DSC 14/INF.9). Useful lessons can be learned from these incidents. The document is attached in **Appendix 1**.

MPA strongly encourages the adoption of safety procedures aimed at preventing casualties to ship's personnel entering enclosed spaces where there may be an oxygen deficient, flammable and/or toxic atmosphere. Shipowners should take note of the contents of the above two useful documents.

- MSC.1/Circ.1324 – 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)
  The amendments to the Revised standards are to ensure that the Maximum Experimental Safe Gap (MESG) value for the medium to be used to test devices protecting cargo tanks containing crude oil, petroleum products and flammable chemicals is appropriate for the product certified to be carried in the tank fitted with such a device.

  The amendments to the Revised standards are applicable 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.

- MSC.1/Circ.1325 – Missing information on apparatus groups in column i´´ of chapter 17 of the IBC Code

  In addition to MSC.1/Circ.1324, attention is drawn to the fact that information on apparatus groups in column i´´ of chapter 17 of the IBC Code is missing in relation to a large number of products listed in that chapter. 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, no later than 31 December 2010.

  Manufacturers intending to have their chemicals assessed by the ESPH WG should submit their applications to MPA in a timely fashion.

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4. Lifeboat Safety

- MSC.1/Circ.1326 – Clarification of SOLAS regulation III/19

  The circular clarifies that SOLAS regulation III/19.3.3.3 requires each lifeboat to be launched, and manoeuvred in the water by its assigned operating crew, at least once every three months during an abandon ship drill. However, the regulation, whilst requiring each lifeboat to be manoeuvred in the water by its assigned operating crew, does not require the assigned operating crew to be on board when the lifeboat is launched, unless the master considered, taking into account all safety aspects, that the lifeboat should be launched with the assigned operating crew on board.

All ship masters, owners and operators are invited to use the above clarification when applying the requirements of SOLAS regulation III/19, and bring it to the attention of all parties concerned and, in particular, port State control officers. A copy of this circular should be presented to PSC officers to clarify the regulation.

- MSC.1/Circ.1327 – Guidelines for the fitting and use of fall preventer devices (FPDs)

  Since the IMO requirements for all ships to be fitted with on-load release systems came into force in 1986, there have been a number of serious accidents during drills and servicing.

  The Design and Equipment (DE) sub-committee in Mar 09 had discussed the issue of "poor and unstable release hooks designs" which should be replaced. MSC 86 approved draft amendments to the LSA Code and SOLAS regulation III/1 developed by the subcommittee, i.e. for all ships, not later than the first scheduled dry-docking after [date to be decided], lifeboat on-load release mechanisms which have been evaluated and identified as not complying with the new criteria of safe design for on-load release mechanisms in the LSA Code shall be replaced with equipment that complies with the Code.

  As an interim measure, a "Fall Preventer Device" (FPD) can be used to minimize the risk of injury or death by providing a secondary alternate load path in the event of failure of the on-load hook or its release mechanism or of accidental release of the on-load hook.

  The use of FPDs should be considered as an interim risk mitigation measure, only to be used in connection with existing on-load release hooks, at the discretion of the master, pending the wide implementation of improved hook designs with enhanced safety features.

  Ship owners and operators and classification societies should apply the Guidelines when FPDs are used.

- MSC.1/Circ.1206/Rev.1 – Measures to prevent accidents with lifeboats

  MSC 86 approved DE sub-committee's amendment of MSC.1/Circ.1206 *Measures to prevent accidents with lifeboats* which was prompted by the new *Interim recommendation on conditions for authorization of service providers for lifeboats, launching appliances and on-load release gear* (MSC.1/Circ.1277). The revised MSC.1/Circ.1206 incorporates elements of MSC.1/Circ.1277.

  Contact officer: Mr Ong Hua Siong (tel: 6375-6210)

5. Container Safety

- CSC.1/Circ.137 – Amendments to the Guidance on serious structural deficiencies in containers

  The amendments to the *Guidance on serious structural deficiencies in containers (CSC.1/Circ.134)* resulted from a proposal by ISO detailing consideration of in-service failures of corner fittings and its recommendations for review of its inspection criteria, including the adequacy of current design parameters for use on large containerships.

  Containership owners and operators and container terminal operators are to note the contents of the circular. A copy of CSC.1/Circ.134 is also attached in ***Appendix 2*** *for reference.*

  Contact officer: Mr Ong Hua Siong (tel: 6375-6210)

6. Bilge discharge system

- MSC-MEPC.4/Circ.3 – Blanking of bilge discharge piping systems in port

  In the past, there have been several instances where deficiencies have been mistakenly raised by port State control officers and other surveyors concerning requiring the ship's crew to blank off emergency bilge pumping overboard discharges. This practice is in contravention of SOLAS regulation II-1/21, as the bilge pumping arrangement is rendered inoperative and leads to a potentially dangerous situation where the ship is left unable to efficiently and promptly tackle an emergency situation in case of flooding or fire.

  The primary purpose of the bilge pumping overboard discharge is to secure the ship's safety in the event of emergency situations, such as fire or flooding and which, as such, must be available for use at all times and not be blanked off. Ship masters should keep a copy of the circular on board for port State control purpose.

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7. High-speed Craft (HSC)

- MSC.1/Circ.1329 – Guidelines for uniform operating limitations of high-speed craft

  The HSC 2000 Code states that "unrestricted operation is not suitable for high-speed craft" and therefore, operational limitations are necessary. These Guidelines have been prepared to assist in the uniform implementation of the Code as amended in 2006 (resolution MSC.222(82)), in particular paragraph 1.9.7 ("determining worst intended conditions for Permit to Operate") and annex 12 ("Factors to be considered in determining craft operational limitations”), and to provide information on the rationale underpinning such operating limitations.

The amendments to the HSC 2000 Code entered into force on 1 Jul 08. MPA requires the operational limitations to be indicated in the Permit to Operate document.

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8. Protective Coatings

- MSC.1/Circ.1330 – Guidelines for maintenance and repair of protective coatings

  The purpose of the Guidelines is to assist surveyors, shipowners, shipyards, flag Administrations and other interested parties involved in the survey, assessment and repair of protective coatings in ballast tanks. Currently, two resolutions cover *Performance standard for protective coatings for dedicated seawater ballast tanks in all types of ships and double-side skin spaces of bulk carriers* (resolution MSC.215(82)) and *Performance standard for protective coatings for void spaces* (resolution MSC.244(83)). The new circular augments the two resolutions by providing guidelines for corrosion protection of permanent means of access arrangements, which may or may not form part of the structural strength elements in ballast tanks or void spaces.

  Shipowners and shipbuilders are advised to take into consideration the guidance provided in the circular. Maintenance and repair of the protective coating system should be included in the ship’s overall maintenance and repair scheme.

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9. Accommodation ladders and Gangways

- MSC.1/Circ.1331 – Guidelines for construction, installation, maintenance and inspection/survey of accommodation ladders and gangways

  The Guidelines provide specific guidance on the construction, installation, maintenance and inspection/survey of means of embarkation and disembarkation such as accommodation ladders and gangways required under SOLAS regulation II-1/3-9.

  Where means of embarkation and disembarkation other than those specifically covered by these Guidelines are fitted, an equivalent level of safety should be provided.

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10. Maritime Security

- MSC.1/Circ.1283 – Non-mandatory guidelines on security aspects of the operation of vessels which do not fall within the scope of SOLAS chapter XI-2 and the ISPS Code

  MSC 85 approved the non-mandatory *Guidelines on security aspects of the operation of ships which do not fall within the scope of SOLAS chapter XI-2 and the ISPS Code*, aimed at enhancing the security of non-SOLAS ships. The Guidelines are intended to be practical, sustainable and proportionate to the risks and threats involved.

  *To implement effective security, o*perators of non-SOLAS vessels and related facilities *are advised to refer to Part 2 of the Guidelines ("Information for use by owners, operators and users (operators) of non-SOLAS vessels and related facilities"). For operation within Singapore Port Limits, please refer also to the appropriate Port Marine Circulars on maritime security.*

- MSC.1/Circ.1305 – Revised Guidance to masters, Companies and duly authorized officers on the requirements relating to the submission of security-related information prior to the entry of a ship into port

  Previously, the MSC approved circular MSC/Circ.1130 on *Guidance to masters, Companies and duly authorized officers on the requirements relating to the submission of security-related information prior to the entry of a ship into port*. MSC 86 approved the current circular to include, in the standard data set of security-related information a ship might be expected to submit prior to entry into port, the IMO Company identification number. MSC/Circ.1130 is hereby revoked.

  Contact officer: Mr Ong Hua Siong (tel: 6375-6210)

11. Navigational Safety

- COLREG.2/Circ.60 – New and amended traffic separation schemes

  The following new and amended existing traffic separation schemes and associated routeing measures were adopted by MSC 85, with their implementation dates:

  .1 "In the approaches to the Port of Thessaloniki" (new scheme); [0000 hours UTC on 1 June 2009]

  .2 "The Åland Sea" (new scheme) [0000 hours UTC on 1 January 2010];

  .3 "In Liverpool Bay" (new scheme); [0000 hours UTC on 1 July 2009]

.4 “In the approach to Boston, Massachusetts” (amended scheme); [0000 hours UTC on 1 June 2009]

.5 “Off Land’s End, between Seven Stones and Longships” (amended scheme); [0000 hours UTC on 1 July 2009]

.6 “In the approaches to the River Humber” (amended scheme); [0000 hours UTC on 1 July 2009] and

.7 “At Hatter Barn” (amended scheme) [0000 hours UTC on 1 July 2009].

- SN.1/Circ.272 and Add.1 – Routeing measures other than traffic separation schemes

  MSC 85 adopted the following new routeing measures other than traffic separation schemes, with the dates of implementations:

  .1 new recommendatory seasonal Area To Be Avoided “In the Great South Channel”; [0000 hours UTC on 1 June 2009]

  .2 new Area To Be Avoided and two new mandatory No Anchoring Areas in the vicinity of the proposed “Excelerate Northeast Gateway Energy Bridge Deepwater Port”; [0000 hours UTC on 1 June 2009]

  .3 new deep-water routes inside the borders of the “North Åland Sea” and “South Åland” TSS; [0000 hours UTC on 1 January 2010]

  .4 new two-way route leading to the “Åland Sea”; [0000 hours UTC on 1 January 2010] and

.5 new Area To Be Avoided (ATBA) “In Liverpool Bay” [0000 hours UTC on 1 July 2009].

- SN.1/Circ.273 – Mandatory ship reporting systems

  MSC 85 adopted a new mandatory ship reporting system and amendments to an existing ship reporting system, as follows:

  .1 Off the coast of Portugal (new system); and

  .2 The Papahanaumokuakea Marine National Monument Particularly Sensitive Sea Area (PSSA) (amended system).

  The entry into force date for both systems is 0000 hours UTC on 1 June 2009.

- SN.1/Circ.275 – Amendments to the General Provisions on Ships’ Routeing (resolution A.572(14), as amended)

  The amendments concern graphical symbols for archipelagic sea lanes (ASL) and boundary symbols.

- SN/Circ.227/Corr.1 – Guidelines for the installation of a shipborne Automatic Identification System (AIS)

  The amendment contains the consequential change with regard to the entry into force of resolution MEPC.118(52), concerning the change in the categorization and listing of Noxious Liquid Substances and other substances. NAV sub-committee noted that the number of categories to be reported is the same, and therefore it was sufficient to revise the reference documentation SN/Circ.227 to reflect the new classification letters corresponding to the same digits as currently in use by the AIS shipborne equipment. Practically, this means that the previous reference hazard or pollutant categories A, B, C and D are changed to the new hazard or pollutant categories X, Y, Z and OS, by using the same digits 1, 2, 3 and 4.

  Users of AIS equipment are invited to note this equivalence when using the displays of existing AIS installations.

- SN.1/Circ.276 – Transitioning from paper chart to electronic chart display and information systems (ECDIS) navigation

  In developing the mandatory carriage requirements for ECDIS, the IMO recognized that proper training will be an important factor in the successful implementation of an ECDIS carriage requirement. The current revision of the STCW Convention and STCW Code, due for completion in 2010, will fully take into account the human element and training requirements necessary for a smooth transition from the use of paper charts to ECDIS. In the meantime, the current circular provides useful guidance for seafarers, shipowners and operators, maritime training organizations and ECDIS equipment manufacturers for transitioning from paper chart to ECDIS navigation, whenever ships are first equipped with ECDIS.

  Contact officer: Capt I G Sangameswar (tel: 6375-6205)

12. Voluntary Observing Ship's Scheme

- MSC.1/Circ.1293 – Participation in the WMO Voluntary Observing Ship's (VOS) Scheme

  At MSC 85, the World Meteorological Organization (WMO) sought the assistance of IMO Member States to enhance the recruitment of merchant ships into the Voluntary Observing Ships' (VOS) Scheme.

  The VOS meteorological reports provide vital real time feedback on ocean weather conditions to Weather Forecasters who use the data to improve the quality of the forecasts and warnings issued through the SafetyNET Maritime Safety Information (MSI) and the international NAVTEX services for mariners at sea. The VOS reports, therefore, form an important element in ensuring the safety of ships, their cargoes and crews.

It should be made clear that participation in the VOS Scheme is entirely voluntary and no charges are incurred by the ship, shipowner or ship operator, as the meteorological instruments and, in most cases, the cost of the observation transmission are borne by meteorological services.

In accordance with the provisions of SOLAS regulation V/5, MPA brings to the attention of shipowners, ship operators, ship managers, masters and crews, and other parties concerned the relevant information in the circular regarding the VOS Scheme and to encourage them to offer their ships to participate in the VOS Scheme. More information on this issue can be located at the following web address:

http://www.bom.gov.au/jcomm/vos/index.html

Ships that pass through or operate in the data-sparse areas are strongly encouraged to volunteer and join the VOS Scheme.

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2 Ship owners are urged to implement the recommendations in the circulars. They may approach the nine approved classification societies to seek further guidance.

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Related Shipping Circulars:

1. No. 22 of 2009 – Resolutions adopted by the 86th session of the Maritime Safety Committee (MSC 86) of IMO
2. No. 20 of 2009 – MSC 86 Resolution – Revised Recommendation for Material Safety Data Sheets (MSDS) for MARPOL Annex I type oil as cargo in bulk and marine fuel oil
3. No. 13 of 2009 – Resolutions adopted by the 85th session of the Maritime Safety Committee (MSC 85) of IMO

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MSC.1/Circ.1307
9 June 2009

GUIDANCE ON THE SURVEY AND CERTIFICATION OF COMPLIANCE OF SHIPS WITH THE REQUIREMENT TO TRANSMIT LRIT INFORMATION

1 The Maritime Safety Committee (the Committee), at its eighty-sixth session (27 May to 5 June 2009), considered a number of issues which have arisen in relation to the survey and certification of ships following the issue of MSC.1/Circ.1296 on Guidance on the survey and certification of compliance of ships with the requirement to transmit LRIT information, and approved the Guidance on the survey and certification of compliance of ships with the requirement to transmit LRIT information (the Guidance) as set out in the annex.

2 The Guidance outlines a number of alternative options for documenting compliance of the shipborne equipment with the requirements of SOLAS regulations V/19-1.6 and V/19-1.7 and the related provisions of the Revised performance standards and functional requirements for the long-range identification and tracking of ships (Revised performance standards) adopted by resolution MSC.263(84) and sets out the approach to be taken when surveying and certifying the compliance of ships which are required to transmit LRIT information with the aforesaid obligation. The Guidance should be read together with SOLAS regulation V/19-1 and the Revised performance standards.

3 The Committee also agreed to keep the Guidance under review and amend it as and when the circumstances so warrant.

4 The Committee also decided that Conformance test reports issued prior to 15 December 2008 pursuant to the provisions of MSC.1/Circ.1257 and Conformance test reports issued prior to 1 July 2009 pursuant to the provisions of MSC.1/Circ.1296 should be accepted, subject to the conditions specified in paragraphs 7.2 and 7.3 of the annex to this circular in relation to the validity of Conformance test reports, as providing evidence of compliance equal to those specified in the annex to this circular until they are replaced. The Committee further agreed that such Conformance test reports should be replaced by Conformance test reports issued pursuant to the provisions of this circular when they are re-issued or updated on or after 1 July 2009.

5 SOLAS Contracting Governments are invited to bring the present circular and its annex to the attention of recognized organizations which they have authorized to act on their behalf and to provide to such recognized organizations any necessary further guidance and instruction so as to ensure that the objectives of this circular are achieved.

6 SOLAS Contracting Governments are also invited to bring the present circular and the salient parts of its annex to the attention of companies operating ships entitled to fly their flag which are required to transmit LRIT information and to provide to such companies any necessary further guidance and instruction so as to ensure that the objectives of this circular are achieved.

7 SOLAS Contracting Governments should communicate to the Organization as soon as possible the names and contact details of the Application Service Providers they have either recognized within the framework of the Revised performance standards or they have authorized to conduct conformance testing as set out in the attached Guidance, together with any conditions attached to such recognitions or authorizations and update the information as and when changes occur.

8 SOLAS Contracting Governments, international organizations and non-governmental organizations with consultative status are also invited to bring to the attention of the Committee, at the earliest opportunity, the results of the experience gained from the use of the Guidance for consideration of action to be taken.

9 This circular revokes MSC.1/Circ.1296 and any reference to MSC.1/Circ.1296 should be read as reference to the present circular.

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ANNEX

GUIDANCE ON THE SURVEY AND CERTIFICATION OF COMPLIANCE OF SHIPS WITH THE REQUIREMENT TO TRANSMIT LRIT INFORMATION

1 Introduction

1.1 This note provides guidance to Contracting Governments in relation to the survey and certification of the compliance of ships, high-speed craft and mobile offshore drilling units entitled to fly their flag with the obligation to transmit LRIT information.

1.2 In addition, this note provides salient information which would enable companies operating ships, owners and operators of high-speed craft and owners and operators of mobile offshore drilling units which are required to comply with the obligation to transmit LRIT information to ensure the survey and certification of their compliance in a timely manner.

1.3 In relation to mobile offshore drilling units, the provisions of this note apply subject to the modifications set out in section 11.

2 Related documents

2.1 The provisions relating to the survey and certification of compliance of ships with the obligation to transmit LRIT information are set out in or governed by:

.1 Regulation V/19-1 on long-range identification and tracking of ships;

.2 Revised performance standards and functional requirements for the long-range identification and tracking of ships adopted by resolution MSC.263(84) (the Revised performance standards);

.3 Resolution A.694(17) on Recommendations on general requirements for shipborne radio equipment forming part of the global maritime distress and safety system (GMDSS) and for electronic navigational aids;

.4 Resolution A.813(19) on General requirements for electromagnetic compatibility of all electrical and electronic ship's equipment;

.5 Resolution MSC.216(82) on Adoption of amendments to the International Convention for the Safety of Life at Sea, 1974, as amended, which sets out in annex 1 amendments (amendments 50 to 52) inserting in the Record of Equipment for the Passenger Ship Safety Certificate (Form P), the Record of Equipment for the Cargo Ship Safety Equipment Certificate (Form E) and the Record of Equipment for the Cargo Ship Safety Certificate (Form C) an entry to indicate compliance with Long-range identification and tracking systems;

.6 Resolution MSC.221(82) on Adoption of amendments to the International Code of Safety for High-Speed Craft (1994 HSC Code) which sets out in the annex an amendment (amendment 9) inserting in the Record of Equipment for High-Speed Craft Safety Certificate an entry to indicate compliance with Long-range identification and tracking systems;

.7 Resolution MSC.222(82) on Adoption of amendments to the International Code of Safety for High-Speed Craft, 2000, which sets out in the annex an amendment (amendment 148) inserting in the Record of Equipment for High-Speed Craft Safety Certificate an entry to indicate compliance with Long-range identification and tracking systems; and

.8 Resolution MSC.227(82) on Adoption of amendments to the Protocol of 1988 relating to the International Convention for the Safety of Life at Sea, 1974, which sets out in the annex amendments (amendments 1 to 3) inserting in the Record of Equipment for the Passenger Ship Safety Certificate (Form P), the Record of Equipment for the Cargo Ship Safety Equipment Certificate (Form E) and the Record of Equipment for the Cargo Ship Safety Certificate (Form C) an entry to indicate compliance with Long-range identification and tracking systems.

3 Definitions

3.1 Unless indicated otherwise for the purposes of this note:

.1 *Authorized testing ASP* means an Application Service Provider, other than a Recognized ASP, which has been authorized by the Administration to conduct conformance tests in accordance with this note and for which related information has been communicated to the Organization in accordance with the provisions of paragraph 6.2;

.2 *Certificate* means the Passenger Ship Safety Certificate, Cargo Ship Safety Equipment Certificate and Cargo Ship Safety Certificate issued under the provisions of the Convention or the Protocol and High-Speed Craft Safety Certificate issued under the provisions of the International Code of Safety for High-Speed Craft or the International Code of Safety for High-Speed Craft, 2000;

.3 *Chapter* means a chapter of the Convention;

.4 *Contracting Government* means a Contracting Government to the Convention;

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

.6 *Protocol* means the Protocol of 1988 relating to the International Convention for the Safety of Life at Sea, 1974, as amended;

.7 *Radio related certificate* means the Passenger Ship Safety Certificate, Cargo Ship Safety Radio Certificate and Cargo Ship Safety Certificate issued under the provisions of the Convention or the Protocol and High-Speed Craft Safety Certificate issued under the provisions of the International Code of Safety for High-Speed Craft or the International Code of Safety for High-Speed Craft, 2000;

.8 *Record of Equipment* means the Record of Equipment for the Passenger Ship Safety Certificate (Form P), the Record of Equipment for the Cargo Ship Safety Equipment Certificate (Form E) and the Record of Equipment for the Cargo Ship Safety Certificate (Form C) issued under the provisions of the Convention or the

Protocol and the Record of Equipment for High-Speed Craft Safety Certificate issued under the provisions of the International Code of Safety for High-Speed Craft or the International Code of Safety for High-Speed Craft, 2000;

.9 *Recognized ASP* means an Application Service Provider which has been recognized by the Contracting Government concerned pursuant to the provisions of paragraphs 5.1.1 and 5.1.2 of the Revised performance standards and for which related information has been communicated to the Organization in accordance with the provisions of paragraph 5.2 of the Revised performance standards;

.10 *Regulation* means a regulation of the Convention (or of the Convention as modified by the Protocol, as in force between Contracting Governments which are also parties to the Protocol); and

.11 *Ship* refers to ships, high-speed craft and mobile offshore drilling units which are required to comply with the provisions of regulation V/19-1.

3.2 Terms used in this note not otherwise defined have the meaning assigned to them in chapters I, IV and V or in the Revised performance standards.

4 Shipborne equipment to be of a type approved by the Administration

4.1 Regulation V/19-1.6 specifies that the shipboard equipment to be used to transmit LRIT information (shipborne equipment) shall be of a type approved by the Administration.

4.2 Compliance of the shipborne equipment with the requirements of regulations V/19-1.6 and V/19-1.7 and of section 4 of the Revised performance standards should be demonstrated by the equipment being:

.1 of a type approved by the Administration in accordance with the provisions of regulation V/19-1; or

.2 of a type approved by the Administration in accordance with the provisions of regulation IV/14 and satisfactorily completing a conformance test in accordance with the procedures and provisions set out in appendix 1; or

.3 certified by the Administration as meeting the requirements of IEC 60945 (2002-08) and IEC 60945 Corr.1 (2008-04) on Maritime navigation and radiocommunication equipment and systems – General requirements – Methods of testing and required test results and satisfactorily completing a conformance test in accordance with the procedures and provisions set out in appendix 1; or

.4 certified by the Administration as meeting the requirements of the provisions of regulation XI-2/6; and the provisions of either resolution MSC.136(76) on Performance standards for a ship security alert system or of resolution MSC.147(77) on Adoption of the Revised performance standards for a ship security alert system; and the provisions of section 4 of the Revised performance standards; and satisfactorily completing a conformance test in accordance with the procedures and provisions set out in appendix 1.

5 Conformance test

5.1 The conformance test should be conducted either by a recognized ASP or by an authorized testing ASP.

5.2 Subject to the provisions of paragraphs 5.2.1 and 5.2.2, the conformance test should be conducted using a communication system which provides coverage in all sea areas for which the ship is certified to operate.

5.2.1 Subject to the provisions of paragraphs 5.2 and 5.2.2, the results of the conformance test are not in any way prejudiced by the location or whereabouts of the ship when the conformance test is conducted.

5.2.2 Notwithstanding the provisions of paragraph 5.2, for ships constructed before 31 December 2008 and certified to operate in sea areas A1, A2, A3 and A4, the conformance test for sea area A4 may be conducted separately taking into account the provisions of regulation V/19-1.4.1.3.

5.3 For ships constructed on or after 31 December 2008, the conformance test should be:

.1 conducted after the completion of the initial survey of the radio installation, provided such survey has indicated that, as far as the radio installation is concerned, the ship meets the related requirements for the issue of a radio related certificate; and

.2 satisfactorily completed prior to the issue of a certificate as a result of satisfactory completion of the related initial survey.

5.4 For ships constructed before 31 December 2008, the conformance test should be:

.1 conducted prior to the date on which a ship would need to demonstrate compliance with the requirements of regulation V/19-1; and

.2 satisfactorily completed prior to the amendment of the record of equipment to document compliance with the requirements relating to Long-range identification and tracking system or prior to the issue of a certificate, in case the ship in question is undergoing a related renewal survey.

5.5 Administrations should establish, for ships constructed before 31 December 2008, dates, ahead of the dates stipulated in regulation V/19-1.4.1 for the phased in implementation of the requirement to transmit LRIT information, by which the conformance testing should be carried out with a view to ensuring the timely compliance of the ships entitled to fly their flag with the requirements of regulation V/19-1.

5.6 Notwithstanding the provisions of regulation V/19-1.4.1, ships the construction of which has commenced before 31 December 2008 but has been, or is to be, completed on or after 31 December 2008 should comply with the obligation to transmit LRIT information before they are put into service. For such ships the conformance test should be conducted and satisfactorily completed as specified in paragraph 5.3.

6 Communication of information in relation to Application Service Providers

6.1 Unless the Administration concerned informs the Organization otherwise, recognized ASPs should be automatically considered as being authorized by the Administration concerned to conduct conformance tests in accordance with the provisions of this note.

6.2 Administrations should provide to the Organization a list with the names and contact details of the authorized testing ASPs[1] together with any associated conditions of authorization and thereafter should, without undue delay, update the Organization as changes occur.

6.3 The Organization should communicate the information it receives pursuant to the provisions of paragraph 5.2 of the Revised performance standards and the information it receives pursuant to paragraphs 6.1 and 6.2 to all Contracting Governments, international organizations and non-governmental organizations with consultative status.

7 Conformance test report

7.1 A Conformance test report should be issued, on satisfactory completion of a conformance test, by the Administration or the ASP who conducted the test acting on behalf of the Administration and should be in accordance with the model set out in appendix 2.

7.2 The Conformance test report should be considered as no longer remaining valid if:

.1 there is a change in the shipborne equipment used to transmit LRIT information;

.2 the ship is transferred to the flag of another Contracting Government, subject to the provisions of paragraph 10.1;

.3 the ASP which has issued the Conformance test report has notified the Administration or the Recognized Organization which, acting on behalf of the Administration, has issued the certificate is no longer in a position to attest the validity of the report; and

.4 the Administration has withdrawn the recognition or authorization of the ASP which conducted the conformance test. However, in such cases the Administration concerned may decide that the Conformance test report, issued either prior to the date of withdrawal of such recognition or authorization or prior to a date determined by the Administration, remain valid subject to these being considered as being the responsibility of Administration.

7.3 Notwithstanding the provisions of regulations I/11 and V/16, the Conformance test report should also be considered as no longer remaining valid when the shipborne equipment used to transmit LRIT information becomes unserviceable.

7.4 Administrations choosing to use the services of authorized testing ASPs should ensure that the recognized ASP(s) are able to integrate into the LRIT system the ships to which an authorized testing ASP has issued Conformance test reports.

[1] A model letter for communicating the relevant information to the Organization is provided in MSC.1/Circ.1298 on Guidance on the implementation of the LRIT system.

8 Initial certification of compliance on or after 31 December 2008

8.1 The conformance test has been designed also to demonstrate compliance of the shipborne equipment with the functional requirements of V/19-1.5 and section 4 of the Revised performance standards.

8.2 For ships constructed on or after 31 December 2008, prior to the issue of a certificate, the shipborne equipment should satisfactorily complete a conformance test in accordance with the procedures and provisions set out in appendix 1 within the periods specified in paragraph 5.3.

8.3 Subject to the provisions of paragraph 5.6, for ships constructed before 31 December 2008, prior to the amendment of the record of equipment associated with a valid certificate or the renewal of a certificate in case it is also due, the shipborne equipment should satisfactorily complete a conformance test in accordance with the procedures and provisions set out in appendix 1 within the period specified in paragraph 5.4 and the survey of the radio installation has indicated that, as far as the radio installation is concerned, the ship meets the related requirements for the renewal or endorsement of the radio related certificate.

8.4 Notwithstanding paragraphs 8.2 and 8.3, shipborne equipment which has already satisfactorily completed a conformance test for the purposes of demonstrating compliance with the requirement to be of a type approved by the Administration (refer to paragraphs 4.2.2 to 4.2.4) are not required to undergo any further conformance test (i.e. the conformance test is required to be carried out only once), provided such tests have been conducted within the periods specified in paragraphs 5.3 or 5.4, as the case may be, taking into account the provisions of paragraph 5.6.

8.5 Notwithstanding paragraphs 8.2 and 8.3, shipborne equipment of a type approved by the Administration (refer to paragraph 4.2.1) should undergo conformance test within the periods specified in paragraphs 5.3 or 5.4, as the case may be, taking into account the provisions of paragraph 5.6 (i.e. shipborne equipment of a type approved by the Administration are required to undergo conformance testing).

8.6 In relation to cargo ships, the provision of the Convention and of the Protocol stipulated as a results of the amendments adopted by resolutions MSC.216(82) and MSC.227(82) that compliance with the obligation to transmit LRIT information should be attested by completing the entry provided in section 3 of the Record of Equipment for the Cargo Ship Safety Equipment Certificate (Form E) or section 5 of the Record of Equipment for the Cargo Ship Safety Certificate (Form C) and thus the relevant certificates are the Cargo Ship Safety Equipment Certificate and Cargo Ship Safety Certificate.

8.6.1 As a result, any amendment of the Cargo Ship Safety Radio Certificate or of the Record of Equipment for the Cargo Ship Safety Radio Certificate (Form R) or any amendment of the Cargo Ship Safety Certificate or of the Record of Equipment for the Cargo Ship Safety Certificate (Form C), other than the one specified in paragraph 8.6 in relation to Long-range identification and tracking systems, does not attest compliance of the ship concerned with the obligation to transmit LRIT information.

9 Renewal and annual survey after the initial certification of compliance

9.1 During any renewal or annual survey following the initial certification of compliance of a ship with the requirements of regulation V/19-1, the related certificate should be issued or endorsed, as the case may be, provided the Conformance test report is still valid taking into account the provisions of paragraphs 7.2 and 7.3.

10 Transfer of flag

10.1 When a ship is transferred to the flag of another Contracting Government, the Conformance test report should be considered as remaining valid if the ASP which conducted the conformance test is also either a recognized ASP or an authorized testing ASP by the Contracting Government to whose flag the ship is transferred.

10.1.1 In such cases the ASP concerned should reissue the Conformance test report on behalf of the Administration concerned henceforth indicating the new particulars of the ship but without altering the date of completion of the conformance test.

10.2 In cases where the Conformance test report is deemed to be no longer valid, due to the transfer of the flag to another Contracting Government, a new conformance test should be conducted, prior to the issue of a certificate, by either a recognized ASP or an authorized testing ASP acting on behalf of the Administration concerned.

11 Specific provisions in relation to mobile offshore drilling units

11.1 Mobile offshore drilling units may be required by the Contracting Government whose flag they may be entitled to fly to comply with the provisions of the:

.1 national codes or requirements for the construction and equipment of mobile offshore drilling units, in case they were constructed prior 31 December 1981; or

.2 Code for the construction and equipment of mobile offshore drilling units adopted by resolution A.414(XI) (the 1979 MODU Code); or

.3 Code for the construction and equipment of mobile offshore drilling units, 1989 adopted by resolution A.649(16) (the 1989 MODU Code) in case their keel was laid or was at a similar state of construction on or after 1 May 1991.

11.2 The provisions of this note should apply *mutatis mutandis* to mobile offshore drilling units subject to any reference to certificate and radio related certificate in this note being read as referring:

.1 for mobile offshore drilling units constructed on or after 31 December 2008, to the Mobile Offshore Drilling Unit Safety Certificate, 1989 issued pursuant to the provisions of the 1989 MODU Code; and

.2 for mobile offshore drilling units constructed before 31 December 2008, to either the Mobile Offshore Drilling Unit Safety Certificate issued pursuant to the provisions of the 1979 MODU Code or the Mobile Offshore Drilling Unit Safety Certificate, 1989, issued pursuant to the provisions of the 1989 MODU Code or a certificate or document issued under a national code or requirements in case of units constructed prior to 31 December 1981, as the case may be.

11.3 As the Mobile Offshore Drilling Unit Safety Certificate and the Mobile Offshore Drilling Unit Safety Certificate, 1989 are not accompanied by a record of equipment, mobile offshore drilling units should be considered as meeting the requirements when:

.1 the provisions of sections 4, 5 and 8 are met;

.2 there is on board a valid certificate or document issued under a national code or requirements in case of units constructed prior to 31 December 1981, or a valid Mobile Offshore Drilling Unit Safety Certificate or a valid Mobile Offshore Drilling Unit Safety Certificate, 1989; and

.3 there is on board a valid Conformance test report.

12 Cargo ships of gross tonnage of 300 and above but of less than 500

12.1 Cargo ships whose gross tonnage is 300 and above but of less than 500 are not required to hold a valid Cargo Ship Safety Equipment Certificate and thus there is no Record of Equipment for the Cargo Ship Safety Equipment Certificate (Form E) which could be endorsed so as to attest their compliance with the obligation to transmit LRIT information.

12.2 The compliance of the aforesaid cargo ships with the obligation to transmit LRIT information should be documented:

.1 in case they are issued with a Cargo Ship Safety Certificate, by completing the relevant entry in section 5 of the Record of Equipment for the Cargo Ship Safety Certificate (Form C) and having on board a valid Conformance test report; or

.2 in case they are not issued with a Cargo Ship Safety Certificate, by having on board a valid Conformance test report.

12.3 Neither the Cargo Ship Safety Radio Certificate nor the Record of Equipment for the Cargo Ship Safety Radio Certificate (Form R) should be amended in any way to document their compliance with the obligation to transmit LRIT information as any such amendment does not attest compliance of the ship concerned with the obligation to transmit LRIT information.

13 Units and ships addressed by MSC.1/Circ.1295

13.1 The provisions of this note should apply *mutatis mutandis* to floating production, storage and offloading units (FPSOs) and floating storage units (FSUs) propelled by mechanical means; offshore supply vessels; special purposes ships and A.494(XII)-ships (collectively referred to henceforth as “1295 units and ships”) referred to in MSC.1/Circ.1295 on Guidance in relation to certain types of ships which are required to transmit LRIT information, on exemptions and equivalents and certain operational matters (the Guidance).

13.2 In the cases where the Guidance states that the 1295 units and ships transmit LRIT information in accordance with the provisions of regulation V/19-1 as from 31 December 2009, the conformance test should be satisfactorily completed and a Conformance test report should be issued no later than 31 December 2009.

14 First survey of the radio installation

14.1 Regulations V/19-1.4.1.2 and V/19-1.4.1.3 refers to the first survey of the radio installation after 31 December 2008 and after 1 July 2009, respectively.

14.2 Unless the Administration concerned has, taking into account the provisions of MSC.1/Circ.1290 on Unified interpretation of the term "first survey" referred to in SOLAS regulations, specifies otherwise, the first survey of the radio installation is for ships entitled to fly the flag of:

.1 Contracting Governments, is the first periodical survey of the radio installation in accordance with the provisions of regulation I/9 of the Convention; and

.2 Contracting Governments which are also State Parties to the Protocol, is the first renewal survey or the first periodical survey of the radio installation, which ever of the two becomes due first, in accordance with the provision of regulation I/9 of the Convention as modified by the Protocol (i.e. in accordance with regulations I/9(a)(ii) and I/9(a)(iii) respectively).

14.3 For the purposes of implementation of the provisions of regulations V/19-1.4.1.2 and V/19-1.4.1.3, the date of the "first survey" specified under paragraph 14.2 is not altered as a result of either surveys conducted in relation to the transfer of the flag of the ships or as a consequence of any scheduled or unscheduled inspections or surveys or any additional or occasional surveys required by the Administration.

15 Difficulties in conducting conformance testing

15.1 Those who have engaged in conformance testing have advised that they have encountered difficulties when attempting to conduct conformance testing in certain parts of the world or in certain situations.

15.2 Administrations are advised that in such circumstances the inability to complete the conformance testing should not be considered as making the ship unseaworthy or as a reason for delaying the ship in port until the conformance testing is satisfactorily completed, provided suitable arrangements are made, to the satisfaction of the Administration concerned as soon as is practically possible.

15.3 Administrations are urged to report to the Organization the areas where, and/or the circumstances under which, conformance testing cannot be conducted as these have an impact on the functioning of the LRIT system.

Appendix 1

Conformance Test

1 Shipborne equipment requirements testing matrix

1.1 The table set out below has been derived from an analysis of the salient provisions of regulation V/19-1, the Revised Performance standards and the Technical specifications for communications within the LRIT system and specifies for each regulatory requirement the conformance test to be conducted.

Table 1

Shipborne equipment regulatory requirements testing matrix

Column heading	***Explanation***
Ref.	Regulatory reference
Regulatory text	The text of the related provision with minor paraphrasing and *emphasis* (showing in italics)
CTN	Conformance test number

Symbols	***Explanation***
R	Paragraph of the related provisions of regulation V/19-1
PS	Paragraph of the related provision of the Revised Performance standards
TS	Paragraph of the related provision of the Technical specifications for communications within the LRIT system (refer to MSC.1/Circ.1259 on Revised interim technical specifications for the LRIT system)
EL	Shipborne equipment lifecycle, i.e. requirements not explicitly defined in the regulatory text but critical to the successful operation of the LRIT system

Ref.	**Regulatory text**	**CTN**
R:4.1.1 to R:4.1.3	Ships shall be fitted with a system to automatically transmit the information specified in regulation V/19-1.5 as follows: … ships constructed before 31 December 2008 and <u>*certified for operations*</u> in sea areas A1 to A4	1
PS:4.3	The equipment should transmit the LRIT information using a communication system which <u>*provides coverage*</u> where the ship operates	1
R:5	Ships shall <u>*automatically*</u> transmit the following long-range identification and tracking information	2
R:5.1	The <u>*identity*</u> of the ship	3
PS:4.2 (Table 1)	The equipment should transmit *the shipborne equipment <u>identifier</u>* …	3

Ref.	**Regulatory text**	**CTN**
R:5.2	The *position* of the ship (latitude and longitude)	4a
PS:4.2 (Table 1)	Position – the equipment should be capable of transmitting the GNSS position (latitude and longitude), based upon *WGS84* datum, without human interaction on board the ship	4b
R:5.3	The *date and time of the position* provided	5a
PS:4.2(Table 1)	Date and time – the equipment should be capable of transmitting the date and time associated with the GNSS position with each transmission of LRIT information, and the time should be in *UTC*	5b
TS:2.2.2.6	The parameters provided by the equipment include: the latitude; longitude; *Time Stamp when the position was generated* …	5c
TS: Table 2	The parameters provided by the equipment include: the latitude; longitude; *Time Stamp when the position was generated* …	5c
R:6	Systems and equipment used to meet the requirements of regulation V/19-1 shall conform to the performance standards and functional requirements not inferior to those adopted by the Organization. Any shipboard equipment should be of a *type approved* by the Administration	6
R:7	Systems and equipments used to meet the requirements of this regulation shall be capable of being *switched off on board or be capable of ceasing the distribution*	7
PS:4.1	*In addition to the general requirements contained in resolution A.694(17)* on Recommendations on general requirements for shipborne radio equipment for part of the global maritime distress and safety system (GMDSS)	8
PS:4.1.5	*Be tested for electromagnetic compatibility* taking into account the recommendations developed by the Organization (refer to Assembly resolution A.813(19) on General requirements for electromagnetic compatibility of all electrical and electronic ship's equipment)	8
PS:4.2 (Table 1)	Pre-scheduled position reports – the equipment should be capable of being remotely configured to transmit LRIT information at intervals ranging from a *minimum of 15 min* to periods of 6 h to the LRIT Data Centre, irrespective of where the ship is located and without human interaction on board the ship	9a
PS:4.1.2	Be capable of *being configured remotely* to transmit LRIT information at variable intervals	9b
TS:2.2.3.12	The "Request Type" parameter indicates whether the request is for either a one-time poll, … *polls at a specified rate* …	9b
PS:4.1.1	Be capable of automatically and without human intervention on board the ship transmit the ship's LRIT information at *6-hour intervals* to an LRIT Data Centre	9c

Ref.	**Regulatory text**	**CTN**
PS:4.4.1	When a ship is undergoing repairs in dry-dock or in port or is laid up for a long period, the master or the Administration may reduce the frequency of the transmission of LRIT information to *one report every 24-hour period* …	9d
PS:13.1	LRIT information should be available to an LRIT Data User *within 15 min* of the time it is transmitted by the ship. In lieu for the purposes of testing to an ASP	9e
PS:4.1.3	Be capable of *transmitting LRIT information following receipt of polling commands* …	10
PS:4.2 (Table 1)	On-demand position reports – the equipment should be capable of *responding to a request to transmit LRIT information* on demand without human interaction on board the ship, irrespective of where the ship is located	10
PS:13.2	On-demand LRIT information reports should be provided to an LRIT Data User *within 30 min* of the time the LRIT Data User requested the information. In lieu for the purposes of testing to an ASP	10
PS:4.1.4	Interface *directly* to the shipborne global navigation satellite system equipment, or have *internal* positioning capability	11
PS:4.1.5	Be *supplied with energy from the main and emergency source of electrical power*	12
PS:4.4	The equipment should be set to automatically transmit the ship's LRIT information at 6-hour intervals *to the LRIT Data Centre identified by the Administration* …	13
PS:5.3.1	An ASP function should, *inter alia*, provide a communication protocol interface between the *Communication Service Providers and the LRIT Data Centre* …	13
PS:5.3.1	An ASP function should, *inter alia*, ensure that LRIT information is *collected, stored and routed in a reliable and secure manner* …	13

2 Shipborne equipment test requirements, procedures and acceptance criteria matrix

2.1 The table set out below specifies the shipborne equipment test requirements, the related procedures and the corresponding acceptance criteria for each conformance test and provides a brief citation of the related regulatory provisions.

Table 2

Shipborne equipment test requirements, procedures and acceptance criteria

CTN	Test requirement Procedure	Acceptance criteria
EL1	The equipment is activated into the ASP system ASP issuance of an activation command (Note: this function is critical during the transfer of flag process)	CSP acknowledgement received
1	Establish the sea areas the ship is certified to operate from the Cargo Ship Safety Radio Certificate, Cargo Ship Safety Certificate, Passenger Ship Safety Certificate or equivalent Administrative	Confirmed by shipowner declaration on testing registration form prior to testing including certificate type and reference number
2	The equipment automatically transmits an LRIT information Evaluative	Validated in conjunction with CTN 9
3	The equipment identity is present in the received LRIT information Evaluative	Validated in conjunction with CTN 9
4a	The latitude and longitude is present in the received LRIT information Evaluative	Validated in conjunction with CTN 9
4b	The equipment GNSS position information is based upon the WGS84 datum Evaluative	Assumed compliant in accordance with standard IMO guidelines and regulations
5a	The date and time is present in the received LRIT information Evaluative	Validated in conjunction with CTN 9
5b	The equipment date and time information is in UTC Evaluative	Confirmed by the ASP recognized by the Administration or approved to conduct conformance testing based upon the confirmed inclusion of MEM code 11 (in the case of Inmarsat-C) and in the case of alternate hardware the compliance of the received message structure with the equipment manufacturers published standard for a message containing the generated Date and Time stamp

CTN	Test requirement Procedure	Acceptance criteria
5c	The equipment transmits a Time Stamp relative to when the position was generated (not the CSP receipt time) Evaluative	Confirmed by the ASP recognized by the Administration or approved to conduct conformance testing based upon the confirmed inclusion of MEM code 11 (in the case of Inmarsat-C) and in the case of alternate hardware the compliance of the received message structure with the equipment manufacturers published standard for a message containing the generated Date and Time stamp
6	The equipment is of a type approved by the Administration Administrative	Forms the subject of this test specification which will be if the results are satisfactory and a Statement of conformity is issued by the ASP conducting the test (and the subsequent issuance of a Certificate of compliance by the Administration)
7	The equipment is switched off on board or ceases the distribution of LRIT information ASP outbound Program-Stop command	CSP acknowledgement received and nil LRIT information are transmitted within 90 min
8	The equipment is compliant with provisions of resolution A.694(17) The equipment has been tested for electromagnetic compatibility (refer to resolution A.813(19)) Administrative	Confirmed by manufacturer or validation of technical specification
9a	The equipment is re-configured to automatically transmit LRIT information at 15-min intervals ASP issuance of Start-15 min reporting command	Confirmed subsequent to receipt of 48 consecutive 15-min automatic transmissions of LRIT information. Refer to paragraph 3.2 for information on acceptable tolerances.
9b	The equipment is re-configured to automatically transmit LRIT information at 60-min intervals demonstrating that a change in transmitting interval has been successfully achieved ASP issuance of Start-60 min reporting command	Confirmed subsequent to receipt of 12 consecutive 60-min automatic transmissions of LRIT information. Refer to paragraph 3.2 for information on acceptable tolerances.
9c	The equipment automatically transmits a LRIT information at 6-h intervals Administrative	Confirmed by ASP or manufacturer or validation of the technical specification
9d	The equipment is re-configured to automatically transmit LRIT information at 24 h intervals Administrative	Confirmed by ASP or manufacturer or validation of technical specification

CTN	Test requirement Procedure	Acceptance criteria
9e	LRIT information is available within 15 min of the time it is transmitted by the ship Comparison of the UTC time stamp when the LRIT information was generated against the UTC time stamp when the information was received by the ASP	Validated in conjunction with CTN 9a and 9b
10	The equipment transmits LRIT information (subsequent to the ASP issuing a poll command) and the LRIT information is available within 30 min of the time the ASP has requested the information ASP issuance of a Send-Request for Position command	Confirmed subsequent to receipt of 1 polled transmission of LRIT information within 30 min
11	The equipment interfaces directly to the shipborne global navigation satellite system equipment, or has internal positioning capability Administrative	Confirmed by ASP or manufacturer or by validation of technical specification if internal GPS, or if external GPS confirmed by shipowner declaration on testing registration form prior to testing
12	The equipment is supplied with energy from the main and emergency source of electrical power (this provision does not apply to Inmarsat-C) Administrative	Confirmed by shipowner declaration on testing registration form prior to testing
13	The equipment automatically transmits LRIT information via the CSP to the ASP in a reliable and secure manner Administrative	Confirmed by the ASP recognized by the Administration or approved to conduct conformance testing based upon confirmation that all communication links from the terminal – satellite – CSP –ASP are direct and secure with no third party ASP involvement
EL2	The equipment is de-activated and released from the LRIT system ASP issuance of deactivation command or Administrative (Note: this function is critical during the transfer of flag process)	CSP acknowledgement or CSP declaration received

3 Shipborne equipment performance acceptance criteria and tolerances

3.1 When considering the performance of the LRIT system and the implications of the performance shipborne equipment the following issues need to be taken into account:

.1 The overall LRIT system utilizes a sophisticated array of hardware components, software systems and satellite/terrestrial communications networks, which include without limitation:

 .1 Shipborne equipment;
 .2 Communications satellites;
 .3 Land Earth Stations;
 .4 Terrestrial communication networks;
 .5 CSP routing/switching systems; and
 .6 ASP systems;

.2 In common with all real world systems the overall LRIT system may suffer from data losses and data latency, i.e. non-delivery/late-delivery of messages;

.3 Data losses in the system as a whole are the result of a complex interaction of each of its components. The cause of losses can be as technical as a packet collision in the space segment or as practical as an equipment blockage caused by a ship funnel or crane, in port, etc.;

.4 In order to specify the conditions of the conformance testing scheme it should be assumed that the average loss rate of messages sent to and from the existing potential equipment is 4% in each direction. Thus, the loss on a command and response pair such as Data Network Identifier (DNID) download and its acknowledgement is 8%, and the loss on an automatic LRIT information transmission is 4%;

.5 Data latency in the system arises from the store-and-forward nature of the communication networks used. Each part of the communication chain, first stores a message and then forwards it to the next link which produces a robust system but one which has intrinsically variable latency;

.6 In order to specify the conditions of conformance testing scheme it should be assumed that 1 h latency is within the normal operation of the system;

.7 The design of a test for the conformance testing scheme allows for the real world performance of the overall LRIT system. Hence, it should be a design objective of the test that terminals are not incorrectly failed and thus cause shipowners to needlessly replace equipment;

.8 Consider a poll request, it should be assumed that 8% of poll request/responses are lost, therefore, a fair test requires that the poll request is repeated in a sequence of attempts;

Table 3

Poll attempts and expectations

Attempt	P(Success)	P(Failure)	Expectation	Cumulative P(Success)	Cumulative Expectation
1	0.92000	0.08000	0.92000	0.92000	0.92000
2	0.07360	0.00640	0.14720	0.99360	1.06720
3	0.00589	0.00051	0.01766	0.99949	1.08486

Notes:

Column heading	*Explanation*
Attempt	Number of attempts
P(Success)	Probability of success on that attempt
P(Failure)	Probability of failure on that attempt
Expectation	Contribution to the expected number of attempts
Cumulative P	Cumulative probability of success
Cumulative Expectation	Cumulative expectation of number of attempts required for a successful download

.9 Table 3 demonstrates that if the system retries the poll three times there is a 1 in 1,000 chance of wrongly failing the equipment due to statistical variation. The cumulative expectation shows that the cost of testing apparent non-compliant terminals is only increased by 8% compared to a regime which had only a single attempt;

.10 Consequently, it is recommended that each command is retried a maximum of three times, unless statistical variation can be excluded because of a network response, e.g., if the ship is in port and the equipment confirmed by the communication system as logged-out;

.11 The ASP recognized by the Administration or approved to conduct conformance testing should properly account for different network regions. For example, the Inmarsat-C network has four ocean regions and the test provider must ensure that they have addressed the region containing the equipment;

.12 This calculation assumes uncorrelated failures within the network which it is assumed to be true where there is a reasonable interval between attempts. To increase the likelihood that this assumption is correct it is recommended that the system retries are separated by at least 15 min; and

.13 A similar analysis may be performed for receipt of automatic transmission of LRIT information. The more transmissions of LRIT information that are received the greater confidence there may be that the equipment is conformant while not wrongly failing units. To achieve a 1 in 1,000 confidence of wrongly failing units, it is recommended that 40 out of 48 transmissions of LRIT information are received with a transmitting interval of 15 min, and 10 out of 12 transmission of LRIT information with a transmission interval of 1 h.

3.2 The table set out below specifies for each conformance test the related acceptance criteria and the tolerances or limits within which the functional performance of existing equipment should be before it is considered as being acceptable.

Table 4

Shipborne equipment performance acceptance criteria and tolerances

CTN	Acceptance criteria	Tolerances
EL1	CSP acknowledgement received	Maximum of 3 attempts separated by a minimum of 15 min
1	Confirmed by shipowner declaration on testing registration form prior to testing including certificate type and reference number	None
2	Validated in conjunction with CTN 9	None
3	Validated in conjunction with CTN 9	None
4a	Validated in conjunction with CTN 9	None
4b	Assumed compliant in accordance with standard IMO guidelines and regulations	None
5a	Validated in conjunction with CTN 9	None
5b	Confirmed by ASP recognized by the Administration or approved to conduct conformance testing based upon the confirmed inclusion of MEM code 11 (in the case of Inmarsat-C) and in the case of alternate hardware the compliance of the received message structure with the equipment manufacturers published standard for a message containing the generated Date and Time stamp	None
5c	Confirmed by ASP recognized by the Administration or approved to conduct conformance testing based upon the confirmed inclusion of MEM code 11 (in the case of Inmarsat-C) and in the case of alternate hardware the compliance of the received message structure with the equipment manufacturers published standard for a message containing the generated Date and Time stamp	None
6	Forms the subject of this test specification which will be if the results are satisfactory and a Statement of conformity is issued by the ASP conducting the test (and the subsequent issuance of a Certificate of compliance by the Administration)	None
7	CSP acknowledgement received and nil position reports received within 15 min	Maximum of 3 attempts separated by a minimum of 15 min
8	Confirmed by manufacturer or by validation of technical specification	None

CTN	Acceptance criteria	Tolerances
9a	Confirmed subsequent to receipt of 48 consecutive transmissions of LRIT information transmitted at 15-min intervals	3 attempts separated by a minimum of 15 min Acceptable results: a minimum of 40 out of 48 transmissions are received (>82% success rate)
9b	Confirmed subsequent to receipt of 12 consecutive transmissions of LRIT information transmitted at 60-min intervals	3 attempts separated by a minimum of 15 min Acceptable results: a minimum of 10 out of the 12 transmissions are received (>82% success rate)
9c	Confirmed by ASP or manufacturer or by validation of technical specification	None
9d	Confirmed by ASP or manufacturer of by validation of technical specification	None
9e	Validated in conjunction with CTN 9a and 9b	Satisfactory: a minimum of 50 out of 60 transmissions are received (>82% success rate)
10	Confirmed subsequent to receipt of 1 polled transmission of LRIT information within 30 min	3 attempts separated by a minimum of 15 min Satisfactory: a minimum 1 out of 1 transmissions are received (100% success rate)
11	Confirmed by ASP or manufacturer of by validation of technical specification if internal GPS, or if external GPS confirmed by shipowner declaration on testing registration form prior to testing	None
12	Confirmed by shipowner declaration on testing registration form prior to testing	None
13	Confirmed by the ASP recognized by the Administration or approved to conduct conformance testing based upon confirmation that all communication links from the equipment – satellite – CSP – ASP are direct and secure with no third party ASP involvement	None
EL2	CSP acknowledgement or CSP declaration received	3 attempts separated by a minimum of 15 min

4 Estimated duration of conformance testing

4.1 Based upon the equipment requirements testing matrix, the test requirements, the procedures, the acceptance criteria and the acceptable tolerances detailed in this annex, the table set out below provides information on the estimated duration of the conformance testing:

Table 5

Estimated duration of conformance testing

CTN	**Tolerances**	**Maximum Duration**
EL1	3 attempts separated by a minimum of 15 min	45 min
9a	3 attempts separated by a minimum of 15 min Acceptable results: a minimum of 40 out 48	45 min 720 min (12 h)
9b	3 attempts separated by a minimum of 15 min Acceptable results: a minimum of 10 out of 12	45 min 720 min (12 h)
10	3 attempts separated by a minimum of 15 min	45 min
7	3 attempts separated by a minimum of 15 min	45 min + wait 90 min
EL2	3 attempts separated by a minimum of 15 min	45 min
	Total	30 h

Appendix 2

Model of Conformance test report

Conformance test report

issued under the provisions of MSC.1/Circ.1307 on Guidance on the survey and certification of compliance of ships with the requirements to transmit LRIT information

issued by …………………….

on behalf of the Government of ……………………….

Name of ship:	
Port of registry:	
Distinctive number or letters:	
IMO Number:	
Maritime Mobile Service Identity:	
Gross tonnage:	
Sea areas in which the ship is certified to operate[1]:	
Sea areas for which this report is valid[2]:	
Application Service Provider conducting the test:	

THIS IS TO CERTIFY that the shipborne equipment designated to transmit LRIT information and specified below:

.1 has been found to meet the requirement of the provision of regulations V/19-1.6 and V/19-1.7 and of the Revised performance standards and functional requirements for the long-range identification and tracking of ships adopted by resolution MSC.263(84) and[3]:

.1 is of a type approved by the Administration in accordance with the provisions of regulation V/19-1; ☐ Yes ☐ No

.2 is of a type approved by the Administration in accordance with the provisions of regulation IV/14; ☐ Yes ☐ No

.3 has been certified by the Administration as meeting the requirements of IEC 60945 (2002-08) and IEC 60945 Corr.1 (2008-04) on Maritime navigation and radiocommunication equipment and systems – General requirements – Methods of testing and required test results; ☐ Yes ☐ No

.4	has been certified by the Administration as meeting the requirements of the provisions of regulation XI-2/6; and of resolution MSC.136(76) on Performance standards for a ship security alert system[4]/resolution MSC.147(77) on Adoption of the Revised performance standards for a ship security alert system[5];	☐ Yes ☐ No

.2 has undergone conformance testing in accordance with the procedures and provisions set out in MSC.1/Circ.1307, and has shown that it can operate within the tolerances of the acceptance criteria stated in the aforesaid circular.

The conformance test was satisfactorily completed on ....
(date of completion of testing)

Details of the shipborne equipment used to transmit LRIT information (e.g., maker model, serial number and shipborne equipment identifier):

Issued at .... on ....
(place of issue) *(date of issue)*

……………………………………..………………………..
(name and signature of authorized person issuing the report)

---

1 Insert the sea areas specified in Radio related certificate (refer to paragraph 3.1.6 and to section 11 of this circular).

2 Refer to paragraphs 5.2 to 5.2.2. Insert the sea areas for which the conformance testing is valid. For example, if the sea areas indicated on the Radio related certificate are A1, A2, A3 and A4 and the conformance test has been conducted using a communication system which provides coverage only for sea areas A1, A2 and A3, insert A1, A2 and A3.

3 Indicate “Yes” against the option(s) which is/are applicable and “No” against the rest of the option(s).

4 Delete as appropriate.

5 Delete as appropriate.

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Ref. T1/2.03

MSC.1/Circ.1281
9 December 2008

EXPLANATORY NOTES TO THE INTERNATIONAL CODE ON INTACT STABILITY, 2008

1 The Maritime Safety Committee, at its eighty-fifth session (26 November to 5 December 2008), adopted, by resolution MSC.267(85), the International Code on Intact Stability, 2008 (2008 IS Code). In adopting the 2008 IS Code, the Committee recognized the necessity of appropriate explanatory notes to ensure uniform interpretation and application.

2 To this end, the Committee approved the Explanatory Notes to the Intact Stability Code, 2008, set out in the annex, as prepared by the Sub-Committee on Stability and Load Lines and on Fishing Vessels Safety, at its fiftieth session (30 April to 4 May 2007).

3 The Explanatory Notes are intended to provide Administrations and the shipping industry with specific guidance to assist in the uniform interpretation and application of the intact stability requirements of the 2008 IS Code.

4 Member Governments are invited to use the Explanatory Notes when applying the intact stability requirements of the 2008 IS Code adopted by resolution MSC.267(85) and to bring them to the attention of all parties concerned.

***

ANNEX

EXPLANATORY NOTES TO THE INTERNATIONAL CODE ON INTACT STABILITY, 2008

CONTENTS

EXPLANATORY NOTES TO THE INTERNATIONAL CODE ON INTACT STABILITY, 2008

CHAPTER 1 – GENERAL

1.1 Introduction

The intact stability criteria given in part A (mandatory) and part B (recommendatory) of the 2008 IS Code are prescriptive rules developed from ship operation statistics and weather criterion collected in the middle of the twentieth century. To enable a proper understanding and application of these criteria, their origin and development are presented in chapter 3.

1.2 Purpose

The purpose of these explanatory notes is to deliver to the user of the Code information on the history, background and method of elaboration of the present stability criteria, as set out in part A of the 2008 IS Code.

CHAPTER 2 – TERMINOLOGY

It should be noted that, while the terms listed below are in common usage, they are not those given in MSC/Circ.920, MODEL LOADING AND STABILITY MANUAL, section 2.2, table 1, which are based on ISO standards (ISO 7462 and ISO 7463).

Particular care should be taken with regard to asymmetric weight and buoyancy distribution.

Term, as used in the 2008 IS Code	Term, as used in MSC/Circ.920	Explanation
LCG	XG	**Longitudinal Centre of Gravity (m from A.P.)** Longitudinal distance from reference point to centre of gravity, reference point usually at Aft Perpendicular (forward + / aft -).
TCG	YG	**Transversal Centre of Gravity (m from C.L.)** Transversal distance from reference point to centre of gravity, reference point on the Centreline (port + / starboard -).
VCG	KG	**Vertical Centre of Gravity (m above B.L.)** Vertical distance from reference point to centre of gravity, reference point on Base Line (upwards + / down -).
LCB	XB	**Longitudinal Centre of Buoyancy (m from A.P.)** Longitudinal distance from reference point to centre of buoyancy, reference point usually at Aft Perpendicular (forward + / aft -).
TCB	--	**Transversal Centre of Buoyancy (m from C.L.)** Transversal distance from reference point to centre of buoyancy, reference point on the Centreline (port + / starboard -).
VCB	--	**Vertical Centre of Buoyancy (m above B.L.)** Vertical distance from reference point to centre of buoyancy, reference point on Base Line (upward + / down -).
LCF	XF	**Longitudinal Centre of Flotation (m from A.P.)** Longitudinal distance from reference point to centre of flotation, reference point usually at Aft Perpendicular (forward + / aft -).
TCF	--	**Transversal Centre of Flotation (m from C.L.)** Transversal distance from reference point to centre of flotation, reference point on the Centreline (port + / starboard -).

In all cases it is of utmost importance to define clearly the reference points/planes and the signs of the positive and negative directions along the vessel's coordinate system.

CHAPTER 3 – ORIGIN OF PRESENT STABILITY CRITERIA

3.1 General

3.1.1 The Maritime Safety Committee requested the Sub-Committee on Stability and Load Lines and on Fishing Vessels Safety (SLF), to develop a range of intact stability requirements to cover all ship types for eventual incorporation into the 1974 SOLAS Convention. At the thirty-third session of the Sub-Committee (SLF 33), the Working Group on Intact Stability (IS) considered this matter and foresaw the procedural problems that would arise by incorporating a wide range of stability criteria covering different ship types into the Convention, and also recognized that these criteria could not be developed in a short time. The group recommended that, alternatively, consideration should be given to developing a comprehensive code to incorporate the then existing stability requirements contained in all IMO recommendations and codes for various types of ships. Criteria for additional ship types could be added later as each ship type was considered and a criterion developed. The group also suggested that the 1974 SOLAS Convention should either: include a basic stability standard and refer to the Code for varying ship types or, alternatively, it should only refer to the Code. The proposed Code could be divided into two parts: part A, containing mandatory requirements; and part B, containing recommendatory requirements. Development of the proposed Code was given priority [IMO 1988].

3.1.2 In considering the proposal by the above group, SLF 33 agreed that the development of a stability code for all ships covered by IMO instruments (IS Code) would be of value, so that the generally accepted and special stability requirements for all types of ships' forms would be contained in a single publication for ease of reference. This was thought to be important because stability requirements were dissipated amongst various documents which made their use by designers and authorities difficult [IMO 1988a]. The SLF Sub-Committee emphasized that the Code should contain instructions on operational procedures as well as technical design characteristics. This course of action was approved by the Maritime Safety Committee at its fifty-seventh session.

3.1.3 The collation of the stability requirements contained in various IMO instruments and the preparation of the first draft of the Code was undertaken by Poland and submitted to IMO [IMO 1990]. This formed the basis for the development of the Code which was to include the following groups of requirements as proposed by Poland [Kobylinski 1989]:

.1 ship construction;

.2 physical characteristics of ships;

.3 information available onboard and navigational aids; and

.4 operations.

3.1.4 This framework was eventually adopted by SLF 35, which also agreed that the Code should have recommendatory status. The final draft of the Code was agreed by SLF 37 and subsequently adopted by resolution A.749(18) [IMO 1993]. It was subsequently amended in 1998 by resolution MSC.75(69). The Code was considered to be a "living" document under constant review, into which all new requirements developed by IMO would be incorporated.

3.2 Background of criteria regarding righting lever curve properties (part A of the 2008 IS Code)

3.2.1 *Introduction*

3.2.1.1 The statistical stability criteria were originally included in resolutions A.167(ES.IV) and A.168(ES.IV). They were developed as a result of discussions conducted at several sessions of the Sub-Committee on Subdivision and Stability Problems (STAB), a forerunner of the SLF Sub-Committee and the Working Group on Intact Stability (IS). There was general agreement that the criteria would have to be developed on the basis of the statistical analysis of stability parameters of ships that had suffered casualties and of ships that were operating safely.*

3.2.1.2 The IS Working Group agreed to a programme of work that eventually included the following item:

.1 collation, analysis and evaluation of existing national rules or recommendations on stability;

.2 evaluation of stability parameters which could be used as stability criteria;

.3 collection of stability characteristics of those ships that become casualties or experienced dangerous heeling under circumstances suggesting insufficient stability;

.4 collection of stability characteristics of those ships which were operating with safe experience;

.5 comparative analysis of stability parameters of ships becoming casualties and of ships operated safely;

.6 estimation of critical values of chosen stability parameters; and

.7 checking formulated criteria against a certain number of existing ships.

3.2.1.3 The analysis of existing national stability requirements (paragraph 3.2.1.2.1) [IMO 1964] revealed considerable consistency in the applicability of certain parameters as stability criteria. It was noted also that in many countries there was a tendency to adopt weather criterion. However, weather criterion was not considered by the IS Working Group at that time.

3.2.1.4 With regard to paragraph 3.2.1.2.2 of the programme, the IS Working Group singled out a group of parameters characterizing the curve of righting levers for the ship at rest ($V = 0$) in still water. This was done notwithstanding the fact that if a ship sails in a seaway, the curve of static stability levers changes. However, it was decided that the only practical solution would be to use the "stipulated" curve of righting levers and this curve could be characterized using the following set of parameters:

* The detailed discussion of the work of these IMO bodies and of the method used in the development of stability standards was reported in the following papers: Nadeinski and Jens [1968] and Thompson and Tope [1970].

.1 initial stability – GM_0,

.2 righting levers at angles – GZ_{10}, GZ_{20}, GZ_{30}, GZ_{40}, GZ_{φ}, GZ_m,

.3 angles – φ_m, φ_v, φ_f, φ_{fd},

.4 levers of dynamic stability – e_{20}, e_{30}, e_{40}, e_{φ}.

3.2.1.5 The number of stability parameters which could be used as stability criteria should be, however, limited. Therefore, by analysing the parameters used in various national stability requirements, the Working Group on Intact Stability concluded the following eight parameters have to be left for further consideration: GM_0, GZ_{20}, GZ_{30}, GZ_m, φ_m, φ_v, φ_{fd}, e.

3.2.1.6 During the realization of paragraph 3.2.1.2.3 of the programme, a special form of casualty record was prepared and circulated amongst IMO Member States [IMO 1963]. It was requested that the form be filled in carefully with as many details of the casualty as possible. Altogether there were casualty records collected for 68 passenger and cargo ships and for 38 fishing vessels [IMO 1966, 1966a]. In a later period, some countries submitted further casualty records so that, in the second analysis that was performed in 1985, data for 93 passenger and cargo ships and for 73 fishing vessels were available [IMO 1985]. On the basis of the submitted data, tables of details of casualties were prepared.

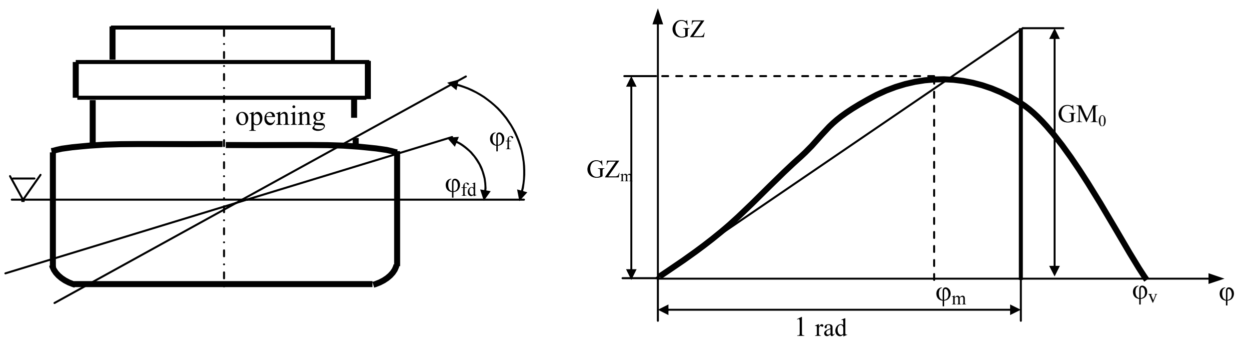

Figure 1 – Explanation of righting levers and heeling angles

3.2.1.7 Within paragraph 3.2.1.2.4 of the programme, data on stability characteristics for 62 passenger and cargo ships and for 48 fishing vessels, which were operated safely, were collected and for this purpose a special instruction containing detailed specifications for the manner how the stability information was to be submitted was developed. Also, for these ships, tables were prepared of stability parameters.

3.2.1.8 Paragraph 3.2.1.2.5 of the programme included analysis of the collected data, the results of which were submitted to IMO in several documents separately prepared for passenger and cargo ships and for fishing vessels [IMO 1965; 1966; 1966a; 1966b].

3.2.1.9 After IMO resolutions A.167(ES.IV) and A.168(ES.IV) had been adopted and further intact stability casualty data were collected, it was decided to repeat the analysis in order to find out if additional data might change conclusions drawn in the first analysis. This second analysis confirmed, in general, the results achieved in the first analysis [IMO 1985]. In the following text, the results of the second analysis that was based on the larger database are referred to.

3.2.1.10 The analysis performed consisted of two parts. In the first part, details relevant to casualties were evaluated, which allowed qualitative conclusions with regard to the circumstances of casualties to be developed and therefore the specification of general safety precautions. In the second part, stability parameters of ships reported as casualties were compared with those for ships which were operated safely. Two methods were adopted in this analysis. The first was identical with the method adopted by Rahola [Rahola 1939] and the second was the discrimination analysis. The results of the analysis of intact stability casualty data and of the first part of the analysis of stability parameters are included in paragraph 3.2.2.2. The results of the discrimination analysis are referred to in paragraph 3.2.2.3.

3.2.2 ***Results of the Analysis of Intact Stability Casualty Records and Stability Parameters***

3.2.2.1 *Analysis of details relevant to the casualties*

3.2.2.1.1 The evaluation of details relevant to the casualties is shown in Figures 2 to 7.

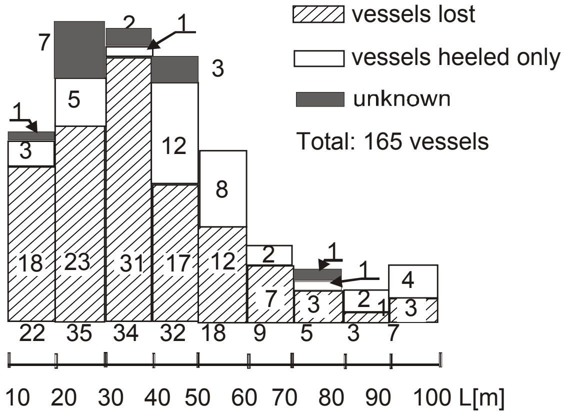

Figure 2 – Distribution of length of capsized ships collated by IMO [1985]

3.2.2.1.2 In all 166 casualties reported, the ships concerned were: 80 cargo ships, 1 cargo and passenger ship, 1 bulk carrier, 4 off-shore supply ships, 7 special service vessels, and 73 fishing vessels. Distribution of ship's length is shown in figure 2. It is seen that the majority of casualties occurred in ships of less than 60 m in length.

3.2.2.1.3 A great variety of cargoes were carried so that no definite conclusions could be drawn. It may be noted, however, that in 35 cases of the 80 cargo ships reported, deck cargo was present.

3.2.2.1.4 The result of the analysis of the location of the casualty is shown in Figure 3. It may be seen that the majority of casualties (72% of all casualties) occurred in restricted water areas, in estuaries and along the coastline. This is understandable because the majority of ships lost were small ships of under 60 m in length. From the analysis of the season when the casualty occurred (Figure 4) it may be seen that the most dangerous season is autumn (41% of all casualties).

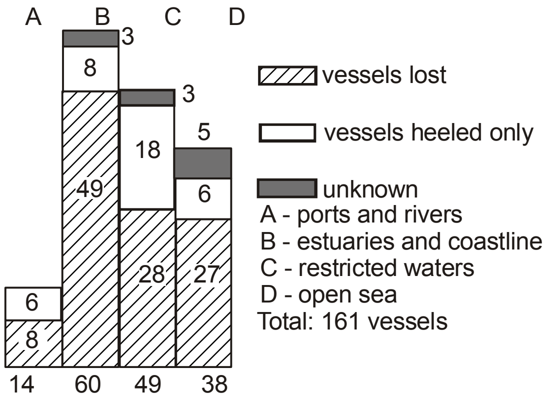

Figure 3 – Place of casualty [IMO 1985]

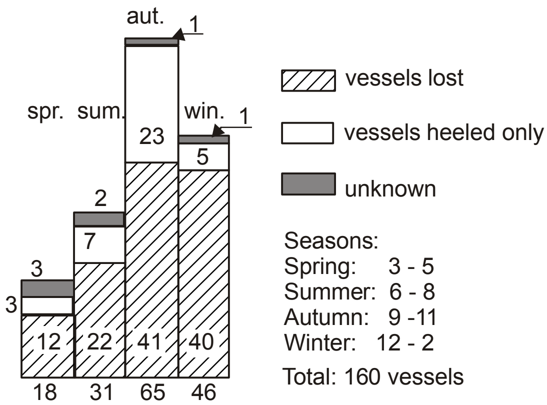

Figure 4 – Season of casualty [IMO 1985]

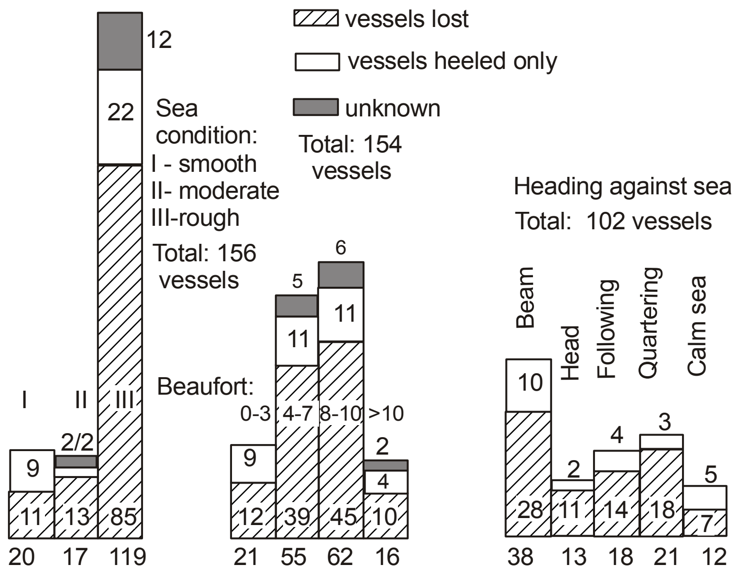

Figure 5 – Sea and wind condition during casualty [IMO 1985]

3.2.2.1.5 The result of the analysis of the weather conditions is shown in Figure 5. About 75% of all casualties occurred in rough seas at a wind force of between Beaufort 4 to 10. Ships were sailing most often in beam seas, less often in quartering and following seas.

3.2.2.1.6 The manner of the casualty was also analysed (Figure 6). It showed that the most common casualty was through gradual or sudden capsizing. In about 30% of casualties, ships survived the casualty and were heeled only.

3.2.2.1.7 In Figure 7 the results of the analysis of the age of ships are shown. No definite conclusions could be drawn from this analysis.

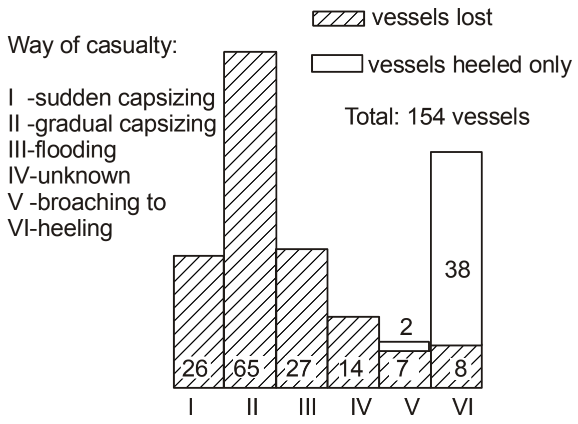

Figure 6 – Way of casualty [IMO 1985]

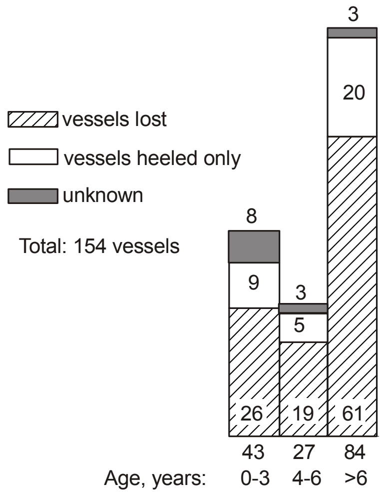

Figure 7 – Age of vessel during casualty [IMO 1985]

3.2.2.1.8 The distributions of stability parameters for ships' condition at time of loss are shown in Figures 8 to 14.

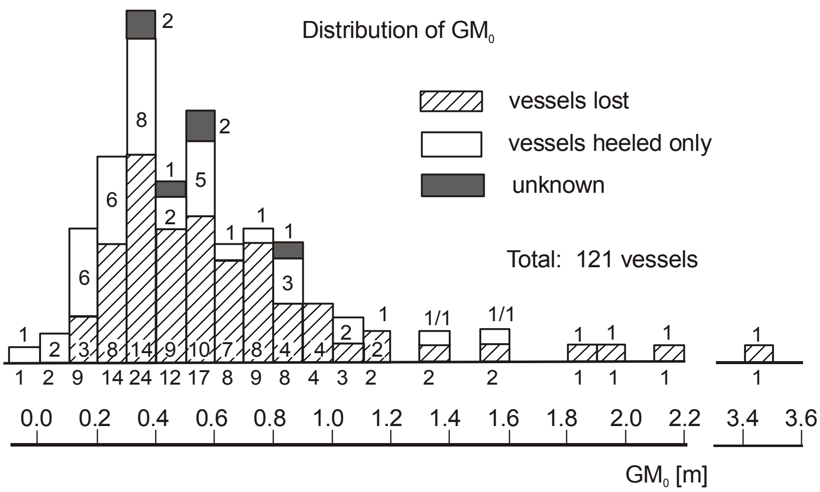

Figure 8 – Condition at time of casualty. Distribution of GM_0 [IMO 1985]

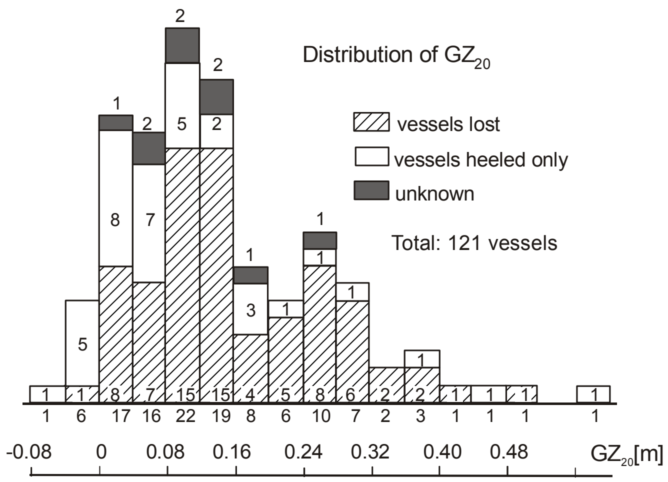

Figure 9 – Condition at time of casualty. Distribution of GZ_{20} [IMO 1985]

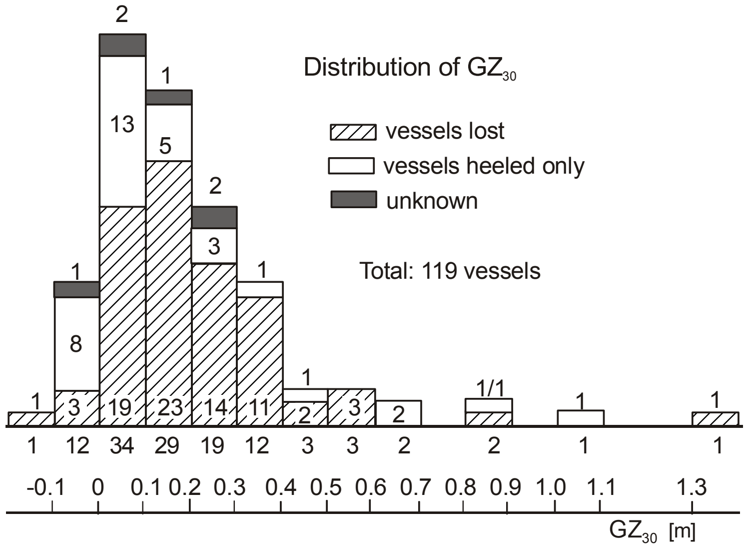

Figure 10 – Condition at time of casualty. Distribution of GZ_{30} [IMO 1985]

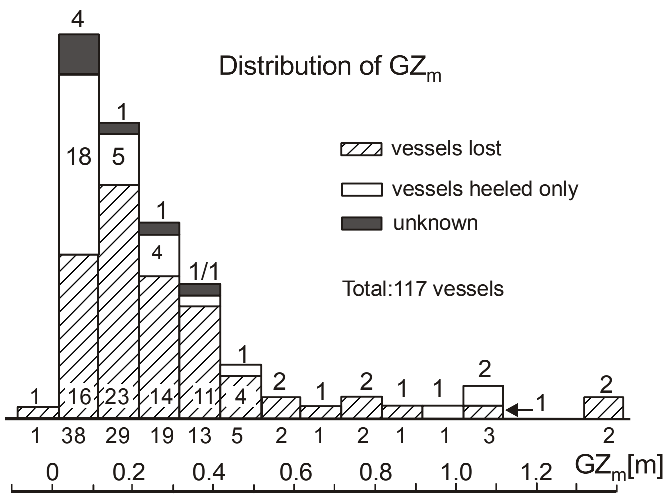

Figure 11 – Condition at time of casualty. Distribution of GZ_m [IMO 1985]

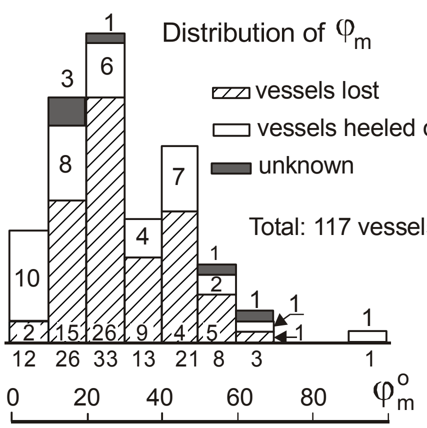

Figure 12 – Condition at time of casualty. Distribution of φ_m [IMO 1985]

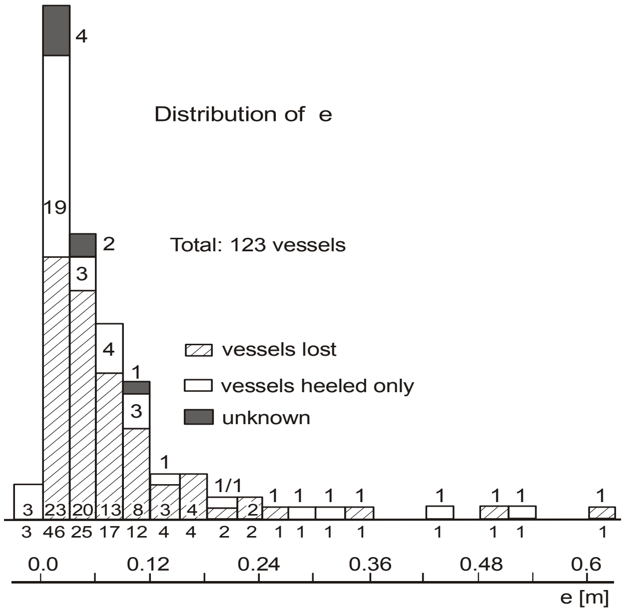

Figure 13 – Condition at time of casualty. Distribution of *e* [IMO 1985]

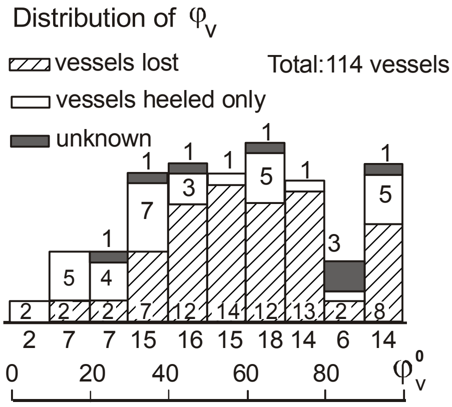

Figure 14 – Condition at time of casualty. Distribution of φ_V [IMO 1985]

3.2.2.2 *Analysis of stability parameters using Rahola method*

3.2.2.2.1 The stability parameters for casualty condition were analysed by plotting in a similar manner, as was done by Rahola, together with parameters for ships operated safely for comparison.

3.2.2.2.2 The parameters chosen for analysis were GM_0, GZ_{20}, GZ_{30}, GZ_{40}, GZ_m, e_{40}, and φ_m. From the available data, histograms were prepared, where respective values of stability parameters for casualty condition were entered by starting with the highest value at the left of the vertical line (ordinate) down to the lowest value, and the values of the same parameter for safe ships were entered on the right side by starting from the lowest and ending with the highest value. Thus, at the ordinate, the highest value of the parameter for casualty condition is next to the lowest value of the parameter for the safe case. In Figure 15 an example diagram for righting levers comprising all ships analysed is shown. In the original analysis [IMO 1966, 1966a, 1985] diagrams were prepared separately for cargo and fishing vessels, but they are not reproduced here.

3.2.2.2.3 In the diagram (Figure 15), the values for casualty condition are shaded, only those that have to be specially considered due to exceptional circumstances were left blank. On the right side of the ordinate the areas above the steps were shaded in order to make a distinction between the safe and unsafe cases easier. The limiting lines or the imaginary static stability lever curves were drawn in an identical way as in the Rahola diagram. Percentages of ships in arrival condition, the respective stability parameters which are below the limiting lines are shown in table 1. The lower percentages mean in general that there is better discrimination between safe and unsafe conditions.

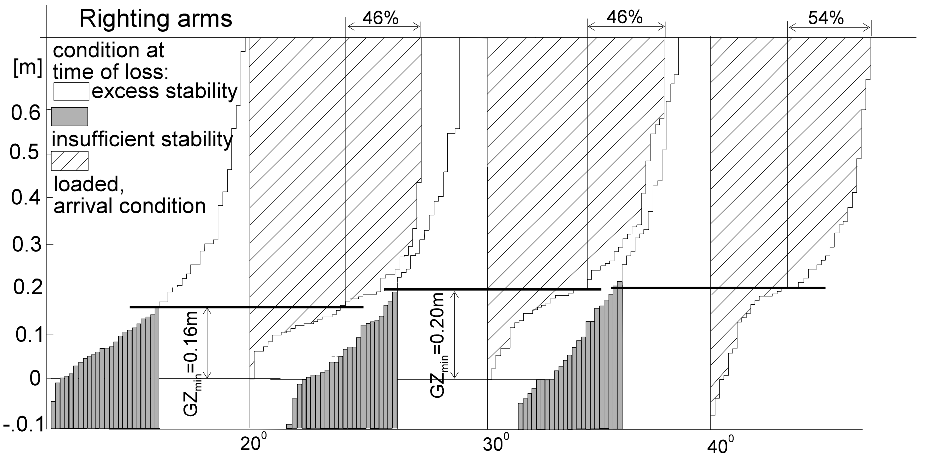

Figure 15 – Plot of righting levers for ships at time of casualty. Cargo vessels only. [IMO 1966, 1985]

Table 1 – Percentages of ships below limiting line

Stability parameter	Percentages		
	all ships	**cargo**	**fishing**
GZ_{20}	39	54	26
GZ_{30}	48	54	42
GZ_{40}	48	46	48
e	55	56	53

3.2.2.2.4 The type of analysis described above is not entirely rigorous; it was partly based on intuition and allows arbitrary judgement. Nevertheless, from the point of view of practical application, it provided acceptable results and finally was adopted as a basis for IMO stability criteria.

3.2.2.3 *Discrimination Analysis*

3.2.2.3.1 When two populations of data, as in this case, data for capsized ships and for ships considered safe, are available and the critical values of parameters from these two sets have to be obtained, the method of discrimination analysis may be applied.

3.2.2.3.2 The application of the discrimination analysis in order to estimate critical values of stability parameters were contained in a joint report by [IMO 1966, 1966a], and constituted the basis for development of IMO stability criteria along the previously described Rahola method.

3.2.2.3.3 In this investigation, discrimination analysis was applied independently to nine stability parameters. Using data from intact stability casualty records (group 1) and from intact stability calculations for ships considered safe in operation (group 2) the distribution functions were plotted, where for group 1 the distribution function F_1 and for group 2 function $(1 - F_2)$ were drawn. Practically, on the abscissa axis of the diagram, values for the respective stability parameter were plotted and the ordinates represent the number of ships in per cent of the total number of ships considered having the respective parameter smaller than the actual value for ships of group 1 and greater than the actual value for ships of group 2 considered safe.

3.2.2.3.4 The point of intersection of both curves in the diagram provides the critical value of the parameter in question. This value is dividing the parameters of group 1 and of group 2. In an ideal case, both distribution functions should not intersect and the critical value of the respective parameter is then at the point between two curves (see Figure 16).

3.2.2.3.5 In reality, both curves always intersect and the critical value of the parameter is taken at the point of intersection. At this point, the percentage of ships capsized having the value of the respective parameter higher than the critical value is equal to the percentage of safe ships having the value of this parameter lower than the critical value.

3.2.2.3.6 The set of diagrams was prepared in this way for various stability parameters based on IMO statistics for cargo and passenger ships and for fishing vessels. One of the diagrams is reproduced in Figure 17. It means that the probability of capsizing of a ship with the considered parameter higher than the critical value is the same as the probability of survival of a ship with this parameter lower than the critical value.

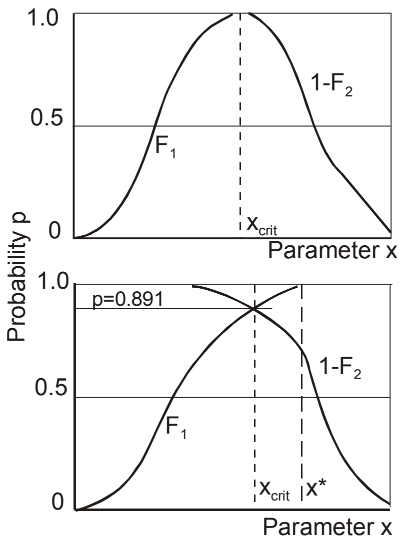

Figure 16 – Estimation of critical parameter

3.2.2.3.7 In order to increase the probability of survival, the value of the parameter should be increased, say up to x^* (Figure 16), at which the probability of survival (based on the population investigated) would be 100%. However, this would mean excessive severity of the criterion, which usually is not possible to adopt in practice because of unrealistic values of parameters obtained in this way curves do intersect could be explained in two ways. It is possible that ships of group 2 having values of the parameter in question $x < x_{crit}$ are unsafe, but they were lucky not to meet excessive environmental conditions which might cause capsizing. On the other hand, the conclusion could also be drawn that consideration of only one stability parameter is not sufficient to judge the stability of a ship.

3.2.2.3.8 The last consideration led to an attempt to utilize the IMO data bank for a discrimination analysis where a set of stability parameters was investigated [Krappinger and Sharma 1974]. The results of this analysis were, however, available after the SLF Sub-Committee had adopted criteria included in resolutions A.167(ES.IV) and A.168(ES.IV) and were not taken into consideration.

3.2.2.3.9 As can be seen from Figure 17, the accurate estimation of the critical values of the respective parameters is difficult because those values are very sensitive to the running of the curves in the vicinity of the intersection point, especially if the population of ships is small.

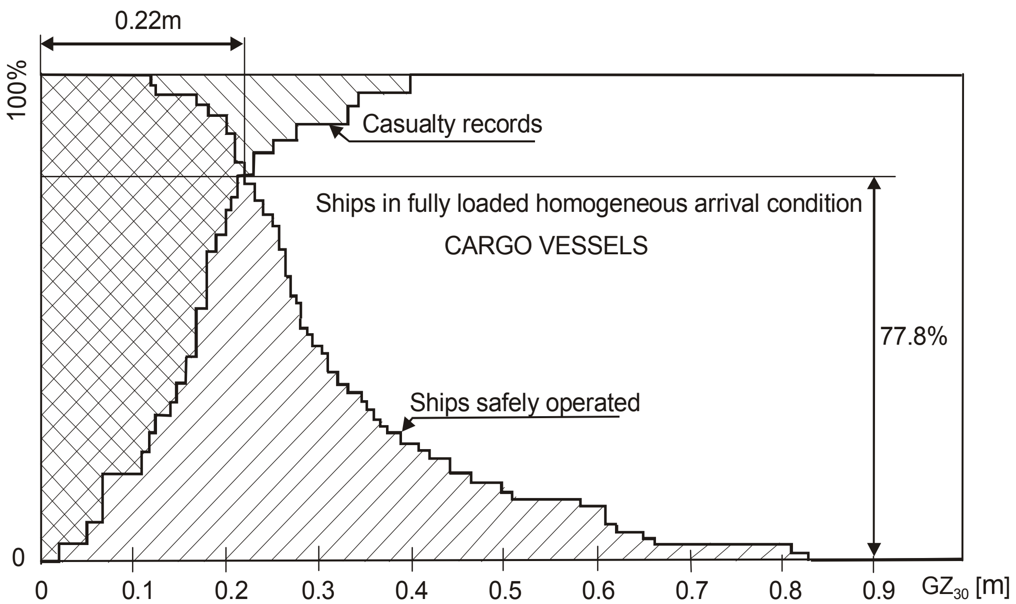

Figure 17 – Discrimination analysis for parameter GZ_{30} [IMO 1965]

3.2.2.4 *Adoption of the final criteria and checking the criteria against a certain number of ships*

3.2.2.4.1 The final criteria, as they were evaluated on the basis of the diagrams, are prepared in the form as shown in Figures 15 and 17. The main set of diagrams did show righting lever curves (Figure 15), but diagrams showing distribution of dynamic stability levers were also included. Diagrams were prepared jointly for cargo and passenger vessels and for fishing vessels, except vessels carrying timber deck cargo. Sets of diagrams were also separately prepared for cargo ships and fishing vessels. Diagrams in the form as shown in Figure 17 were prepared separately for each stability parameter and separately for cargo and passenger ships and for fishing vessels.

3.2.2.4.2 After discussion by the Working Group on Intact Stability and the SLF Sub-Committee, the stability criteria were rounded off and finally adopted in the form as they appear in the resolutions A.167(ES.IV) and A.168(ES.IV).

3.2.2.4.3 In the original analysis the angle of vanishing stability was also included. However, due to the wide scatter of values of this parameter, it was not included in the final proposal.

3.2.2.4.4 As each criterion or system of criteria has to be checked against a sample of the population of existing ships, it was necessary to find the common basis for comparison results achieved with the application of different criteria. The most convenient basis for the comparison was the value of KG_{crit} that is the highest admissible value of KG satisfying the criterion or system of criteria, and the higher the value of KG_{crit}, the less severe the criterion.

3.2.2.4.5 As an example, criteria related to the righting lever curves could be written as:

$$GZ = KZ - KG\sin\varphi \tag{1}$$

and

$$KG = \frac{KZ(\Delta,\varphi) - GZ}{\sin\varphi} \tag{2}$$

3.2.2.4.6 If for GZ and φ, values of respective criterion are inserted, values of KG_{crit} for respective displacement are obtained. Then the curve $KG_{crit} = f(\Delta)$ could be drawn. KG_{crit} could also be obtained graphically as shown in Figure 18. It is possible to calculate values KG_{crit} also for dynamic criteria, although the method is more complicated.

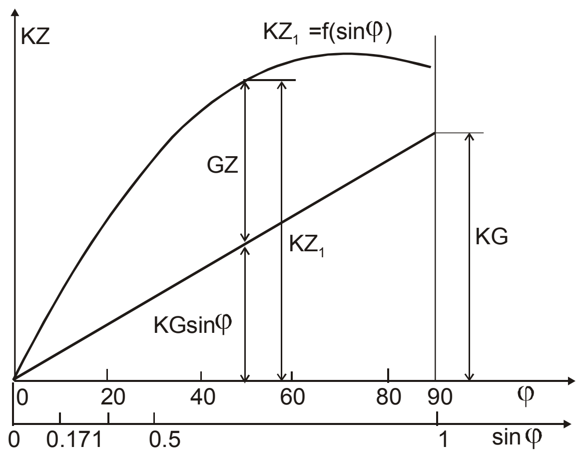

Figure 18 – Graphical estimation of KG_{crit}

3.2.2.4.7 Figure 19 shows the results of calculations of KG_{crit} for a fishing vessel ([IMO 1966]). Curves $KG_{crit} = f(\Delta)$ for 11 different criteria are plotted in the Figure. By having such curves for each individual criterion, it is easy to determine critical KG curve for a system of criteria by drawing envelope.

3.2.2.4.8 Curves for KG_{crit}, as shown in Figure 19, also allow conclusions to be drawn regarding the relative severity of various criteria or systems of criteria and to single out the governing one. If, in addition, actual values of KG for the particular ship are available, then it is possible to estimate whether the ship satisfies the criteria and which criterion leads to the condition most close to the actual condition. If it is assumed that ships in service are safe from the point of view of stability, it could be concluded which criterion or system of criteria fits in the best way without excessive reserve of stability.

3.2.2.4.9 With

$$k = \frac{KG_{actual}}{KG_{critical}}$$

a histogram of distribution of k is shown for the group of ships analysed (Figure 20).

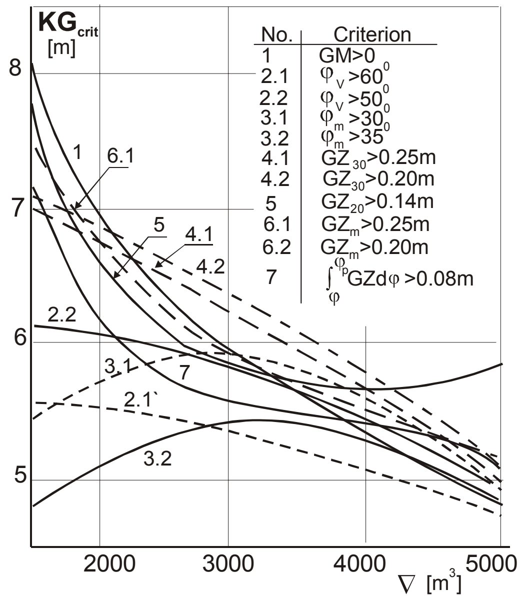

Figure 19 – Plot of the KG_{crit} curves for various criteria

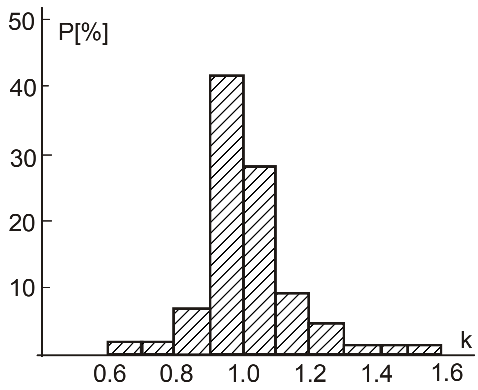

Figure 20 – Distribution of coefficient k for a group of ships analysed [Sevastianov 1968]

3.3 Background of the approximate formula for the minimum GM_0 for small fishing vessels (part B, paragraph 2.1.5.1 of the 2008 IS Code)

3.3.1 The approximate formula for the minimum metacentric height for small fishing vessels was developed using the method of regression analysis. In 1967 the Panel of Experts on Fishing Vessels Stability (PFV) of IMO recommended to develop an appropriate stability standard for small fishing vessels less than 30 m in length. The reason for this was the fact that for small fishing vessels quite often no drawings and stability data are available; therefore, the application of criteria of resolution A.168(ES IV) is not possible. It was proposed that a stability standard for those vessels could be developed in the form of a formula for GM_{crit} that could be compared with the actual GM_0 estimated on the basis of the rolling test. The value of GM_{crit} should correspond to the criteria of resolution A.168(ES IV).

3.3.2 For the development of the appropriate formula, members of the Panel were requested to submit stability data for as many small fishing vessels as possible and also information regarding approximate formulae on GM_{crit} used in their countries, if any. Those formulae were later compared with the formulae developed by the regression analysis. The review of all approximate formulae revealed a rather wide scatter of values of GM_{crit}. This could be expected because it is obvious that the formulae do not take into account all parameters of the ship's hull that are important from the point of view of stability. Therefore, none of the formulae were adopted by IMO and it was decided to develop a new formula based on a regression analysis of a larger number of data for small fishing vessels.

3.3.3 The formula should provide results as close as possible to those provided by using IMO criteria included in resolution A.168(ES IV). As it would be impossible to take into account all criteria, it was decided that the representative criterion which should be satisfied was GZ_{30} = 0.20 m.

3.3.4 Stability data was collected on 119 vessels of between 15 and 29 m in length and analysed [IMO 1968a].

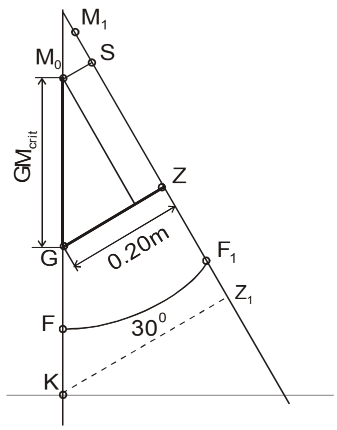

Figure 21 – Relation between GM_{crit} and GZ = 0.20m

3.3.5 As the condition for GM_{crit} is GZ_{30} = 0.2 m, the following is valid (Figure 21):

$$GZ_{30} = GM_0 \sin 30^0 + MS_{30} \tag{3}$$

then:

$$GM_{crit} = 0.40 - 2B\left(\frac{MS_{30}}{B}\right) \tag{4}$$

3.3.6 As MS_{30}/B depends only on geometrical parameters of the hull, this parameter might be used not only to evaluate GM_{crit} but also to compare different hull shapes from the stability point of view.

3.3.7 It is assumed that, in general, $\frac{MS_{30}}{B} = f\left\{\frac{f}{B}, \frac{B}{D}, \frac{l_{\sup}}{L}\right\}$ polynomial expressions of different type were tested with coefficients evaluated by regression analysis. The evaluation of errors while estimating GM_{crit} of those expressions with respect to the actual GM_{crit} of the analysed vessels showed, as expected, that for about 50% of the vessels the calculated GM_{crit} was smaller than the actual value. For another 50% it was greater than the actual value (Figure 22a) with the distribution of errors considered acceptable. To increase the safety, it was then decided that the calculated values of GM_{crit} should be increased by a certain amount, C_{GM} , in order to achieve a situation where about 85% of vessels were on the safe side (Figure 22b). This supplementary C_{GM} was evaluated by an iteration process and it was determined that the proper value is $C_{GM} = 0.1250$.

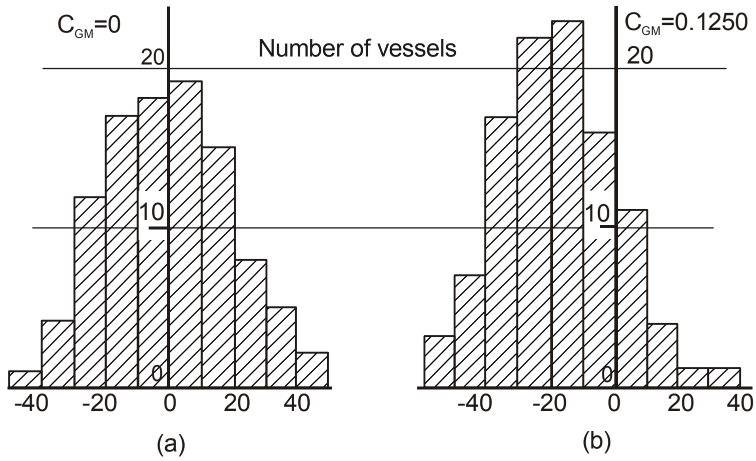

Figure 22 – Distribution of errors in estimation of GM_{crit} for small fishing vessels

3.3.8 The formula (4) was modified as follows:

$$GM_{crit} = 0.40 + C_{GM} - 2B\left(\frac{MS_{30}}{B}\right) \quad (5)$$

3.3.9 The final formula, as given in resolution A.207(VII), was:

$$GM_{crit} = 0.40 + C_{GM} - 2B\left[a_0 + a_1\left(\frac{f}{B}\right) + a_2\left(\frac{f}{B}\right)^2 + a_3\left(\frac{B}{T}\right) + a_4\left(\frac{l_{\sup}}{L}\right)\right] \quad (6)$$

where:

C_{GM}	=	0.1250	a_2	=	- 0.8340
a_0	=	- 0.0745	a_3	=	0.0137
a_1	=	0.3704	a_4	=	0.0321

3.4 References relating to paragraphs 3.1 to 3.3

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3.5 Background of the severe wind and rolling criterion (weather criterion)

3.5.1 *Introduction*

3.5.1.1 The severe wind and rolling criterion (weather criterion) is one of general provisions of the 2008 IS Code. This criterion was originally developed to guarantee the safety against capsizing for a ship losing all propulsive and steering power in severe wind and waves, which is known as a dead ship. Because of no forward velocity of ships, this assumes a irregular beam wind and wave condition. Thus operational aspects of stability are separated from this criterion, and are dealt with the guidance to the master for avoiding dangerous situation in following and quartering seas (MSC/Circ.707), in which a ship could capsize more easily than beam seas under some operational actions.

3.5.1.2 The weather criterion firstly appeared in the IMO instruments as Attachment No.3 to the Final Act of Torremolinos International Convention for the Safety of Fishing Vessels, 1977. During the discussion for developing the Torremolinos Convention, the limitation of the GZ curve criterion based on resolution A.168(ES.IV) was remarked; it is based on experiences of fishing vessels only in limited water areas and it has no way for extending its applicability to other ship types and other weather conditions. Thus, other than the GZ curve criterion, the Torremolinos Convention adopted the severe wind and rolling criterion including a guideline of calculation. This new provision is based on the Japanese stability standards for passenger ships (Tsuchiya, 1975; Watanabe *et al.*, 1956).

3.5.1.3 Then, a similar criticism to the GZ curve criterion for passenger and cargo ships, resolution A.167(ES.IV), was raised at IMCO. At least resolution A.167(ES.IV) was claimed to be applicable to ships of 100 m in length or below because of the limitation of statistical data source. As a result, a weather criterion was adopted also for passenger and cargo ships as well as fishing vessels of 45 m in length or over, as given in resolution A.562(14) in 1985. This new criterion keeps the framework of the Japanese stability standard for passenger ships but includes USSR's calculation formula for roll angle. For smaller fishing vessels, resolution A.685(17) in 1991 was passed. Here the reduction of wind velocity near sea surface is introduced reflecting USSR's standard. When the IS Code was established as resolution A.749(18) in 1993, all the above provisions were superseded.

3.5.2 *Energy Balance Method*

3.5.2.1 The basic principle of the weather criteria is energy balance between the beam wind heeling and righting moments with a roll motion taken into account. One of the pioneering works on such energy balance methods can be found in Pierrottet (1935) (Figure 23). Here, as shown in Figure 3.1, the energy required for restoring is larger than that required for the wind heeling moment. Since no roll motion is taken into account, a ship is assumed to suddenly suffer a wind heeling moment at its upright condition. This was later used in the interim stability requirements of the USSR and then Poland, Rumania, GDR and China (Kobylinski & Kastner, 2003).

3.5.2.2 In Japan the energy balance method is extended to cover a roll motion and to distinguish steady and gusty wind as shown in Figure 24. Then it is adopted as the basic principle of Japan's national standard (Watanabe *et al.*, 1956). The regulation of the Register of Shipping of the USSR (1961) also assumes initial windward roll angle as shown in Figure 24. The current IMO weather criterion of chapter 2.3 of the IS Code, part A, utilizes the energy balance method adopted in Japan without major modification. Here we assume that a ship with a steady heel angle due to steady wind has a resonant roll motion in beam waves. Then, as a worst case, the ship is assumed to suffer gusty wind when she rolls toward windward. In the case of the resonant roll, roll damping moment and wave exciting moment cancel out. Thus, the energy balance between restoring and wind heeling energy can be validated around the upright condition. Furthermore, at the final stage of capsizing, since no resonance mechanism exists near the angle of vanishing stability, the effect of wave exciting moment could be approximated to be small (Belenky, 1993).

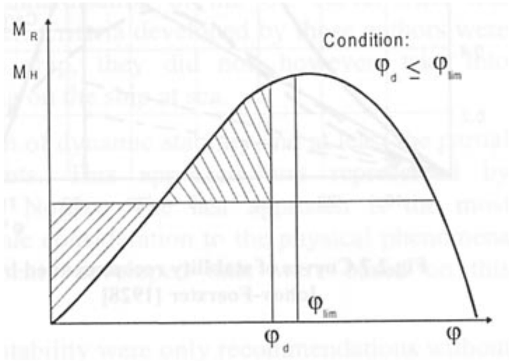

Figure 23 – Energy balance method used by Pierrottet (1935)

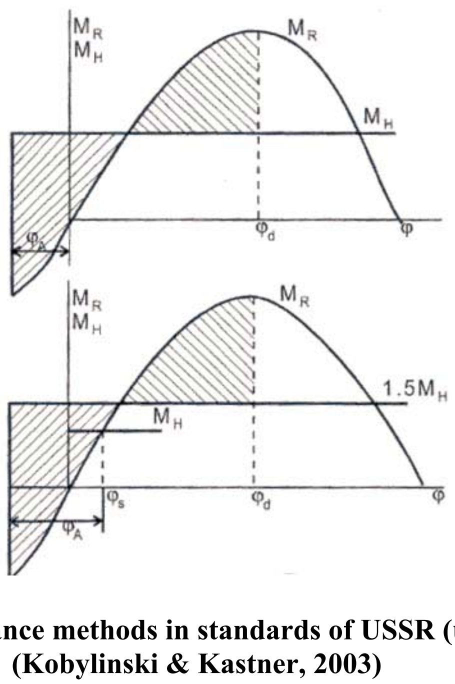

Figure 24 – Energy balance methods in standards of USSR (upper) and Japan (lower) (Kobylinski & Kastner, 2003)

3.5.3 *Wind heeling moment*

3.5.3.1 In the Japanese standard the steady heeling moment, M_w, is expressed as follows:

$$M_W = \frac{1}{2}\rho C_D A H_0 (H/H_0) V_w^2 \qquad (1)$$

where:

ρ	=	air density
C_D	=	drag coefficient
A	=	lateral windage area above water surface
H	=	heeling lever
H_0	=	vertical distance from centre of lateral windage area to a point at one half the mean draught
V_w	=	wind velocity

3.5.3.2 Values of C_D obtained from experiments of passenger ships and train ferries ranges from 0.95 to 1.28. In addition, a wind tunnel test for a domestic passenger ship (Okada, 1952) shows that H/H_0 is about 1.2. Considering these data, the value of $C_D(H/H_0)$ was assumed to be 1.22 on average. These formula and coefficients were adopted also at IMO.

3.5.3.3 To represent fluctuating wind, gustiness should be determined. Figure 25 shows the ratio of gustiness measured in various stormy conditions. (Watanabe *et al.*, 1955). Here the maximum is 1.7 and the average is $\sqrt{1.5}(\approx 1.23)$. However, these were measured for about 2 hours of duration but capsize could happen within half the roll natural period, say 3 to 8 seconds. In addition, reaction force could act on centre of ship mass because of such short duration. Therefore, in place of the maximum value, the average value of Figure 25 is adopted. This results in 1.5 as heeling lever ratio for gustiness as shown in the 2008 IS Code.

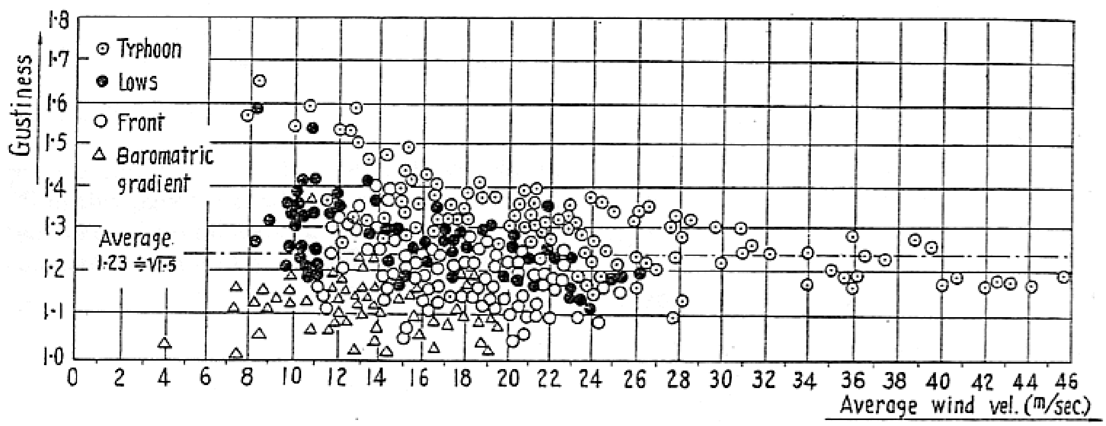

Figure 25 – Gustiness of measured sea wind (Watanabe *et al.*, 1956)

3.5.4 *Roll angle in waves (Japanese Method)*

In general, ship motion consists of surge, sway, heave, roll, pitch and yaw. In beam seas, however, only sway, heave and roll are dominant. Furthermore, the effect of heave on roll is negligibly small and coupling from sway to roll can be cancelled with roll diffraction moment (Tasai & Takagi, 1969). Therefore, the roll motion can be modelled without coupling from other motion modes if the wave exciting moment is estimated without wave diffraction. Consequently, considering nonlinear roll damping effect is taken into account, the amplitude of resonant roll in regular beam waves, ϕ (degrees), can be obtained as follows:

$$\phi = \sqrt{\frac{\pi r \Theta}{2N(\phi)}} \quad (2)$$

where:

$\Theta(=180s)$	=	maximum wave slope (degrees)
s	=	wave steepness
r	=	effective wave slope coefficient
N	=	Bertin's roll damping coefficient as a function of roll amplitude.

3.5.4.1 *Wave steepness*

Based on observations at sea, Sverdrup and Munk (1947) published a relationship between wave age and wave steepness as shown in Figure 26. Here the wave age is defined with the ratio of wave phase velocity, u, to wind velocity, v, and wave height, H_w, means significant wave height. If we use the dispersion relationship of water waves, $u = \frac{gT}{2\pi}$, this diagram can be converted to that with wave period, T, as shown in Figure 27. Further, since the ship suffers a resonant roll motion, the wave period could be assumed to be equal to the ship natural roll period. Here it is noteworthy that the obtained wave steepness is a function of roll period and wind velocity. In addition, because of possible spectrum of ocean waves, regions for the maximum and minimum steepness are modified from the original data.

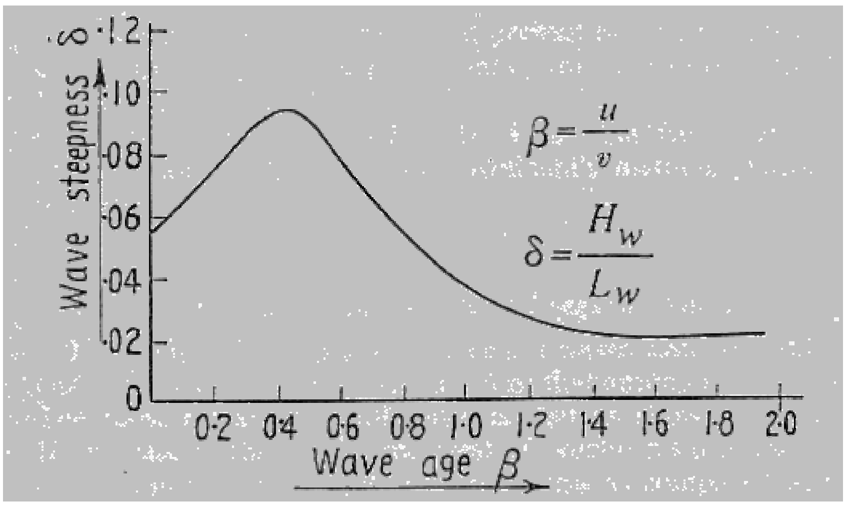

Figure 26 – Relationship between wave age and wave steepness (Sverdrup & Munk, 1947)

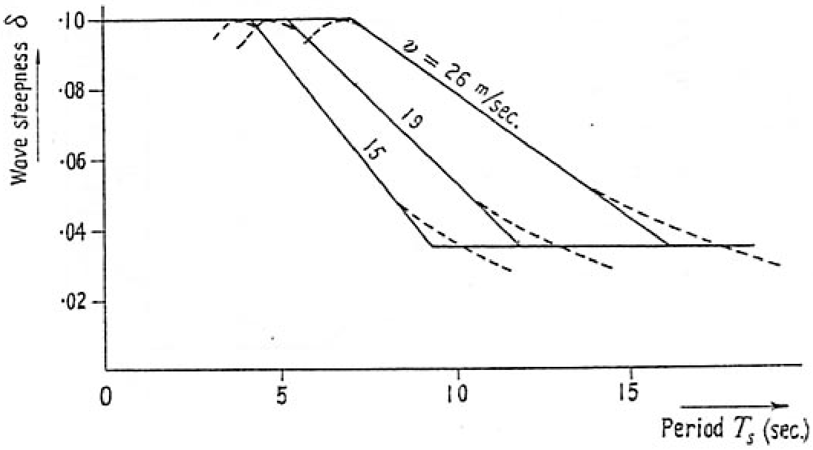

Figure 27 – Relationship between roll period and wave steepness in Japanese criterion (Yamagata, 1959)

3.5.4.2 *Hydrodynamic coefficients*

For using Equation (2), it is necessary to estimate the values of *r* and *N*. Since we should estimate wave exciting moment without wave diffraction due to a ship, it can be obtained by integrating undisturbed water pressure over the hull under calm water surface. Watanabe (1938) applied this method to several ships and developed an empirical formula, which is a function of wave length, VCG, GM, breadth, draught, block coefficient and water plane area coefficient. For simplicity sake, it is further simplified for 60 actual ships only as a function of VCG and draught shown in Figure 28. The formula used in the IMO weather criterion for *r* was obtained by this procedure.

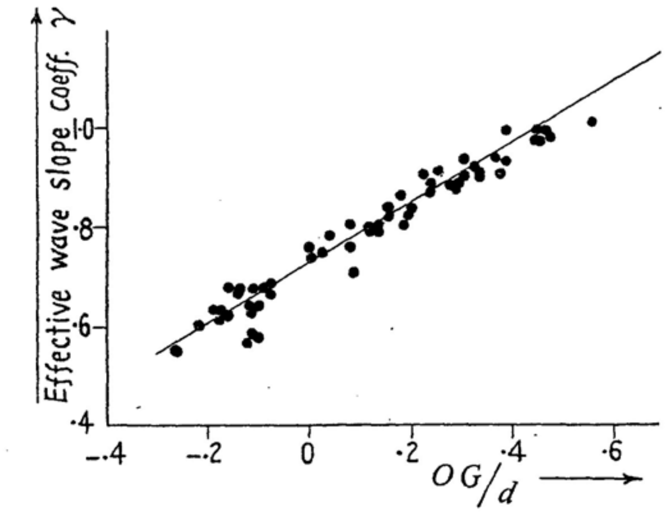

Figure 28 – Effective wave slope coefficient: measurements (circles) and estimation (solid line) (Yamagata, 1959)

For estimating the *N* coefficient, several empirical formulae were available. However, in the Japanese stability standards, *N*=0.02 is recommended for a ship having bilge keels at the roll angle of 20°. Some evidence of this value can be found in Figure 29 (Motora, 1957).

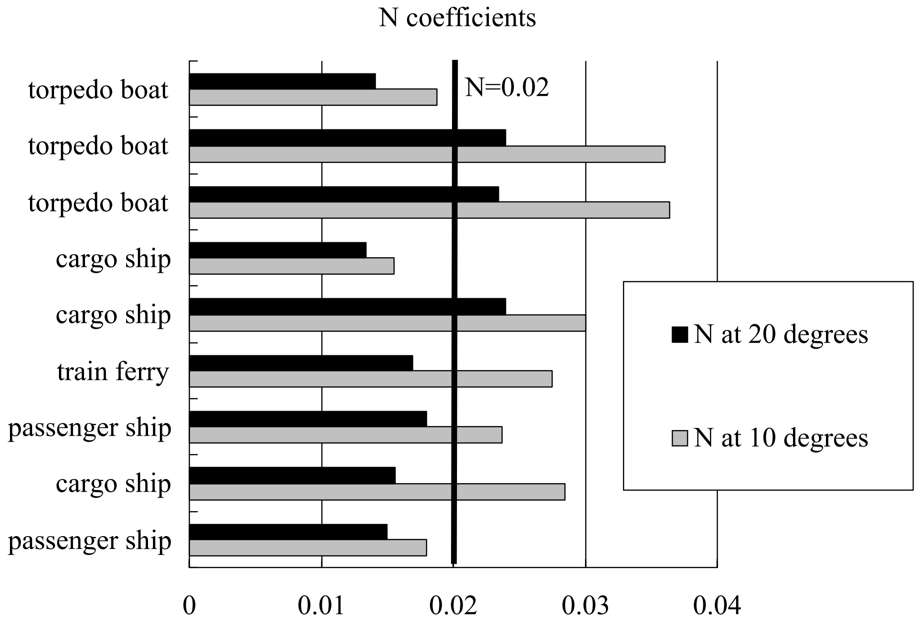

Figure 29 – Example of *N* coefficients measured in model experiments

3.5.4.3 *Natural roll period*

For calculating the wave steepness, it is necessary to estimate the natural roll period for a subject ship. In the Japanese standard, the value measured with the actual ship is corrected with Kato's empirical formula (Kato, 1956). However, at the STAB Sub-Committee, this procedure was regarded as tedious and Japan was requested to develop a simple and updated empirical formula for the roll period. Thus the current formula was statistically developed by Morita, and is based on data measured from 71 full-scaled ships in 1982. As shown in Figure 30, all sampled data exist within $\pm 7.5\%$ of error from Morita's formula. More precisely, the standard deviation of the error from the formula is 1.9%. Furthermore, sensitivity analysis of C on required GM indicated that even 20% error of C estimation results in only 0.04 m error of required GM calculation. Therefore, IMO concluded that this formula can be used for weather criteria.

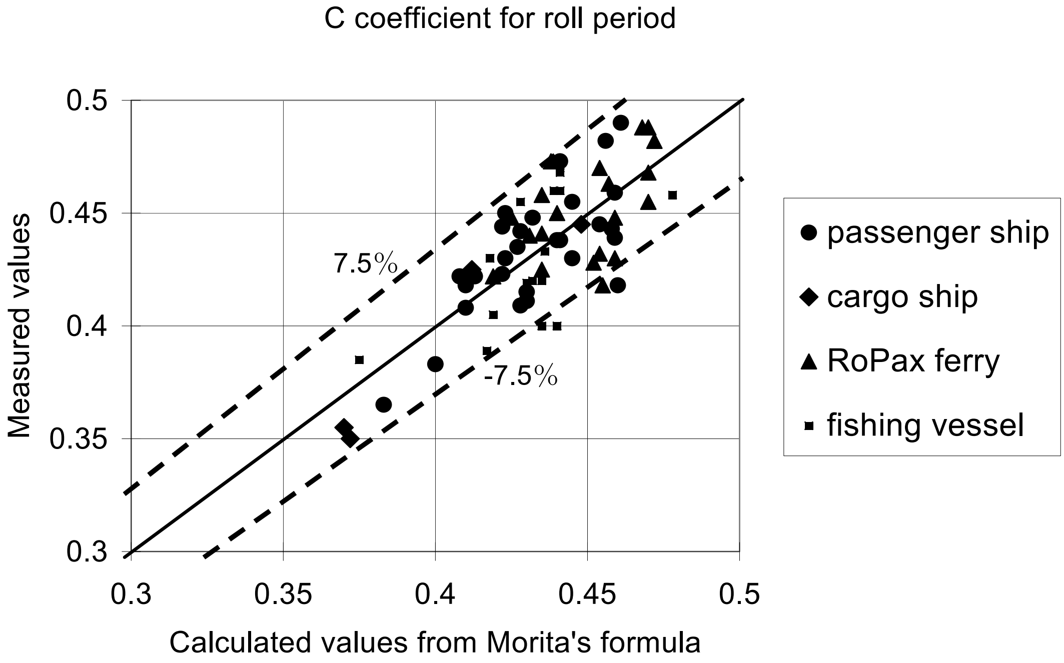

Figure 30 – Estimation accuracy for empirical formula for roll period

3.5.4.4 *Wave randomness*

While the wave steepness obtained from Sverdrup-Munk's diagram is defined by the significant wave height in irregular waves, the resonant roll amplitude given by Equation (2) is formulated for regular waves. For filling the gap between two, the roll amplitude in irregular waves whose significant wave height and mean wave period are equal to height and period of regular waves was compared with the resonant roll amplitude in the regular waves. As shown in Figure 31, if we focus the maximum amplitude out of 20 to 50 roll cycles, an obtained reduction factor is 0.7.

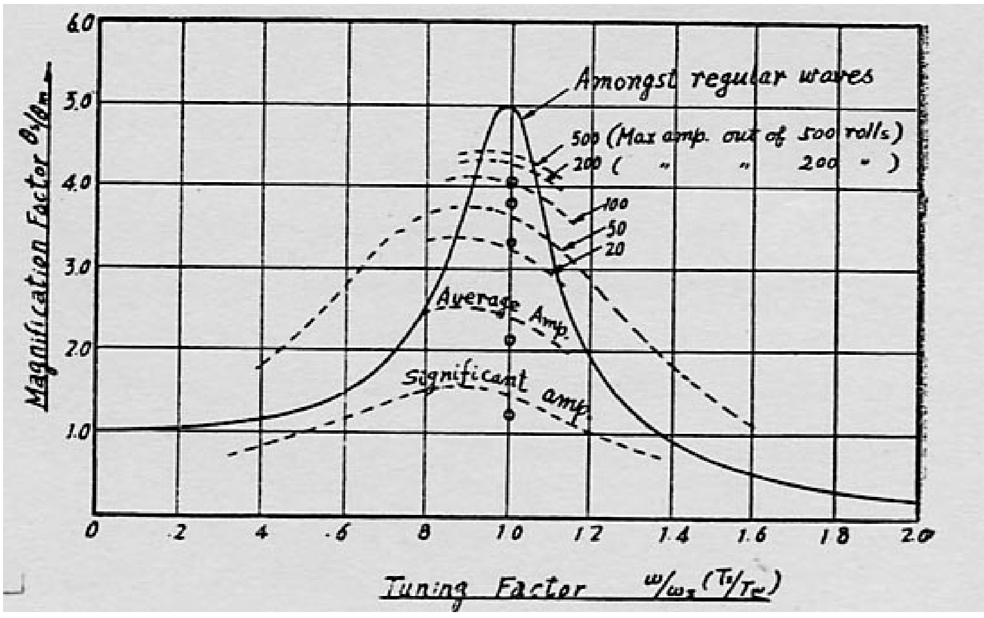

Figure 31 – Comparison of roll amplitude in regular and irregular waves (Watanabe *et al.*, 1956)

3.5.4.5 *Steady wind velocity*

As explained above, the Japanese weather criterion introduced probabilistic assumptions for determining gust and roll in irregular waves. These make final probabilistic safety level unclear. Possible estimation error for wind heel lever coefficient, roll damping coefficient, effective wave slope coefficient, natural roll period and wave steepness added uncertainty to the required safety level. Therefore, Japan carried out test calculations for 50 ships, which include 13 ocean going ships as shown in Figure 32. Based on these calculated outcomes, the steady wind velocity was determined to distinguish ships having insufficient stability from other ships. In other words, for ships having insufficient stability the energy balance should not be obtained with the above procedure. As a result, the wind velocity for ocean going ships is determined as 26 m/s. Here a sunken torpedo boat (0-12-I), a sunken destroyer (0-13) and three passenger ships having insufficient stability (0-3, 7, and 9) are categorized as unsafe and 2 cargo ships, 3 passenger ships and 3 larger passenger ships are done as safe. It is noteworthy here that 26 m/s of wind velocity is only obtained from casualty statistics for ships and is not directly obtained from actual wind statistics. IMO also adopted 26 m/s as critical wind velocity. If we substitute V_w=26 m/s to Equation (1), the wind pressure in the current IS Code is obtained.

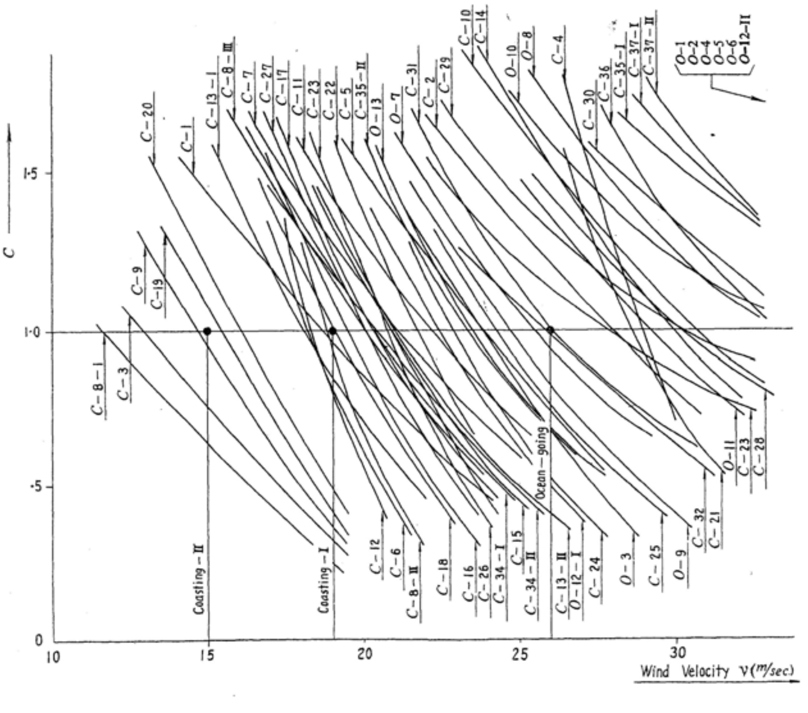

Figure 32 – Results of test calculations for determining steady wind velocity. Relation between wind velocity and the b/a factor for various sample ships (Watanabe *et al.*, 1956)

3.5.4.6 *Rolling in waves (USSR's method)*

In the stability standard of USSR (USSR, 1961), the maximum roll amplitude of 50 roll cycles is estimated as follows:

$$\phi_R = kX_1X_2\varphi_A \qquad (3)$$

Here k is a function of bilge keel area, X_1 is a function of B/d, X_2 is a function of the block coefficient and φ_A is roll amplitude of the standard ship, which is shown in Figure 33. This formula was developed by systematic calculations for a series of ships utilizing the transfer function and wave spectrum (Kobylinski & Kastner, 2003).

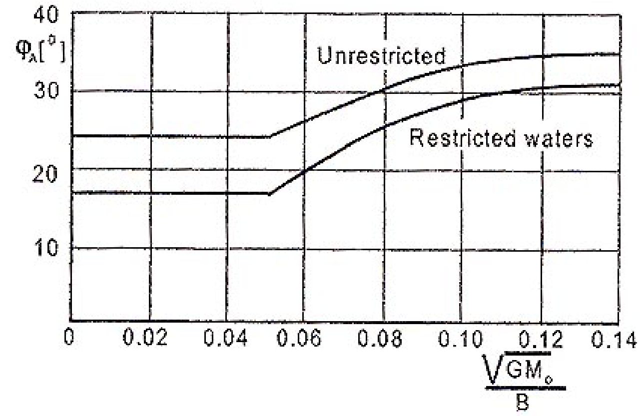

Figure 33 – Standard roll amplitude in USSR's criterion (USSR, 1961)

As mentioned earlier, IMO decided to partly use this USSR's roll formula together with the Japanese criterion. This is because the USSR's formula depends on hull forms for estimating roll damping while the Japanese does not. The proposed formula is as follows:

$$\phi_1(\deg rees) = C_{JR} k X_1 X_2 \sqrt{rs} \quad (4)$$

Here C_{JR} is a tuning factor for keeping the safety level of the new criterion as the same as the Japanese domestic standard. To determine this factor, member states of a working group of STAB Sub-Committee executed test calculations of Japanese and new formulations for many ships. For example, Japan (1982) executed test calculation for 58 ships out of 8,825 Japanese flagged-ships larger than 100 gross tonnage in 1980. These include 11 cargo ships, 10 oil tankers, 2 chemical tankers, 5 liquid gas carriers, 4 container ships, 4 car carriers, 5 tug boats and 17 passenger or RoPax ships. As a result, IMO concluded that C_{JR} should be 109.

3.6 References relating to paragraph 3.5

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CHAPTER 4 – GUIDANCE FOR THE APPLICATION OF THE 2008 IS CODE

4.1 Criteria regarding righting lever curve properties

For certain ships the requirement contained in paragraph 2.2.3 of part A of the Code may not be practicable. Such ships are typically of wide beam and small depth, indicatively B/D ≥ 2.5. For such ships Administrations may apply the following alternative criteria:

.1 the maximum righting lever (GZ) should occur at an angle of heel not less than 15°; and

.2 the area under the curve of righting levers (GZ curve) should not be less than 0.070 metre-radians up to an angle of 15° when the maximum righting lever (GZ) occurs at 15° and 0.055 metre-radians up to an angle of 30° when the maximum righting lever (GZ) occurs at 30° or above. Where the maximum righting lever (GZ) occurs at angles of between 15° and 30°, the corresponding area under the righting lever curve should be:

$0.055 + 0.001 (30° - \varphi_{max})$ metre-radians*.

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* φ_{max} is the angle of heel in degrees at which the righting lever curve reaches its maximum.

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MSC.1/Circ.1291
9 December 2008

GUIDELINES FOR FLOODING DETECTION SYSTEMS ON PASSENGER SHIPS

1 The Maritime Safety Committee, at its eighty-fifth session (26 November to 5 December 2008), approved the Guidelines for flooding detection systems on passenger ships, as set out in the annex, following the recommendations made by the Sub-Committee on Stability and Load Lines and on Fishing Vessels Safety, at its fifty-first session. The Guidelines provide guidance for the flooding detection systems for watertight spaces below the bulkhead deck, required by SOLAS regulation II-1/22-1 for passenger ships carrying 36 or more persons and constructed on or after 1 July 2010.

2 Member Governments are invited to use the annexed Guidelines for flooding detection systems on passenger ships when applying the relevant provisions of SOLAS regulation II-1/22-1 and to bring them to the attention of all parties concerned.

***

ANNEX

GUIDELINES FOR FLOODING DETECTION SYSTEMS ON PASSENGER SHIPS

Introduction

1 SOLAS regulation II-1/22-1 requires passenger ships carrying 36 or more persons constructed on or after 1 July 2010 to be provided with flooding detection systems for watertight spaces below the bulkhead deck based on guidelines developed by the Organization.

2 These guidelines are intended to provide detailed requirements for flooding detection systems to provide information in the case of flooding in order to assess the actual flooding situation and support the decision-making process.

Definitions

3 *Flooding detection system* means a system of sensors and alarms that detect and warn of water ingress into watertight spaces. Continuous flood level monitoring may be provided, but is not required.

4 *Sensor* means a device fitted at the location being monitored that activates a signal to identify the presence of water at the location.

5 *Alarm* means an audible and visual signal which announces a flooding condition requiring attention.

System installation

6 A flooding detection system should be fitted in all watertight spaces below the bulkhead deck that:

.1 have a volume, in cubic metres (m^3), that is more than the ship's moulded displacement per centimetre (cm) immersion at deepest subdivision draught; or

.2 have a volume more than 30 m^3,

whichever is the greater.

7 Any watertight spaces that are separately equipped with a liquid level monitoring system (such as fresh water, ballast water, fuel, etc.), with an indicator panel or other means of monitoring at the navigation bridge (and the safety centre if located in a separate space from the navigation bridge), are excluded from these requirements.

Sensor installation

8 The number and location of flooding detection sensors should be sufficient to ensure that any substantial water ingress into a watertight space requiring a flooding detection system is detected under reasonable angles of trim and heel. To accomplish this, flooding detection sensors required in accordance with paragraph 6 should generally be installed as indicated below:

.1 **Vertical location** – sensors should be installed as low as practical in the watertight space.

.2 **Longitudinal location** – in watertight spaces located forward of the mid-length, sensors should generally be installed at the forward end of the space; and in watertight spaces located aft of the mid-length, sensors should generally be installed at the aft end of the space. For watertight spaces located in the vicinity of the mid-length, consideration should be given to the appropriate longitudinal location of the sensor. In addition, any watertight space of more than $L_s/5$ in length or with arrangements that would seriously restrict the longitudinal flow of water should be provided with sensors at both the forward and aft ends.

.3 **Transverse location** – sensors should generally be installed at the centreline of the space (or alternatively at both the port and starboard sides). In addition, any watertight space that extends the full breadth of the ship or with arrangements that would seriously restrict the transverse flow of water should be provided with sensors at both the port and starboard sides.

9 Where a watertight space extends in height over more than one deck, there should be at least one flooding detection sensor at each deck level. This provision is not applicable in cases where a continuous flood level monitoring system is installed.

Unusual arrangements

10 For watertight spaces with unusual arrangements or in other cases where these guidelines would not achieve the intended purpose, the number and location of flooding detection sensors should be subject to special consideration.

Alarm installation

11 Each flooding detection system should give an audible and visual alarm at the navigation bridge and the safety centre, if located in a separate space from the navigation bridge. These alarms should indicate which watertight space is flooded.

12 Visual and audible alarms should conform to the Code on Alarms and Indicators, 1995, as may be amended, as applicable to a *primary alarm* for the preservation or safety of the ship.

Design requirements

13 The flooding detection system and equipment should be suitably designed to withstand supply voltage variation and transients, ambient temperature changes, vibration, humidity, shock, impact and corrosion normally encountered in ships. Sensor cabling and junction boxes should be suitably rated to ensure operability of the detection system in a flooded condition. In addition, the detection system should be designed on the fail-to-safety principle, where an open sensor circuit should result in an alarm condition.*

14 The flooding detection system should be continuously powered and should have an automatic change-over to a stand-by power supply in case of loss of the normal power supply. Failure of the normal power supply should be indicated by an alarm.*

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* Refer to the Code on Alarms and Indicators, 1995, as amended.

Detector maintenance, accessibility and testing

15 Documented operating, maintenance and testing procedures for the flooding detection system should be kept on board and be readily accessible.

16 Flooding detection system sensors and equipment should be installed where they are accessible for testing, maintenance and repair.

17 The flooding detection system should be capable of being functionally tested using either direct or indirect methods. Records of testing should be retained on board.

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MSC.1/Circ.1292
9 December 2008

EARLY APPLICATION OF THE INTERNATIONAL CODE ON INTACT STABILITY, 2008

1 The Maritime Safety Committee, at its eighty-fifth session (26 November to 5 December 2008), adopted the International Code on Intact Stability, 2008 (2008 IS Code) by resolution MSC.267(85), together with adoption of amendments to chapter II-1 of the International Convention for the Safety of Life at Sea, 1974, as amended (1974 SOLAS Convention) (resolution MSC.269(85)) and to the Protocol of 1988 relating to the International Convention on Load Lines, 1966 (1988 LL Protocol) (resolution MSC.270(85)), in order to make the introduction and the provisions of part A of the 2008 IS Code mandatory under the Convention and the Protocol, which are expected to enter into force on 1 July 2010.

2 In adopting the aforementioned amendments, the Committee considered the recommendation by the Sub-Committee on Stability and Load Lines and on Fishing Vessels Safety, at its fifty-first session, that Contracting Governments to the 1974 SOLAS Convention and Parties to the 1988 LL Protocol may apply, in advance, the provisions of the 2008 IS Code before it has entered into force, and agreed to the recommendation.

3 The Committee, therefore, resolved that Contracting Governments to the 1974 SOLAS Convention and Parties to the 1988 LL Protocol may apply the 2008 IS Code in advance of the entry into force of the amendments to chapter II-1 of the 1974 SOLAS Convention and the 1988 LL Protocol that make the introduction and the provisions of part A of the 2008 IS Code mandatory.

4 Contracting Governments to the 1974 SOLAS Convention and Parties to the 1988 LL Protocol are invited to take account of this decision when surveying and certifying ships flying their flag constructed on or after 5 December 2008.

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MSC.1/Circ.1312
10 June 2009

REVISED GUIDELINES FOR THE PERFORMANCE AND TESTING CRITERIA, AND SURVEYS OF FOAM CONCENTRATES FOR FIXED FIRE-EXTINGUISHING SYSTEMS

1 The Maritime Safety Committee, at its sixtieth session (6 to 10 April 1992), approved Guidelines for the performance and testing criteria, and surveys of low-expansion foam concentrates for fixed fire-extinguishing systems (MSC/Circ.582).

2 The Committee, at its sixty-eighth session (28 May to 6 June 1997), approved Guidelines for the performance and testing criteria, and surveys of expansion foam concentrates for fixed fire-extinguishing systems of chemical tankers (MSC/Circ.799).

3 The Sub-Committee on Fire Protection, at its fifty-third session (16 to 20 February 2009) reviewed the aforementioned Guidelines and made amendments to the test methods for both types of foam concentrates which combined the test procedure into one document.

4 The Committee, at its eighty-sixth session (27 May to 5 June 2009), after having considered the above proposal by the Sub-Committee on Fire Protection, at its fifty-third session, approved the Revised Guidelines for the performance and testing criteria, and surveys of foam concentrates for fixed fire-extinguishing systems, as set out in the annex.

5 Member Governments are invited to apply the annexed Guidelines when approving foam concentrates for fixed fire-extinguishing systems onboard tankers and chemical tankers and bring them to the attention of ship designers, shipowners, equipment manufacturers, test laboratories and other parties concerned.

6 This circular supersedes MSC/Circ.582 and Corr.1, and MSC/Circ.799. Type approvals conducted in accordance with the aforementioned Guidelines should remain valid until 1 July 2012.

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ANNEX

REVISED GUIDELINES FOR THE PERFORMANCE AND TESTING CRITERIA, AND SURVEYS OF FOAM CONCENTRATES FOR FIXED FIRE-EXTINGUISHING SYSTEMS

1 GENERAL

1.1 Application

These Guidelines apply to the foam concentrates used for fixed deck foam fire-extinguishing systems required for tankers by SOLAS regulations II-2/10.8 and chapter 14 of the International Code for Fire Safety Systems (FSS Code), and chemical tankers as specified by SOLAS regulation II-2/1.6.2.1.2 and the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (IBC Code). These Guidelines also apply to foam concentrates for fixed foam fire-extinguishing systems in machinery spaces according to chapter 6 of the FSS Code and to portable foam applicators according to chapter 4 of the FSS Code. These Guidelines do not apply to the foam generating equipment, only the foam concentrate.

1.2 Definitions

For the purpose of these Guidelines, the following definitions apply:

1.2.1 *Foam (fire fighting)* is an aggregate of air filled bubbles formed from an aqueous solution of suitable foam concentrate.

1.2.2 *Foam solution* is a solution of foam concentrate and water.

1.2.3 *Foam concentrate* is a liquid which, when mixed with water in the appropriate concentration, gives a foam solution.

1.2.4 *Expansion ratio* is the ratio of the volume of foam to the volume of foam solution from which it was made.

1.2.5 *Spreading coefficient* is a measurement of the ability of one liquid to spontaneously spread across another.

1.2.6 *25% (50%) drainage time* is the time for 25% (50%) of the liquid content of a foam to drain out.

1.2.7 *Gentle application* is the application of foam to the surface of a liquid fuel via a backboard, tank wall or surface.

1.2.8 *Sediment* is insoluble particles in the foam concentrate.

1.2.9 *Aqueous film-forming foam concentrate (AFF)* is a foam concentrate based on a mixture of hydrocarbon and fluorinated surface active agents.

1.2.10 *Alcohol–resistant foam concentrate (AR)* is a foam concentrate that is resistant to breakdown when applied to the surface of alcohol or other polar solvents.

1.2.11 *Film-forming fluoroprotein foam concentrate (FFFP)* is a foam concentrate which has the ability to form an aqueous film on the surface of some hydrocarbons.

1.2.12 *Fluoroprotein foam concentrate (FP)* is a protein foam concentrate with added fluorinated surface active agents.

1.2.13 *Protein foam concentrate (P)* is a foam concentrate made from hydrolyzed protein materials.

1.2.14 *Synthetic foam concentrate (S)* is a foam concentrate based on a mixture of hydrocarbon surface active agents and which may contain fluorocarbons with additional stabilizers.

1.2.15 *Type A foam concentrates* are alcohol-resistant or multi-purpose foam concentrates.

1.2.16 *Type B foam concentrates* are all regular type foam concentrates that are not alcohol-resistant, including fluoroprotein and aqueous film-forming (AFF) foam concentrates.

2 SAMPLING PROCEDURE

The sampling method should ensure representative samples which should be stored in filled containers.

The sample size should be:

.1 2 x 20 *l* containers (or other standard shipping containers) for type tests (see section 3); and

.2 2 *l* for periodical controls (see section 4).

3 TESTS FOR TYPE APPROVAL OF FOAM CONCENTRATES

For foam concentrate type approval, the tests under paragraphs 3.1 to 3.14 below should be performed by the foam concentrate manufacturer at laboratories acceptable to the Administration.

3.1 Freezing and thawing

3.1.1 Before and after temperature conditioning in accordance with paragraph 3.1.2 below, the foam concentrate should show no visual sign of stratification, non-homogeneity or sedimentation.

3.1.2 Freezing and thawing test:

.1 apparatus:

 .1 freezing chamber, capable of achieving temperatures required, as stated in paragraph 3.1.2.2.1 below;

 .2 polyethylene tube, approximately 10 mm diameter, 400 mm long and sealed and weighted at one end, with suitable spacers attached. Figure 1 shows a typical form; and

 .3 500 ml cylinder, approximately 400 mm high and 65 mm in diameter.

.2 procedure:

.1 set the temperature of the freezing chamber to a temperature which is 10ºC below the freezing point of the sample measured in accordance with standard BS 5117, section 1.3 (excluding 5.2 in the standard). To prevent the glass measuring cylinder from breaking, due to expansion of the foam concentrate on freezing, insert the tube into the measuring cylinder, sealed end downward, weighted if necessary to avoid flotation, and the spacers ensuring it remains approximately on the central axis of the cylinder. Place the cylinder with the sample in the chest, cool it and maintain at the required temperature for 24 h. At the end of this period, thaw the sample for not less than 24 h and not more than 96 h in an ambient temperature of 20 to 25ºC;

.2 repeat the procedure described in the above subparagraph three times to give four cycles of freezing and thawing; and

.3 condition the sample for seven days at 60ºC followed by one day at room temperature. The sample shall then be examined for visual signs of stratification, non-homogeneity or sedimentation.

3.2 Heat stability

An unopened 20 *l* container (or other standard shipping container), as supplied by the manufacturer from a production batch, should be maintained for seven days at 60ºC, followed by one day at room temperature. Following this conditioning, the foam liquid after agitating/stirring will be subjected to the fire test as per subsection 3.9. Only fire tests as per subsection 3.9 should be performed with the heat conditioned sample.

3.3 Sedimentation

3.3.1 Any sediment in the concentrate prepared in accordance with section 2 should be dispersible through a 180 µm sieve, and the percentage volume of sediment should not be more than 0.25% when tested in accordance with paragraph 3.3.2 below.

3.3.2 The test should be carried out as follows:

.1 apparatus:

.1 graduated centrifuge tubes;

.2 centrifuge operating at 6,000 ± 100 m/s^2;

.3 180 µm sieve complying with standard ISO 3310-1; and

.4 plastic wash bottle.

Note: a centrifuge and tubes complying with standard ISO 3734 are suitable; and

.2 procedure: centrifuge each sample for 10 min. Determine the volume of the sediment and determine the percentage of this volume with respect to the centrifuged sample volume. Wash the contents of the centrifuge tube onto the sieve and check that the sediment can or cannot be dispersed through the sieve by the jet from the plastic wash bottle.

Note: It is possible that the test method is not suitable for some non-Newtonian foam concentrates. In this case an alternative method, to the satisfaction of the Administration, should be used so that compliance with this requirement can be verified.

3.4 Kinematic viscosity

3.4.1 The test should be carried out according to standard ASTM D 445-86 or ISO 3104. Kinematic viscosity should not exceed 200 mm^2/s.

3.4.2 The method for determining viscosity of non-Newtonian foam concentrates or kinematic viscosity exceeding 200 mm^2/s should be to the satisfaction of the Administration. A suitable method is described in standard EN 1568.

3.5 pH value

The pH of the foam concentrate prepared in accordance with section 2 should be not less than 6 and not more than 9.5 at 20 ± 2ºC.

3.6 Film formation of the foam solution (if applicable)

3.6.1 The spreading coefficient should be determined using the following formula:

$$S = T_c - T_s - T_i$$

where:

S is the spreading coefficient;

T_c is the surface tension of cyclohexane (N/m);

T_s is the surface tension of the foam solution (N/m);

T_i is the interfacial tension between the foam solution and cyclohexane (N/m).

T_c, T_s and T_i should be determined according to paragraph 3.6.2 below.

The spreading coefficient S should be greater than 0.

3.6.2 *Determination of T_c, T_s and T_i*

.1 materials:

.1 solution of foam concentrate, at the recommended usage concentration in distilled water complying with standard ISO 3696; and

Note: The solution may be made up in a 100 m*l* volumetric flask using a pipette to measure the foam concentrate.

.2 for T_c and T_i, cyclohexane of purity not less than 99%;

.2 procedures for surface tension: determine T_s at a temperature of 20 ± 2ºC using the ring or plate method of standard ISO 304; and

.3 procedure for interfacial tension: after measuring the surface tension in accordance with subparagraph .2 above, introduce a layer of cyclohexane at 20 ± 2ºC onto the foam solution, being careful to avoid contact between the ring or plate and the cyclohexane. Wait 6 ± 1 min and measure T_i.

3.7 Expansion ratio

3.7.1 The test should be carried out according to paragraph 3.7.2 with simulated seawater at about 20ºC having the characteristics stated in paragraph 3.7.3.

3.7.2 *Determination of the expansion ratio*

.1 apparatus:

.1 plastic collecting vessel of volume *V*, known to ± 16 m*l*, as shown in figure 2, equipped with a bottom discharge facility;

.2 foam collector, as shown in figure 3; and

.3 foam making equipment with nozzle, as shown in figure 4, which when tested with water has a flow rate of 11.4 *l*/min at a nozzle pressure of 6.3 ± 0.3 bar;

.2 procedure:

.1 check that the pipe work and hose from the foam solution tank to the nozzle is completely full of solution. Set up the nozzle horizontally directly in front of the foam collector with the front of the nozzle 3 ± 0.3 m from the top edge of the collector. Wet the vessel internally and weigh it (W_1). Set up the foam equipment and adjust the nozzle pressure to give a flow rate of 11.4 *l*/min. Discharge the foam and adjust the height of the nozzle so that the discharge strikes the collector centrally. Keep the nozzle horizontal. Stop the foam discharge and rinse all foam from the collector. Check that the foam solution tank is full. Start discharging the foam and after 30 ± 5 s to allow the discharge to stabilize, place the collecting vessel, with the discharge outlet closed, on the collector. As soon as the vessel is full, remove it from the collector, strike the foam surface level with the rim and start the clock. Weigh the vessel (W_2);

.2 calculate the expansion *E* from the equation:

$$E = \frac{V}{W_2 - W_1}$$

in which it is assumed that the density of the foam solution is 1 and where:

V is the vessel volume in ml;

W_1 is the mass of the empty vessel in grams;

W_2 is the mass of the full vessel in grams; and

.3 open the drainage facility and collect the foam solution in the measuring cylinder to measure the 25% drainage time (see paragraph 3.8.1 below).

3.7.3 Simulated sea water may be made up by dissolving in 0.9584 kg of potable water:

25 g	Sodium chloride	($NaCl$);
11 g	Magnesium chloride	($MgCl_2$ 6 H_2O);
1.6 g	Calcium chloride	($CaCl_2$ 2H_2O);
4 g	Sodium sulphate	(Na_2 SO_4).

3.8 Drainage time

3.8.1 The drainage time should be determined according to paragraph 3.7.2.3 above, after having determined the expansion ratio.

3.8.2 The test should be carried out with simulated seawater at about 20ºC having the characteristics stated in paragraph 3.7.3 above.

3.9 Fire tests

Fire tests should be carried out according to paragraphs 3.9.1 to 3.9.7.

Note: The fire tests of this subsection 3.9 are more expensive and time consuming than the other tests of these Guidelines. It is recommended that fire tests should be carried out at the end of the test programme, so as to avoid the expense of unnecessary testing of foam concentrates which do not comply in other respects.

3.9.1 *Environmental conditions*:

.1	air temperature	15 ± 5ºC;
.2	fuel temperature	17.5 ± 2.5ºC;
.3	water temperature	17.5 ± 2.5ºC;
.4	foam solution temperature	17.5 ± 2.5ºC; and

.5 maximum wind speed 3 m/s in proximity of the fire tray.

Note: If necessary, some form of wind-screen may be used.

3.9.2 *Observations during the fire test:*

During the fire test, record the following:

.1 indoor or outdoor test;

.2 air temperature;

.3 fuel temperature;

.4 water temperature;

.5 foam solution temperature;

.6 wind speed;

.7 extinction time; and

.8 25% burnback time.

Note: Burnback time may either be determined visually by an experienced person or may be determined from thermal radiation measurements (a suitable method is described in standard EN 1568).

3.9.3 *Foam solution:*

.1 prepare a foam solution following the recommendations from the supplier for concentration, maximum premix time, compatibility with the test equipment, avoiding contamination by other types of foam, etc; and

.2 the test should be carried out with simulated sea water at about 20ºC having the characteristics stated in paragraph 3.7.3 above.

3.9.4 *Apparatus:*

.1 fire tray: square tray with the following dimensions:

area	4.5 m^2;
depth	200 mm;
thickness of steel wall	2.5 mm;

with a vertical steel backboard 1 ± 0.05 m high and 1 ± 0.05 m long;

.2 foam making equipment: in accordance with paragraph 3.7.2.1 for type B foam concentrates. For type A foam concentrates, the foam application rate should be as determined by the manufacturer, up to a total of three nozzles in accordance with paragraph 3.7.2.1;

.3 burnback pot: circular burnback pot with the following dimensions:

diameter	300 ± 5 mm;
height	150 ± 5 mm;
thickness of steel wall	2.5 mm.

3.9.5 *Fuel*

3.9.5.1 For type B foams, use an aliphatic hydrocarbon mixture with physical properties according to the following specification:

distillation range	84ºC to 105ºC;
maximum difference between initial and final boiling points	10ºC;
maximum aromatic content	1%;
density at 15ºC	707.5 ± 2.5 kg/m^3;
temperature	about 20ºC.

Note: Typical fuels meeting this specification are n-heptane and certain solvent fractions sometimes referred to as commercial heptane.

The Administration may require additional fire tests using an additional test fuel.

3.9.5.2 For type A foams, acetone and isopropyl alcohol should be used as the standard test fuels. However, the Administration may require additional fire tests using different test fuels for water-miscible cargoes that require a higher foam application rate than acetone. Impurities for all type A fuels should not exceed 1%.

3.9.6 *Test procedure:*

.1 place the tray directly on the ground and ensure that it is level. If using heptane, add approximately 90 *l* of simulated sea water having the characteristics stated in paragraph 3.7.3, and check that the base of the tray is completely covered. Set up the foam nozzle horizontally, about 1 m above the ground in a position where the central part of the foam discharge will strike the centre axis of the backboard, 0.35 ± 0.1 m above the rim of the tray (gentle application). Add 144 ± 5 *l* of fuel, to give a nominal freeboard of 150 mm. If using acetone or isopropyl alcohol, add 234 ± 5 *l* of fuel directly into the tray, without water, to give a nominal freeboard of 150 mm;

.2 ignite the tray not more than 5 min after adding the fuel and allow it to burn for a period of 60 ± 5 s after full involvement of the surface of the fuel, then start foam application; and

.3 apply foam for 300 ± 2 s. Stop foam application and after a further 300 ± 10 s place the burnback pot, containing 2 ± 0.1 *l* of fuel in the centre of the tray and ignite. Visually estimate when 25% of the tray is covered by sustained flames or by "flare up" flames (see Note below), ignoring any faint, barely visible, or transient flames.

Note: During the burnback test, a "flare up" may occur, in which large flames may be sustained for periods typically from 30 s to 3 min before decreasing in intensity.

3.9.7 *Permissible limits:*

.1 extinction time: not more than 5 min; and

.2 burnback time: not less than 15 min for 25% of the surface.

3.10 Corrosiveness

The storage container should be compatible with its foam concentrate throughout the service life of the foam such that the chemical and physical properties of the foam should not deteriorate below the initial values accepted by the Administration.

3.11 Volumic mass

According to standard ASTM D 1298-85.

3.12 Batch certificate

The foam concentrate should be delivered with a declaration of the main characteristics (sedimentation, pH value, expansion ratio, drainage time and volumetric mass). The declaration should be issued by the maker and will be the basis for the annual condition test.

3.13 Foam concentrate container marking

Each foam concentrate container should be marked with complete information needed to identify the liquid and confirm its intended use. As a minimum, the following information should be included:

.1 name and address of manufacturer;

.2 product designation;

.3 type of foam (synthetic, protein-based, etc.);

.4 intended use (regular or alcohol-resistant);

.5 batch number and reference to batch certificate;

.6 date of manufacture;

.7 expiry date;

.8 reference to test standard and approvals;

.9 recommended usage concentration;

.10 indication if seawater compatible;

.11 maximum and minimum storage temperature;

.12 required onboard storage tank materials (steel, stainless steel, FRP, etc.);

.13 quantity of foam concentrate;

.14 indication of film forming capability; and

.15 safety, health and environmental information.

3.14 Reference test and annual periodic re-test for protein-based alcohol-resistant foam concentrates

Protein-based alcohol-resistant foam concentrates should be required to demonstrate manufacturing consistency through an annual small-scale test at a recognized test laboratory. The reference test should be performed at the same time and at the same recognized laboratory as the full-scale test defined in subsection 3.9.

The concentrate should be tested according to standards ISO 7203-3 Annex C, EN 1568-4 Annex I, SP Method 2580 or another standard acceptable to the Administration. The reference test and annual test should be carried out to the same standard.

The concentrate is deemed to fail the test if the results from the annual small scale test indicate significant changes in the foam quality compared to the reference test.

4 PERIODICAL CONTROLS OF FOAM CONCENTRATES STORED ON BOARD

The attention of the Administration is drawn to the fact that particular installation conditions (excessive ambient storage temperature, contamination of the foam concentrate, incomplete filling of the tank, etc.) may lead to an abnormal ageing of the concentrates.

For periodical control of foam concentrates, the tests under paragraphs 4.1 to 4.7 should be performed by the shipowner or operator. They should be carried out at laboratories or authorized service suppliers acceptable to the Administration.

The deviations in the values obtained by these tests, in respect of those obtained during the type approval tests, should be within the ranges acceptable to the Administration.

Tests under paragraphs 4.1, 4.3 and 4.4 should be carried out on samples maintained at 60ºC for 24 h and subsequently cooled to the test temperature.

4.1 Sedimentation

According to paragraph 3.3 above.

4.2 pH value

According to paragraph 3.5 above.

4.3 Expansion ratio

According to paragraph 3.7 above.

4.4 Drainage time

According to paragraph 3.8 above.

4.5 Volumic mass

According to paragraph 3.11 above.

4.6 Small scale fire test for protein-based alcohol-resistant foam concentrates

According to paragraph 3.14 above.

4.7 Chemical stability test for protein-based alcohol-resistant foam concentrates

Protein-based alcohol-resistant foam concentrates should be subjected to a stability test with acetone. A foam solution should be prepared at the approved concentration and gently applied to the surface of a tray containing acetone. The concentrate is deemed to fail the test if the foam solution mixes with the acetone.

5 INTERVALS OF PERIODIC CONTROLS

Except for tests in accordance with paragraph 4.7 the first periodical control of foam concentrates should be performed not more than 3 years after being supplied to the ship, and after that, every year. The tests required by paragraph 4.7 should be performed prior to delivery to the ship and annually thereafter.

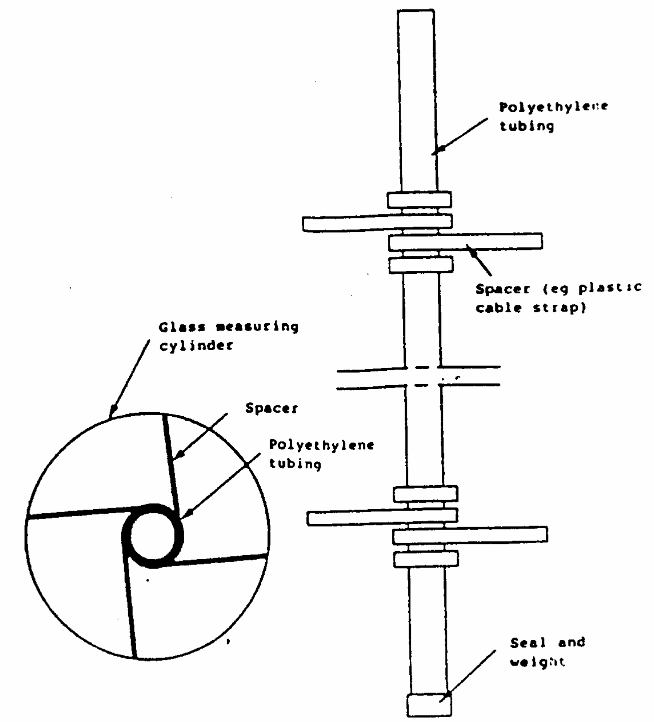

Figure 1 – Typical form of polyethylene tube

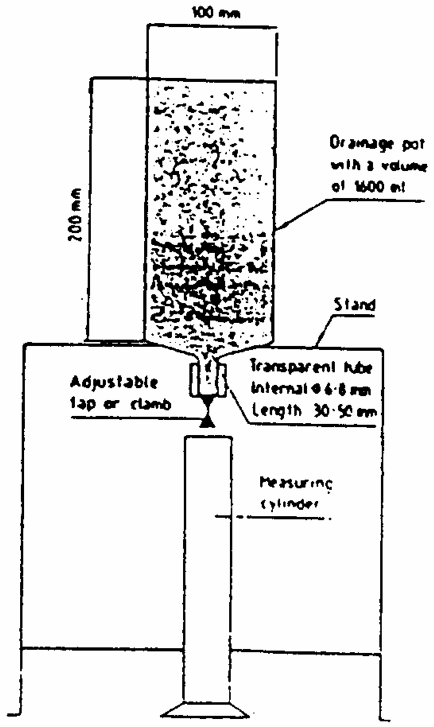

Figure 2 – Collecting vessel for determination of expansion and drainage time

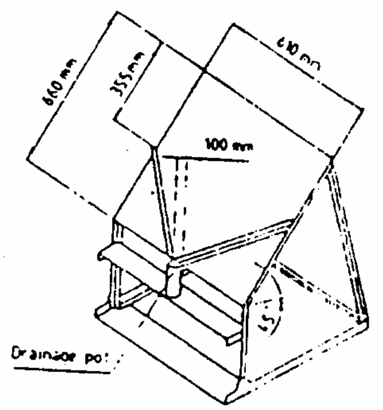

Figure 3 – Foam collector for expansion and drainage measurement

Note: Suitable materials for the collection surface are stainless steel, aluminium, brass or plastics

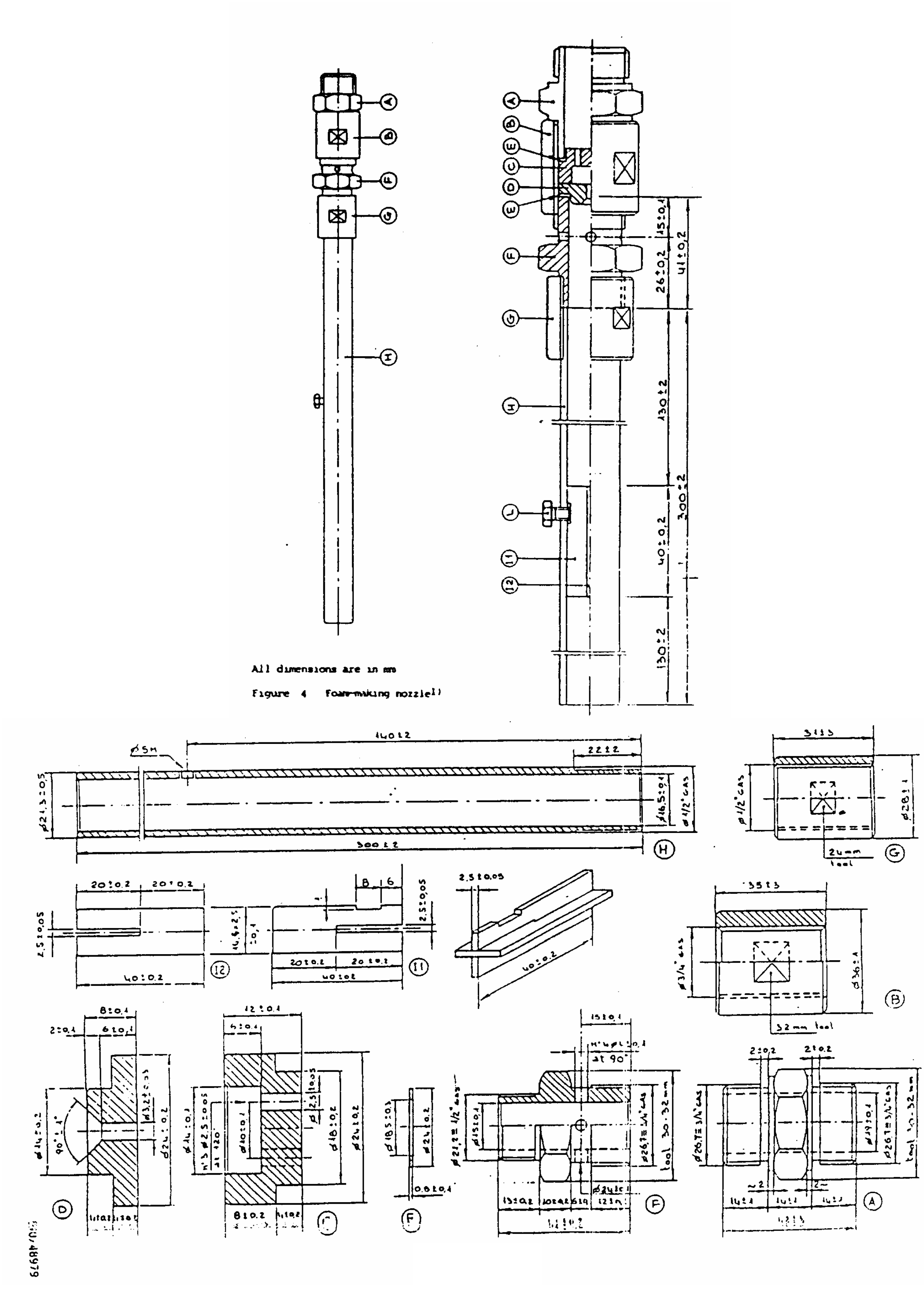

Figure 4 – Foam making nozzle

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MSC.1/Circ.1313
10 June 2009

GUIDANCE FOR APPLICATION OF CHAPTERS 4 TO 7 AND 9 OF THE FSS CODE, AS AMENDED BY RESOLUTIONS MSC.206(81) AND MSC.217(82)

1 The Maritime Safety Committee, at its eighty-sixth session (27 May to 5 June 2009), having considered the proposal by the Sub-Committee on Fire Protection, at its fifty-third session, agreed that chapter 5 of the FSS Code, as amended by resolution MSC.206(81), should apply only to ships constructed on or after 1 July 2010 but not to ships constructed before 1 July 2010, taking into account SOLAS article VIII(e) and the following proposed amendment to paragraph 1.2 of chapter 1 of the FSS Code approved at this session, with a view to subsequent adoption:

"**1 Application**

The following new sentence is added to the end of paragraph 1.2:

> "However, amendments to the Code adopted after 1 July 2002 shall apply only to ships the keels of which are laid or which are at a similar stage of construction, on or after the date on which the amendments enter into force, unless expressly provided otherwise."

2 Considering the aforementioned proposal in paragraph 1 and having recognized that it would be of benefit to the industry and other interested parties that the same action be taken with regard to resolution MSC.217(82), the Committee agreed to the proposal and invited Contracting Governments to the 1974 SOLAS Convention to:

.1 apply chapters 4, 6, 7 and 9 of the FSS Code, as amended by annex 1 to resolution MSC.217(82), only to ships constructed on or after 1 July 2008 flying their flags;

.2 apply the revised chapter 5 of the FSS Code, as amended by resolution MSC.206(81), and chapter 9 of the FSS Code, as amended by annex 2 to resolution MSC.217(82), only to ships constructed on or after 1 July 2010 flying their flags; and

.3 accept ships flying the flags of other Contracting Governments to the 1974 SOLAS Convention, constructed and equipped in accordance with the relevant requirements of the 1974 SOLAS Convention and chapters 4 to 7 and 9 of the FSS Code, as amended by resolutions MSC.206(81) and MSC.217(82).

3 Member Governments are invited to bring the above information to the attention of all parties concerned.

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MSC.1/Circ.1315
10 June 2009

GUIDELINES FOR THE APPROVAL OF FIXED DRY CHEMICAL POWDER FIRE-EXTINGUISHING SYSTEMS FOR THE PROTECTION OF SHIPS CARRYING LIQUEFIED GASES IN BULK

1 The Committee, at its eighty-sixth session (27 May to 5 June 2009), having considered the proposal by the Sub-Committee on Fire Protection, at its fifty-third session, approved Guidelines for the approval of fixed dry chemical powder fire-extinguishing systems for the protection of ships carrying liquefied gases in bulk, as set out in the annex.

2 Member Governments are invited to apply the annexed Guidelines when approving fixed dry chemical powder fire-extinguishing systems for the protection of ships carrying liquefied gases in bulk, and bring them to the attention of ship designers, shipowners, equipment manufacturers, test laboratories and other parties concerned.

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ANNEX

GUIDELINES FOR THE APPROVAL OF FIXED DRY CHEMICAL POWDER FIRE-EXTINGUISHING SYSTEMS FOR THE PROTECTION OF SHIPS CARRYING LIQUEFIED GASES IN BULK

1 Application

These Guidelines apply to fixed dry chemical powder fire-extinguishing systems for the protection of on-deck cargo areas of ships carrying liquefied gases in bulk in accordance with SOLAS regulation II-2/1.6.2 and chapter 11 of the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC Code).

2 Definitions

2.1 *Caking* is a chemical reaction between dry chemical powder and moisture that causes individual particles of the medium to bind together to form an aggregate mass.

2.2 *Dry chemical powder* is an extinguishing medium consisting of very fine particles of sodium or potassium bicarbonate treated or supplemented with additional materials to prevent packing and caking (moisture absorption) and to ensure consistent flow characteristics.

2.3 *Dry chemical powder unit* is a complete system including dry chemical storage container(s), pressurizing gas storage container(s), controls, piping and hand hose lines.

2.4 *Gas point* is a defined point in the discharge of a dry chemical powder unit when the discharge of dry chemical powder ends, and is marked by a change in the nozzle stream to the discharge of primarily pressurizing gas.

2.5 *Hand hose line* is a hand-held dry chemical powder nozzle covering cargo areas not covered by a monitor.

2.6 *Monitor* is a fixed dry chemical powder nozzle protecting cargo loading and discharge manifold areas.

2.7 *Packing* is a phenomenon that occurs when dry chemical powder stored in a container is subjected to vibration causing the smaller particles to move to the bottom of the container and the larger particles to travel to the top.

2.8 *Pressurizing medium* is the gas used to expel the dry chemical from the system, usually dry nitrogen.

3 Principal requirements for the system

3.1 The system should be capable of manual release. A manual release station should be located adjacent to each hand hose line storage area and each monitor. A back-up release station should be provided at the fixed dry chemical powder unit. The operation of any manual release station should initiate the pressurization of the fixed dry chemical powder unit and begin the discharge of dry chemical powder to all connected hand hose lines and monitors.

3.2 The system and its components should be designed to withstand ambient temperature changes, vibration, humidity, shock, impact and corrosion normally encountered on the open deck of ships, and manufactured and tested to the satisfaction of the Administration in accordance with the criteria given in the appendix.

3.3 Systems should be designed for the discharge characteristics and flow rates of a specific dry chemical medium. The type of dry chemical in the system should not be changed unless testing to verify performance is conducted by a laboratory to the satisfaction of the Administration. Different dry chemical media should not be mixed.

3.4 Only chemicals based on the salts of potassium should be used. Dry chemical storage containers should be designed to pressure codes of practice acceptable to the Administration, for the maximum system pressure developed at 55ºC.

3.5 A means for pressurizing the system using an inert gas, which is normally dry nitrogen, in high pressure cylinders should be provided. The nitrogen should be industrial grade with a dewpoint of -50ºC or lower. Pressure gauges should be provided for monitoring the contents of the cylinders. A pressure regulator should be installed to reduce the gas pressure to the required system operating pressure.

3.6 The quantity of expellant gas should be adequate for the system to discharge the entire charge of dry chemical powder within the time period specified in paragraph 4.1 below. If multiple gas cylinders are provided, they should be arranged with normally closed cylinder valves that are automatically opened by a pilot system when a release station is actuated. Each cylinder should have, in addition, the capability of manual operation.

3.7 System piping should be arranged to ensure that the required flow rates are achieved at each hand hose line and monitor. Flow through the piping should be based on flow calculation methods determined by the test laboratory for the specific dry chemical powder medium and equipment used.

3.8 Hand hose line nozzles, monitors and hose couplings should be constructed of brass or stainless steel. Piping, fittings and related components, except gaskets, should be designed to withstand 925ºC.

3.9 Dry chemical storage container pick-up tubes and related internal structures should be shown to be resistant to corrosive effects of the dry chemical medium.

3.10 Dry chemical storage containers should have a fill opening of at least 100 mm to allow onboard recharging, and suitable connections to allow the dry powder charge to be fully agitated with nitrogen, in accordance with the system manufacturer's maintenance instructions.

3.11 Operating instructions for the system should be placed at each operating station.

3.12 Recharging instructions should be provided on a permanent nameplate affixed to the fixed dry chemical powder unit. As a minimum, the instructions should indicate the required type of dry chemical powder, the manufacturer of the powder and the required charge. The required pressurizing medium pressure, number of cylinders and regulator valve setting should also be provided.

3.13 An approved design, installation, operation and maintenance manual should be provided to the shipowner for each type of fixed dry chemical powder unit.

4 Onboard testing

After installation, the pipes, valves fittings and assembled systems should be tested to the satisfaction of the Administration, including functional testing of the remote and local release stations. All distribution piping should be blown through with air to ensure that the piping is free of obstructions.

APPENDIX

APPROVAL TESTS

Except for paragraph 5, a fully charged fixed dry chemical powder unit conditioned at 21 ± 3ºC for at least 24 h should be used.

1 Discharge duration test

A fixed dry chemical powder unit should have a discharge duration of at least 45 s with all attached hand hose lines and monitors operating. The hand hose lines should be fully deployed for this test. To conduct the test, the hose lines and monitors should be held in a horizontal position and their discharge valves fully opened. The duration of discharge should be measured from the time dry chemical powder begins flowing from all attached devices until the gas point is reached at the first nozzle.

2 Maximum length of piping and fittings test

The discharge duration test should be conducted with the maximum length of discharge piping, elbows, tees and other fittings to be used on board, as recommended by the manufacturer. One nozzle should be located at the maximum height for which approval is requested.

3 Discharge range test

Dry chemical powder monitors should have a minimum discharge range as follows:

Monitor flow rate	Minimum range
10 kg/s	10 m
25 kg/s	30 m
45 kg/s	40 m

For monitors with a discharge rate between the above listed values, the minimum range should be determined by interpolation. The test should be conducted with the monitor positioned horizontally, 1 m above the floor. The monitor should be capable of achieving the minimum range for at least 40 s of the 45 s discharge.

4 Flow rate test

The minimum flow rate of each type of hand hose line nozzle should be at least 3.5 kg/s and each type monitor should be at least 10 kg/s. The minimum flow rate should be determined based on the average of three discharge tests. The tests should be conducted with the nozzle/monitor discharged for at least 30 s. The fixed dry chemical powder unit should be placed on a load cell or weighed before and after testing to determine the quantity of medium discharged during the test.

5 Minimum temperature test

A fully charged fixed dry chemical powder unit conditioned at the minimum expected storage temperature for at least 24 h should be capable of discharging at least 85% of the dry chemical medium with all attached hand hose lines and monitors operating. The minimum expected storage temperature should be determined by the Administration.

6 Hand hose line hydrostatic test

A full length representative sample of a hand hose line should be subjected to a hydrostatic pressure equal to two times the operating pressure that would be developed in the line by a fully charged unit with the nozzle discharge valve closed. The hose should be capable of withstanding this test pressure for a period of 1 min without rupturing.

7 Salt spray test

7.1 Representative samples of valves, pressure regulators, gauges, releasing controls and related components that will be installed at locations exposed to the weather should be subjected to a salt spray within a fog chamber. Prior to exposure, any components with inlet or outlet orifices should be sealed.

7.2 The salt solution should be a 20% by mass sodium chloride solution in distilled water. The pH should be between 6.5 and 7.2 and the density between 1.126 g/m*l* and 1.157 g/m*l* when atomized at 35ºC. Suitable means of controlling the atmosphere in the chamber should be provided. The specimens should be supported in their normal operating position and exposed to the salt spray (fog) in a chamber having a volume of at least 0.43 m^3 in which the exposure zone should be maintained at a temperature of 35 ± 2ºC. The temperature should be recorded at least once per day, at least 7 h apart (except weekends and holidays when the chamber normally would not be opened). Salt solution should be supplied from a recirculating reservoir through air-aspirating nozzles, at a pressure between 0.7 bar (0.07 MPa) and 1.7 bar (0.17 MPa). Salt solution run-off from exposed samples should be collected and should not return to the reservoir for recirculation. The samples should be shielded from condensate dripping.

7.3 Fog should be collected from at least two points in the exposure zone to determine the rate of application and salt concentration. The fog should be such that for each 80 cm^2 of collection area, 1 m*l* to 2 m*l* of solution should be collected per hour over a 16 h period and the salt concentration should be 20 ± 1% by mass.

7.4 The samples should withstand exposure to the salt spray for a period of 30 days. After this period, the samples should be removed from the fog chamber and allowed to dry for 4 to 7 days at a temperature of 20°C to 25°C in an atmosphere having a relative humidity not greater than 70%.

7.5 Following the drying period, the samples should be examined for evidence of failure. Any operating components should be functionally tested to verify continued operability. Gauges should remain watertight for at least 2 h when immersed in 0.3 m of water.

8 Dry chemical powder tests

8.1 Fluidity

The dry chemical powder should be tested to ensure that it remains free flowing throughout the temperature range requested by the applicant. Elevated temperature tests and hygroscopicity tests should be performed to the satisfaction of the Administration.

8.2 Fire-extinguishing capability

The dry chemical powder should be demonstrated capable of extinguishing fires in liquefied gas cargoes. Representative equipment should be subjected to full-scale fire tests to the satisfaction of the Administration.

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MSC.1/Circ.1316
10 June 2009

GUIDELINES ON DETERMINING THE NO OBSERVED ADVERSE EFFECT LEVEL (NOAEL) AND LOWEST OBSERVED ADVERSE EFFECT LEVEL (LOAEL) VALUES FOR HALOCARBON FIRE-EXTINGUISHING AGENTS

1 The Committee, at its eighty-sixth session (27 May to 5 June 2009), having considered the proposal by the Sub-Committee on Fire Protection, at its fifty-third session, recognized the need for guidelines on the method to determine the NOAEL and LOAEL values referred to in the Revised Guidelines for the approval of equivalent fixed gas fire-extinguishing systems, as referred to in SOLAS 74, for machinery spaces and cargo pump-rooms (MSC/Circ.848) and the Amendments to the Revised Guidelines (MSC.1/Circ.1267), and approved Guidelines on determining the no observed adverse effect level (NOAEL) and lowest observed adverse effect level (LOAEL) values for halocarbon fire-extinguishing agents, as set out in the annex.

2 Member Governments are invited to apply the annexed Guidelines when approving fixed gas fire-extinguishing systems in accordance with MSC/Circ.848 and MSC.1/Circ.1267 on or after 29 May 2009 and bring them to the attention of ship designers, shipowners, equipment manufacturers, test laboratories and other parties concerned.

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ANNEX

GUIDELINES ON DETERMINING THE NO OBSERVED ADVERSE EFFECT LEVEL (NOAEL) AND LOWEST OBSERVED ADVERSE EFFECT LEVEL (LOAEL) VALUES FOR HALOCARBON FIRE-EXTINGUISHING AGENTS

1 General

MSC/Circ.848 and MSC.1/Circ.1267 permit halocarbon agents to be used in concentrations up to the No Observed Adverse Effect Level (NOAEL) calculated on the net volume of the protected space at the maximum expected ambient temperature without additional safety measures. In no case should halocarbon agents be used at concentrations above the Lowest Observed Adverse Effect Level (LOAEL). These Guidelines prescribe the recommended protocol for determining the referred-to NOAEL and LOAEL levels.

2 Definitions

2.1 *Adverse physiological or toxicological effects* are considered to be evidence of cardiac sensitization, for the purposes of approving halocarbon fire-extinguishing agents in accordance with MSC/Circ.848 and MSC.1/Circ.1267.

2.2 *Halocarbon agent* is a fire-extinguishing medium consisting of one or more carbon atoms linked to one or more Halogen atoms from the elements bromine, chlorine, fluorine and iodine.

2.3 *NOAEL* is the highest concentration at which no adverse physiological or toxicological effect has been observed.

2.4 *LOAEL* is the lowest concentration at which an adverse physiological or toxicological effect has been observed.

3 National Fire Protection Association values

3.1 The NOAEL and LOAEL values for halocarbon agents listed in the National Fire Protection Association Standard (NFPA) 2001 are acceptable as meeting these Guidelines without further testing. For halocarbon agents not listed in NFPA 2001, cardiac sensitization testing in accordance with section 4 below should be performed to determine the NOAEL and LOAEL values.

4 Cardiac sensitization

4.1 The NOAEL and LOAEL values are based on the toxicological effect known as cardiac sensitization. Cardiac sensitization occurs when a chemical causes an increased sensitivity of the heart to adrenaline, a naturally occurring substance, which may result in the sudden onset of irregular heart beats and possibly heart attack.

4.2 The test protocol should measure the cardiac sensitization in a stepwise manner using sufficiently small changes in concentration, such that the interval between the LOAEL and NOAEL can be accurately determined.

4.3 The test animals should be exposed to a predetermined concentration of the halocarbon agent for a 5-min period. At the end of the 5-min exposure, an external dose of adrenaline (epinephrine) should be administered. If the animal experiences cardiac sensitization, an effect should be recorded.

4.4 The following standard protocols for cardiac sensitization may be used for reference:

.1 Hardy, C.J., I.J. Sharman and G.C. Clark. 1991. Assessment of Cardiac Sensitisation Potential in Dogs. Rep. No. CTL/C/ 2521. Huntingdon Research Centre, Huntingdon, Cambridgeshire, United Kingdom.

.2 Reinhardt, C.F., L.S. Mullen and M.E. Maxfield. 1973. Epinephrine induced cardiac arrhythmia potential of some common industrial solvents. J. Occup. Med. 15:953-955.

.3 WIL Research Laboratory Reports. Project Nos. WIL12248, 12265, 12318. WIL Research Laboratories, Inc. 1992.

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11 June 2009

APPLICATION FOR EXISTING APPROVALS ACCORDING TO THE REVISED GUIDELINES FOR THE APPROVAL OF EQUIVALENT FIXED GAS FIRE-EXTINGUISHING SYSTEMS, AS REFERRED TO IN SOLAS 74, FOR MACHINERY SPACES AND CARGO PUMP-ROOMS (MSC/CIRC.848)

1 The Committee, at its eighty-sixth session (27 May to 5 June 2009), having considered the proposal by the Sub-Committee on Fire Protection, at its fifty-third session, with regard to the application for existing approvals according to the Revised Guidelines for approval of equivalent fixed gas fire-extinguishing systems, as referred to in SOLAS 74, for machinery spaces and cargo pump-rooms (MSC/Circ.848), in relation to the amendments to the Revised Guidelines (MSC.1/Circ.1267), agreed to the following interpretation:

> "Type approvals conducted in accordance with the Revised Guidelines for approval of equivalent fixed gas fire-extinguishing systems, as referred to in SOLAS 74, for machinery spaces and cargo pump-rooms (MSC/Circ.848) should remain valid until 1 July 2012."

2 Member Governments are invited to apply the above interpretation when approving equivalent fixed gas fire-extinguishing systems, as referred to in SOLAS 74, for machinery spaces and cargo pump-rooms, and bring it to the attention of ship designers, shipowners, equipment manufacturers, test laboratories and other parties concerned.

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11 June 2009

GUIDELINES FOR THE MAINTENANCE AND INSPECTIONS OF FIXED CARBON DIOXIDE FIRE-EXTINGUISHING SYSTEMS

1 The Committee, at its eighty-sixth session (27 May to 5 June 2009), having considered the proposal by the Sub-Committee on Fire Protection, at its fifty-third session, approved Guidelines for the maintenance and inspections of fixed carbon dioxide fire-extinguishing systems, as set out in the annex.

2 Member Governments are invited to apply the annexed Guidelines when inspecting fixed carbon dioxide fire-extinguishing systems on board all ships and bring them to the attention of ship designers, shipowners, equipment manufacturers, and other parties concerned.

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ANNEX

GUIDELINES FOR THE MAINTENANCE AND INSPECTIONS OF FIXED CARBON DIOXIDE FIRE-EXTINGUISHING SYSTEMS

1 General

These Guidelines provide the minimum recommended level of maintenance and inspections for fixed carbon dioxide fire-extinguishing systems on all ships, and are intended to demonstrate that the system is kept in good working order as specified in SOLAS regulation II-2/14.2.1.2. These Guidelines are intended to supplement the fire-extinguishing system manufacturer's approved maintenance instructions. Certain maintenance procedures and inspections may be performed by competent crewmembers, while others should be performed by persons specially trained in the maintenance of such systems. The onboard maintenance plan should indicate which parts of the recommended inspections and maintenance should be completed by trained personnel.

2 Safety

Whenever carbon dioxide fire-extinguishing systems are subjected to inspection or maintenance, strict safety precautions should be followed to prevent the possibility that individuals performing or witnessing the activities are placed at risk. Prior to performing any work, a safety plan should be developed to account for all personnel and establish an effective communications system between the inspection personnel and the on-duty crew. Measures to avoid accidental discharges such as locking or removing the operating arms from directional valves, or shutting and locking the system block valve should be taken as the initial procedure for the protection of personnel performing any maintenance or inspections. All personnel should be notified of the impending activities before work is begun.

3 Maintenance and inspection plan

Fixed carbon dioxide fire-extinguishing systems should be kept in good working order and readily available for immediate use. Maintenance and inspections should be carried out in accordance with the ship's maintenance plan having due regard to ensuring the reliability of the system. The onboard maintenance plan should be included in the ship's safety management system and should be based on the system manufacturer's recommendations including:

.1 maintenance and inspection procedures and instructions;

.2 required schedules for periodic maintenance and inspections;

.3 listing of recommended spare parts; and

.4 records of inspections and maintenance, including corrective actions taken to maintain the system in operable condition.

4 Monthly inspections

4.1 At least every 30 days a general visual inspection should be made of the overall system condition for obvious signs of damage, and should include verification that:

.1 all stop valves are in the closed position;

.2 all releasing controls are in the proper position and readily accessible for immediate use;

.3 all discharge piping and pneumatic tubing is intact and has not been damaged;

.4 all high pressure cylinders are in place and properly secured; and

.5 the alarm devices are in place and do not appear damaged.

4.2 In addition, on low pressure systems the inspections should verify that:

.1 the pressure gauge is reading in the normal range;

.2 the liquid level indicator is reading within the proper level;

.3 the manually operated storage tank main service valve is secured in the open position; and

.4 the vapour supply line valve is secured in the open position.

5 Annual inspections

The following minimum level of maintenance and inspections should be carried out in accordance with the system manufacturer's instructions and safety precautions:

.1 the boundaries of the protected space should be visually inspected to confirm that no modifications have been made to the enclosure that have created uncloseable openings that would render the system ineffective;

.2 all storage containers should be visually inspected for any signs of damage, rust or loose mounting hardware. Cylinders that are leaking, corroded, dented or bulging should be hydrostatically retested or replaced;

.3 system piping should be visually inspected to check for damage, loose supports and corrosion. Nozzles should be inspected to ensure they have not been obstructed by the storage of spare parts or a new installation of structure or machinery;

.4 the manifold should be inspected to verify that all flexible discharge hoses and fittings are properly tightened; and

.5 all entrance doors to the protected space should close properly and should have warning signs, which indicate that the space is protected by a fixed carbon dioxide system and that personnel should evacuate immediately if the alarms sound. All remote releasing controls should be checked for clear operating instructions and indication as to the space served.

6 Minimum recommended maintenance

6.1 At least biennially (intervals of 2 years ± 3 months) in passenger ships or at each intermediate, periodical or renewal survey* in cargo ships, the following maintenance should be carried out (to assist in carrying out the recommended maintenance, examples of service charts are set out in the appendix):

.1 all high pressure cylinders and pilot cylinders should be weighed or have their contents verified by other reliable means to confirm that the available charge in each is above 90% of the nominal charge. Cylinders containing less than 90% of the nominal charge should be refilled. The liquid level of low pressure storage tanks should be checked to verify that the required amount of carbon dioxide to protect the largest hazard is available;

.2 the hydrostatic test date of all storage containers should be checked. High pressure cylinders should be subjected to periodical tests at intervals not exceeding 10 years. At the 10-year inspection, at least 10% of the total number provided should be subjected to an internal inspection and hydrostatic test**. If one or more cylinders fail, a total of 50% of the onboard cylinders should be tested. If further cylinders fail, all cylinders should be tested. Flexible hoses should be replaced at the intervals recommended by the manufacturer and not exceeding every 10 years; and

.3 the discharge piping and nozzles should be tested to verify that they are not blocked. The test should be performed by isolating the discharge piping from the system and flowing dry air or nitrogen from test cylinders or suitable means through the piping.

6.2 At least biennially (intervals of 2 years ± 3 months) in passenger ships or at each renewal survey* in cargo ships, the following maintenance should be carried out by service technicians/specialists trained to standards accepted by the Administration:

.1 where possible, all activating heads should be removed from the cylinder valves and tested for correct functioning by applying full working pressure through the pilot lines.

In cases where this is not possible, pilot lines should be disconnected from the cylinder valves and blanked off or connected together and tested with full working pressure from the release station and checked for leakage.

In both cases this should be carried out from one or more release stations when installed.

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* Refer to Survey guidelines under the Harmonized System of Survey and Certification, 2007 (resolution A.997(25)).

** Refer to standard ISO 6406 – Periodic inspection and testing of seamless steel gas cylinders.

If manual pull cables operate the remote release controls, they should be checked to verify the cables and corner pulleys are in good condition and freely move and do not require an excessive amount of travel to activate the system;

.2 all cable components should be cleaned and adjusted as necessary, and the cable connectors should be properly tightened. If the remote release controls are operated by pneumatic pressure, the tubing should be checked for leakage, and the proper charge of the remote releasing station pilot gas cylinders should be verified. All controls and warning devices should function normally, and the time delay, if fitted should prevent the discharge of gas for the required time period; and

.3 after completion of the work, the system should be returned to service. All releasing controls should be verified in the proper position and connected to the correct control valves. All pressure switch interlocks should be reset and returned to service. All stop valves should be in the closed position.

APPENDIX

EXAMPLE SERVICE CHARTS

HIGH PRESSURE CO_2 SYSTEM

Date:	Name of ship/unit:	IMO No.:	

Technical description

No.	Text	Value
1	Manufacturer	
2	Number of main cylinders	
3	Main cylinders capacity (each)	
4	Number of pilot cylinders	
5	Pilot cylinder capacity (each)	
6	Number of distribution lines	
7	Oldest cylinder pressure test date	
8	Protected space(s)	
9	Date flexible hoses fitted/renewed	

Description of inspection/Tests

No.	Description	Carried out	Not carried out	Not applicable	Comment
1	Release controls and distribution valves secured to prevent accidental discharge				
2	Contents in main cylinders checked by weighing				
3	Contents in main cylinders checked by liquid level indicator				
4	Contents of pilot cylinders checked				
5	All cylinder valves visually inspected				
6	All cylinder clamps and connections checked for tightness				
7	Manifold visually inspected				
8	Manifold tested for leakage, by applying dry working air				
9	Main valve and distribution valves visually inspected				
10	Main valve and distribution valves tested for operation				
11	Time delay devices tested for correct setting*				
12	Remote release system visually inspected				
13	Remote release system tested				
14	Servo tubing/pilot lines pressure tested at maximum working pressure and checked for leakages and blockage				
15	Manual pull cables, pulleys, gang releases tested, serviced and tightened/adjusted as necessary				
16	Release stations visually inspected				
17	Warning alarms (audible/visual) tested				
18	Fan stop tested*				
19	10% of cylinders and pilot cylinder/s pressure tested every 10 years				
20	Distribution lines and nozzles blown through, by applying dry working air				
21	All doors, hinges and locks inspected*				
22	All instruction and warning signs on installation inspected				
23	All flexible hoses renewed and check valves in manifold visually inspected every 10 years				
24	Release controls and distribution valves reconnected and system put back in service				
25	Inspection date tags attached				

* If fitted as part of the CO_2 system.

LOW PRESSURE CO_2 SYSTEM

Date:	Name of ship/unit:	IMO No.:	

Technical description

No.	Text	Value
1	Manufacturer	
2	No. of tanks	
3	Tanks capacity (tonnes)	
4	Number of pilot cylinders	
5	Pilot cylinder capacity (each)	
6	Number of distribution lines	
7	Protected space(s)	

Description of inspection/Tests

No.	Description	Carried out	Not carried out	Not applicable	Comment
1	Tank main service valve closed and secured to prevent accidental discharge				
2	Distribution valves verified closed				
3	Check correct function of level indicator				
4	Contents of CO_2 tank checked by tank level indicator				
5	Contents of CO_2 tank checked by riser tube reading				
6	Contents of CO_2 tank checked by level control valve				
7	Supports of tank inspected				
8	Insulation on tank inspected				
9	Safety valves of tank inspected				
10	Safety valves of tank tested				
11	Contents of pilot cylinders checked				
12	Start/stop function of cooling compressors tested				
13	All connected electrical alarms and indicators tested				
14	Main manifold valve inspected				
15	Main manifold valve tested				
16	Distribution valves inspected				
17	Distribution valves tested				
18	Release stations inspected				
19	Total flooding release mechanism inspected				
20	Total flooding release mechanism tested				
21	Time delay devices tested for correct setting*				
22	Warning alarms tested				
23	Fan stop tested*				
24	Distribution lines and nozzles inspected				
25	Distribution lines and nozzles tested				
26	Distribution lines and nozzles blown through				
27	All doors, hinges and locks inspected*				
28	All instruction plates inspected				
29	Tank main service valve reopened and secured open				
30	System put back in service				
31	Inspection date tags attached				

* If fitted as part of the CO_2 system.

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RECOMMENDATION FOR THE EVALUATION OF FIRE PERFORMANCE AND APPROVAL OF LARGE FIRE DOORS

1 The Maritime Safety Committee, at its eighty-sixth session (27 May to 5 June 2009), having considered the proposal by the Sub-Committee on Fire Protection, at its fifty-third session, approved the Recommendation for the evaluation of fire performance and approval of large fire doors, as set out in the annex.

2 Member Governments are invited to apply the annexed Recommendation when approving large fire doors and to bring them to the attention of all parties concerned.

***

ANNEX

RECOMMENDATION FOR THE EVALUATION OF FIRE PERFORMANCE AND APPROVAL OF LARGE FIRE DOORS

1 Methods of evaluation and testing

For doors larger than those which can be accommodated in the standard specimen size (e.g., 2,440 mm wide and 2,500 mm high), as specified in part 3 of the FTP Code:

.1 if such doors can be accommodated into a larger test furnace, it is recommended to conduct a test with the full size specimen of the door; or

.2 it is recommended to use the following method for evaluation of the fire performance of the door and approval of the door.

2 Doors of marginally larger dimensions

2.1 A fire door of marginally larger dimensions than a fire-tested fire door may be individually assessed and accepted for a specific project with the same classification, provided all of the following is met:

.1 dimensions (width, height) are not more than 15% above those of the tested door;

.2 the surface area of the door is not more than 10% above that of the tested door;

.3 the door design does not deviate in any other aspect from the one tested; and

.4 the tested door has successfully satisfied both insulation and integrity criteria for the following times, as appropriate:

"B-0"	0 min insulation	36 min integrity
"B-15"	18 min insulation	36 min integrity
"A-0"	0 min insulation	68 min integrity
"A-15"	18 min insulation	68 min integrity
"A-30"	36 min insulation	68 min integrity
"A-60"	68 min insulation	68 min integrity.

2.2 If the door to be approved is larger than stated above and complies with the size requirements stated under section 3 below, the test should also include additional instrumentation as specified in paragraph 3.4.2 below, or equivalent arrangement.

3 Doors larger than those in section 1 above, but not exceeding 50% in surface area

3.1 An engineering assessment can be used to extrapolate the fire test results of a door having a larger geometry than the tested door.

3.2 Such an assessment should be used for verification only if the dimensions of the actual door are greater than the maximum permitted by the furnace (considering a furnace with an aperture of 2,440 mm width x 2,500 mm height) and the door involved has already been tested, with such dimensions, with satisfactory results in accordance with section 1 above, and the actual door does not exceed 50% in surface area.

3.3 The methodology used to extrapolate the fire tests results should consider the following three steps:

.1 standard fire test of the "specimen" to obtain reference temperature and structural displacements. Such a "specimen" may be either:

.1.1 a door already certified through the fire test which is identical in design to the door to be analysed (fire test to include additional instrumentation as per paragraph 3.4.2, or equivalent arrangement); or

.1.2 a specially-built specimen where the finite element method is to be performed to extrapolate the results of a specimen of an actual door having a size exceeding the maximum size allowed by the furnace of the testing laboratory; the specimen should be a mock-up of the actual door, but having a size that fits in the furnace;

.2 finite element analysis in paragraph 3.6, of the "specimen" to calibrate the thermal and mechanical boundary conditions of the FEM model, which are adjusted until the numerical and experimental temperature and displacement distribution compare satisfactorily; and

.3 finite element analysis in paragraph 3.5, of the actual door carried out using the model calibrated as per paragraph 3.7, assuming that the differences in the geometry and dimensions between the actual door and the specimen door do not significantly influence the results.

3.4 *Data to be submitted*

3.4.1 In order for the analysis to be carried out, the following information should be submitted:

.1 detailed drawings of the door, the door frame and the closure and locking devices including the indications of clearances and interferences;

.2 test report of the prototype used to extrapolate the results.

In this respect, additional instrumentation should consist of two sets of three 1.6 mm diameter thermocouples fitted through the thickness of the leaf, at depths of 1/3 t, 1/2 t, 2/3 t. Such sets should be fitted, on the upper part of the door, within a circle of 100 mm in diameter whose centre is 150 mm aside of the surface thermocouples fitted in the centre of the top quarters;

.3 mechanical characteristics of all materials used for the construction of the door and its insulation:

.3.1 Young's module;

.3.2 yield strength; and

.3.3 density; and

.4 thermal properties:

.4.1 thermal expansion coefficient;

.4.2 thermal conductivity; and

.4.3 specific heat.

3.4.2 Since all these properties are temperature dependent, it is necessary that the required data be given as a function of the temperature range foreseen for the fire tests. Where it is not possible to obtain experimental data, an engineering evaluation should be submitted with the supporting considerations for the proposed curves of variation of mechanical and thermal characteristics as a function of the temperature in the considered range.

3.5 *Method of analysis*

The comparison of the fire resistance of doors having larger geometry should be considered in two steps:

.1 evaluation of the heat transmission through the specimen thickness and of the temperature on the unexposed specimen surface; and

.2 evaluation of the strength characteristics and of the displacements of the structural members of the specimen.

3.6 *Heat transmission analysis*

3.6.1 By carrying out finite element calculations, the histories over time of the heat transmission within the structural assembly are computed and the temperature is compared with the temperature experienced by the assembly represented in the standard fire test.

3.6.2 Based on suitable data for the temperature-dependent variables, an iterative procedure is used for the evaluation of thermal-mechanic properties.

3.6.3 The thermal boundary conditions of convecting and radiative type are:

$$q_c = h_c (T_s - T_\infty)$$

and

$$q_r = \sigma\varepsilon(T_s^4 - T_\infty^4)$$

where:

q_c and q_r	:	Convective and radiative heat flux, respectively
h_c	:	Convective heat transfer coefficient
σ	:	Stefan-Boltzmann constant
ε	:	Emissivity coefficient
T_s	:	Surface temperature
T_∞	:	Furnace or ambient temperature.

3.6.4 The two equations can be included in an equivalent boundary condition:

$$q = H_{eq} (\sigma, \varepsilon, T_s, T_\infty) (T_s – T_\infty)$$

where:

the equivalent coefficient H_{eq} depends on the unknown surface temperature. However, it can be calculated as part of the finite element analysis using an emissivity coefficient appropriately calibrated with the fire test results.

3.6.5 The equivalent heat transfer coefficient can be assumed to be constant on the single exposed surface, as the furnace assembly built in accordance with the FTP Code gives uniformity of the temperature and heat flux within the furnace.

3.6.6 Alternatively, the temperature distribution measured on the specimen of the standard fire test can be directly applied on the finite element structural model taking into account the same time histories.

3.7 *Structural analysis*

3.7.1 Using the results of the heat transmission analysis and information on temperature-dependent material properties, the thermal stresses and deformations on the geometry are evaluated. When modelling the structural assembly, attention should be paid to using a sufficient number of elements to account for the non-uniform temperature distribution within the member and to catch the non-linear temperature-dependent behaviour.

3.7.2 Once the model is prepared, the analysis should be carried out stepwise. For each element, the incremental strain or deformation caused by a temperature increase is calculated and a new stress level is obtained based on the stress-strain relationship applicable for that particular temperature increase.

3.7.3 The mechanical boundary conditions should be congruent in order to represent the real interaction of the door with the external frame for the overall length of the test.

4 Larger doors exceeding 50% in surface area

4.1 For larger doors exceeding 50% in surface area, a full analysis based on SOLAS regulation II-2/17 should be performed to assess the safety of the vessel.

4.2 The approach should be based on the results of the fire test of the door having the maximum dimensions permitted by the furnace (considering a furnace with an aperture of 2,440 mm width x 2,500 mm height) according to the procedure described under section 3.

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GUIDELINES FOR THE DRAINAGE OF FIRE-FIGHTING WATER FROM CLOSED VEHICLE AND RO-RO SPACES AND SPECIAL CATEGORY SPACES OF PASSENGER AND CARGO SHIPS

1 The Committee, at its eighty-sixth session (27 May to 5 June 2009), having considered the proposal by the Sub-Committee on Fire Protection, at its the fifty-third session, with regard to the amendments to SOLAS regulation II-2/20 adopted by resolution MSC.256(84), approved Guidelines for the drainage of fire-fighting water from closed vehicle and ro-ro spaces and special category spaces of passenger and cargo ships, as set out in the annex.

2 Member Governments are invited to apply the annexed Guidelines when approving the drainage systems of fire-fighting water from closed vehicle and ro-ro spaces and special category spaces of passenger and cargo ships, in accordance with paragraphs 6.1.4 and 6.1.5 of SOLAS regulation II-2/20 (resolution MSC.256(84)), and bring them to the attention of ship designers, shipowners, equipment manufacturers, test laboratories and other parties concerned.

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ANNEX

GUIDELINES FOR THE DRAINAGE OF FIRE-FIGHTING WATER FROM CLOSED VEHICLE AND RO-RO SPACES AND SPECIAL CATEGORY SPACES OF PASSENGER AND CARGO SHIPS

1 GENERAL

1.1 Purpose

1.1.1 When fixed water-based fire-extinguishing systems are provided for the protection of closed vehicle and ro-ro spaces and special category spaces, adequate drainage facilities, as required by SOLAS regulation II-2/20.6.1.4, should be provided to prevent the accumulation of significant quantities of water on decks and the build-up of free surfaces. In addition, SOLAS regulation II-2/20.6.1.5 requires effective measures to be taken to ensure that floating debris does not cause blockage of the drains.

1.1.2 When the direct overboard discharge provisions or the bilge system required by SOLAS regulation II-1/35-1 have a capacity sufficient for the additional flow from the fixed fire-extinguishing system and the required number of fire hoses, as determined by these Guidelines, additional drainage facilities are not required.

1.1.3 Scuppers, freeing ports, discharges and bilge systems should be installed in accordance with SOLAS regulation II-1/35-1, the relevant regulations of the International Convention on Load Lines, 1966 (ICLL 66), and these Guidelines.

1.1.4 *In lieu* of the above, the Administration, after having given consideration to the ship's arrangement and equipment, may accept other fixed installations if they afford equivalent protection. Any equivalent protection should demonstrate the capability to rapidly drain fire-fighting water from the affected decks and prevent the build-up of free surfaces under expected conditions of trim and list, for as long as the fire-extinguishing system is in operation.

1.2 Application

These Guidelines apply to the design of drainage systems in closed vehicle and ro-ro spaces and special category spaces required by SOLAS regulation II-2/20.6.1.4, and to the protection of drain openings required by SOLAS regulation II-2/20.6.1.5.

2 DEFINITIONS

2.1 *Bilge wells* are recessed areas where water accumulates before entering the bilges.

2.2 *Bulkhead deck* in a passenger ship means the uppermost deck at any point in the subdivision length (L_s) to which the main bulkheads and the ship's shell are carried watertight and the lowermost deck from which passenger and crew evacuation will not be impeded by water in any stage of flooding for damage cases defined in regulation 8 and in part B-2 of SOLAS chapter II-1. The bulkhead deck may be a stepped deck. In a cargo ship the freeboard deck may be taken as the bulkhead deck.

2.3 *Drains*, as used in these Guidelines, refer to either scupper wells and scuppers, freeing ports, or bilge wells and drain pipes.

2.4 *Freeing ports* are openings in the bulwarks on the open deck to allow water to drain directly overboard.

2.5 *Scuppers* are a system of gravity deck drains and connected piping leading from scupper wells to the sideshell of the ship or to the bilge system.

2.6 *Scupper wells* are recessed areas in the deck where water accumulates before entering the scuppers.

3 DRAINAGE ARRANGEMENTS FOR PASSENGER SHIPS

3.1 Arrangements above the bulkhead deck

3.1.1 Above the bulkhead deck, except as provided in paragraph 1.1.2 above, an adequate number of properly-sized drains should be provided on each deck to ensure that the combined water flow from the fixed fire-extinguishing system and the required number of fire hoses can be rapidly discharged overboard or drain to a bilge system with a reservoir tank fitted with a high water level alarm.

3.1.2 At least four drains should be located on each side of the protected space, uniformly distributed fore and aft. Freeing ports should not be installed in enclosed superstructures, as defined by regulation 3.10 of the ICLL 66.

3.1.3 The drainage system on each side of the deck should have an aggregate capacity of not less than 125% of the maximum flow rate of the fixed fire-extinguishing system water pumps plus the flow from two fire hoses (four if required by SOLAS regulation II-2/19.3.1.2). In case an automatic deep well or submersible pumping system is installed, the bilge pump capacity can be subtracted from the required drainage capacity.

3.1.4 ***Minimum capacity of drains***

The minimum capacity of scuppers, freeing ports or a combination thereof should be determined in accordance with the provisions of paragraphs 3.1.4.1 or 3.1.4.2, respectively.

3.1.4.1 The minimum required area of scuppers and connected piping should be determined by the following formula:

$$A = \frac{Q}{0.5\sqrt{19.62(h - \sum h_l)}}$$

where:

A is the total required sectional area of the drains on each side of the deck in m^2;

Q is the combined waterflow from the fixed fire-extinguishing system and the required number of fire hoses in m^3/s;

h is the elevation head difference between the bottom of the scupper well or suction level and the overboard discharge opening or highest approved load line in m; and

$\sum h_l$ is the summation of head losses corresponding to scupper piping, fittings and valves in m.

In no case should the area of each individual drain be less than 0.0078 m^2 or 125 mm diameter piping.

3.1.4.2 The minimum required area of freeing ports should be determined by the following formula:

$$A = \frac{Q}{0.5\sqrt{19.62(h_1 - h_2)}}$$

where:

A is the total required sectional area of freeing ports on each side of the ship in m^2;

Q is the combined waterflow from the fixed fire-extinguishing system and the required number of fire hoses in m^3/s; and

h_1-h_2 is the depth of water on the deck determined in accordance with paragraph 4.2.

If the cross-sectional area of freeing ports required by the ICLL 66 is equal to or greater than determined above, additional freeing ports are not required.

3.2 Arrangements below the bulkhead deck

3.2.1 Below the bulkhead deck, except as provided in paragraph 1.1.2 above, an efficient bilge pumping system should be provided to ensure that the combined waterflow from the fixed fire-extinguishing system and the required number of fire hoses can be rapidly collected and led to suitable arrangements for discharge overboard. The bilge system capacity should be not less than that required by paragraph 3.2.3.

3.2.2 The bilge piping system should be arranged in accordance with SOLAS chapter II-1. At least four bilge wells should be located on each side of the protected space, uniformly distributed fore and aft.

3.2.3 The bilge pumping system on each side of the ship should have an aggregate capacity of not less than 125% of the maximum flow rate of the fixed fire-extinguishing system water pumps plus the flow from two fire hoses (four, if required by SOLAS regulation II-2/19.3.1.2).

3.2.4 The required area of the main and branch bilge pipes for the protected space should be adequate to ensure a maximum waterflow of 2 m/s in each section of piping in accordance with paragraphs 3.2.4.1 to 3.2.4.3.

3.2.4.1 If the drainage system is a bilge pumping system, the following three criteria should be satisfied:

$$\sum Q_{bpump} \geq 1{,}25Q$$

$$A_M \geq 0{,}625Q \ \&$$

$$\sum A_B \geq 0{,}625Q$$

where:

Q_{bpump} is the combined capacity of all power bilge pumps except the emergency bilge pump in m^3/s;

Q is the combined waterflow from the fixed fire-extinguishing system and the required number of fire hoses in m^3/s;

A_M is the sectional area of the main bilge pipe of the protected space in m^2;

$\sum A_B$ is the total sectional area of branched bilge pipes for each side in m^2.

3.2.4.2 If the drainage system is based on gravity drains leading to a reservoir tank, the minimum required area of drains and connected piping should be determined by paragraph 3.1.4.

3.2.4.3 If the drainage system is a combined system, the relevant dimensioning for each part of the system should be determined using paragraphs 3.2.4.1 and 3.2.4.2.

3.2.5 The required capacity of each bilge well should be at least 0.15 m^3.

3.2.6 If the system includes a reservoir tank, the tank should have adequate capacity for at least 20 min of operation at the required drainage capacity for the affected space.

4 DRAINAGE ARRANGEMENTS FOR CARGO SHIPS

4.1 In cargo ships, the drainage and pumping arrangements should be such as to prevent the build-up of free surfaces in accordance with paragraph 3.1 or 3.2, as appropriate.

4.2 If the abovementioned pumping arrangement is not possible, the adverse affect upon stability of the added weight and free surface of water should be taken into account according to the International Code on Intact Stability, 2008, chapter 3.

For that purpose, the depth of water ($h_1 - h_2$) on each deck should be calculated by multiplying the maximum flow rate of the installed fire-extinguishing system water pumps plus the flow from two fire hoses (four if required by SOLAS regulation II-2/19.3.1.2) by an operating time of 30 min. This volume of water should be divided by the area of the affected deck.

5 PROTECTION OF DRAIN OPENINGS

5.1 An easily removable grating, screen or other means should be installed over each drain opening in the protected spaces to prevent debris from blocking the drain. The total open area ratio of the grating to the attached drain pipe should be at least 6 to 1. The grating should be raised above the deck or installed at an angle to prevent large objects from blocking the drain. No dimension of the individual openings in the grating should be more than 25 mm.

5.2 No grating or screen is required when a fixed mechanical system is provided to unblock the drainage system, or when other than a gravity drain system is provided with its own filter.

5.3 A clearly visible sign or marking should be provided not less than 1,500 mm above each drain opening stating, “Drain opening – do not cover or obstruct”. The marking should be in letters at least 50 mm in height.

6 TESTING

The drainage facilities on ro-ro passenger ships should be functionally tested before the ship enters service to verify that the capacity of the system is adequate. The drainage facilities on all ships should be periodically visually examined for blockage or other damage and should be flushed with fire hoses or similar means to verify that the system is functional, if obstructions are noted.

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GUIDELINES FOR MEASURES TO PREVENT FIRES IN ENGINE-ROOMS AND CARGO PUMP-ROOMS

1 The Maritime Safety Committee, at its seventy-ninth session (1 to 10 December 2004), recognized the need for the development of practical guidelines for measures to prevent fires in engine-rooms and cargo pump-rooms, taking into account relevant IMO instruments and present engineering and shipbuilding technology.

2 The Committee, at its eighty-sixth session (27 May to 5 June 2009), having considered a proposal by the Sub-Committee on Fire Protection, at its fifty-third session, approved the Guidelines for measures to prevent fires in engine-rooms and cargo pump-rooms, set out in the annex.

3 Member Governments are invited to bring the annexed Guidelines to the attention of ship designers, owners, operators, shipbuilders and other parties concerned.

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ANNEX

GUIDELINES FOR MEASURES TO PREVENT FIRE IN ENGINE-ROOMS AND CARGO PUMP-ROOMS

CONTENTS

PART 1

GENERAL

1 Purpose

1.1 These Guidelines are a consolidation of the measures to prevent fire in engine-rooms, cargo pump-rooms and other fire-prone spaces based on present engineering and shipbuilding technology, including resolutions, circulars and other documents developed by IMO.

1.2 The purpose of these Guidelines is to provide uniform and harmonized guidance in a single document to shipowners, ship designers, shipmasters, inspectors and surveyors. Also this minimizes the deviation of interpretation or application standards among inspectors, surveyors and Member States.

1.3 Attention is drawn to the importance of the design, construction, testing, installation, inspection and maintenance of systems containing flammable oils in order to reduce the risk of fire.

1.4 The Guidelines have been developed without prejudice to the requirements of existing SOLAS regulations, MSC circulars and other IMO safety instruments.

2 Application

2.1 These Guidelines are intended for application of fire safety engineering design to provide technical justification and installation guidance on measures to prevent fire in engine-rooms, cargo pump-rooms and other fire-prone spaces.

2.2 These Guidelines do not cover fire hazards related to the arrangements for gas fuels which must satisfy the relevant Codes and regulations developed by IMO.

3 Definitions

3.1 *Flashpoint* means the temperature in degrees Celsius (closed cup test) at which a product will give off enough flammable vapour to be ignited, as determined by an approved flashpoint apparatus.

3.2 *Auto-ignition point* means the temperature at which a substance will spontaneously combine with oxygen and burn without an external ignition or heat source.

3.3 *High temperature surfaces* means surfaces with temperatures above 220°C.

3.4 *Hot surfaces* means surfaces with a temperature of less than 220°C including steam systems with a pressure of less than 2.3 N/mm^2, thermal oil systems, exhaust gas piping and oil-fired and exhaust gas boilers.

3.5 *Heated surfaces* means surfaces with a high temperature source on the other side.

3.6 *Potential ignition sources* means sources having enough energy to cause ignition. These include high temperature surfaces, sparks or flames from inefficient flanges or joints, electrical discharges caused from electrostatic atmospheres, or electrical contactor faults. Sources of these are for example exhaust gas piping of internal combustion engines, leakages from boiler furnace joints and electrical equipment within oil treatment rooms.

3.7 *Flammable oils*, for the purpose of these Guidelines, means those oils used in machinery spaces such as those listed in table 1.

3.8 *Flammable oil system* means the system used for the supply of flammable liquid to engines or equipment.

3.9 *Lower flammable limit (LFL)* means the concentration of a hydrocarbon gas in air below which there is insufficient hydrocarbon to support and propagate combustion.

PART 2

INSTALLATION PRACTICE

CHAPTER 1 – GENERAL

1 General requirements

1.1 *Fire triangle*

The interaction of the three equal sides of the fire triangle: HEAT, FUEL AND OXYGEN, are required for the creation and maintenance of fire. When there is not enough heat generated to sustain the process, when the fuel is exhausted, removed or isolated, or when oxygen supply is limited, then a side of the triangle is broken and the fire is suppressed.

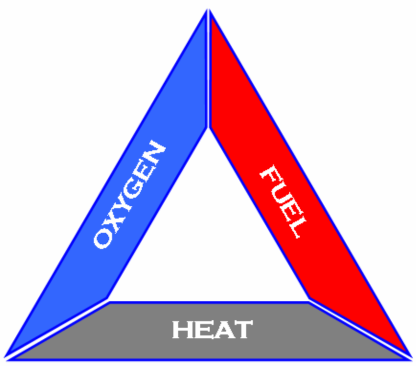

Figure 2-1 – Fire triangle

For flammable liquids, the idea of the fire triangle is generally embodied in fire prevention by excluding the flammable mixture of oil (LFL) and (or) hot spots (Auto Ignition Point). Given 21% O_2 concentration in the atmosphere, for a flammable oil, the flammable mixture (LFL) can exist at the temperature of its flashpoint (FP) and above.

1.2 *SOLAS requirements to break the fire triangle chain*

1.2.1 Fuel control

Many kinds of flammable oils are used in ships.

When flammable oils are leaked or splashed in engine-room spaces or where potential ignition sources exist, they may cause a fire depending on the situation. To prevent leaks, splashes or spray from flammable oil service or transfer piping systems, the following measures need to be considered as described in SOLAS:

.1 spray shields for flanged/screwed joints of pipes containing flammable oils (fuel oil, lubricating oil and hydraulic oil);

.2 jacketed piping system for high pressure fuel pipes;

.3 flammable oil piping location;

.4 tank sounding pipes, air vents and level measuring devices location; and

.5 flammable gas measurement systems.

1.2.2 Heat control

Many hot surfaces and potential ignition sources exist in engine-rooms, cargo pump-rooms and other fire-prone spaces. To assist in preventing a fire originating as a result of flammable oil coming in direct contact with high temperature surfaces, these surfaces should be properly insulated.

Therefore, the SOLAS regulations require:

.1 insulation of high temperature surfaces;

.2 temperature sensing devices for cargo pumps, ballast pumps and stripping pumps installed in cargo pump-rooms and driven by shafts passing through the pump-room bulkhead;

.3 the surface of any insulation used in spaces where penetration of oil is possible (e.g., machinery spaces) to be impervious to oil or oil vapours. This applies equally in cases where the insulation is applied to meet shipyard practice or at the owner's request, for example to reduce heat loss or to protect the crew; and

.4 spray protection of some electrical equipment.

1.2.3 Oxygen control

It is not possible to exclude air from engine-rooms or pump-rooms except when actively suppressing a fire, so control of oxygen supply is not a practical means of preventing fire in these spaces. However, cargo tanks or slop tanks which are part of a cargo area could be inerted using an inert gas system.

To decrease the flammable vapours within cargo pump-rooms SOLAS requires such spaces to be mechanically ventilated. The number of air changes shall be at least 20 per hour, based upon the gross volume of the space. The ventilation shall be of the suction type using fans of the non-sparking type.

1.3 ***Specification of flammable oils***

Flammable oils have different flashpoints and auto-ignition points. The actual ignition condition may differ from the flashpoint and auto-ignition point. Table 1 shows the typical flashpoint and auto-ignition point of various flammable oils used on board ship.

Table 1 – Typical flashpoint and auto-ignition point

		Flashpoint (^{o}C)	Auto-ignition point (^{o}C)
Heavy oil fuel		65~80	min. 400
Intermediate oil fuel 380		60~75	min. 250
Intermediate oil fuel 180		60~75	min. 250
Medium oil fuel		60~75	min. 250
Marine diesel oil		60~75	min. 250
Marine gas oil		60~75	min. 250
Lubricating oil	Cylinder oil	210~240	min. 320
	System oil	250~255	min. 320
Hydraulic oil		180	min. 320
Thermal oil		210	min. 320

1.3.1 Flashpoint of oil fuel

.1 Oil fuels with a flashpoint of less than 60°C (closed cup test) are not permitted, except for the following:

.1 ships certified for restricted service within areas having a climate ensuring that ambient temperatures of spaces where such oil fuel is stored will not rise to within 10°C below its flashpoint, but not less than 43°C;

.2 installations complying with IACS UR M24 regarding use of crude oil as fuel; and

.3 in emergency generators oil fuel with a flashpoint of not less than 43°C may be used.

.2 Oil fuel in storage tanks should not be heated to temperatures within 10°C below the flashpoint of the oil fuel, except for the following:

.1 oil fuel in service tanks, settling tanks and any other tanks in the supply system may be heated above this limit, provided:

.1.1 the length of the vent pipes from such tanks is sufficient for cooling the vapours to at least 10°C below the flashpoint of the oil fuel;

.1.2 a temperature sensor is fitted in the vent pipe and adjusted to give an alarm if the temperature should exceed a limit set at 10°C below the flashpoint of the oil fuel;

.1.3 the vent pipes are fitted with flame screens meeting the requirements of IMO's "Standards for devices for preventing passage of flames into cargo tanks";

.1.4 there are no openings from the vapour space of the oil fuel tanks into machinery spaces, (bolted manholes are acceptable);

.1.5 enclosed spaces should not be located directly over such oil fuel tanks, except for well ventilated cofferdams; and

.1.6 electrical equipment should not be fitted in the vapour space of the oil fuel tanks, unless it is certified to be intrinsically safe.

CHAPTER 2 PIPING SYSTEM

1 Design and construction

1.1 *General*

For the application of these Guidelines, flammable oil systems are classified as follows:

.1 high pressure oil system:

- a piping system which services or transfers flammable oils having pressures of 10.0 N/mm^2 or above; and

.2 low pressure oil system:

- a piping system which services or transfers flammable oils having pressures between 0.18 N/mm^2 and 10.0 N/mm^2.

1.2 *Pressurized oil fuel system*

If oil fuel lines fail, spray patterns may occur. These spray patterns depend on the pressure of the system and the failure condition. Major factors of flammability are air/fuel mixture ratio, temperature of fuel and droplet size. Droplet diameter is one of the factors and is dependent on fluid pressure and size of failure. As a general rule, the smaller the droplet size the greater the fire risk when the fuel system is under high pressure and a small orifice exists, as this results in the atomization of the fuel oil. Therefore, a small crack in a high-pressure oil fuel pipe may lead to a most dangerous situation.

2 Flexible pipes, hoses and hose assemblies

2.1 *Application*

Flexible pipes, hoses and hose assemblies – which are flexible hoses with end fittings attached – should be in as short lengths as practicable, but should not, in general, exceed 1.5 m in length, and only be used where necessary to accommodate relative movement between fixed piping and machinery parts.

2.2 *Design and construction*

Hoses should be constructed to a recognized standard and be approved as suitable for the intended service, taking into account fire resistance, pressure, temperature, fluid compatibility and mechanical loading including impulse where applicable. Each type of hose assembly should be provided with a certificate of hydrostatic pressure testing and conformity of production.

2.3 *Installation*

Hoses should be installed in accordance with the manufacturers' instructions, having regard to: minimum bend radius, twist angle and orientation, and support where necessary. In locations where hoses could possibly suffer external damage, adequate protection should be provided. After installation, the system should be operated at maximum pressure and checked for possible malfunctions and leakages.

2.4 *Installation guidelines*

Flexible hoses should:

.1 avoid sharp bends;

.2 have end fittings torqued in accordance with manufacturer's specifications;

.3 consider fluid flow; and

.4 consider movement of attached bodies.

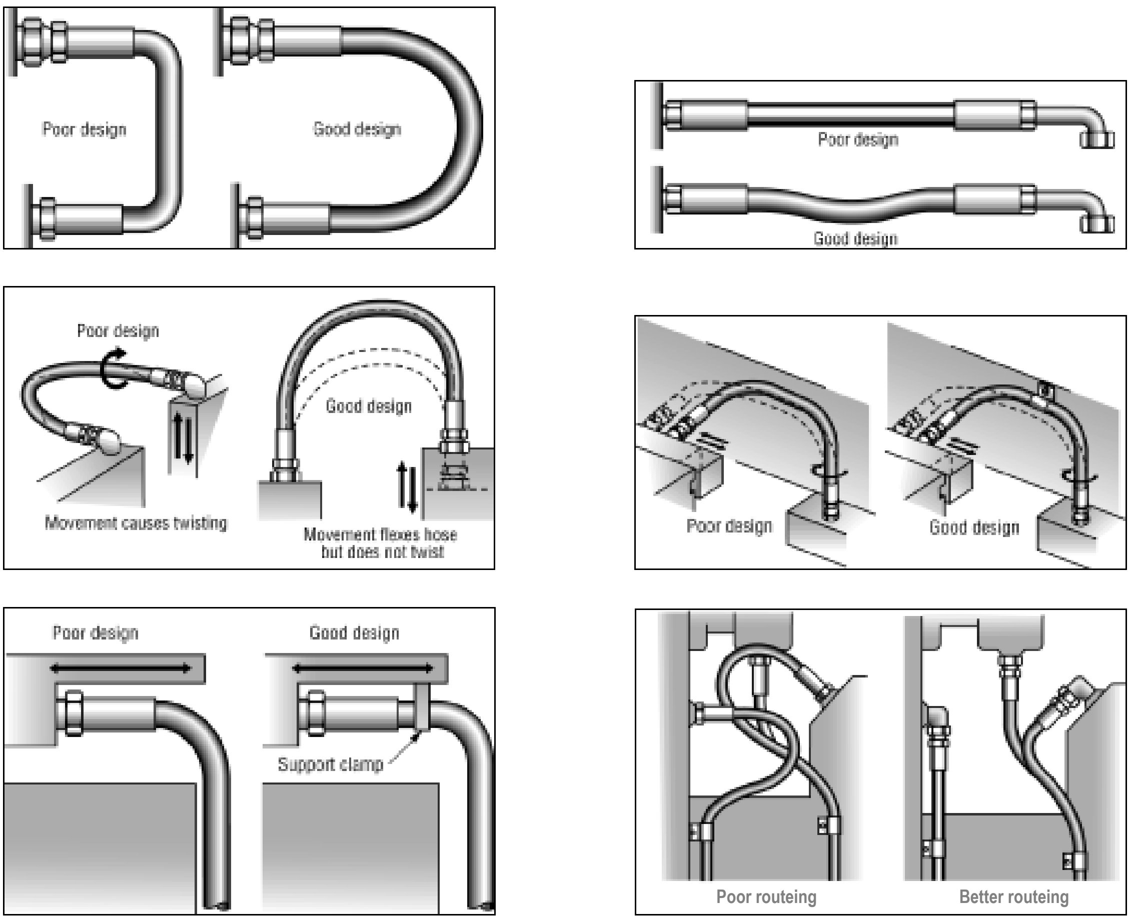

Figure 2-2 – Example of correct installation of flexible hoses

2.5 ***Inspection and maintenance***

2.5.1 Hose assemblies should be inspected frequently and maintained in good order or replaced when there is evidence of distress likely to lead to failure. Any of the following conditions may require replacement of the hose assembly:

.1 leaks at fitting or in flexible hose;

.2 damaged, cut or abraded cover;

.3 kinked, crushed, flattened or twisted flexible hose;

.4 hard, stiff, heat cracked or charred flexible hose;

.5 blistered, soft, degraded or loose cover;

.6 cracked, damaged or badly corroded fittings; and

.7 fitting slippage on flexible hose.

2.5.2 It is expected that hose assemblies may need to be replaced several times in the life of the ship. Manufacturer's recommendations should be followed in this respect. However, hoses should be replaced as soon as possible whenever there is doubt as to their suitability to continue in service. Test reports of flexible hoses should be kept on board to ensure that correct replacement hoses are used when making repairs.

2.6 Flexible pipes should be closely examined and renewed if signs of material cracking or deterioration are evident. Extra care should be exercised in the tightening of these pipe connections to ensure that they are not twisted when re-installed.

2.7 Flexible pipes should be pressure tested to their original design pressure at five-year intervals. Alternatively, such pipes should be the subject of a study aimed at determining their finite life and then be automatically renewed before that life cycle has been reached. Recommendations of engine and fuel system manufacturers should be sought and considered.

3 **Bellows expansion joints**

3.1 ***Design***

Expansion joints are designed to accommodate axial and lateral movement. Expansion joints should not be used to compensate for pipe misalignment. Design may be based on an acceptable code or on testing of expansion joints of similar construction, type, size and use. Thermal expansion, contraction and the fatigue life due to vibration are also important points to consider. Where external mechanical damage is possible, the bellows are to be suitably protected. Each bellows expansion joint should be provided with a certificate of hydrostatic pressure testing and conformity of production.

3.2 ***Installation***

The bellows expansion joints should be installed in accordance with the manufacturer's instructions and examined under working conditions.

3.3 *Inspection and maintenance*

Bellows expansion joints should be inspected regularly and be replaced whenever there is doubt as to their suitability to continue in service.

4 Filters and strainers

4.1 *Design*

4.1.1 Housings and bodies of filters and strainers used in oil fuel, lubricating oil or other flammable oil systems should be made of steel or other equivalent material with a melting point above 930°C and with an elongation above 12%. Other housing and body materials may be utilized provided their use is specially considered on a case-by-case basis in relation to the risk of fire.

4.1.2 All pressure-retaining parts should be suitable for the design temperature and pressures. The filter or strainer design and construction should facilitate cleaning and prevent or minimize spillage during maintenance.

4.1.3 Plug type air vents are not permitted. Air vent cocks or valves should be clearly marked with open/closed positions and the discharge should be led to a safe position.

4.1.4 Oil residues of drain trap should lead to one of the drain tanks.

4.2 *Installation*

Filters and strainers should be located as far away as practicable from hot surfaces and other sources of ignition. They should not be located in positions where spillages could fall onto the flywheel or other rotating machinery parts and be sprayed around. Suitable drip trays should be provided under filters and strainers. A vertical spray shield that will prevent a high pressure fuel or lubricating oil leak from coming into contact with a hot surface should be installed between the strainer and the hot surface. If a hot surface cannot be insulated or the oil filter cannot be located in a safe position, it should be installed in parallel with another filter. The spray shields should be installed in such a manner as to not impede the servicing of the filter or strainer.

4.3 *Inspection and maintenance*

Filters and strainers should be inspected every time they are opened for cleaning and the cover gaskets or seals should be renewed when necessary. Satisfactory seating and tightening of the cover should be verified before the system is put back into service. The filter or strainer should also be carefully bled of air before returning the unit into service.

5 Insulation materials

5.1 *Design*

5.1.1 Insulation of high temperature surfaces should be primarily provided to reduce the risk of fire by reducing the temperature of surfaces below 220°C.

5.1.2 Insulation of hot surfaces, in addition to high temperature surfaces should be considered to reduce the potential risk of fire.

5.1.3 The insulation should be non-combustible and so supported that it will not crack or deteriorate when subject to vibration.

5.2 *Installation*

Manufacturers' instructions should be followed, if available. Permanent insulation should be used to the greatest extent possible. Insulation should be provided with readily removable sections to allow access for normal maintenance. The surface of any oil-absorbent and oil-permeable insulation should be covered by a material which is impervious to oil or oil vapours.

5.3 *Inspection and maintenance*

A regular check of equipment should be made to confirm that the insulation is in place. When maintenance or repair of equipment has been carried out, checks should be made to ensure that the insulation covering the high temperature or hot surfaces has been properly reinstalled or replaced; surface temperature should be measured if considered necessary.

6 Pressure, temperature, oil level gauges and sight glasses

6.1 *Design*

All pressure gauges and other similar instruments in oil systems should, wherever possible, be fitted with an isolating valve or cock at the connection to the pressure take off point. The number of pressure take off points should be kept to a minimum and gauge piping runs should be as short as practicable. Copper pipes, where permitted, may be joined by brazing but soldered connections should not be used in oil systems. Temperature gauges in oil systems should be fitted into a fixed pocket (thermo-well). Oil level gauges should be of a design which is approved for the intended service. The glass or equivalent used on oil piping systems, such as sight glasses for overflow pipes of oil tanks, should be of a heat resistant type.

6.2 *Installation*

The installation of level gauges that penetrate below the top of oil tanks is prohibited under SOLAS for passenger ships, and is discouraged for cargo ships. Suitably protected gauges having heat resistant flat glass of substantial thickness and self-closing fittings at each tank connection may be fitted with the permission of the Administration to oil tanks in cargo ships. Self-closing fittings should not have locking devices fitted to keep them in the open position. Round gauge glasses are not permitted.

6.3 *Inspection and maintenance*

Copper gauge piping is particularly sensitive to work-hardening. All gauge pipes and fittings should be regularly inspected and maintained in good working order.

7 Pipe fittings

7.1 *Design*

7.1.1 Materials for valves and pipe fittings should be suitable for the media and service for which the pipes are intended.

7.1.2 All gasket and seal ring materials, and any jointing compounds used, should comply with the requirements of the manufacturer and relevant international standards.

7.1.3 Direct connection of pipe lengths should be made by direct welding, flanges, threaded joints or mechanical joints, and should be of international standards or of a design proven to be suitable for the intended purpose.

7.1.4 All copper and aluminium-brass piping should be heat treated (annealed) and fitted with sufficient supports to prevent damage from vibration. Replacement with steel piping should be considered.

7.1.5 All component locking devices, such as spring and tab washers and locking wires should be present and in use. (It is recognized that it is impracticable to lock fuel pump vent screws with wire, due to their frequent use. However, wire loops containing a weight attached to each screw would prevent them unscrewing under the influence of vibration if they became slack.)

7.1.6 Valves fitted to oil fuel tanks under static pressure should be of steel or spheroidal-graphite cast iron with an elongation of 12% or above.

7.1.7 Ordinary cast iron valves may be used in piping systems where the design pressure is lower than 7 bar and the design temperature is below 60°C.

7.2 *Installation*

Pipe fittings, including flanged connections should be carefully tightened without exceeding permissible torque. If necessary, suitable spray shields or sealing tape should be used around flange joints and screwed pipe fittings to prevent oil spraying onto hot surfaces in the event of a leakage.

7.3 *Inspection and maintenance*

Where fitted, compression fittings should be carefully examined and, if necessary, tightened (but not over-tightened) with a torque spanner to the manufacturer's specification. Replacement with flanged connections should be considered.

PART III

ENGINE-ROOMS

CHAPTER 1 – CONTROL OF FLAMMABLE OILS

1 Arrangement and installation of pressurized oil fuel systems

1.1 Major factors which can lead to failures of oil fuel system components are:

.1 poor installation, especially insufficient care being taken to provide adequate support (pipe brackets, etc.) and lack of attention to thermal expansion and possible machinery movement due to flexible mountings;

.2 the frequent partial dismantling and reassembly of the system for maintenance purposes;

.3 the effects of high frequency, short duration pressure pulses generated by the action of the fuel injection pumps, which are transmitted back into the oil fuel supply and spill rails; and

.4 vibration.

1.2 ***The causes of high pressure pulses in the oil fuel supply and spill systems***

1.2.1 The most common fuel injection pumps (monobloc or "jerk" pumps) are comprised of a plunger moving up and down in a barrel which contains ports for fuel to enter and leave. The pump is designed to provide the variable fuel flow required for the engine to operate under fluctuating load or rpm, by adjustment of the plunger delivery stroke. At a point determined by the engine's fuel requirement, the plunger will uncover the ports and the internal pressures between 80 N/mm^2 and 150 N/mm^2 will be spilled back into the fuel supply and spill piping.

1.2.2 Each injection pump action generates high magnitude spill pressures followed by periods of reduced pressure. The pressure differences accelerate columns of fuel within the piping system and, when combined with the action of the circulating pump relief valve, cavitation and reflected pressure waves can be caused. Cavitation implosions occur quickly, and can induce very short duration pressure pulses in excess of 10 N/mm^2.

1.2.3 Tests have determined that the magnitude of pressure pulses in the fuel system of a typical medium speed diesel engine installation are greatest at 40% to 60% engine load, and will reach 6 N/mm^2 to 8 N/mm^2. The pulses are approximately eight times the nominal pressure of the system. High-speed engines, such as those installed on high-speed craft, generate higher injection pressures and it is likely that the fuel system of these engines will experience correspondingly higher pressure pulses.

1.2.4 High pressure pulses lead to vibration and fatigue and are responsible for many failures of equipment such as thermostats, pressostats and mechanical dampers. The failure of fuel lines and their components will invariably involve fatigue and the initiation of fractures due to tensile stress.

1.3 *Design consideration*

1.3.1 It is essential that the fuel system is designed to accommodate the high pressure pulses which will be generated by the injection pumps. The engine manufacturer and/or the fuel installation manufacturer and the piping installer, etc., should be consulted for an explicit statement of the fuel system parameters including the maximum pressures which will be generated. Many engine manufacturers, aware of the potential risks due to high pressure pulses within the fuel system, now aim to limit the magnitude of the pulses to 1.6 N/mm^2 at the engine fuel rail outlets.

1.3.2 The alternative approaches which may be considered by the designer are:

.1 to design the fuel system such that it is able to contend with the magnitude of pressure pulses generated. Piping systems should be designed and installed to an appropriate classification society or ISO specification;

.2 to install pressure damping devices; or

.3 to specify injection pumps which are designed to eliminate or reduce high pressure pulses.

1.3.3 The fuel line between the fuel tank and the engine is made up of several parts often from different suppliers. The fact that these suppliers may be unaware of, and therefore do not take into account, the pressures that may be placed on their equipment by the other components of the system, is often the reason for the system's failure. The specification, design and installation of all of the components of the fuel system should be carefully coordinated to ensure that they are all suitable individually, and in combination with the other components, for the anticipated high pressure pulses.

1.3.4 There are a number of pressure damping devices which have been fitted within fuel systems. Mechanical pressure accumulators and gas filled bellows have both been used however, in some cases, problems of slow response and failure due to fatigue and vibration have been reported.

1.3.5 Fuel pipes should be of steel and supports should be adequate to prevent fatigue due to vibration through the structure from the engines and propellers. The support arrangements should also protect the system from vibration caused by high pressure pulses. Copper and aluminium-brass pipes should not be used as their inherent work hardening characteristics make them prone to failure when subjected to vibration.

1.3.6 Experience indicates that compression couplings require careful attention to tightening procedures and torques to avoid leaks or damage to the pipe when subjected to over-tightening. They should not be used in the fuel supply line of the injection pumps and spill system. Flanged connections should be used in place of compression couplings.

1.3.7 In multi-engine installations supplied from the same fuel source, means of isolating the fuel supply to and spill from individual engines should be provided. The means of isolation should be operable from the control position. Without the ability to isolate the fuel supply and spill lines on each engine a single leak could necessitate the need to stop all engines, thus putting the manoeuvrability of the vessel at risk.

1.4 ***Installation***

1.4.1 One designated person should be responsible for coordinating the initial onboard installation of the complete fuel system.

1.4.2 The coordinator should be able to understand the overall design criteria and ensure that the design intent is fully implemented at the time of installation.

1.5 *Inspection and maintenance*

1.5.1 The ship safety management system should contain procedures to identify vibration, fatigue, defects, poor components and poor fitting of the fuel system and ensure that proper attention to protecting hot surfaces is maintained. Means, such as check lists should be prepared to ensure that all procedures are followed at major overhauls and that all components, supports, restraints, etc., are refitted on completion of such work. The installed system should be routinely inspected for:

.1 verification of the adequacy of its supports and the condition of its fittings;

.2 evidence of fatigue stresses to welded or brazed pipes and connections;

.3 assessment of the level of vibration present; and

.4 condition of the lagging or shielding of hot surfaces.

1.5.2 Components of the fuel system should be comprehensively examined, particularly threaded connections, at each dismantling.

1.5.3 Injection pump holding-down bolts should be proved tight by testing with a torque spanner at frequent intervals (not to exceed 3 months).

1.5.4 The supports and retaining devices of the low pressure fuel system should be checked at regular intervals (not to exceed 6 months), to be proved tight and to provide adequate restraint. The lining of such devices should be examined for wear and renewed if they provide insufficient support.

2 Spray shields for joints of pressurized flammable oil piping systems

2.1 ***Application***

Spray shields should be fitted around flanged joints, flanged bonnets and any other flanged or threaded connections of oil fuel and lubricating oil systems having an internal pressure exceeding 0.18 N/mm^2 which have the possibility of being in contact with potential ignition sources by direct spray or by reflection. The purpose of spray shields is to prevent the impingement of sprayed flammable oils onto a high temperature surface or other source of ignition.

2.2 *Design and installation*

2.2.1 Many types of spray shields are possible to avoid spray at flanged connections. For example, the following may be treated as spray shield:

.1 thermal insulation having sufficient thickness;

.2 anti-splashing tape made of approved materials. Caution should be taken to avoid using the anti-splashing tape in areas of high temperature so as to maintain its adhesive characteristics. In case of rewrapping of the new tape, the surface area of the tape should be clean and dry; and

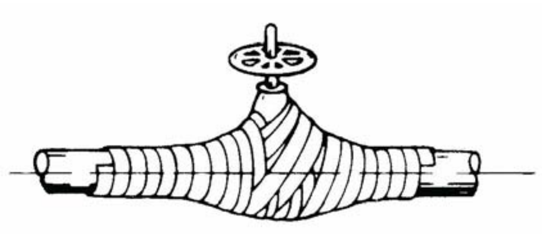

Figure 3-1 – Example of correct taping method

.3 where an anti-spray cover is wrapped around the side of flange, it is not necessary to wrap tightening bolts completely.

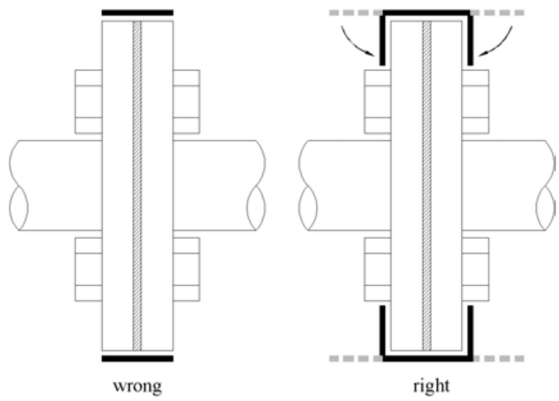

Figure 3-2 – Recommended arrangement of anti-spray cover for flange joint

2.2.2 Anti-splashing tape or other equivalent method may be treated as spray shield on threaded connections. Additionally, the use of sealing tape at thread of union joint is strongly recommended to prevent spray.

2.2.3 Spray shields should be applied not only to a piping system but also to pressurized equipment and/or fittings on oil fuel systems, such as heat exchanger, tube plate and filter or strainer body joints.

2.3 *Inspection and maintenance*

Spray shields should be inspected regularly for their integrity and any which have been removed for maintenance purposes should be refitted on completion of the task according to the manufacturer's instructions.

3 Jacketed high pressure fuel lines of internal combustion engines

3.1 *Application*

3.1.1 All external high pressure fuel delivery lines between the high pressure fuel pumps and fuel injectors are required to be protected with a jacketed piping system capable of containing fuel from a high pressure line failure.

3.1.2 The requirements are applicable to internal combustion engines installed in any area on board ships irrespective of service and location.

3.1.3 Single cylinder and multi-cylinder engines having separate fuel pumps and those having multiple fuel injection pump units are included.

3.1.4 For the purpose of these Guidelines, lifeboat engines and diesel fire pumps are excluded.

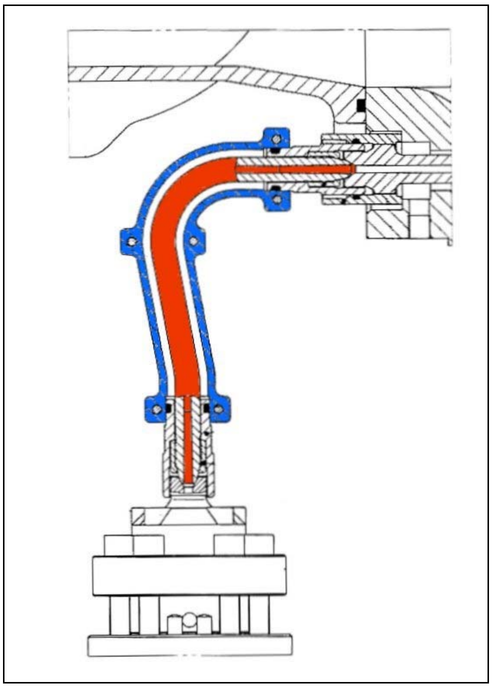

Figure 3-3 – Sample of jacketed pipe

3.2 *Suitable enclosure*

3.2.1 For engines of less than 375 kW where an enclosure is fitted, the enclosure is to have a similar function to jacketed pipes, i.e. prevent spray from a damaged injector pipe impinging on a hot surface.

3.2.2 The enclosure should completely surround the injection pipes except that existing "cold" engine surfaces may be considered as part of the enclosure.

3.2.3 The enclosure should have sufficient strength and cover area to resist the effects of high pressure spray from a failed fuel pipe in service, prevent hot parts from being sprayed and to restrict the area that can be reached by leaked fuel. Where the enclosure is not of metallic construction, it should be made of non-combustible, non oil-absorbing material.

3.2.4 Screening by the use of reinforced tapes is not acceptable as a suitable enclosure.

3.2.5 Where leaked oil can reach hot surfaces, suitable drainage arrangements should be fitted to enable rapid passage of leaked oil to a safe location which may be a drain tank. Leaked fuel flow onto "cold" engine surfaces can be accepted, provided that it is prevented from leaking onto hot surfaces by means of screens or other arrangements.

3.2.6 Where the enclosure has penetrations to accommodate high pressure fittings, the penetrations should be a close fit to prevent leakage.

3.3 *Design*

Two systems have been successfully used in meeting this requirement, namely, rigid sheathed fuel pipe and flexible sheathed fuel pipe. In both systems the sheathing is to fully enclose the pipe and is to resist penetration by a fine spray or jet of oil from a failure in the pipe during service. Also the annular space and drainage arrangements should be sufficient to ensure that in the event of complete fracture of the internal pipe, an excessive build up of pressure cannot occur and cause rupture of the sheath. The suitability of such pipes should be demonstrated by prototype testing. The drainage arrangement should prevent contamination of lubricating oil by oil fuel, and should include an alarm to indicate leakage has occurred.

3.4 *Inspection and maintenance*

Regardless of the system selected, little additional maintenance or periodic inspection is required to keep the jacketed fuel lines in proper working order. However, jacketed pipes should be inspected regularly and any drainage arrangement which may have been disconnected for maintenance purposes should be refitted on completion of the task.

CHAPTER 2 – CONTROL OF IGNITION SOURCE

1 Insulation of hot surfaces and high temperature surfaces

1.1 *Design*

1.1.1 Insulation practice

Different insulation methods for high temperature surfaces are possible and their design should be confirmed by relevant Administrations or recognized organizations. Examples of typical insulation practice are shown in figures 3-4 and 3-5 below.

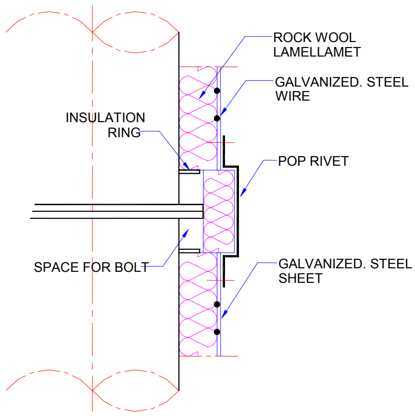

Figure 3-4 – Insulation method on flanged part

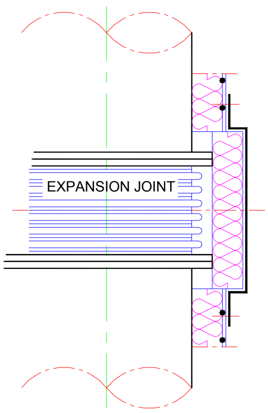

Figure 3-5 – Insulation method on compensator part

1.1.2 Exhaust gas piping

In order to avoid a discontinuity of insulation of the exhaust gas piping (i.e. the exhaust gas piping before and after turbo charger and the exhaust gas piping between cylinder and exhaust gas manifold), special finishing material (e.g., pop-riveted sheet metal or oil-impervious finish insulation mat) should be used as shown in figure 3-6.

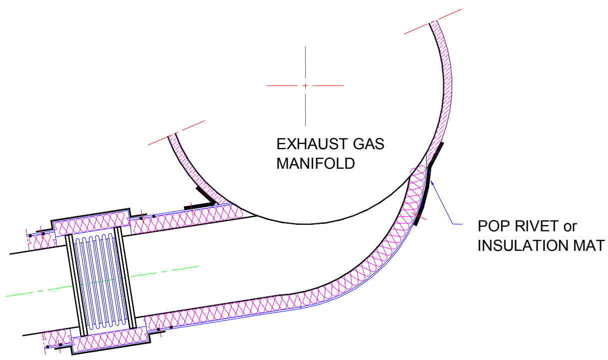

Figure 3-6 – Insulation practice of discontinuous part

1.1.3 Exhaust gas manifolds

Even though the insulation of the exhaust gas manifold is considered sturdy and satisfactory, special attention should be given to insulating the manifold supports since they are susceptible to become hot surfaces due to heat transfer.

1.1.4 Exhaust gas turbo chargers

Dry type turbo chargers, if installed, should be completely insulated, as far as practicable, to prevent the existence of high temperature surfaces.

1.1.5 Cylinder head indicator cocks

Exposed indicator cocks should be insulated in order to cover the high temperature surface.

1.1.6 Superheated steam pipes

In order to avoid a discontinuity of insulation of superheated steam piping, special finishing material, e.g., pop-riveted sheet metal cladding or oil-impervious finish insulation mat, should be used.

1.2 *Inspection and maintenance*

1.2.1 A regular check of equipment or material should be made to confirm that the insulation is correctly installed. When maintenance or repair to equipment has been carried out, checks should be made to ensure that the insulation covering the heated surfaces has been properly reinstalled or replaced. Special attention should be paid to the following:

- .1 insulation areas where vibration may be present;
- .2 discontinuous part of exhaust gas piping and turbo charger; and
- .3 other suspect parts.

2 Protection of electrical equipment

2.1 *Design and installation*

2.1.1 Electrical equipment should be installed in well ventilated and adequately lit spaces in which inflammable gases cannot accumulate and where they are not exposed to the risk of damage from flammable oils.

2.1.2 Switchboards should be installed in dry places away from the vicinity of flammable oil pipes.

2.1.3 Cables fitted in any space where flammable oils or gases may accumulate should have a metallic sheath or an impervious sheath.

2.1.4 Where cables are installed in bunches, and the risk of fire propagation is considered high, special precautions should be taken in cable installation to prevent fire propagation.

3 Identification and protection of potential ignition sources

3.1 While oil impingement on uninsulated hot surfaces has been known to start fires simply due to the vapour reaching its auto-ignition temperature, the hazard is even greater if there is the presence of a flame, spark, naked light bulb, or electric arc.

3.2 The major sources of the above that exist in engine-rooms are as follows:

.1 cylinder head indicator cocks of internal combustion engines;

.2 connections of burner assemblies used for boilers, incinerators and inert gas generators;

.3 electrical panels fitted with magnetic contactors, etc., which undergo repetitive ON/OFF operation during the machinery operation such as purifier control and air compressor panels;

.4 moving parts subject to relative motion which may lead to metal to metal contact; and

.5 drain cocks of exhaust gas pipes.

3.4 In case of a flammable oil line located near any of the above ignition sources, it is necessary to carefully consider the probability of spray, possible spray direction, spray distance, etc., and to isolate the ignition sources as far as practicable.

CHAPTER 3 – CONTROL OF VENTILATION

1 Design of ventilation systems

1.1 The ventilation of machinery spaces should be sufficient under normal conditions to prevent accumulation of oil vapour.

1.2 To control and minimize the hazards from the spread of smoke, means for controlling smoke in machinery spaces should be provided.

1.3 Suitable arrangements should be available to permit the release of smoke, in the event of fire, from machinery spaces of category A. Reversible ventilation systems may be acceptable for this purpose.

1.4 The position of fire detectors should be determined with due regard to the ventilation characteristics of the space.

CHAPTER 4 – USEFUL ARRANGEMENT, INSTALLATION AND APPARATUS FOR FIRE SAFETY

1 Measures for the prevention of spillage of flammable oils

1.1 *Tanks*

1.1.1 Tanks used for the storage of fuel oil, lubricating oil, hydraulic oil, thermal oil and other flammable oils, together with their fittings, should be constructed so as to prevent overpressure and spillages due to leakage or overfilling.

1.1.2 An alarm device should be provided to give warning when the oil reaches a predetermined level in the tank or, alternatively, a sight glass should be provided in the overflow pipe to indicate when any tank is overflowing. Such sight glasses should be placed on vertical pipes only, in readily visible positions, and should be shown by testing to have a suitable degree of fire resistance.

1.1.3 Any overflow pipe should have a sectional area of at least 1.25 times that of the filling pipe and should be led to an overflow tank of adequate capacity or to a storage tank having space reserved for overflow purposes.

1.2 *Air and overflow pipes*

1.2.1 Air pipes from oil fuel tanks and heated lubricating oil tanks should be led to a safe position on the open deck. They should not terminate in any place where a risk of ignition is present. Air pipes from unheated lubricating oil tanks may terminate in the machinery space, provided that the open ends are so situated that issuing oil cannot come into contact with electrical equipment, heated or hot surfaces.

1.2.2 Any overflow pipe should have a sectional area of at least 1.25 times that of the filling pipe and should be led to an overflow tank of adequate capacity or to a storage tank having space reserved for overflow purposes.

1.2.3 In order to fulfil the requirements of SOLAS regulation II-1/26.11, a common air pipe is commonly used. In this case the air pipes from heated and unheated oil tanks should be separated.

1.3 *Measuring devices of tanks*

1.3.1 Where sounding pipes are used, they should not terminate in any space where the risk of ignition of spillage from the sounding pipe might arise. In particular, they should not terminate in passenger or crew spaces. As a general rule, they should not terminate in machinery spaces. However, where the classification society considers that these latter requirements are impracticable, it may permit termination of sounding pipes from tanks in machinery spaces, on condition that all of the following requirements are met:

.1 an oil level gauge of an approved type is provided;

.2 the sounding pipes terminate in locations remote from ignition hazards, unless precautions are taken such as the fitting of effective screens to prevent the oil fuel in the case of spillage from the sounding pipes, coming into contact with a source of ignition; and

.3 the terminations of sounding pipes are fitted with self-closing blanking devices and with a small-diameter self-closing control cock located below the blanking device for the purposes of ascertaining before the blanking device is opened that oil fuel is not present. Provision should be made so as to ensure that any spillage of oil fuel through the control cock involves no ignition hazard. Locking arrangements for self-closing blanking devices to be kept in the open position should not be permitted.

1.3.2 Short sounding pipes may be used for tanks, other than double bottom tanks, without the additional closed level gauge provided an overflow system is fitted.

1.3.3 Oil level gauges may be used in place of sounding pipes, subject to the following conditions:

.1 in passenger ships, such gauges should not require penetration below the top of the tank and their failure or overfilling of the tanks will not permit release of fuel; and

.2 in cargo ships, the failure of such gauges or overfilling of the tank should not permit release of fuel. The use of cylindrical gauge glasses is prohibited. The classification society may permit the use of oil-level gauges with flat glasses and self-closing valves between the gauges and fuel tanks.

2 Fuel oil isolation valves for multi-engines

2.1 In order to fulfil SOLAS regulation II-2/4.2.2.5.5, isolating valves should be located and operable from a position not rendered inaccessible by a fire on any of the engines.

2.1.1 Where practicable, isolating valves should be located at least 5 m away from engines in any direction. If this is not possible, the operating position of the valves should be protected by an obstruction. Figure 3-8 shows an example of protection by obstructions.

2.1.2 If the above is impracticable, other means of protection capable of enabling access to the isolating valves in the event of a fire might be acceptable.

2.1.3 Figure 3-9 shows the possible areas affected by fire and figure 3-10 shows a schematic diagram of a typical isolation valve arrangement.

2.1.4 Isolating valves controlled remotely could be acceptable. In this case, the operating mechanism should be protected from fire.

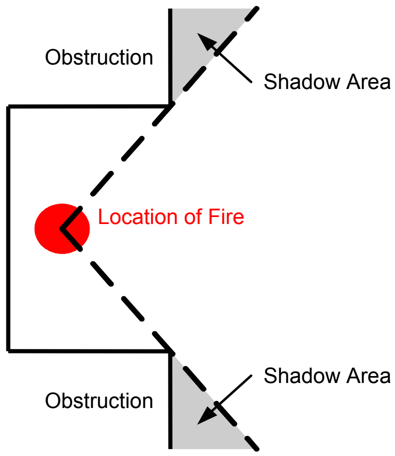

Figure 3-8 – Safe isolating valve operating position protected by obstruction

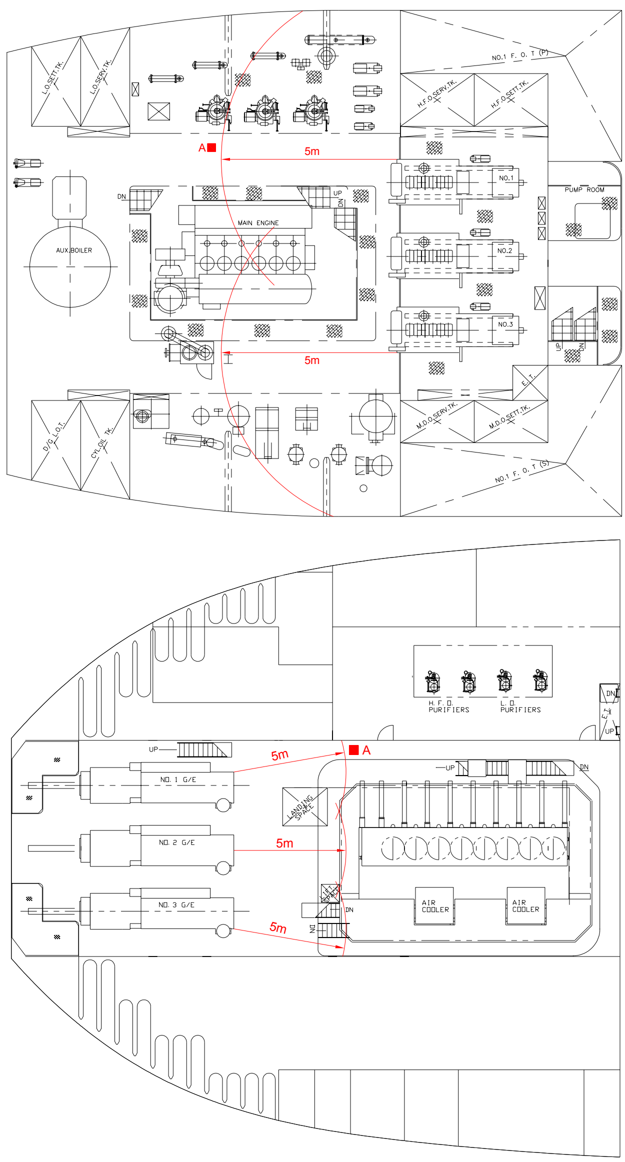

Figure 3-9 – Isolation valves arrangement for multi-engines

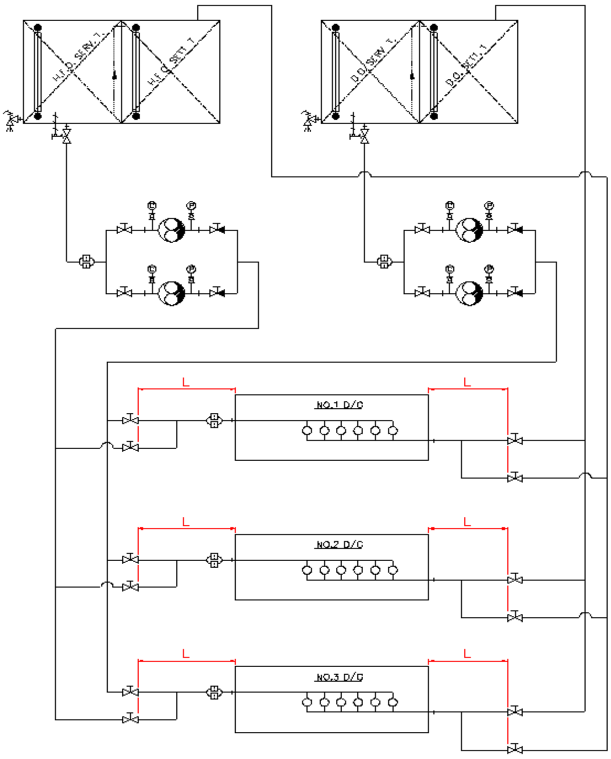

Figure 3-10 – Acceptable arrangement of isolation valves

CHAPTER 5 – EQUIPMENT INSTALLATION

1 Boilers

1.1 *System arrangement*

1.1.1 Boilers should be suitably insulated with non-combustible material and sheathed with steel or other non-combustible material the surface of which is to be impervious to oil and oil vapours. The clearance spaces between the boilers and tops of double bottom tanks, and between the boilers and the sides of storage tanks in which oil fuel and cargo oil is carried, should be adequate for the free circulation of air necessary to keep the temperature of the stored oil sufficiently below its flashpoint, except in the case of tanks not heated to temperatures within 10°C below the flashpoint of the fuel oil.

1.1.2 The oil burning units should meet the following requirements:

.1 oil burners should be so arranged that they cannot be withdrawn unless the oil supply to the burners is cut off; and

.2 fuel supply to all burners should be capable of being automatically cut off in case of total lack of flame in the combustion chamber; moreover, this should be warned by a visual and audible alarm. The alarms need not be fitted for domestic boilers.

1.1.3 Where boilers are located in machinery spaces on 'tween decks and the boiler rooms are not separated from the machinery space by watertight bulkheads, the 'tween decks should be provided with coamings at least 200 mm in height. This area may be drained to the bilges. The drain tank should not form part of an overflow system.

2 Thermal oil installations

2.1 *System arrangement*

2.1.1 The inlet and outlet valves of oil-fired thermal oil heaters and exhaust-fired thermal oil heaters should be controllable from outside the compartment where they are situated. As an alternative, an arrangement for quick gravity drainage of the thermal oil contained in the system into a collecting tank is acceptable.

2.1.2 Heating of liquid cargoes with flashpoints below 60°C should be arranged by means of a separate secondary system, located completely within the cargo area. However, a single circuit system may be accepted on the following conditions:

.1 the system is so arranged that a positive pressure in the coil should be at least 3 m water column above the static head of the cargo when circulating pump is not in operation;

.2 the thermal oil system expansion tank should be fitted with high and low level alarms;

.3 means should be provided in the thermal oil system expansion tank for detection of flammable cargo vapour. Portable equipment may be accepted; and

.4 valves for the individual heating coils should be provided with locking arrangement to ensure that the coils are under static pressure at all times.

2.1.3 The thermal oil circulating pumps should be arranged for emergency stopping from a position outside the space where they are situated.

2.1.4 Vents from expansion tanks and thermal oil storage tanks of thermal oil heating plants should be led to open deck.

2.2 *Exhaust-fired thermal oil heaters*

2.2.1 The heater should be so designed and installed that all tubes may easily and readily be inspected for signs of corrosion and leakage.

2.2.2 Visual inspection and tightness testing of the heater tubes to not less than the working pressure should he carried out annually, and hydraulic testing should be carried out bi-annually.

2.2.3 The heater should be fitted with temperature sensor(s) and an alarm for fire detection.

2.2.4 A fixed fire-extinguishing and cooling system should be fitted. A drenching system providing at least 5 l/m^2/min of water may be accepted. The exhaust ducting below the exhaust boiler should be arranged for adequate collection and drainage, to prevent water flowing into the diesel engine. The drain should be led to a suitable location.

3 Purifier rooms

3.1 *System arrangement*

3.1.1 As far as practicable, purifiers and associated components should be placed in a separate room, enclosed by bulkheads having effective construction and rooms should be provided with:

.1 independent mechanical ventilation or a ventilation arrangement which can be isolated from the machinery space ventilation; and

.2 fire-detecting and fire-extinguishing systems.

3.1.2 If it is impracticable to locate the main components in a separate room, the purifiers and associated components should be located in a space which is equipped with the following:

.1 Scuppers having sufficient capacity to minimize the free surface of oil. Where drain pipes are provided from collected leakages, they should be led to a suitable oil drain tank not forming part of an overflow system.

.2 Spray shields in way of any connections of flammable oil pipes; any leakage should be led to scuppers.

3.1.3 The control panel should be located in an area in which flammable mist cannot accumulate.

4 Oil heaters

4.1 *System arrangement*

4.1.1 Where steam heaters or heaters using other heating media are provided in fuel or lubricating oil systems, they should be fitted with at least a high temperature alarm or low flow alarm in addition to a temperature control, except where the temperature limit for the ignition of the medium cannot be reached.

4.1.2 When electric heaters are fitted, means should be provided to ensure that heating elements are permanently submerged during operation. In order to avoid a heating element surface temperature of 220°C and above, a safety temperature switch, independent from the automatic control sensor, should be provided. The safety switch should cut off the electrical power supply in the event of excessive temperature and should be provided with a manual reset.

4.1.3 Containment enclosures should be fitted with adequate drainage. Where drain pipes are provided from collected leakages, they should be led to a suitable oil drain tank not forming part of an overflow system.

5 Hydraulic power packs

5.1 *System arrangement*

5.1.1 Hydraulic power packs of more than 50 kW with a working pressure more than 100 bar should be installed in specially dedicated spaces, with a separate ventilation system.

PART IV

CARGO PUMP-ROOMS

CHAPTER 1 – CONTROL OF FLAMMABLE MATERIALS

1 General

1.1 Requirements described below should be applied to vessels carrying oils with flashpoints not exceeding 60°C (closed cup test).

1.2 Alternative design and arrangements might be acceptable, if new design meets SOLAS regulation II-2/17.

2 Equipment and fittings on cargo piping systems

2.1 *Materials*

2.1.1 Aluminium pipes should be prohibited except those used in ballast tanks and inerted cargo tanks.

2.2 *Piping arrangement and design*

2.2.1 In order to avoid the generation of static electricity when cargo is loaded directly into tanks, the loading pipes, as far as practicable, should be led to the lowest area in the tank.

2.2.2 Spray shields or spray protection covers should be provided on any detachable connections and around the glands of cargo handling pumps in order to reduce the formation of mist.

CHAPTER 2 – CONTROL OF IGNITION SOURCE

1 General

1.1 The steam and heating media temperature within the cargo area should not to exceed 220°C.

1.2 Any potential ignition sources should be protected.

2 Lighting system and protection of electrical equipment

2.1 Glazed port lights providing illumination to the pump-rooms should be effectively protected from mechanical damage by strong covers secured from the side of the safe space.

2.2 Lighting other than emergency lighting should be interlocked with ventilation.

3 Protection of penetration to other spaces

3.1 Any penetration of the engine-room boundary or safety area passing through a pump-room bulkhead should be provided with the following:

.1 gas tight sealing device with efficient lubricant (periodic greasing type is not permitted); and

.2 temperature measuring device.

4 Temperature monitoring system for pumps in cargo pump-rooms

4.1 *Design requirements*

4.1.1 Except for pump-rooms intended solely for ballast transfer or fuel oil transfer, temperature monitoring systems for pumps should be provided.

4.1.2 The following pumps installed in cargo pump-rooms, which may be driven by shafts passing through pump-room bulkheads, are included:

.1 cargo pumps including slop pumps;

.2 ballast pumps;

.3 stripping pumps; and

.4 tank cleaning pumps.

4.1.3 The following pumps might be omitted:

.1 small pumps of 1 m^3/h capacity or less; and

.2 bilge pumps.

4.2 *System arrangements*

4.2.1 Sensing points should be provided as follows:

.1 bulkhead shaft glands;

.2 bearings; and

.3 pump casings.

4.2.2 In case of parallel bearing support with common oil bath, only one bearing sensor might be installed.

4.2.3 The range of temperature for sensors is recommended to be from 0°C to 250°C and the setting point to about 60°C to 80°C in consideration to the kind of pumps, cargoes and environmental condition, which would automatically shut down the pump when the set point is reached.

4.2.4 Sensors should be installed so that the end of sensor reaches the measuring points and is fixed permanently.

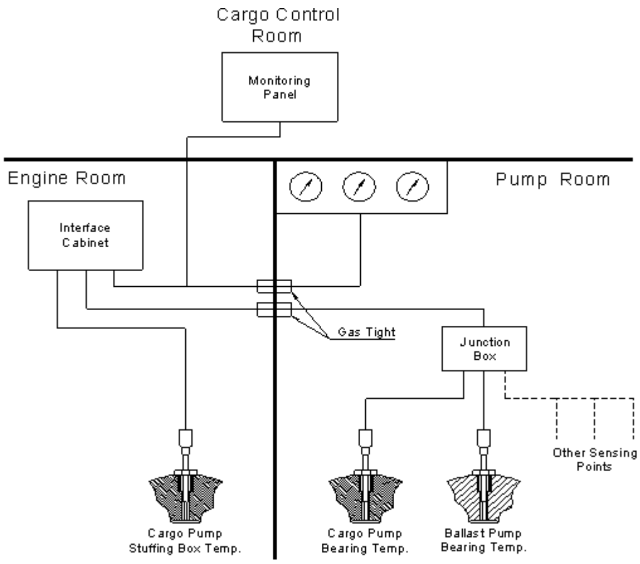

Figure 4-1 – Sample of temperature monitoring system

CHAPTER 3 – CONTROL OF VENTILATION

1 Design criteria of ventilation systems

.1 cargo pump-rooms should be mechanically ventilated and the capacity should be 20 air changes per hour of the total volume of the pump-room;

.2 the position of the vent outlet should be arranged at a distance of at least 3 m measured horizontally from any ignition source and from the nearest opening to accommodation, service or machinery spaces;

.3 an emergency intake located about 2 m above the pump-room lower grating is to be provided. This emergency intake is to be used when the lower intake is sealed off due to flooding in the bilges. The emergency intake should have a damper fitted which is capable of being closed from the exposed main deck and lower grating level;

.4 floor gratings should not disturb the free flow of air; and

.5 normally, the density of petroleum product vapours are heavier than air (x 2), however, the density of diluted gas/air mixture is closer to air (x 1.5). Therefore, vapour density and pump-room temperature should be carefully considered for the design of the ventilation arrangement.

2 Gas detection systems

2.1 *Design requirements*

.1 sampling lines should not run through gas-safe spaces;

.2 gas analysing units located in dangerous areas should be of the explosion-proof type;

.3 gas sampling pipes should be equipped with flame arresters;

.4 sampling points should be located in zones where air circulation is reduced (dead spots such as recessed corners);

.5 the following should be considered in selecting hydrocarbon gas detector and detection positions in cargo pump-rooms:

.5.1 shape of the cargo pump-room; and

.5.2 placement of exhaust duct considering the flow characteristics;

.6 if necessary, actual demonstration tests or computational simulation analysis should be carried out;

.7 a hydrocarbon gas detector is recommended to be installed in the following places:

.7.1 (perpendicular) upper part of the main cargo pump or between two cargo pumps;

.7.2 one detector within 30 cm above the lowest part of the cargo pump-room bottom floor; and

.7.3 one detector every 10 m length or width of the cargo pump-room;

.8 sequential sampling is acceptable as long as it is dedicated to the pump-room, including exhaust ducts, and if the sampling time is reasonably short;

.9 sample gas should be provided with or connected to the analysing unit for regular calibration, otherwise calibration records carried out by a specialist should be kept on board; and

.10 sampling tubing should be resistant to water and cargo vapour.

2.2 ***The setting value***

.1 audible and visual alarms should be activated by the hydrocarbon gas with the concentration of a pre-set level which is no higher than 10% of the lower flammable limit (LFL);

.2 the setting value should be set carefully, because LFL of a mixture of hydrocarbon gases changes according to their mixing ratio;

.3 in the case of a ship carrying two or more cargoes, the set value of an alarm point should be corrected based on the lowest LFL of each cargo, and the following information and equipment should be provided:

.1 LFL data of cargo from shippers, etc.; and

.2 gas detectors with function to allow adjustment of the alarm setting.

2.3 *System arrangement*

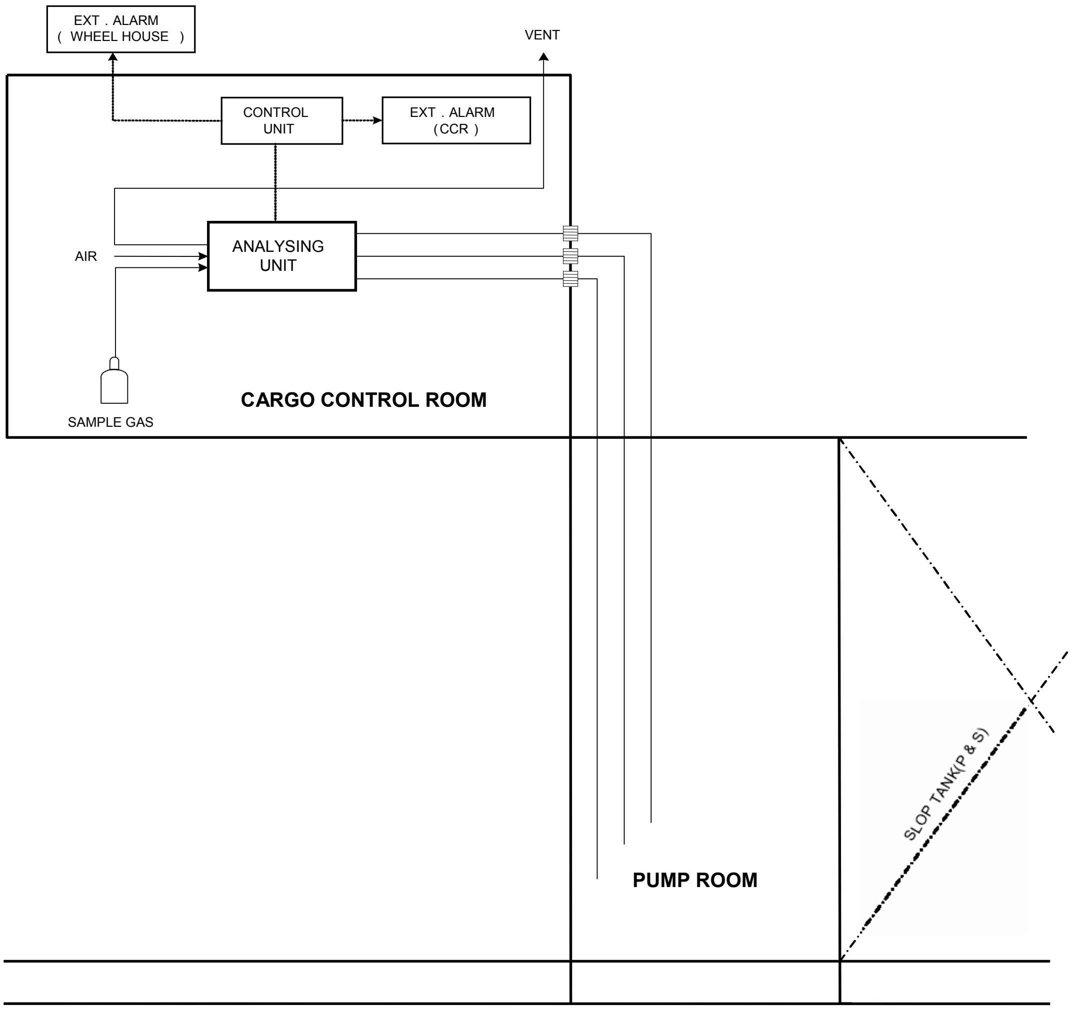

Figure 4-2 – Monitoring system of the concentration of hydrocarbon gases

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Ref. T4/7.01

MSC.1/Circ.1324
10 June 2009

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 Subparagraph .4 of paragraph 4.1 is replaced with the following:

".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.

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MSC.1/Circ.1325
10 June 2009

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 to the Revised standards, as promulgated by MSC/Circ.1324, 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.

***

* 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)

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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.

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MSC.1/Circ.1326
11 June 2009

CLARIFICATION OF SOLAS REGULATION III/19

1 The Maritime Safety Committee, at its eighty-sixth session (27 May to 5 June 2009), having considered a recommendation made by the Sub-Committee on Ship Design and Equipment, at its fifty-second session, agreed that there was a need to clarify the application of SOLAS regulation III/19.3.3.3.

2 SOLAS regulation III/19.3.3.3 requires each lifeboat to be launched, and manoeuvred in the water by its assigned operating crew, at least once every three months during an abandon ship drill. However, the regulation, whilst requiring each lifeboat to be manoeuvred in the water by its assigned operating crew, does not require the assigned operating crew to be on board when the lifeboat is launched.

3 The Committee, therefore, agreed that the assigned operating crew should not be required to be on board lifeboats during launching, unless the master, within the authority conferred to him by paragraph 5.5 of the ISM Code, considered, taking into account all safety aspects, that the lifeboat should be launched with the assigned operating crew on board.

4 Member Governments are invited to use the above clarification when applying the requirements of SOLAS regulation III/19, and bring it to the attention of all parties concerned and, in particular, port State control officers.

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MSC.1/Circ.1327
11 June 2009

GUIDELINES FOR THE FITTING AND USE OF FALL PREVENTER DEVICES (FPDs)

1 The Maritime Safety Committee, at its eighty-sixth session (27 May to 5 June 2009), approved the Guidelines for the fitting and use of fall preventer devices (FPDs), set out in the annex, following the recommendations made by the Sub-Committee on Ship Design and Equipment, at its fifty-second session.

2 The use of FPDs should be considered as an interim risk mitigation measure, only to be used in connection with existing on-load release hooks, at the discretion of the master, pending the wide implementation of improved hook designs with enhanced safety features.

3 Member Governments are invited to use the annexed Guidelines when approving the use of fall preventer devices (FPDs), and to bring them to the attention of all parties concerned.

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ANNEX

GUIDELINES FOR THE FITTING AND USE OF FALL PREVENTER DEVICES (FPDs)

1 Background

1.1 In 1986, on-load release hooks for lifeboats and rescue boats were made mandatory in the SOLAS Convention, in response to Norway's worst offshore accident in March 1980, when the **Alexander Kielland** platform in the North Sea Ekofisk field capsized, killing 123 of the 212 persons on board. These then new SOLAS requirements were considered an important step forward in lifeboat design.

1.2 Some deaths in that accident were attributed to the fact that the lifeboat had no means of release when its weight was on the hook and falls. Therefore, on-load release systems were seen to offer benefits.

1.3 Since the IMO requirements for all ships to be fitted with on-load release systems came into force, there have been a number of serious accidents during drills and servicing.

1.4 Many of these accidents were attributed to either lack of maintenance, poor design or inadequate training. Failures of equipment can result in the premature opening of the on-load hook mechanism, causing the lifeboat to fall from the davits unexpectedly, even with three safety interlocks provided for in the design.

1.5 A number of current designs of on-load release hooks are designed to open under the effect of the lifeboat's own weight and often need to be held closed by the operating mechanism. This means that any defects or faults in the operating mechanism, errors by the crew or incorrect resetting of the hook after being previously operated, can result in premature release.

1.6 A "Fall Preventer Device" (FPD) can be used to minimize the risk of injury or death by providing a secondary alternate load path in the event of failure of the on-load hook or its release mechanism or of accidental release of the on-load hook. However, FPDs should not be regarded as a substitute for a safe on-load release mechanism.

2 Design and operation of FPDs

2.1 Locking pins

The following points should be considered when utilizing locking pins as FPDs:

.1 existing on-load release hooks fitted to ships should **not** be modified by drilling to provide a locking pin insertion point, unless approved by the Administration in accordance with paragraph 4, as this may significantly reduce the strength of the hook;

.2 locking pins should have clear operational instructions located near the insertion point of the locking pin and be colour coded so that it is clear where the pins are to be inserted;

.3 locking pins should be designed so that they cannot be inadvertently inserted in the wrong place;

.4 locking pins should be confirmed to be in place prior to turning out the lifeboat and during descent to the water;

.5 strict procedures, including a warning notice at the release handle, should be in place to ensure that the locking pin is removed before the release mechanism is activated. The handle of the locking pin should be coloured red or a suitable contrasting safety colour and prominently marked with a warning that it must be removed before activating the release mechanism;

.6 the removal of the pin should be achievable quickly and easily without posing any risk to the operating crew designated to carry out the task once the lifeboat has reached the water;

.7 if the removal of the pins requires opening of the lifeboat hatch it should be readily achievable by the operating crew at each device from within the craft;

.8 once the on-load release hooks have been connected to recover the lifeboat, the locking pins should be re-inserted before the boat is hoisted clear of the water. The locking pins should be designed so that they do not interfere with either the lifting or re-stowing of the lifeboat into the davits; and

.9 where provided, fall preventer locking pins should not be used for any other purpose and should be fitted to the lifeboat at all times.

2.2 Strops or slings

Wires or chains should not be used as FPDs, as they do not absorb shock loads. The following points should be considered when synthetic strops or slings are used as FPDs:

.1 where FPDs are synthetic strops or slings and no modifications are required to the lifeboat, the on-load release hook or launching equipment, a functional test should be carried out. The functional test should demonstrate, to the satisfaction of the Administration, that the equipment performs without interfering in the operation of the lifeboat or launching equipment. Strops or slings should be of resilient fibre in construction;

.2 the strops or slings should be issued with an appropriate certificate documenting a tensile strength which provides for a factor of safety of at least six, based on the total weight of the lifeboat when loaded with its full complement of persons and equipment. The strops or slings should be inspected before use and thoroughly inspected by ship's crew every six months. The material of the strop or sling should be rot-proof, corrosion-resistant, not be unduly affected by seawater, oil or fungal attack, and UV resistant. The strops or slings should be permanently marked with the date of entry into service;

.3 strict procedures, including a warning notice at the release handle, should be in place to ensure that the strops or slings are removed before the release mechanism is activated;

.4 the attachment point of the strop or sling to the on-load release hook and the davit falls block should be clearly marked and designed so that any connection device such as shackles cannot be connected to either the wrong part of the block or the wrong part of the on-load release hook;

.5 the release of the strops or slings should be achievable quickly and easily without posing any risk to the operating crew designated to carry out the task once the lifeboat has reached the water. If the release of the strops or slings requires opening of the lifeboat hatch it should be readily achievable by the operating crew at each device from within the craft. Once detached, the strops or slings should not interfere with the operation of the on-load release gear or the propeller;

.6 once the on-load release hooks have been connected to recover the lifeboat, the strops or slings should be reattached to the lifeboat before the boat is hoisted clear of the water. The strops or slings should be designed so that they do not interfere with either the lifting or re-stowing of the lifeboat into the davits;

.7 a strop or sling used as an FPD should be sized and arranged to allow the transfer of load from the hook mechanism to the strop with minimal movement (drop) of the boat in the event of a release mechanism failure. Should a fall preventer strop or sling be subject to an unintentional dynamic shock loading, then the strop or sling should be replaced and the associated attachment points inspected. In such cases, the Administration should be informed as soon as possible and the master should provide a full report of the circumstances of the incident; and

.8 where provided, fall preventer strops or slings should not be used for any other purpose and should be fitted to the lifeboat at all times.

3 Drills, testing, inspections and maintenance of lifeboats and launching appliances

3.1 The ship's master or the officer in charge of any lifeboat lowering or lifting operation should ensure that, where provided, lifeboat FPDs are properly in place before commencing any drill, testing, inspection or maintenance where persons are in the lifeboat.

3.2 The ship's operating crew should be familiar with the operation of the FPD fitted to the lifeboat on their ship. The procedure to be followed should be contained in the ISM Code documentation and the ship's training manual.

3.3 Those conducting training drills and drafting ISM Code procedures should take into account that with certain types of ship such as oil, gas or chemical tankers it may not be possible to use an FPD in an abandon ship situation where the release mechanism of the device is not inside the lifeboat. In such cases, the master should take this into account when considering application of paragraphs 2.1.9 or 2.2.8. Where a different procedure is followed during routine drills compared with an abandon ship situation, this should be clearly described in the ISM Code documentation and training manual.

4 Modification of existing approved on-load hooks already fitted to a ship to incorporate FPDs

The shipowner or original equipment manufacturer should contact the Administration for approval before any modification, such as modifying existing lifeboats and hooks for oil and chemical tankers so that FPDs can be released from within the lifeboat, is made to a hook, lifeboat or davit to accommodate the use of FPDs. Any retesting of any equipment should be agreed and witnessed by the Administration or a recognized organization appointed by them and documented in the relevant approval file.

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MEASURES TO PREVENT ACCIDENTS WITH LIFEBOATS

1 The Maritime Safety Committee, at its eighty-first session (10 to 19 May 2006), recalled that at its seventy-fifth session (15 to 24 May 2002), it had considered the issue of the unacceptably high number of accidents with lifeboats in which crew were being injured, sometimes fatally, while participating in lifeboat drills and/or inspections, and noted that most accidents fell under the following categories:

.1 failure of on-load release mechanism;

.2 inadvertent operation of on-load release mechanism;

.3 inadequate maintenance of lifeboats, davits and launching equipment;

.4 communication failures;

.5 lack of familiarity with lifeboats, davits, equipment and associated controls;

.6 unsafe practices during lifeboat drills and inspections; and

.7 design faults other than on-load release mechanisms.

2 Pending further consideration of the problem, the Committee approved MSC/Circ.1049 on Accidents with lifeboats, to draw the attention of manufacturers, shipowners, crews and classification societies to the personal injury and loss of life that may follow inadequate attention to the design, construction, maintenance and operation of lifeboats, davits and associated equipment and urged all concerned to take necessary action to prevent further accidents with lifeboats. It invited Member Governments to:

.1 bring the circular to the attention of their maritime Administrations, relevant industry organizations, manufacturers, shipowners, crews and classification societies;

.2 take the necessary action to prevent further accidents with lifeboats pending the development of appropriate IMO guidance;

.3 ensure that:

.3.1 on-load release equipment used on ships flying their flag is in full compliance with the requirements of paragraphs 4.4.7.6.2.2 to 4.4.7.6.5 of the LSA Code;

.3.2 all appropriate documentation for the maintenance and adjustment of lifeboats, launching appliances and associated equipment is available on board;

.3.3 personnel undertaking inspections, maintenance and adjustment of lifeboats, launching appliances and associated equipment are fully trained and familiar with these duties;

.3.4 maintenance of lifeboats, launching appliances and associated equipment is carried out in accordance with approved established procedures;

.3.5 lifeboat drills are conducted in accordance with SOLAS regulation III/19.3.3 for the purpose of ensuring that ship's personnel will be able to safely embark and launch the lifeboats in an emergency;

.3.6 the principles of safety and health at work apply to drills as well;

.3.7 personnel undertaking maintenance and repair activities are appropriately qualified;

.3.8 hanging-off pennants should only be used for maintenance purposes and not during training exercises;

.3.9 all tests required for the design and approval of life-saving appliances are conducted rigorously, according to the Guidelines developed by the Organization, in order to identify and rectify any design faults at an early stage;

.3.10 the equipment is easily accessible for inspections and maintenance and is proven durable in harsh operational conditions, in addition to withstanding prototype tests; and

.3.11 the approving authorities or bodies pay close attention to proper workmanship and state-of-the-art possibilities when assessing equipment for approval; and

.4 encourage shipowners, when undertaking maintenance and repair activities, to employ qualified personnel, preferably certified by the manufacturer.

3 Member Governments were further invited, while enforcing the provisions of SOLAS regulation IX/4.3, to ensure that the above issues are addressed through the Safety Management System of the company, as appropriate.

4 The Committee further recalled that, at its seventy-seventh session (28 May to 6 June 2003), recognizing the experience gained since the approval of the Guidelines on inspection and maintenance of lifeboat on-load release gear (MSC/Circ.614) at its sixty-second session (24 to 28 May 1993), and that the implementation of expanded and improved guidelines could contribute towards a reduction of the incidence of accidents with lifeboats, it had approved the Guidelines for periodic servicing and maintenance of lifeboats, launching appliances and on-load release gear (MSC/Circ.1093), superseding MSC/Circ.614. Taking into account subsequent amendments to SOLAS chapter III and the LSA Code, and having considered proposals by the fiftieth session of the Sub-Committee on Fire Protection, the Committee approved amendments to the Guidelines, and further noted that the guidance developed for lifeboats could also apply to the periodic servicing and maintenance of liferafts, rescue boats and fast rescue boats and their launching appliances and on-load release gear.

5 The Committee further recalled that, at its seventy-ninth session (1 to 10 December 2004), it had endorsed the intention of the Sub-Committee on Ship Design and Equipment, in cooperation with the Sub-Committee on Standards of Training and Watchkeeping, to develop further IMO guidance as envisioned in MSC/Circ.1049 and, accordingly, approved the Guidance on safety during abandon ship drills using lifeboats (MSC/Circ.1136), as set out in annex 2. The Committee further recalled that the Guidance developed for lifeboats has relevance, in general, for emergency drills with other life-saving systems and should be taken into account when such drills are conducted. In connection with MSC/Circ.1136, and recognizing the need to provide a basic outline of essential steps to safely carry out simulated launching of free-fall lifeboats in accordance with SOLAS regulation III/19.3.3.4, and having considered proposals by the forty-seventh session of the Sub-Committee on Design and Equipment, the Committee further approved the Guidelines for simulated launching of free-fall lifeboats (MSC/Circ.1137), as set out in the appendix to annex 2.

6 Having considered the need to update several of the circulars discussed above, and having considered proposals by the fiftieth session of the Sub-Committee on Fire Protection to consolidate the numerous circulars on the subject of measures to prevent accidents with lifeboats in order to better serve the mariner, the Committee approved Guidelines for periodic servicing and maintenance of lifeboats, launching appliances and on-load release gear and Guidelines on safety during abandon ship drills using lifeboats, as set out in annexes 1 and 2, respectively, to MSC.1/Circ.1206.

7 The Maritime Safety Committee, at its eighty-sixth session (27 May to 5 June 2009), approved amendments to the aforementioned Guidelines (annexes 1 and 2 to MSC.1/Circ.1206) concerning inspection and maintenance of lifeboats, launching appliances and on-load release gear, following the recommendations made by the Sub-Committee on Ship Design and Equipment, at its fifty-second session. The revised Guidelines are set out in annexes 1 and 2 to this circular.

8 Member Governments are invited to give effect to the annexed Guidelines as soon as possible and to bring them to the attention of shipowners, ship operators, ship-vetting organizations, ship personnel, surveyors, manufacturers and all others concerned with the inspection and maintenance of lifeboats, liferafts, rescue boats and fast rescue boats and their launching appliances and on-load release gear.

9 This circular supersedes MSC/Circ.1049, MSC/Circ.1093, MSC/Circ.1136, MSC/Circ.1137 and MSC.1/Circ.1206.

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ANNEX 1

GUIDELINES FOR PERIODIC SERVICING AND MAINTENANCE OF LIFEBOATS, LAUNCHING APPLIANCES AND ON-LOAD RELEASE GEAR

General

1 The objective of these Guidelines is to establish a uniform, safe and documented performance of periodic servicing and maintenance of lifeboats, launching appliances and on-load release gear.

2 These Guidelines relate to the application of the ISM Code to periodic servicing and maintenance of lifeboat arrangements and should therefore be reflected in procedures developed for a ship under that Code.

3 The general principle in these Guidelines may also be applied for the periodic servicing and maintenance of liferafts, rescue boats and fast rescue boats and their launching appliances and release gear.

4 Detailed guidance regarding some procedures covered by these Guidelines is provided in the appendix.

SOLAS regulations

5 These Guidelines relate to the requirements contained in:

.1 SOLAS regulation III/20 – Operational readiness, maintenance and inspections; and

.2 SOLAS regulation III/36 – Instructions for onboard maintenance.

Responsibility

6 The company* is responsible for servicing and maintenance on board its ships in accordance with SOLAS regulation III/20 and for the establishment and implementation of health, safety and environment (HSE) procedures covering all activities during servicing and maintenance.

7 The personnel carrying out servicing and maintenance are responsible for the performance of the work as authorized in accordance with the system specified in paragraph 10.

8 The above personnel are also responsible for complying with HSE instructions and procedures.

9 Service providers carrying out the thorough examination, operational testing, repair and overhaul of lifeboats, launching appliances and on-load release gear should be authorized in accordance with MSC.1/Circ.1277.

* For the purpose of these Guidelines, company is as defined in SOLAS regulation IX/1.2.

Certification

10 Where these Guidelines call for certification of servicing personnel, such certification should be issued in accordance with an established system for training and authorization in accordance with MSC.1/Circ.1277.

Qualification levels

11 Weekly and monthly inspections, and routine maintenance as specified in the equipment maintenance manual(s), should be conducted under the direct supervision of a senior ship's officer in accordance with the maintenance manual(s).

12 All other inspections, servicing and repair should be conducted by the manufacturer's representative or other person appropriately trained and certified for the work to be done in accordance with MSC.1/Circ.1277.

Reports and records

13 All reports and checklists should be correctly filled out and signed by the person who carries out the inspection and maintenance work and should also be signed by the company's representative or the ship's master.

14 Records of inspections, servicing, repairs and maintenance should be updated and filed on board the ship.

15 When repairs, thorough examinations and annual servicing are completed, a statement confirming that the lifeboat arrangements remain fit for purpose should be promptly issued by the service provider who performed the work.

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APPENDIX

SPECIFIC PROCEDURES FOR MAINTENANCE AND SERVICING

1 GENERAL

1.1 Any inspection, servicing and repair should be carried out according to the maintenance manuals and associated technical documentation developed by the manufacturer or an alternative body authorized in accordance with MSC.1/Circ.1277.

1.2 A full set of maintenance manuals and associated technical documentation as specified in 1.1 should be available on board for use in all operations involved in the inspection, maintenance, adjustment and re-setting of the lifeboat and associated equipment, such as davits and release gear.

1.3 The maintenance manuals and associated technical documentation as specified in 1.1 should include the following items as a minimum and should be periodically reviewed and updated as necessary.

2 ANNUAL THOROUGH EXAMINATION

2.1 As items listed in checklists for the weekly/monthly inspections also form the first part of the annual thorough examination, when carrying out this examination the inspection of these items should be performed by the ship's crew in the presence of the manufacturer's representative or other person appropriately trained and certified for the work to be done in accordance with MSC.1/Circ.1277.

2.2 Inspection and maintenance records of inspections and routine maintenance carried out by the ship's crew and the applicable certificates for the launching appliances and equipment should be available.

Lifeboats

2.3 The following items should be examined and checked for satisfactory condition and operation:

.1 condition of lifeboat structure including fixed and loose equipment;

.2 engine and propulsion system;

.3 sprinkler system, where fitted;

.4 air supply system, where fitted;

.5 manoeuvring system;

.6 power supply system; and

.7 bailing system.

Release gear

2.4 The following should be examined for satisfactory condition and operation after the annual winch brake test with the empty boat, as required by 3.1:

.1 operation of devices for activation of release gear;

.2 excessive free play (tolerances);

.3 hydrostatic interlock system, where fitted;

.4 cables for control and release; and

.5 hook fastening.

Notes:

1 The setting and maintenance of release gear are critical operations with regard to maintaining the safe operation of the lifeboat and the safety of personnel in the lifeboat. All inspection and maintenance operations on this equipment should therefore be carried out with the utmost care.

2 No maintenance or adjustment of the release gear should be undertaken while the hooks are under load.

3 Hanging-off pennants may be used for this purpose but should not remain connected at other times, such as when the lifeboat is normally stowed and during training exercises.

4 The release gear is to be examined prior to its operational test. The release gear is to be re-examined after its operational test and the dynamic winch brake test. Special consideration should be given to ensure that no damage has occurred during the winch brake test, especially the hook fastening.

2.5 Operational test of on-load release function:

.1 position the lifeboat partially into the water such that the mass of the boat is substantially supported by the falls and the hydrostatic interlock system, where fitted, is not triggered;

.2 operate the on-load release gear;

.3 reset the on-load release gear; and

.4 examine the release gear and hook fastening to ensure that the hook is completely reset and no damage has occurred.

2.6 Operational test of off-load release function:

.1 position the lifeboat fully waterborne;

.2 operate the off-load release gear;

.3 reset the on-load release gear; and

.4 recover the lifeboat to the stowed position and prepare for operational readiness.

Note:

Prior to hoisting, check that the release gear is completely and properly reset. The final turning-in of the lifeboat should be done without any persons on board.

2.7 Operational test of free-fall lifeboat release function:

.1 engage the simulated launching arrangements as specified in the manufacturer's operating instructions;

.2 the operator should be properly seated and secured in the seat location from which the release mechanism is to be operated;

.3 operate the release mechanism to release the lifeboat;

.4 reset the lifeboat in the stowed configuration;

.5 repeat procedures referred to in .2 to .4 above, using the back-up release mechanism, when applicable;

.6 remove the simulated launching arrangements; and

.7 verify that the lifeboat is in the ready to launch stowed configuration.

Davit

2.8 The following items should be examined for satisfactory condition and operation:

.1 davit structure, in particular with regard to corrosion, misalignments, deformations and excessive free play;

.2 wires and sheaves, possible damages such as kinks and corrosion;

.3 lubrication of wires, sheaves and moving parts;

.4 functioning of limit switches;

.5 stored power systems; and

.6 hydraulic systems.

Winch

2.9 The following items should be examined for satisfactory condition and operation:

.1 open and inspect brake mechanism;

.2 replace brake pads, if necessary;

.3 remote control system;

.4 power supply system; and

.5 winch foundation.

3 DYNAMIC WINCH BRAKE TEST

3.1 Annual operational testing should preferably be done by lowering the empty boat. When the boat has reached its maximum lowering speed and before the boat enters the water, the brake should be abruptly applied.

3.2 The five-year operational test should be done by lowering the boat loaded to a proof load equal to 1.1 times the weight of the survival craft or rescue boat and its full complement of persons and equipment, or equivalent load. When the boat has reached its maximum lowering speed and before the boat enters the water, the brake should be abruptly applied.

3.3 Following these tests, the brake pads and stressed structural parts should be re-inspected.

Note:

In loading the boat for this test, precautions should be taken to ensure that the stability of the boat is not adversely affected by free surface effects or the raising of the centre of gravity.

4 OVERHAUL OF ON-LOAD RELEASE GEAR

Overhaul of on-load release gear includes:

.1 dismantling of hook release units;

.2 examination with regard to tolerances and design requirements;

.3 adjustment of release gear system after assembly;

.4 operational test as per above and with a load according to SOLAS regulation III/20.11.2.3; and

.5 examination of vital parts with regard to defects and cracks.

Note:

Non-destructive examination (NDE) techniques, such as dye penetrants (DPE), may be suitable.

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ANNEX 2

GUIDELINES ON SAFETY DURING ABANDON SHIP DRILLS USING LIFEBOATS

1 GENERAL

1.1 Introduction

1.1.1 It is essential that seafarers are familiar with the life-saving systems on board their ships and that they have confidence that the systems provided for their safety will work and will be effective in an emergency. Frequent periodic shipboard drills are necessary to achieve this.

1.1.2 Crew training is an important component of drills. As a supplement to initial shore-side training, onboard training will familiarize crew members with the ship systems and the associated procedures for use, operation and drills. On these occasions, the objective is to develop appropriate crew competencies, enabling effective and safe utilization of the equipment required by the 1974 SOLAS Convention. The time limits set out in SOLAS for ship abandonment should be considered as a secondary objective when conducting drills.

1.2 Drill frequency

Experience has shown that holding frequent drills furthers the goals of making the crew familiar with the life-saving systems on board their ships and increasing their confidence that the systems will work and will be effective in an emergency. Drills give the crew opportunity to gain experience in the use of the safety equipment and in cooperation. The ability to cope with an emergency and handle the situation, if the ship needs to be abandoned, needs to be well rehearsed. However, frequent crew changes sometimes make it difficult to assure that all on board have had the opportunity to participate in drills if only the minimum required drills are conducted. Therefore, consideration needs to be given to scheduling drills as necessary to ensure all on board have an early opportunity to become familiar with the systems on board.

1.3 Drills must be safe

1.3.1 Abandon ship drills should be planned, organized and performed so that the recognized risks are minimized and in accordance with relevant shipboard requirements of occupational safety and health.

1.3.2 Drills provide an opportunity to verify that the life-saving system is working and that all associated equipment is in place and in good working order, ready for use.

1.3.3 Before conducting drills, it should be checked that the lifeboat and its safety equipment have been maintained in accordance with the ship's maintenance manuals and any associated technical documentation, as well as noting all the precautionary measures necessary. Abnormal conditions of wear and tear or corrosion should be reported to the responsible officer immediately.

1.4 Emphasis on learning

Drills should be conducted with an emphasis on learning and be viewed as a learning experience, not just as a task to meet a regulatory requirement to conduct drills. Whether they are emergency drills required by SOLAS or additional special drills conducted to enhance the competence of the crew members, they should be carried out at safe speed. During drills, care should be taken to ensure that everybody familiarizes themselves with their duties and with the equipment. If necessary, pauses should be made during the drills to explain especially difficult elements. The experience of the crew is an important factor in determining how fast a drill or certain drill elements should be carried out.

1.5 Planning and organizing drills

1.5.1 The 1974 SOLAS Convention requires that drills shall, as far as practicable, be conducted as if there was an actual emergency.* This means that the entire drill should, as far as possible, be carried out. The point is that, at the same time, it should be ensured that the drill can be carried out in such a way that it is safe in every respect. Consequently, elements of the drill that may involve unnecessary risks need special attention or may be excluded from the drill.

1.5.2 In preparing for a drill, those responsible should review the manufacturer's instruction manual to assure that a planned drill is conducted properly. Those responsible for the drill should assure that the crew is familiar with the guidance provided in the life-saving system instruction manual.

1.5.3 Lessons learned in the course of a drill should be documented and made a part of follow-up shipboard training discussions and planning the next drill session.

1.5.4 The lowering of a boat with its full complement of persons is an example of an element of a drill that may, depending on the circumstances, involve an unnecessary risk. Such drills should only be carried out if special precautions are observed.

2 ABANDON SHIP DRILLS

2.1 Introduction

It is important that the crew who operate safety equipment on board are familiar with the functioning and operation of such equipment. The 1974 SOLAS Convention requires that sufficiently detailed manufacturers' training manuals and instructions be carried on board, which should be easily understood by the crew. Such manufacturers' manuals and instructions should be accessible for everyone on board and observed and followed closely during drills.

2.2 Guidance to the shipowner

2.2.1 The shipowner should ensure that new safety equipment on board the company's ships has been approved and installed in accordance with the provisions of the 1974 SOLAS Convention and the International Life-Saving Appliances (LSA) Code.

2.2.2 Procedures for holding safe drills should be included in the Safety Management System (SMS) of the shipping companies. Detailed procedures for elements of drills that involve a special risk should be evident from workplace assessments adjusted to the relevant life-saving appliance.

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* Refer to SOLAS regulation III/19.3.1.

2.2.3 Personnel carrying out maintenance and repair work on lifeboats should be qualified accordingly.*

2.3 Lifeboats lowered by means of falls

2.3.1 During drills, those responsible should be alert for potentially dangerous conditions and situations and should bring them to the attention of the responsible person for appropriate action. Feedback and improvement recommendations to the shipowner, the Administration and the system manufacturer are important elements of the marine safety system.

2.3.2 When performing drills with persons on board a lifeboat, it is recommended that the boat first be lowered and recovered without persons on board to ascertain that the arrangement functions correctly. In this case, the boat should then be lowered into the water with only the number of persons on board necessary to operate the boat.

2.3.3 To prevent lashings or gripes from getting entangled, proper release should be checked before swinging out the davit.

2.4 Free-fall lifeboats

2.4.1 The monthly drills with free-fall lifeboats should be carried out according to the manufacturer's instructions, so that the persons who are to enter the boat in an emergency are trained to embark the boat, to take their seats in a correct way and to use the safety belts; and also are instructed on how to act during launching into the sea.

2.4.2 When the lifeboat is free-fall launched as part of a drill, this should be carried out with the minimum personnel required to manoeuvre the boat in the water and to recover it. The recovery operation should be carried out with special attention, bearing in mind the high risk level of this operation. Where permitted by SOLAS, simulated launching should be carried out in accordance with the manufacturer's instructions, taking due note of the Guidelines for simulated launching of free-fall lifeboats at appendix.

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* Refer to the Guidelines for periodic servicing and maintenance of lifeboats, launching appliances and on-load release gear (see annex 1).

APPENDIX

GUIDELINES FOR SIMULATED LAUNCHING OF FREE-FALL LIFEBOATS

1 Definition

Simulated launching is a means of training the crew in the free-fall release procedure of free-fall lifeboats and in verifying the satisfactory function of the free-fall release system without allowing the lifeboat to fall into the sea.

2 Purpose and scope

The purpose of these Guidelines is to provide a basic outline of essential steps to safely carry out simulated launching. These Guidelines are general; the lifeboat manufacturer's instruction manual should always be consulted before conducting simulated launching. Simulated launching should only be carried out with lifeboats and launching appliances designed to accommodate it, and for which the manufacturer has provided instructions. Simulated launching should be carried out under the supervision of a responsible person who should be an officer experienced in such procedures.

3 Typical simulated launching sequence

3.1 Check equipment and documentation to ensure that all components of the lifeboat and launching appliance are in good operational condition.

3.2 Ensure that the restraining device(s) provided by the manufacturer for simulated launching are installed and secure and that the free-fall release mechanism is fully and correctly engaged.

3.3 Establish and maintain good communication between the assigned operating crew and the responsible person.

3.4 Disengage lashings, gripes, etc., installed to secure the lifeboat for sea or for maintenance, except those required for simulated free-fall.

3.5 Participating crew board the lifeboat and fasten their seatbelts under the supervision of the responsible person.

3.6 All crew, except the assigned operating crew, disembark the lifeboat. The assigned operating crew fully prepares the lifeboat for free-fall launch and secures themselves in their seats for the release operation.

3.7 The assigned operating crew activates the release mechanism when instructed by the responsible person. Ensure that the release mechanism operates satisfactorily and, if applicable, the lifeboat travels down the ramp to the distance specified in the manufacturer's instructions.

3.8 Resecure the lifeboat to its stowed position, using the means provided by the manufacturer and ensure that the free-fall release mechanism is fully and correctly engaged.

3.9 Repeat procedures from 3.7 above, using the back-up release mechanism when applicable.

3.10 The assigned operating crew disembarks the lifeboat.

3.11 Ensure that the lifeboat is returned to its normal stowed condition. Remove any restraining and/or recovery devices used only for the simulated launch procedure.

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Ref. T3/1.01

CSC.1/Circ.137
10 June 2009

INTERNATIONAL CONVENTION FOR SAFE CONTAINERS (CSC), 1972, AS AMENDED

Amendments to the Guidance on serious structural deficiencies in containers (CSC/Circ.134)

1 The Maritime Safety Committee, at its eighty-sixth session (27 May to 5 June 2009), having considered a proposal by the Sub-Committee on Dangerous Goods, Solid Cargoes and Containers, at its thirteenth session, approved amendments to the Guidance on serious structural deficiencies in containers, set out in the annex.

2 Member Governments are invited to bring the annexed amendments to the attention of the parties concerned.

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ANNEX

AMENDMENTS TO THE GUIDANCE ON SERIOUS STRUCTURAL DEFICIENCIES IN CONTAINERS (CSC/Circ.134)

The existing text of the column SERIOUS STRUCTURAL DEFICIENCY and row "Corner and intermediate fittings (Castings)" in the table in paragraph 1 is replaced by:

> "Missing corner fittings, any through cracks or tears in the fitting, any deformation of the fitting that precludes full engagement of securing or lifting fittings, any deformation of the fitting beyond 5 mm from its original plane, any aperture width greater than 66 mm, any aperture length greater than 127 mm, any reduction in thickness of the plate containing the top aperture that makes it less than 23 mm thick or any weld separation of adjoining components in excess of 50 mm in length."

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Ref. T5/1.11(f)

MSC-MEPC.4/Circ.3
19 December 2008

PORT STATE CONTROL-RELATED MATTERS

Blanking of bilge discharge piping systems in port

1 The Maritime Safety Committee and the Marine Environment Protection Committee have become aware of several instances where deficiencies have been raised by port State control officers and other surveyors concerning requiring the ship's crew to blank off bilge pumping overboard discharges. This practice is in contravention of SOLAS regulation II-1/21, as the bilge pumping arrangement is rendered inoperative and leads to a potentially dangerous situation where the ship is left unable to efficiently and promptly tackle an emergency situation in case of flooding or fire.

2 The Committees, being concerned about the above situation, request full compliance with the requirements of SOLAS regulation II-1/21 in relation to those bilge discharge piping systems whose primary purpose is to secure the ship's safety in the event of emergency situations, such as fire or flooding and which, as such, must be available for use at all times.

3 Consequently, the Marine Environment Protection Committee, at its fifty-eighth session (6 to 10 October 2008) and the Maritime Safety Committee, at its eighty-fifth session (26 November to 5 December 2008), approved the issuance of this circular and invited Member Governments to bring its content to the attention of their maritime and port authorities, including port State control officers.

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MSC.1/Circ.1329
11 June 2009

GUIDELINES FOR UNIFORM OPERATING LIMITATIONS OF HIGH-SPEED CRAFT

1 The Maritime Safety Committee, at its eighty-sixth session (27 May to 5 June 2009), recognizing that unrestricted operation is not suitable for high-speed craft and that, therefore, operating limitations are necessary, approved the Guidelines for uniform operating limitations of high-speed craft, prepared by the Sub-Committee on Ship Design and Equipment at its fifty-second session, as set out in the annex.

2 Member Governments are invited to utilize the annexed Guidelines when applying the Permit to Operate High-Speed Craft provisions of the 2000 HSC Code and to bring them to the attention of all parties concerned.

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ANNEX

GUIDELINES FOR UNIFORM OPERATING LIMITATIONS OF HIGH-SPEED CRAFT

1 INTRODUCTION

1.1 An explicit element of the Code of Safety for High-Speed Craft, 2000 (2000 HSC Code – "the Code") is that unrestricted operation is not suitable for high-speed craft and that operating limitations are necessary. In this regard, attention is drawn to paragraphs 1.2, 1.3.4 and 1.4.61 of the Code.

1.2 These Guidelines for uniform operating limitations of high-speed craft have been prepared to assist in the uniform implementation of the Code as amended in 2007, in particular paragraph 1.9.7 and annex 12, and to provide information on the rationale underpinning such operating limitations.

1.3 It should be noted that the factors listed in annex 12 of the Code are prefaced by the words "as a minimum" and may, where appropriate, be supplemented by other factors where the flag and/or port State Administrations are of the view that those additional factors are applicable to the satisfactory operations of the craft under the Permit to Operate.

1.4 Matters determining the operating limitations set out in the craft's Permit to Operate, as outlined in these Guidelines, may relate to one or more of the following three sectors:

.1 those affecting the safety of the craft as a whole;

.2 those specifically affecting the safety of the passengers and crew as individuals; and

.3 those affecting the safety of persons outside the craft.

1.5 The operating limitations established under these Guidelines should relate to the craft's normal operations. For example, if an automatic ride control system is normally used in conditions approaching the *worst operating conditions*, then that system should be assumed operational for the establishment of the operating limitations but should also be included in the FMEA analysis specified in the Code.

1.6 Any operating limitations resulting from consideration of all the relevant factors outlined in the following sections of these Guidelines should define the permitted operational envelope for the craft. Those limitations should be described in clear but succinct terms on the Permit to Operate and the Craft Operating Manual and clearly communicated to the craft's operating personnel.

2 MAXIMUM DISTANCE FROM REFUGE

2.1 Paragraph 1.3.4 of the Code gives time limits for passenger craft (4 hours) and cargo craft (8 hours) for the passage to a *place of refuge* (defined in paragraph 1.4.48 of the Code) when proceeding at 90% of *maximum speed* (as defined in paragraph 1.4.38 of the Code). This is to allow the craft to operate solely in areas where the necessary shore-based support is available and to safely retire to shelter in the event of changes in the weather and sea state.

2.2 This limitation is generally set by the referenced provisions of the Code, but should be clearly stated in the craft's documentation and shown on the Permit to Operate unless covered indirectly (e.g., by coordinates of boundaries of the operational area).

2.3 The maximum distance from base port or place of refuge should be established in accordance with paragraph 18.1.4 of the Code, taking account of the relevant limits specified in paragraph 1.3.4 of the Code.

3 AVAILABLE RESCUE AND OPERATIONAL SUPPORT RESOURCES

3.1 In some cases, the operating limitations are functions of the resources available on the route, rather than the craft's limitations. Specifically, the Code is predicated on adequate communications facilities, weather forecasts and maintenance facilities being available within the area of craft operation. Taken in conjunction with the requirement for proximity to place of refuge, the weather forecast requirement is intended to facilitate timely decision-making with regard to seeking refuge.

3.2 In setting the operating limitations, Administrations should consider whether the wave height corresponding to the w*orst intended conditions* should be such as to permit the craft to complete its passage without relying on a drastic reduction in speed, thus increasing the exposure of the passengers and crew to progressively more severe conditions. Such consideration relates to the craft being considered its own best survival craft in deteriorating conditions.

3.3 Paragraph 1.2.7 of the Code states: "*in the intended area of operation, suitable rescue facilities will be readily available*". Further, paragraph 1.4.12.1 states that a category A high-speed craft is one "*operating on a route where it has been demonstrated to the satisfaction of the flag and port States that there is a high probability that in the event of an evacuation at any point of the route all passengers and crew can be rescued safely within the least of:*

- *the time to prevent persons in survival craft from exposure causing hypothermia in the worst intended conditions,*

- *the time appropriate with respect to environmental conditions and geographical features of the route, or*

- *4 hours*".

3.4 The words "a high probability" in this text should be taken to mean that the probability of an evacuation **not** being successful is "remote" as defined in annex 3 of the Code.

3.5 Although the Code gives no guidance on what constitutes "suitable rescue facilities", the Permit to Operate should only be issued where the flag and relevant coastal State Administrations are satisfied that appropriate measures have been implemented and an appropriate assessment made that demonstrates to their satisfaction that the Code's requirements are met across the operational area in accordance with paragraph 18.2.2.4 of the Code. For this purpose Administrations may require the application for the Permit to Operate to be accompanied by an analysis of shipping traffic and other resources likely to be available in the operating area in the event that the craft evacuates and rescue is required. Assessment of suitable rescue facilities through trial evacuation or rescue exercise may be highly beneficial in identifying gaps and weaknesses and in improving overall performance in preparation for an actual rescue, but should not normally be required.

3.6 Appropriate consideration should be given to the seasonal availability of resources. For example, presence of ice due to seasonal variation may render a specified place of refuge unusable due to navigational safety considerations.

4 WIND FORCE, MINIMUM AIR TEMPERATURE, VISIBILITY AND DEPTH OF WATER

4.1 Paragraph 1.4.61 of the Code, in defining the *worst intended conditions*, makes specific reference to the following parameters, which should therefore appear on the Permit to Operate, when appropriate:

.1 significant wave height (refer to section 5 of these Guidelines);

.2 wind force (refer to chapter 2, paragraph 1.1.4 of annex 6, paragraphs 1.3 and 2.2 of annex 7 and paragraphs 1.1 and 2.1.4.3 of annex 8 of the Code. For example, in worst intended conditions the maximum wind pressure should not exceed that used in the craft's stability calculations, nor should it create aerodynamic lift beyond that associated with the craft's normal operating attitude);

.3 minimum air temperature (reference for example brittle fracture properties of materials, susceptibility to icing and resulting effect on stability, etc.);

.4 visibility (e.g., conditions of impaired vision and night navigation may necessitate improved navigation equipment or night vision equipment); and

.5 minimum safe water depth (e.g., safe navigation, bottom scouring, adverse effects on seabed flora and fauna, wash waves (see paragraph 7.2 below).

4.2 The matters outlined in the preceding paragraph are intended to only comprise an illustrative and non-exhaustive list. They may be supplemented by Administrations to include, for example, the effect of sea ice on the craft's structure, propellers, rudders and sea intakes and its ability to navigate safely and reach a place of refuge.

5 SEA STATE LIMITATIONS – SIGNIFICANT WAVE HEIGHT

5.1 General

5.1.1 The *worst intended* sea *conditions* are usually set in terms of a *significant wave height* value as defined in paragraph 1.4.54 of the Code. These Guidelines have been prepared on the assumption that this parameter is used but the underlying principles are still applicable if another parameter is used. In applying the Guidelines, it should be noted that craft motions are dependent upon wave period as well as significant wave height.

5.1.2 For operational purposes, significant wave height is most reliably measured either by satellite or by a system providing real-time monitoring of the height between the sea surface and a point on the craft in conjunction with gyroscopic measurement of accelerations at that point. Alternatively, significant wave height readings could be provided by transmitting-type wave measurement buoys located along the route. In the absence of such systems, visual observations of significant wave height will be necessary, for which the guidance provided in appendix 1 may be used.

5.1.3 Sea state limitations applicable to a craft may vary according to the craft's course relative to waves, but for each course should not be greater than the lowest sea state derived from taking account of the factors listed in the remainder of this section.

5.2 Damage stability

In paragraph 2.6.11 of the Code, the required minimum residual freeboard to downflooding is a function of the significant wave height corresponding to the w*orst intended conditions.*

5.3 Structural safety

5.3.1 It is clearly vital to the structural integrity of a high-speed craft that the craft is not operated outside the limitations to which the structure has been designed.

5.3.2 In this regard, and bearing in mind the equivalence of safety standards of craft covered by the Code with those of SOLAS in accordance with SOLAS chapter X, it should be noted that SOLAS regulation II-1/3-1 requires that:

> "*… ships shall be designed, constructed and maintained in compliance with the structural, mechanical and electrical requirements of a classification society which is recognized by the Administration in accordance with the provisions of regulation XI-1/1, or with applicable national standards of the Administration which provide an equivalent level of safety*".

5.3.3 Some classification society rules base their structural loadings on a limiting vertical acceleration at the longitudinal centre of gravity. In order to avoid exceeding this structural limitation, the societies may issue the craft with a diagram developed from this assumption, which relates the maximum permitted speed of the craft to the prevailing significant wave height. Refer to paragraph 8.2 of these Guidelines in relation to presentation of the resulting operating limitations, which may be determined by other factors in accordance with paragraph 1.6.

5.3.4 Sometimes speed reduction in waves may be involuntary, due to increased resistance. But deliberate speed reduction is generally necessary in order to stay within safe limits in high sea states.

5.4 Dynamic stability

5.4.1 Safe operation of most high-speed craft is significantly affected by the sea state. Safe seakeeping limitations may be as a result of some of the examples listed in paragraphs 2.1.5 and 17.5.4.1 of the Code, including most particularly: propensity to deck diving or broaching; incidence of hull or wet-deck slamming; plough-in, yawing and turning. Refer to the guidance information in appendix 2 in relation to operations in following and quartering seas.

5.4.2 Implied but not explicit these limitations should also include excessively violent motions affecting the passengers and crew (see also section 5.6 of these Guidelines).

5.4.3 Paragraph 18.1.3.2 of the Code requires that the Administration be satisfied that the operating conditions on the intended route are within the capabilities of the craft. This should be verified during the trials conducted in accordance with annex 9 and invoked by paragraph 17.2.1 of the Code.

5.4.4 Administrations should note that paragraph 3.1.2 of annex 9 of the Code explicitly states that "*worst intended conditions, referred to in 1.4.57 of this Code, are those in which it shall be possible to maintain safe cruise without exceptional piloting skill. However, operations at all headings relative to the wind and sea may not be possible*". This provision should be taken into account when setting operating limitations in relation to dynamic stability.

5.5 Safe deployment of evacuation systems and survival craft

5.5.1 The Code places great emphasis on the ability to evacuate a high-speed craft quickly and safely, the maximum evacuation time being linked (in paragraph 4.8.1) to the structural fire protection time. To this end, paragraph 8.6.5 of the Code requires that: "*Survival craft shall be capable of being launched and then boarded ... in all operational conditions and also in all conditions of flooding ...*".

5.5.2 "All operational conditions" includes all intact loading conditions without reference to environmental conditions. "All conditions of flooding" was included to take account of the need to provide for evacuation of the craft under the damage conditions defined in chapter 2 of the Code.

5.5.3 Where the craft is to be evacuated by MES complying with the requirements of the Code, the Code assumes that the environmental conditions required for the heavy weather sea trial (in accordance with paragraph 12.6 of the Revised recommendation on testing of life-saving appliances (resolution MSC.81(70) as amended) provide an assurance of operability of the MES in heavy weather. Experience has shown that heavy weather sea trials in more severe conditions than those specified for type approval of MES involve substantial physical danger for the personnel involved.

5.5.4 Where the craft is to be evacuated directly into survival craft in accordance with paragraph 8.7.5 of the Code without the use of MES, Administrations may require evacuation trials on the craft or an identical sister high-speed craft to be conducted in weather and sea conditions up to the *worst intended conditions* specified in the Permit to Operate, in order to assure itself that such evacuation can be carried out safely in such conditions.

5.6 Safe handling limitations

5.6.1 The Code makes reference to three safety levels (see table 1 in annex 3) and prescribes the acceptable probability that each safety level may occur. Level 1 is expected to have a probability of occurrence of greater than 10^{-5}, i.e. frequent or reasonably probable. Table 1 in annex 3 reveals that for Safety Level 1 (minor effect) it only prescribes that horizontal accelerations should not exceed 0.2 g.

5.6.2 In applying these standards it should be noted that paragraph 4.3.1 of the Code advises that superimposed vertical accelerations exceeding 1 g at the longitudinal centre of gravity should be avoided "unless special precautions are taken with respect to passenger safety". For vertical accelerations exceeding 1 g then hazards for safe seating of passengers and crew will ensue.

5.6.3 Similarly, table 1 in annex 3 of the Code stipulates acceptable maximum horizontal accelerations for severe and extreme operating conditions.

5.6.4 Table 2 in annex 3 of the Code makes it clear that Safety Level 2 relates to conditions when emergency procedures are required and passengers may be injured, and Level 3 to conditions when there is a large reduction in safety margins, and serious injury to a small number of occupants may occur.

5.6.5 The upper limit of Level 2 corresponds to the *worst intended conditions* – see paragraph 3.3.2 of annex 9 of the Code. Passengers must be seated before the onset of Level 2 in accordance with the Code provisions in paragraph 4.2.4 and annex 9, paragraph 3.3.2.

5.6.6 Many forms of high-speed craft may have safe handling limitations as suggested in paragraph 17.5.4.1 of the Code, for example:

.1 Amphibious hovercraft may have to avoid certain speed and drift angle combinations in order that plough-in or skirt tuck-under and possible capsizing do not occur.

.2 Many forms of high-speed craft may have to avoid excessive bow-down trim in order to preserve safe manoeuvring behaviour, such as avoidance of bow-diving or broaching (see paragraph 17.2.1 of the Code).

.3 Guidance in this safe handling may be obtained from appendix 2 and the Revised Guidance to the master for avoiding dangerous situations in adverse weather and sea conditions (MSC.1/Circ.1228), as appropriate, bearing in mind that the latter document is largely addressed to conventional ships.

5.6.7 Chapter 17 of the Code requires full-scale testing to determine operating limitations and procedures for operation of the craft within limitations. Annex 9 defines the test procedures needed to develop these operational limits. In particular section 3 of annex 9 and table 1 of annex 3 define the horizontal and vertical acceleration levels which must not be exceeded to ensure passenger safety. Under normal operation conditions, craft must not exceed Safety Level 1 (0.2 g in horizontal plane) at maximum operating speed as per paragraph 3.3 of annex 9 of the Code. In worst intended conditions, craft should not exceed Safety Level 2 (0.35 g in horizontal plane). Vertical acceleration measurements are also required by annex 9, and these limits are driven by structural limitations for which craft must not exceed the limiting vertical acceleration at the longitudinal centre of gravity as per paragraph 4.3.1 of the Code and paragraph 5.3.3 of these Guidelines. The above limits, trial results, and the significant wave height to speed table inform the process of defining operational limits. It should be noted that paragraph 17.4 of the Code requires the trials conducted under annex 9 to include verification of the effects of failure(s) identified as being critical.

5.6.8 Although paragraph 17.1 of the Code makes provision for use of data from model tests where appropriate, wherever practicable use of such data should be confirmed by suitable trials of the craft or an identical craft. Model tests should be used to evaluate safe limits in situations that would be hazardous to investigate during sea trials. For these purposes, model tests should be taken to include mathematical modelling as well as testing of a physical model.

5.6.9 The references to vertical accelerations in paragraph 4.3.1 and table 1 of annex 3 of the Code should be interpreted as referring to the mean of the $1/100^{th}$ highest accelerations (not RMS), which should be measured using the criteria of footnote 1 to table 1 of annex 3.

6 TRIALS DEMONSTRATING PERFORMANCE IN RELATION TO OPERATING LIMITATIONS

6.1 The *worst intended conditions* of wind and sea may not be available for the conduct of the verification trials required by chapter 17 of the Code, in which case some extrapolation of satisfactory trial results may be necessary. Any extrapolation should take account of the non-linear nature of seakeeping behaviour and of variation in wave period (frequency) and height (amplitude). In such cases, the *worst intended conditions* specified on the craft's Permit to Operate should not be more than 130% of the significant wave height in which the verification trials were conducted. Extrapolation of wave period should be conducted separately from wave height. Where satisfactory trials have been completed on a craft, those trials are not required on subsequent identical sister craft, provided the operational envelope of wave height and wave period is not significantly changed. Any extrapolation based on trial results of another closely similar design of similar size (length and breadth both within 5% of that of the craft in question) should be verified through trials of the new craft. Extrapolation is not applicable to trials conducted under section 5.5 of these Guidelines.

6.2 In order that extrapolation of wave height may be conducted in a consistent manner, a minimum wave period should be associated with each significant wave height used to establish the *worst intended conditions*.

7 NAVIGATIONAL MATTERS

7.1 Casualties to high-speed craft have illustrated that there are number of navigational circumstances that need to be taken into account when establishing the operating limitations under the Permit to Operate. These include:

.1 adequacy of fixed aids to navigation on the route;

.2 night vision with regard to unlit obstacles; and

.3 other restricted visibility.

7.2 Administrations should note that paragraph 3.1.2 of annex 9 of the Code explicitly states that "*worst intended conditions, referred to in 1.4.57 of this Code, are those in which it shall be possible to maintain safe cruise without exceptional piloting skill. However, operations at all headings relative to the wind and sea may not be possible*". This provision can be taken into account by Administrations when setting operating limitations in relation to the craft's course-keeping and ability to follow alternative courses in worsening weather and sea conditions.

7.3 Minimum safe water depth may relate to local environmental regulations or hazards to other craft, persons and property in the operational area in addition to navigational safety. For example, Administrations may require investigation of wash waves generated by the craft that are hazardous to nearby small craft and persons on the shoreline, investigation of environmental hazards due to erosion, and any restrictions on craft speed on the specific route in relation to water depth* in order to avoid these hazards should be stipulated in the Permit to Operate.

* For wake wash waves this is based on depth Froude Number but is also dependent on the depth profile adjacent to the shore.

7.4 Where a route is considered to be especially vulnerable to grounding or stranding, Administrations may require a risk assessment of these hazards, considering the applicability of, for example:

.1 minimum safety margins around particular hazards on the route;

.2 reduced speed during critical sections of the route; or

.3 requiring two navigators in the operating compartment during critical sections of the route.

8 PRESENTATION OF OPERATING LIMITATIONS

8.1 All operating limitations shown on the Permit to Operate, irrespective of whether they relate, for example, to geographical boundaries or limits of wind, weather and sea conditions, should be presented in a manner that provides simple and clear direction to the craft's personnel and should be immediately available to the operator in the operating compartment. Wherever practicable, the information should be posted in a prominent position in the operating compartment readily visible from the operator's position(s). Supplementary and more detailed information may be provided in the Craft Operating Manual or Route Operational Manual, as appropriate.

8.2 The presented information should not extend beyond the limits of permitted operations unless clearly labelled with the purpose of the extended information. Where additional information is provided, for example to place the boundaries of the operating area in geographic context, the presentation should be such as to clearly indicate that operations outside those boundaries are not permitted.

8.3 Limitations with regard to significant wave height, if varied according to heading, may be presented in a number of forms, including:

.1 polar diagram showing safely attainable speed versus wave height and relative heading, since the safe speed in head seas will often be less than that attainable on other headings (see figure 1); or

.2 graph(s) having different lines for heading angles from head through to stern at intervals of not more than 15º (see figure 2).

8.4 Permanently installed instruments may be provided to guide the craft's personnel in maintaining safe operating conditions, particularly in respect of structural safety, through direct onboard monitoring of vertical and lateral accelerations and/or measurement of wave height. Where the operational limitations include limiting sea conditions covering hazards other than those covered by the instrumentation, the specified limiting sea conditions should not be exceeded irrespective of the guidance information provided by the instrumentation system. The instrumentation should:

.1 be calibrated and verified by, or on behalf of, the flag Administration as providing clear, accurate and reliable information to operating personnel for the safe operation of the craft in accordance with paragraph 4.2.4 of the Code;

.2 meet the requirements of paragraph 17.1 of the Code for the conduct of verification trials;

.3 be supplemented by sea state limitations that are to be adhered to in the event of failure of the instrumentation; and

.4 trials required by annex 9 of the Code in relation to areas monitored by the instrumentation should be limited to those necessary under subparagraph .1 above for verification of the instrumentation system.

8.5 Where the information provided in accordance with paragraph 8.1 is not consolidated so as to cover all hazard areas in a single display or document, its presentation should unambiguously facilitate simultaneous compliance with **all** operational limitations listed on the Permit to Operate, addressing as appropriate all the hazards associated with the safe operation of the craft such as those covered in all the preceding sections of these Guidelines.

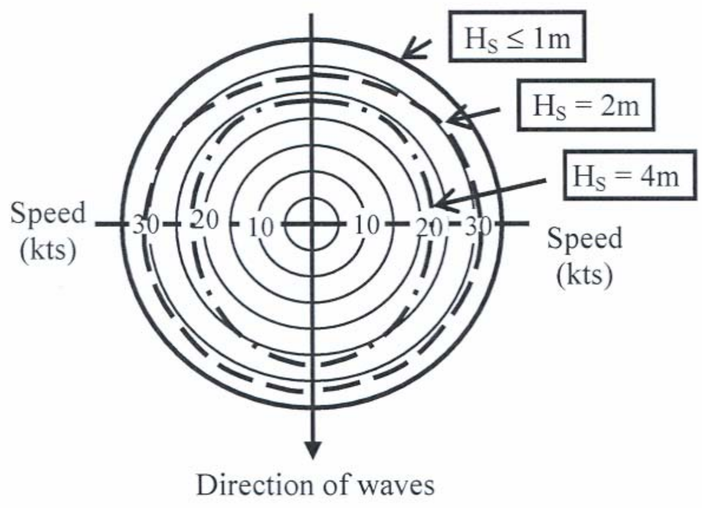

Figure 1

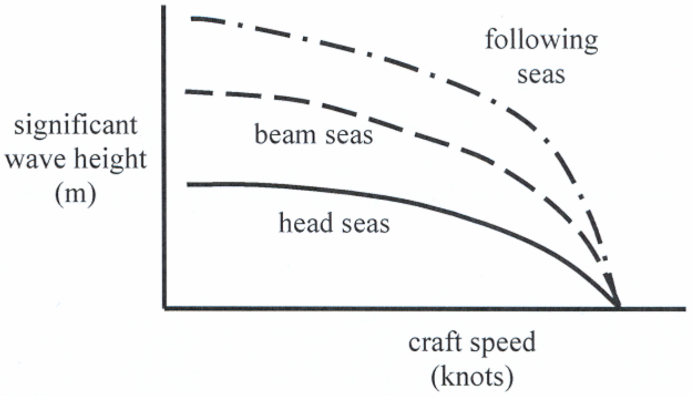

Figure 2

* * *

APPENDIX 1

VISUAL ESTIMATION OF SIGNIFICANT WAVE HEIGHT*

1 A typical record of wave traces is shown in figure 1 below.

2 The record is, in general, complex and shows immediately all the difficulties inherent in eye observation. For example, are all the waves to be considered on an equal footing or are only the big waves to be counted? Since the wave characteristics vary so much, what average values shall be taken? It is obvious that if comparable results are to be obtained the observer must follow a definite procedure. The flat and badly formed waves ("A" in figure 1) between the wave groups cannot be observed accurately by eye and different observers would undoubtedly get different results if an attempt were made to include them in the record. The method to be adopted, therefore, is to observe only the well-formed waves in the centre of the wave groups. The observation of waves entails the measurement or estimation of the following characteristics:

Direction Period Height

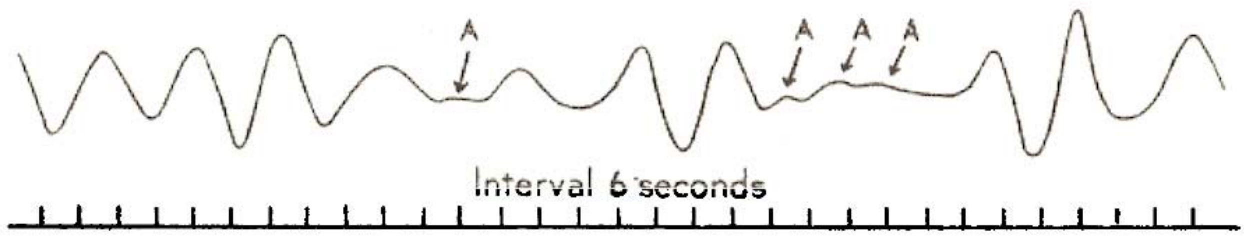

Figure 1 – Wave form of the sea surface

3 Reliable average values of period and height can only be obtained by observing at least twenty waves. Of course, these cannot be consecutive; a few should be selected from each succeeding wave group until the required number has been obtained. Only measurements or quite good estimates are required. Rough guesses have little value and should not be recorded. It will often be found that there are waves coming from more than one direction. For example, there may be a sea caused by the wind then blowing and a swell caused by a wind that has either passed over or is blowing in a distant area. Or there may be two swells (i.e. cross swells) caused by winds blowing from different directions in distant areas. In such cases, the observer should distinguish between sea and swell, and report them separately, giving two groups for swell when appropriate. The direction, height and period of the sea wave may be quite different from that of the swell wave. It will, however, often happen – particularly with winds of Beaufort force 8 and above – that the sea and swell waves are both coming from the same direction. In that case, it is virtually impossible to differentiate between sea and swell, and the best answer is to look upon the combined wave as being a sea wave and log it accordingly.

* Reproduced from Meteorological Office (UK), *The Marine Observers Handbook*, Her Majesty's Stationery Office, London, 1969.

Observing waves from a moving ship

4 Care should be taken to ensure that the observations, especially those of period, are not influenced by the waves generated by the motion of the ship.

4.1 DIRECTION FROM WHICH THE WAVES COME. This is easily obtained either by sighting directly across the wave front or by sighting along the crests of the waves and remembering that the required direction differs from this by 90º. Direction is always recorded true, not magnetic.

4.2 PERIOD*. For measurements of period, a stopwatch is desirable. If this is not available, an ordinary watch with a seconds hand may be used or, alternatively, a practised observer may count seconds. The observer selects a distinctive patch of foam or a small object floating on the water at some distance from the ship, and notes the time at which it is on the crest of each successive wave. The procedure is repeated for the larger waves of each successive group until at least twenty observations are available. The period is then taken as the average time for a complete oscillation from crest to crest. In a fast ship it will be found that the "patch of foam" method will rarely last for more than one complete oscillation and that many waves should be observed separately. With practice, suitable waves can easily be picked out and the timing from crest to crest becomes quite simple. When it is desired to use an object (an empty beer can is usually conspicuous against the sea and will remain afloat long enough to serve its purpose) it should be thrown as far forward as possible. Another method available to the observer with a stopwatch is to observe two or more consecutive "central" waves of a wave group while the watch is running continuously, then to stop the watch until the central waves of the next wave group appear, the watch being then restarted. This procedure is repeated until at least twenty complete oscillations have been observed. The period is then obtained by dividing the total time by the number of oscillations. It is important to note that the periods between times of crests passing a point on the ship are not the ones required.

4.3 HEIGHT. Although wave-recorders are fitted to a few research ships, there is at present no method of measuring the height of waves suitable for general use on merchant ships, but a practised observer can make useful estimates. The procedure to be adopted depends on the length of the waves relative to the length of the ship. If the length of the waves is short in comparison with the ship's length, i.e. if the ship spans two or more wave crests, the height should be estimated from the appearance of the waves at or on the side of the ship, at times when the pitching and rolling of the ship is least. For the best result, the observer should take up a position as low down the ship as possible, preferably amidships where the effect of pitching is least, and on the side of the ship towards which the waves are coming.

4.3.1 This method fails when the length of the waves exceeds the length of the ship, for then the ship rises bodily with the passage of each wave crest. The observer should then take up a position in the ship so that his eye is just in line with the advancing wave crest and the horizon, when the ship is vertical in the trough. The height of eye above the ship's waterline is then the height of the wave. The nearer the observer is to an amidships position, the less chance will there be of the measurement being vitiated by pitching. If the ship rolls heavily, it is particularly important to make the observation at the moment when she is upright in the trough.

* There are several different definitions of wave period, such as modal period, zero up-crossing period, etc. The visual observation of wave period does not necessarily represent the necessary wave periods required for numerical processing, and corrections should be made as appropriate.

Exaggeration of estimates of wave height is mostly due to errors caused by rolling (see figures 2.1 and 2.2). When the ship is rolling (figure 2.2), the observer at "0" should take up a higher position to get a line on the horizon than when she is upright (figure 2.1).

Figure 2.1

Figure 2.2

4.3.2 The observation of height of waves is most difficult when the length of the waves exceeds the length of the ship and their height is small. The best estimate of height can be obtained by going as near the water as possible, but even then the observation can only be rough. In making height estimates an attempt should be made to fix a standard of height in terms of the height of a man or the height of a bulwark, forecastle or well-known dimension in the ship. There is generally a tendency to overestimate the height of short waves and underestimate the height of long waves.

4.3.3 Estimating the height of a wave from a high bridge in a fast ship is a difficult job and much will depend on the skill and ingenuity of the observer; in many cases all one can hope for is a very rough estimate. All estimates of wave height should be made preferably with the ship on an even keel so that the observer's height of eye is consistent. The inherent difficulties already mentioned, together with the practical difficulties of estimation, make it essential that the recorded height be the average value of about twenty distinct observations. These observations should be made on the central waves of the more prominent wave groups.

Wave observations at night or in low visibility

5 Under these conditions, the most that the observer can normally hope to record is direction and an estimate of height, or perhaps direction only, which would at least indicate the presence of waves. Such observations might be of considerable value in tropical waters in the hurricane season. It is only on very bright nights that the observation of period would be practicable.

* * *

APPENDIX 2

GUIDANCE FOR OPERATION OF HIGH-SPEED CRAFT IN FOLLOWING AND STERN-QUARTERING SEAS

1 GENERAL

1.1 This note has, as its primary aim, the provision of advice to mariners on what to expect and how to handle a high-speed craft in severe following and stern-quartering seas. The guidance offered here is based, not only on the recent research, but also on the accumulated experience of practising mariners.

1.2 The principal hazards likely to be experienced by a high-speed craft in severe following or stern-quartering seas are surfing, bow-diving and broaching.

1.3 The master will be in a better position to avoid dynamic problems if he has instruments that inform of the behaviour of his vessel and information on the sea states he is likely to encounter on the voyage. These parameters include vessel speed, heading, vertical acceleration, longitudinal acceleration, wave forecasts and current sea state.

1.4 Following seas refer to seas which are dead astern while stern-quartering seas refer to wave directions between dead astern and 45^{o} from dead astern.

1.5 Bar crossings may involve behaviours similar to a number of those outlined in this appendix. As this guidance is of a general nature, it does not include specific information on bar crossing for which the hazards and behaviours are highly variable according to the individual circumstances. Specific information in this regard in relation to the craft and its route should be provided in the Route Operational Manual.

1.6 It should be noted that the advice given in this note is for guidance only and should augment and not replace the skill and judgement of the mariner, or the tenets of good seamanship.

2 CRITICAL BEHAVIOUR IN FOLLOWING AND STERN-QUARTERING SEAS

2.1 Trapping

2.1.1 Trapping can occur when the craft is moving directly down-wave in waves whose length is roughly equal to the waterline length of the vessel. When cresting one wave, the craft will experience a reduction in resistance, which will cause it to accelerate into the trough ahead and immerse its fore-body in the next wave. If this does not result in a bow dive, the craft will experience a significant increase in resistance that will slow it down to the speed of the waves. It can be the precursor to a bow-dive.

2.1.2 ***Warning signs:***

- .1 moving at the speed of the wave, see table 1; **and**
- .2 one wave crest at the stern and another at the bow; **and**
- .3 wave height greater than 4% craft waterline length;
- .4 craft becomes trapped between two successive crests.

2.1.3 ***Corrective action:***

.1 slow down and allow the waves to draw ahead.

2.2 Surging and surfing

2.2.1 When a high-speed craft is moving in following seas which are directly astern and where the wave length is about the same as or greater than the vessel length, it may accelerate and decelerate in surge as the crests pass. Such surge velocities may differ by as much as 50% of the average speed and are caused by significant changes in resistance and propulsive efficiency as the waves pass. Without warning the craft may accelerate rapidly to the speed of the wave and surf. Surfing is best avoided if at all possible because of the almost total loss of control that occurs while it is in progress. Surfing can be the precursor to a bow-dive, or a broach.

2.2.2 ***Warning signs:***

.1 large variations in craft speed at constant throttle;
.2 craft is moving at wave speed plus or minus 10% ($^{1}/_{10}$th), see table 1; **and**
.3 the wave length is between 1 to 2.5 times craft waterline length; **and**
.4 the craft has a slight bow-down pitch attitude, with a wave crest abaft amidships;
.5 response to steering controls is poor;
.6 breaking waves increase the tendency to surf.

2.2.3 ***Corrective action:***

.1 avoid running at wave speed (see table 1) in waves of dangerous length;
.2 if caught in a surf wait until the critical wave has passed without attempting any major helm action;
.3 afterwards, slow down.

2.3 Bow-diving

2.3.1 Bow-diving occurs when a high-speed craft buries its bow into a wave in following or stern-quartering seas. This causes all way to be lost, the vessel experiences a severe bow-down pitch and the bow becomes submerged, sometimes resulting in structural damage and injury to personnel. It is particularly severe for vessels such as catamarans with a cross deck and limited residual buoyancy forward. It is different to bow immersion in head seas as the wave behind lifts the stern and worsens the situation.

Bow-diving may have a slow onset if moving at wave speed, but may be dramatic without warning if craft is moving substantially faster than the waves.

2.3.2 ***Warning signs:***

.1 If preceded by trapping (see 2.1 above):

   .1 as for trapping; **and**
   .2 wave height greater than about 75% ($^{3}/_{4}$) of bow freeboard when stopped; **and**
   .3 waves from between directly astern and the quarter;
   .4 bow almost immersed to the deck or top of cross-structure.

.2 If craft is moving faster than the waves and:

.1 waves from between directly astern and the stern quarter; **and**
.2 wave height greater than 25% ($^1/_4$) of bow freeboard when stopped; **and**
.3 wave length 100% to 150% of the waterline length of the craft.

2.3.3 ***Corrective action:***

.1 avoidance by attention to the warning signs;
.2 avoiding any trim by the bow;
.3 slow down to less than about 70% of wave speed;
.4 alternatively, if practicable, change course, even to head seas.

2.4 Broaching

2.4.1 Broaching is a severe, and often uncontrollable, yawing movement in following seas which turns the vessel beam on to the waves resulting in a dangerously heavy roll, and a sideways sliding motion down-sea. In monohulls with insufficient stability it can result in capsize. It may be preceded by surfing.

2.4.2 ***Warning signs:***

.1 desired course slightly or appreciably across the waves, up to 45° from directly down-sea;
.2 wave length similar to craft waterline length, or slightly shorter in quartering seas; **and**

.3 craft speed similar to wave speed plus or minus 15% ($^1/_7$th), see table 1; **and**
.4 wave height greater than 4% craft waterline length; **and**
.5 bow-down attitude and bow burying into wave ahead;
.6 up-sea waterjets or propellers beginning to ventilate;
.7 severe yaw motions either side of intended course;
.8 surfing.

2.4.3 ***Corrective action:***

.1 avoid a diagonal course across the waves, i.e. up to 45° from directly down-sea;
.2 avoid running close to wave speed (see table 1) in waves of dangerous length;
.3 reduce speed to less than about 70% of wave speed;
.4 after a broach, directional control is best reasserted by reducing speed.

3 OTHER BEHAVIOUR WHICH MAY OCCUR

Masters should also be aware of the other types of behaviour that may occur, *viz*:

.1 loss of transverse stability due to loss of waterplane area when poised on a wave;
.2 slamming, which can occur with high-speed craft in following seas if their speed is at least twice the speed of the waves;
.3 synchronous rolling, which occurs in stern-quartering seas when the period of the transverse components of the waves coincides with the natural roll period of the craft;

.4 parametric rolling, which can occur in following seas if the length of time each wave takes to pass the craft is approximately equal to half the natural roll period;

.5 combinations of behaviour, such as surfing which can lead to a broach or a bow-dive; both of which can lead to further severe events such as fore-deck immersion or capsize.

4 SUMMARY

4.1 Craft speed

4.1.1 It is important that speed should be appropriate for the sea conditions. In a following or stern-quartering seas, it is comparatively easy to determine whether the craft is moving faster or slower than the dominant waves in daylight. At night-time, however, such assessments are not so easy.

4.1.2 Craft speed, it is assumed, will be known with some accuracy. If not, then, when moving at or near the dominant wave speed (and possibly trapped or in danger of surfing), pitch and heave motions will be considerably reduced, but surge motions will be significantly increased.

4.1.3 A rough idea of the speed of the dominant waves in a given sea state can be obtained from table 1, according to the type of waters in which the craft is operating.

Table 1 – Tabulated typical wave speeds (knots)

Significant wave height (m)	**1**	**2**	**3**	**4**	**5**	**6**
Coastal waves (knots)	15 - 18	17 - 23	19 - 27	20 - 30	21 - 33	23 - 35
Ocean waves (knots)	19 - 29	21 - 31	25 - 35	29 - 39	32 - 42	36 - 46

4.2 Wave length

It can be seen from the advice given above that wave length in relation to the waterline length of the craft is also important in assessing the vulnerability to adverse behaviour. It is therefore important to monitor the length of the waves in which the craft is being operated.

4.3 Tabular summary

Table 2 summarizes the guidance given in this note.

Table 2 – Summary of guidance in following and quartering seas

Behaviour	Critical craft speed		Critical wave length		Critical wave heights
Trapping	$\approx V_W$	and	$\approx L_S$	and	$> 4\% \ L_S$
Surfing	$\approx V_W \pm 10\%$	and	$\approx 1 \rightarrow 2.5 \ L_S$	and	$> 4\% \ L_S$
Bow-diving (slow)	$\approx V_W$	and	$\approx L_S$	and	$>75\%$ F
Bow-diving (sudden)	$> V_W$	and	$\approx 1 \rightarrow 1.5 \ L_S$	and	$> 25\%$ F
Broaching	$\approx V_W \pm 15\%$	and	$\approx L_S$	and	$> 4\% \ L_S$

***Key*:** $\approx$ is approximately equal; $\pm$ is plus or minus
$>$ is greater than; V_W is wave speed
L_S is ship length; F is bow freeboard when stopped

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MSC.1/Circ.1330
11 June 2009

GUIDELINES FOR MAINTENANCE AND REPAIR OF PROTECTIVE COATINGS

1 The Committee, at its eighty-sixth session (27 May to 5 June 2009), having recognized the need for Guidelines for maintenance and repair of protective coatings, taking into account the amendments to SOLAS regulations II-1/3-2 and XII/6 and the Performance standard for protective coatings for dedicated seawater ballast tanks in all types of ships and double-side skin spaces of bulk carriers, adopted by resolutions MSC.216(82) and MSC.215(82), respectively, considered the proposal by the Sub-Committee on Ship Design and Equipment, at its fifty-second session, and approved Guidelines for maintenance and repair of protective coatings, set out in the annex.

2 Member Governments are invited to apply the annexed Guidelines during survey, assessment and repair of protective coatings in ballast tanks on or after 1 January 2011 and bring them to the attention of shipowners, shipbuilders and other parties concerned.

***

ANNEX

GUIDELINES FOR MAINTENANCE AND REPAIR OF PROTECTIVE COATINGS

CONTENTS

1 GENERAL

1.1 The purpose of these Guidelines is to assist surveyors, shipowners, shipyards, flag Administrations and other interested parties involved in the survey, assessment and repair of protective coatings in ballast tanks.

1.2 The ability of the coating system to reach its target useful life depends on the type of coating system, steel preparation, the design of the structures, application and coating inspection and maintenance. All these aspects contribute to the good performance of the coating system. These Guidelines focus on maintenance and repair procedures for coatings.

1.3 Maintenance and repair of the protective coating system should be included in the ship's overall maintenance and repair scheme. The effectiveness of the protective coating system, which may include the use of anodes, should be verified during the life of a ship by the Administration or an organization recognized by the Administration.

2 APPLICATION AND DEFINITIONS

2.1 These Guidelines apply to ships as specified in SOLAS regulation II-1/3-2.1.1 and focus on maintenance and repair procedures for coatings in dedicated seawater ballast tanks of all types of ships and double-side skin spaces of bulk carriers, hereinafter referred to as "ballast tanks". They only cover in-service maintenance and repair of coatings. Corrosion prevention systems other than coating are not covered.

2.2 For the purpose of these Guidelines, the following definitions apply:

.1 *Maintenance* means minor coating restoration work regularly performed by a ship's crew using normal shipboard means and tools to maintain "GOOD" or "FAIR" coating conditions. Maintenance delays or slows down the coating deterioration and effects short term steel protection.

.2 *Repair* means coating restoration work of a longer term nature, usually performed during ship's dry-docking or scheduled repair period (ship idle) to restore the "FAIR" or "POOR" coating condition to "GOOD" condition. This will usually require specialized manpower and equipment such as sand blasting equipment, operators and dehumidifiers.

2.3 These Guidelines have been developed using the best information currently available and taking into consideration that maintenance may take place when the ship is at sea, while repair usually takes place in dry-dock or during scheduled repair periods (afloat at yard).

3 SURVEY RECOMMENDATIONS

3.1 The coating system in ballast tanks should be examined in connection with:

.1 intermediate surveys for all steel ships above 500 gross tonnage exceeding five years of age; and

.2 renewal surveys for all steel ships above 500 gross tonnage.

3.2 The condition of the coating in ballast tanks should be assigned and categorized as GOOD, FAIR or POOR based on visual inspection and estimated percentage of areas with coating failure and rusty surfaces (see table 1) and recorded*.

4 COATING CONDITIONS

4.1 "GOOD", "FAIR", "POOR"

4.1.1 The condition of the coating in ballast tanks is assigned and categorized as "GOOD", "FAIR" or "POOR", based on visual inspection and estimated percentage of areas with coating failure and rusty surfaces.

4.1.2 The definitions of coating conditions "GOOD", "FAIR" and "POOR" in the Guidelines on the enhanced programme of inspections during surveys of bulk carriers and oil tankers (resolution A.744(18)) are as follows:

GOOD: Condition with only minor spot rusting.

FAIR: Condition with local breakdown of coating at edges of stiffeners and weld connections and/or light rusting over 20% or more of areas under consideration, but less than as defined for POOR condition.

POOR: Condition with general breakdown of coating over 20% or more of areas or hard scale at 10% or more of areas under consideration.

4.1.3 These Guidelines clarify the above definitions in order to achieve unified assessment of coating conditions as follows, see also table 1 below:

GOOD: Condition with spot rusting on less than 3% of the area under consideration without visible failure of the coating. Rusting at edges or welds, should be on less than 20% of edges or weld lines in the area under consideration.

FAIR: Condition with breakdown of coating or rust penetration on less than 20% of the area under consideration. Hard rust scale should be less than 10% of the area under consideration. Rusting at edges or welds should be on less than 50% of edges or weld lines in the area under consideration.

POOR: Condition with breakdown of coating or rust penetration on more than 20% or hard rust scale on more than 10% of the area under consideration or local breakdown concentrated at edges or welds on more than 50% of edges or weld lines in the area under consideration.

* Refer to appendix 10 to IACS Recommendation 87 – Guidelines for Coating Maintenance and Repairs for Ballast Tanks and Combined Cargo/Ballast Tanks on Oil Tankers, revision 1, 2006.

Table 1 – "GOOD", "FAIR" and "POOR" coating conditions

	GOOD [3]	FAIR	POOR
Breakdown of coating or area rusted [1]	< 3%	3 – 20%	> 20%
Area of hard rust scale [1]	-	< 10%	≥ 10%
Local breakdown of coating or rust on edges or weld lines [2]	< 20%	20 – 50%	> 50%

Notes:
1 % is the percentage calculated on basis of the area under consideration or of the "critical structural area"
2 % is the percentage calculated on basis of edges or weld lines in the area under consideration or of the "critical structural area"
3 spot rusting, i.e. rusting in spot without visible failure of coating

4.1.4 The above clarifications are further exemplified in IACS Recommendation 87 via photographs along with narrative descriptions of the condition and uniform and localized assessment scales*.

4.2 Areas under consideration

4.2.1 *General*

4.2.1.1 Recognizing that different areas in the tank experience different coating breakdown and corrosion patterns, the intent of this section is to subdivide the planar boundaries of the tank for evaluation of coating into areas small enough to be readily examined and evaluated by the surveyor. However, the areas subdivided should not be so small as to be structurally insignificant or too numerous to practically report on. Coating condition in each area should be reported using current practice and terminology (frame numbers, longitudinal numbers and/or strakes numbers, etc.). Each area is then rated "GOOD", "FAIR" or "POOR" and the tank rating should not be higher than the rating of its "area under consideration" having the lowest rating**.

4.2.1.2 Special attention should be given to coating in critical structural areas which are defined*** as "locations which have been identified from calculations to require monitoring as indicated in the Coating Technical File (CTF) from new building stage or from the service history of the subject ship or from similar or sister ships (if available) to be sensitive to cracking, buckling or corrosion which would impair the structural integrity of the ship". Each critical structural area is rated "GOOD", "FAIR" or "POOR", applying table 1 and the rating of each "area under consideration" should then not be higher than the rating of its critical structural area (if present) having the lowest rating.

* Refer to appendices 8 and 9 of IACS Recommendation 87 – Guidelines for Coating Maintenance and Repairs for Ballast Tanks and Combined Cargo/Ballast Tanks on Oil Tankers, revision 1, 2006.

** Examples of how to report coating conditions with respect to areas under consideration are given in appendix 10 of IACS Recommendation 87.

*** Refer to appendix 5 of IACS Recommendation 87.

4.2.1.3 The "area under consideration" with the worst coating condition should determine the frequency of surveys, such as those addressed in resolution A.744(18) for tankers. Hence, it is not intended to "average" the coating condition for all "areas under consideration" within a tank, to determine an "average" coating condition for the entire tank.

4.2.2 *Ballast tanks in oil tankers*

Definitions of "areas under consideration" for ballast tanks in oil tankers are as follows (also illustrated for a wing ballast tank, a fore peak ballast and aft peak tank in figures 1, 2 and 3 below, respectively).

Single-hull tanker – wing ballast tanks

Deck and bottom

Areas of deck and bottom plating with attached structure (one area to consider for deck and one area to consider for bottom).

Side shell and longitudinal bulkheads

Areas of side shell and longitudinal bulkheads with attached structure, in lower, middle and upper third (three areas to consider for side shell and three areas to consider for longitudinal bulkhead).

Transverse bulkheads (forward and aft)

Areas of transverse bulkhead and attached stiffeners, in lower, middle and upper third (three areas to consider for forward transverse bulkhead and three areas to consider for aft transverse bulkhead).

Double-hull tanker

Double bottom ballast tank

Areas of tank boundaries and attached structure, in lower and upper half of tank (two areas to consider).

Double-hull side tank

Deck and bottom

Areas of deck and bottom plating with attached structure (one area to consider for deck and one area to consider for bottom).

Side shell and longitudinal bulkheads

Areas of side shell and longitudinal bulkheads with attached structure, in lower, middle and upper third (three areas to consider for side shell and three areas to consider for longitudinal bulkhead).

Transverse bulkheads (forward and aft)

Areas of transverse bulkhead and attached stiffeners, in lower, middle and upper third (three areas to consider for forward transverse bulkhead and three areas to consider for aft transverse bulkhead).

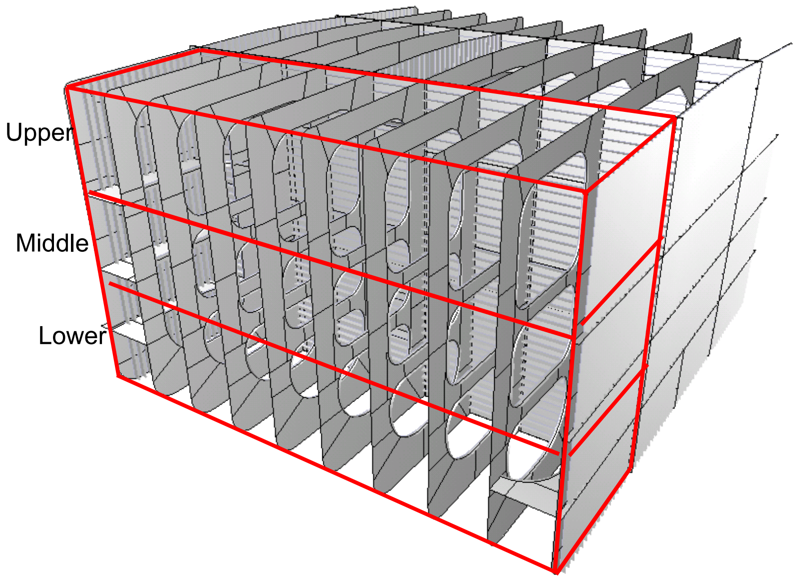

Figure 1 – "Areas under consideration" indicated for a wing ballast tank, from one side, i.e. deck, side shell, longitudinal bulkhead and transverse bulkheads

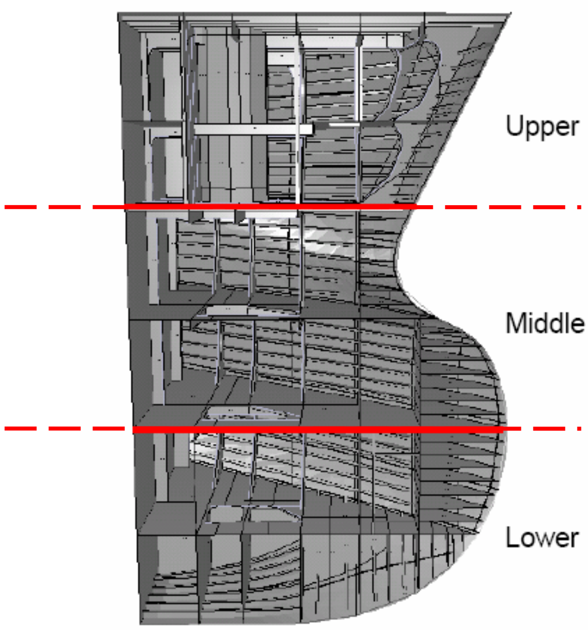

Figure 2 – "Areas under consideration" indicated for a fore peak ballast tank

Fore peak tanks

Areas of tank boundaries and attached structure, in upper, middle and lower third of tank (three areas to consider).

After peak tanks

Areas of tank boundaries and attached structure, in lower and upper half of tank (two areas to consider).

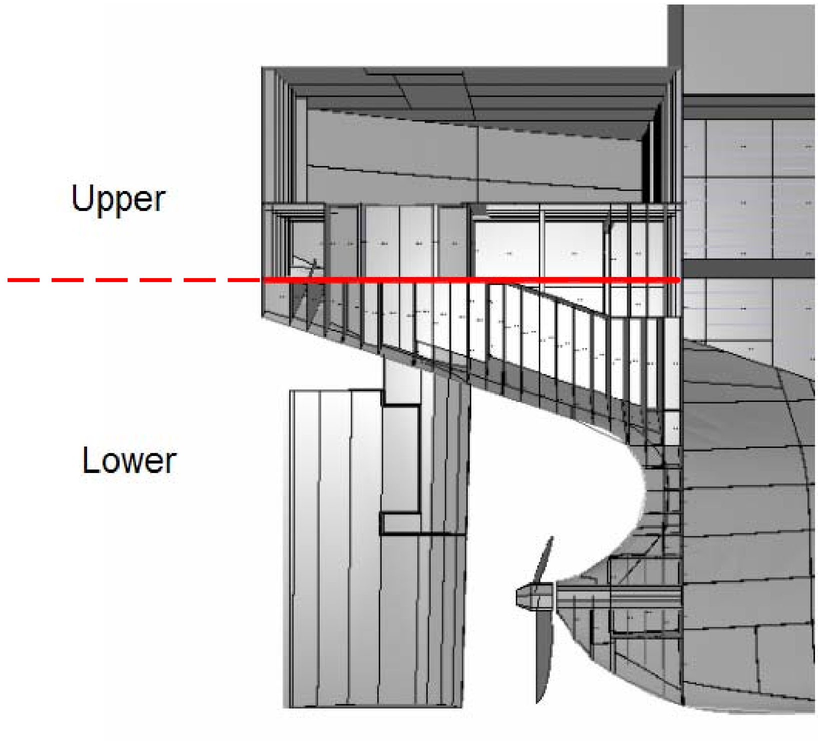

Figure 3 – "Areas under consideration" indicated for an aft peak tank

4.2.3 *Ballast tanks in ships other than oil tankers*

Definitions of "areas under consideration" for ballast tanks and double-side skin spaces in ships other than oil tankers, which are based on representative tank configuration, are as follows (also illustrated for topside tanks, hopper tanks, double bottom tanks, side tanks, fore peak tanks and after peak tanks in figures 4 to 9 below, respectively):

Topside tanks

Deck, vertical strake and bottom

Areas of deck, vertical strake and bottom plating with attached structure (one area to consider for deck and vertical strake with attached structure and one area to consider for bottom).

Side shell

Side shell with attached structure, in lower and upper or in lower, middle and upper depending on the vertical height (two areas to consider for side shell, but if the vertical height is more than 15 m, three areas to consider).

Transverse bulkheads (forward and aft)

Areas of transverse bulkhead and attached stiffeners, in lower and upper or in lower, middle and upper depending on the vertical height (two areas to consider for forward transverse bulkhead and aft transverse bulkhead, but if the vertical height is more than 15 m, three areas to consider).

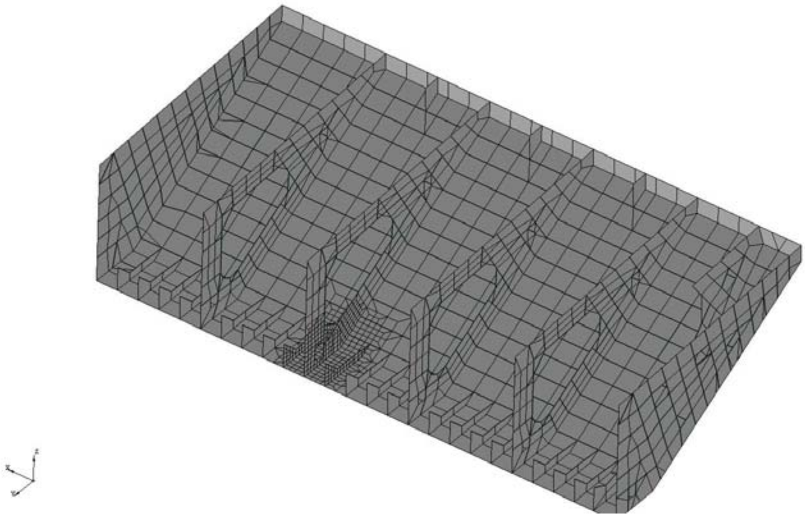

Figure 4 – Topside tanks

Hopper tanks

Hopper, side girder and bottom

Areas of hopper, side girder and bottom plating with attached structure (one area to consider for bottom and side girder with attached structure and one area to consider for hopper).

Side shell

Side shell, including bilge plating, with attached structure, in lower and upper or in lower, middle and upper depending on the vertical height (two areas to consider for side shell, but if the vertical height is more than 15 m, three areas to consider).

Transverse bulkheads (forward and aft)

Areas of transverse bulkhead and attached stiffeners, in lower and upper or in lower, middle and upper depending on the vertical height (two areas to consider for forward transverse bulkhead and aft transverse bulkhead, but if the vertical height is more than 15 m, three areas to consider).

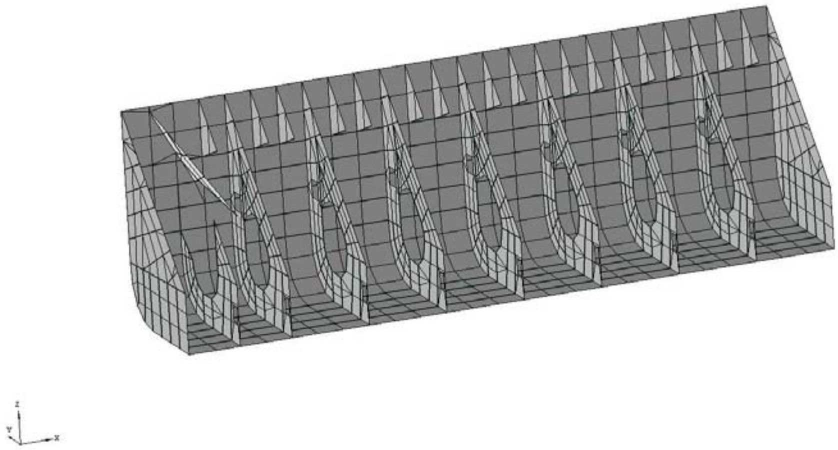

Figure 5 – Hopper tanks

Double bottom tanks

Areas of tank boundaries and attached structure, in lower and upper half of tank (two areas to consider).

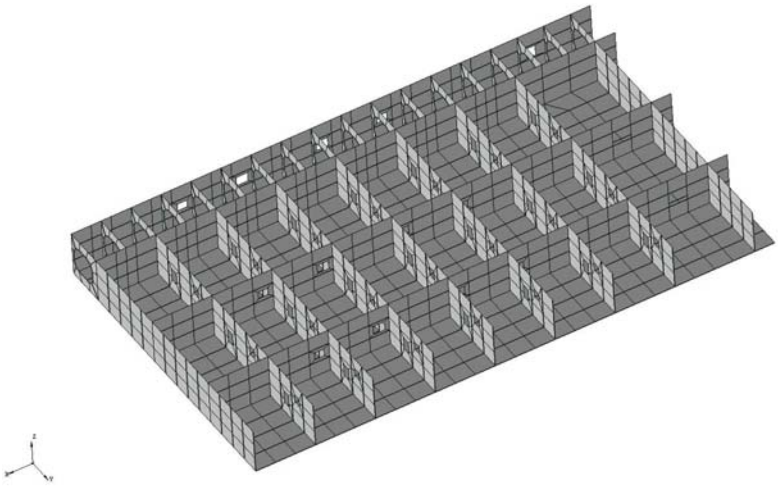

Figure 6 – Double bottom tanks

Side tanks

Deck and bottom

Areas of deck and bottom plating with attached structure (one area to consider for deck and one area to consider for bottom).

Side shell and longitudinal bulkheads

Side shell and longitudinal bulkheads with attached structure, in lower and upper or in lower, middle and upper depending on the vertical height (two areas to consider for side shell, but if the vertical height is more than 15 m, three areas to consider).

Transverse bulkheads (forward and aft)

Areas of transverse bulkhead and attached stiffeners, in lower and upper or in lower, middle and upper depending on the vertical height (two areas to consider for forward transverse bulkhead and aft transverse bulkhead, but if the vertical height is more than 15 m, three areas to consider).

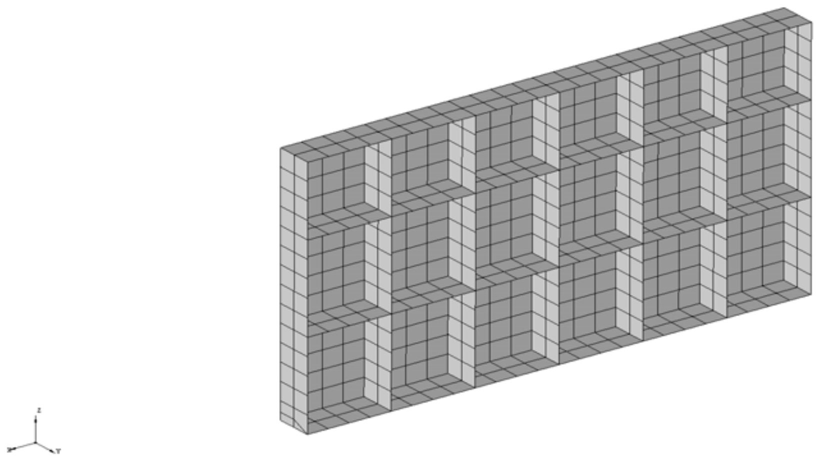

Figure 7 – Side tanks

Fore peak tanks

Areas of tank boundaries and attached structure in upper and lower or upper, middle and lower depending on the vertical height (two areas to consider for fore peak tanks, but if the vertical height is more than 15 m, three areas to consider).

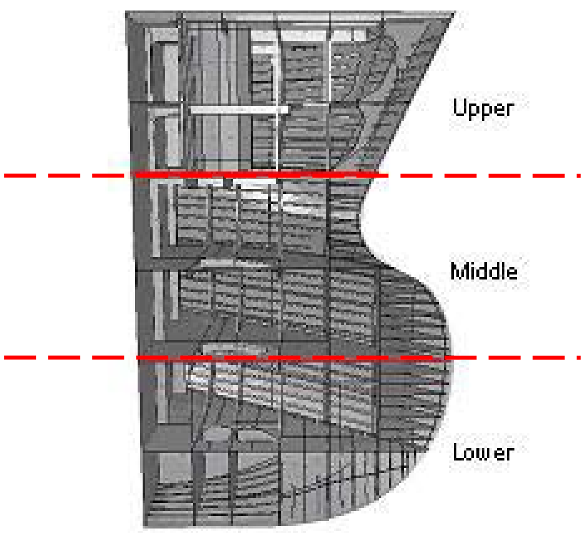

Figure 8 – Fore peak tanks

After peak tanks

Areas of tank boundaries and attached structure in upper and lower (two areas to consider).

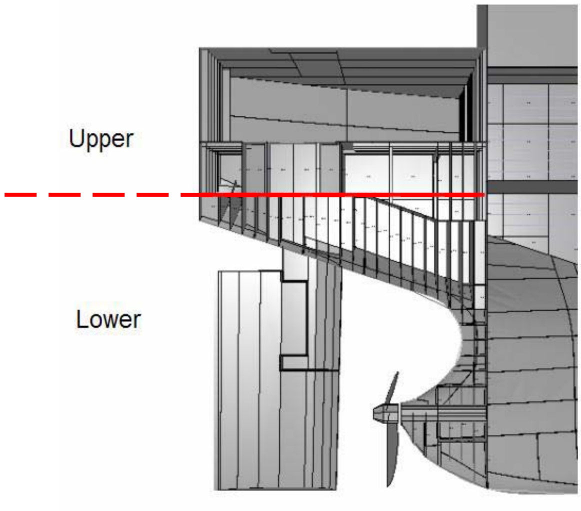

Figure 9 – After peak tanks

Notes:

1 Each area includes plating and attached structural members.

2 A tank configuration which is combined with two or more tanks may be dealt with in separate in accordance with its unit shape of tank configuration, e.g., a tank which has a combination figure of a hopper tank and a double bottom tank or a tank which is combined with a wing tank, a side tank and a hopper tank.

3 For fore peak tank or after peak tank, which consists of ballast tank and void space, they should be separately considered. It is important to note that void spaces are not considered under these Guidelines.

If the vertical height of ballast tanks other than double bottom tanks, fore peak tank, and after peak tank is more than 15 m, it should be divided into three areas under consideration as shown in table 1.

Table 1

Maximum vertical height (h) of tank	**Areas under consideration (vertical)**
$h \leq 15$ m	Two areas (lower/upper)
$h > 15$ m	Three areas (lower/middle/upper)

When deciding the boundary between lower/(middle)/upper parts for areas under consideration of the vertical surface, other than dividing the vertical surface equally by the number of areas decided according to table 1, the conspicuous structural member(s) such as stringers and/or horizontal girders on bulkheads or side shell may be the boundary, which should be mentioned in the report.

4.3 In-service condition monitoring

4.3.1 It is recommended that all ballast tanks, especially for ships over six years of age, are inspected at least annually by the crew.

4.3.2 Standardized reports should be used with the following information, where applicable:

.1 ship's name;

.2 tank number;

.3 inspection date;

.4 inspection by whom;

.5 year coated;

.6 coating name/type;

.7 last repaired;

.8 surface area;

.9 coating condition (GOOD, FAIR or POOR);

.10 Pitting corrosion – Yes/No;

.11 amount of rust scale (in m^2 or % of areas under consideration);

.12 access arrangement condition;

.13 sounding pipe condition;

.14 vent pipe condition;

.15 ballast pipes condition;

.16 structural damage, mechanical damage, location and extent; and

.17 other comments.

4.3.3 The coating condition rating is used to give an objective report of the condition so that the urgency of the repairs can be established and the most cost effective solution found. The suitable rating system for this purpose is GOOD/FAIR/POOR as specified in section 4.1. A copy of the latest standardized report should be maintained on board for use of the owner.

5 COATING MAINTENANCE

5.1 Process considerations for maintenance

5.1.1 Major considerations are:

.1 safety;

.2 salt contamination;

.3 rust scale;

.4 pitting corrosion;

.5 temperature;

.6 condensation;

.7 ventilation; and

.8 compatibility of coating systems.

5.1.2 **Safety**. Refer to the Recommendations for entering enclosed spaces aboard ships (resolution A.864(20)). It is an absolute requirement that all of the ship's safety and tank entry procedures and policies are adhered to. In addition, it is strongly recommended that all travel coating squad members are trained in safe usage of all the equipment and tools to be used for the project on board, before being sent to the ship.

5.1.3 **Salt contamination** will cause accelerated deterioration of the maintenance coating if not removed prior to coating application. A recommended procedure to reduce salt contamination is to remove loose rust scale followed by good fresh water rinsing, if possible. This should be the starting point in any surface preparation process in ballast tanks on board ships.

5.1.4 **Rust scale** that is not removed prior to coating application will cause early failure. Loose top-scale is easy to remove, however the inner (black) hard scale is much more adherent. When over-coated it will soon detach between the steel and the scale and come off, typically with the coating adhering very well to the outside of it. If the hard scale cannot be removed, the service life expectancy of the treatment is 1 to 2 years regardless of the coating used.

5.1.5 **Pitting corrosion** is a common problem in ballast tanks that have been exposed to seawater for some time. If it has been accepted that the pits need not be welded up, in order to prevent further accelerated damage, a coating should be applied. Soluble salts will be present within the pits and it is essential that these are removed otherwise corrosion will soon start inside over-coated pits, affecting the service life. Various methods of salt removal from pits have been proposed for long term repair, however, for shipboard maintenance purpose, high pressure fresh water washing is highly recommended, if available.

5.1.6 When Microbiologically Influenced Corrosion (MIC) is involved, the pits are of a much wider nature, typically "shiny" clean inside with sharp edges to unaffected surrounding steel and often with a foul smell, like rotten egg, being evident when breaking up the scale cap. An MIC attack can proceed very deep, very fast.

5.1.7 **Temperature** is a critical parameter to consider. When trading in cold water, it will be hard to keep the inside tank surfaces free from condensation and to cure the coating in a timely manner. Plan, if possible, the maintenance operation for periods, or locations, of warmer water.

5.1.8 **Condensation** is always a risk on board ships. It is advisable that the crew have a good understanding about relative humidity and its relation to substrate temperature and dew point. To paint over a surface that is at or below the dew point, or that will be at or below the dew point while the coating is wet, will not perform. Ideally the temperature should be at least 3°C above the dew point.

5.1.9 **Ventilation** is a vital factor. This is one item that clearly supports both the quality of the application and the safety of the operation. Arrange the ventilation that it extracts from the lowest and furthest corners to ensure the fast and efficient removal of dangerous solvents. The use of solvent free coating systems does not mean that ventilation is not required.

5.1.10 **Compatibility of coating systems** is of utmost importance for a good end result. To ensure compatibility of coating systems, using the same coating system as was originally employed is recommended. If this is not possible, the paint manufacturer recommendations should be followed. When applying touch up, the intact coat next to the damaged area should be feathered for good adhesion.

5.2 Principles for maintenance

Maintenance process:

.1 de-scaling;

.2 fresh water rinsing;

.3 drying;

.4 surface preparation;

.5 anode protection (protection of items should not be coated) as necessary; and

.6 coating.

5.3 Recommended maintenance

Table 2 describes the recommended maintenance to maintain "GOOD" or "FAIR" coating conditions.

Table 2 – Recommended maintenance

Purpose	Preparation	Coating system	Dry Film Thickness (DFT)
Maintenance of affected area • GOOD to GOOD • FAIR to FAIR	• Removal of mud, oil, grease, etc. • Fresh water hosing • Drying • St 3* or equivalent according to manufacturer's recommendation • Check ambient conditions	• Epoxy-based system • The same coating system as was originally employed or according to manufacturer's recommendation	• According to manufacturer's recommendation

6 COATING REPAIRS

6.1 Process considerations for repairs

6.1.1 Major considerations are:

.1 safety;

.2 salt contamination;

.3 rust scale;

.4 pitting corrosion;

.5 temperature;

.6 condensation;

.7 ventilation;

.8 dehumidification;

.9 compatibility of coating systems;

.10 design/surface area; and

.11 cathodic protections.

6.1.2 **Safety**. Refer to the Recommendations for entering enclosed spaces aboard ships (resolution A.864(20)). It is an absolute requirement that all of the ship's safety and tank entry procedures and policies are adhered to. When a ship is out of service, in a yard repair, local regulations apply covering safety. The yard is responsible for their implementation.

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* Refer to standard: ISO 8501-1:1988/Suppl:1994. Preparation of steel substrate before application of paints and related products – Visual assessment of surface cleanliness.

6.1.3 **Salt contamination** will cause accelerated deterioration of the coating if not removed prior to coating application. A recommended procedure to reduce salt contamination is to remove loose rust scale followed by good fresh water rinsing, at elevated temperatures and high pressure, if possible. Test the salt content after washing and before coating using standard ISO 8502-9 or other equivalent method and re-wash if necessary until the salt level is less than or equal to 80 mg/m^2 of total soluble salts, calculated as sodium chloride or as recommended by the coating manufacturer. This should be the starting point in any surface preparation process in ballast tanks onboard ships. In case of major repair or full recoating, any deviation should be agreed between the parties concerned and noted in the CTF.

6.1.4 **Rust scale** that is not removed prior to coating application will cause early failure. Loose top-scale is easy to remove, however the inner (black) hard scale is much more adherent. When over-coated it will soon detach between the steel and the scale and come off, typically with the coating adhering very well to the outside of it. If the hard scale cannot be removed, the service life expectancy of the treatment is 1 to 2 years regardless of the coating used.

6.1.5 **Pitting corrosion** is a major problem on board ships on plates that have been exposed to seawater for some time. If it has been accepted that the pits need not be welded up in order to prevent further accelerated damage, a coating should be applied. Soluble salts will be present within the pits and it is essential that these are removed otherwise corrosion will soon start inside over-coated pits, affecting the service life. Various methods of salt removal from pits have been proposed, e.g., water-jetting followed by blast cleaning possibly also exposure to high humidity and repeating of water-jetting. Whichever methods are chosen, any residues from the washing processes should be removed otherwise the soluble salt will precipitate out of the water on drying.

6.1.6 When Microbiologically Influenced Corrosion (MIC) is involved the pits are of a much wider nature, typically “shiny” clean inside with sharp edges to unaffected surrounding steel and often with a foul smell, like rotten egg, being evident when breaking up the scale cap. An MIC attack can proceed very deep, very fast.

6.1.7 **Temperature** is a critical parameter to consider. When repairs are carried out in a shipyard, proper temperature control can more readily be achieved in the areas requiring coating.

6.1.8 **Condensation** is always a risk. It is an absolute necessity that the contractors have a good understanding about relative humidity and its relation to substrate temperature and dew point. To paint over a surface that is at or below the dew point, or that will be at or below the dew point while the coating is wet, will not perform. Ideally the temperature should be at least 3°C above the dew point.

6.1.9 **Ventilation** is a vital factor. This is one item that clearly supports both the quality of the application and the safety of the operation. Arrange the ventilation that it extracts from the lowest and furthest corners to ensure the fast and efficient removal of dangerous solvents. The use of solvent free coating systems does not mean that ventilation is not required!

6.1.10 **Dehumidification** is the best insurance for good productivity and performance. There are two different types, i.e. desiccant and refrigeration. Both work well, the desiccant type being ideal in moderate and cold climates, and the refrigeration type in warmer climates. The use of dehumidifiers prevents condensation by lowering the dew point, ensures proper cure of the coating, reduces flash-back rusting, prevents grit blasting from “turning” and assists productivity.

6.1.11 **Compatibility of coating systems** is of utmost importance for a good end result. Unless the original coating system is totally removed, a coating system compatible to the original system should be used in accordance with the paint manufacturer recommendations. The coating system requires a Statement of Compliance or Type Approval Certificate according to the Performance standard for protective coatings for dedicated seawater ballast tanks in all types of ships and double-side skin spaces of bulk carriers (resolution MSC.215(82)). Demonstration of compatibility should not require separate approval of the combined coating system consisting of the old coating and new coating.

6.1.12 **Stripe coating/design/surface areas** should be differentiated with respect to coating application as degree of access varies. Edges, corners, weld seams and other areas that are difficult to coat need special treatment. "Stripe coating" is used to produce a satisfactory coating and to obtain specified Dry Film Thickness (DFT) on such areas. Stripe coats should be applied as a coherent film showing good film formation and no visible defects, such as pores or de-wetted areas. The application method employed should ensure that all areas which cannot be adequately coated by spray application are properly stripe coated. Stripe coats should be applied by brush or roller. Roller to be used for scallops, ratholes, etc., only.

6.1.13 It is recommended to apply a stripe coat before or after each main coat. This should be done using a colour that contrasts with each main coat, as this makes it easier to see that the stripe coat is satisfactory.

6.1.14 **Cathodic protection** is one commonly used anti-corrosion method in ballast tanks. Since the electric potential of certain anodes may damage the coating in their vicinity, it is recommended that the impact of electric potential on coating be considered in the area where cathodic protection system is applied.

6.2 Principles for repairs

6.2.1 Repair process:

.1 mud out ("slurry up" and pump out all mud);

.2 de-scaling (hand scrape off loose scale – the use of magnesium descaling can be considered);

.3 fresh water rinsing;

.4 drying;

.5 surface preparation (surface preparation method chosen depends on the amount of failure and the service life intended);

.6 anode protection (protection of items should not be coated); and

.7 coating.

6.2.2 It is recommended that the process, specification, coating application parameters, standards and time schedule are discussed and agreed upon by the parties involved and presented to the Administration for review. The Administration may, if it so requires, participate in the agreement process.

6.2.3 It is essential that, if a contractor is providing the service, he can prove that all personnel are fully qualified to carry out the required work. It is also necessary that, whilst on board, the team is fully conversant with appropriate ship operation, safety and evacuation requirements.

6.2.4 It should be realized that more control over the coating process can be achieved in dock and, hence, the overall cost effectiveness of repair must establish whether the required service life will be achievable.

6.3 Recommended repair

6.3.1 Table 3 describes the recommended medium and long-term repair to restore "GOOD" coating conditions.

6.3.2 Coating repair should be inspected by qualified inspectors certified to NACE Coating Inspector Level 2, FROSIO Inspector Level III or equivalent as verified by the Administration.

Table 3 – Recommended medium and long-term repair

Purpose	**Preparation**	**Coating system**		**Dry film thickness (DFT)**
Repair of affected area • POOR to GOOD • FAIR to GOOD	• Removal of mud, oil, grease, etc. • Fresh water hosing • Drying • St 3 or Sa 2½[*] for FAIR condition • Sa 2½[*] for POOR condition • Intact coating next to damaged area should be feathered • Total soluble salts, calculated as sodium chloride, according to manufacturer's recommendation, but not more than 80 mg/m^2 • Climatic control	**Medium term** (10-year target life) (Not recommended for ships of less than five years of age)	• Coating system approved according to resolution MSC.215(82) • The same coating system as was originally employed, or a coating system compatible with the original system, or equivalent according to manufacturer's recommendation	• 250 µm DFT[**] • Minimum two spray coats with two stripe coats
		Long term (More than 10 years' target life)	• Coating system approved according to resolution MSC.215(82)	• 320 µm DFT • Minimum two spray coats with two stripe coats

[*] Refer to standard: ISO 8501-1:1988/Suppl:1994. Preparation of steel substrate before application of paints and related products – Visual assessment of surface cleanliness.

[**] Coating used approved at 320 µm DFT, according to resolution MSC.215(82), is satisfactory for medium-term at 250 µm DFT.

Purpose	Preparation	Coating system		Dry film thickness (DFT)
			• The same coating system as was originally employed, or a coating system compatible with the original system, or equivalent according to manufacturer's recommendation	

7 COATING TECHNICAL FILE (CTF)

7.1 Maintenance and repair should be carried out in accordance with the procedures and recommendations provided in the Coating Technical File (CTF).

7.2 For maintenance, the CTF should contain at least the following:

.1 copy of Technical Data Sheet, including:

.1.1 product name and identification mark and/or number;
.1.2 materials, components and composition of the coating system, colours;
.1.3 minimum and maximum dry film thickness;
.1.4 application methods, tools and/or machines;
.1.5 condition of surface to be coated (de-rusting grade, cleanness, profile, etc.); and
.1.6 environmental limitations (temperature and humidity); and

.2 ship maintenance records of coating application, including:

.2.1 applied actual space and area (in square metres) of each compartment;
.2.2 ambient condition during coating; and
.2.3 method of surface preparation.

7.3 For repairs, the CTF should contain at least the following:

.1 copy of Statement of Compliance or Type Approval Certificate;

.2 copy of Technical Data Sheet, including:

.2.1 product name and identification mark and/or number;
.2.2 materials, components and composition of the coating system, colours;
.2.3 minimum and maximum dry film thickness;
.2.4 application methods, tools and/or machines;

.2.5 condition of surface to be coated (de-rusting grade, cleanness, profile, etc.); and
.2.6 environmental limitations (temperature and humidity);

.3 shipyard work records of coating application, including:

.3.1 applied actual space and area (in square metres) of each compartment;
.3.2 applied coating system;
.3.3 time of coating, thickness, number of layers, etc.;
.3.4 ambient condition during coating; and
.3.5 method of surface preparation;

.4 coating log issued by the coating inspector, stating that the coating was applied in accordance with the specifications to the satisfaction of the coating supplier representative and specifying deviations from the specifications (example of daily log and non-conformity report (see annex 2 to resolution MSC.215(82));

.5 shipyard's verified inspection report, including:

.5.1 completion date of inspection;
.5.2 result of inspection;
.5.3 remarks (if given); and
.5.4 inspector signature; and

.6 procedures for in-service maintenance and repair of coating system, if different than original coating system.

8 REFERENCES

IACS Recommendation 87 – Guidelines for Coating Maintenance and Repairs for Ballast Tanks and Combined Cargo/Ballast Tanks on Oil Tankers, revision 1, 2006.

Note:

1 The above reference is for information purposes only. Although IACS Recommendation 87 has been specifically developed for oil tankers, it contains information that may be useful for other ship types.

2 IACS Recommendation 87 is available to download from the website: www.iacs.org.uk.

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GUIDELINES FOR CONSTRUCTION, INSTALLATION, MAINTENANCE AND INSPECTION/SURVEY OF MEANS OF EMBARKATION AND DISEMBARKATION

1 The Maritime Safety Committee, at its eighty-sixth session (27 May to 5 June 2009), with a view to providing specific guidance on the construction, installation, maintenance and inspection/survey of means of embarkation and disembarkation such as accommodation ladders and gangways required under regulation II-1/3-9 of the 1974 SOLAS Convention, approved the Guidelines for construction, installation, maintenance and inspection/survey of means of embarkation and disembarkation, prepared by the Sub-Committee on Ship Design and Equipment at its fifty-second session, as set out in the annex.

2 Member Governments are invited to bring the attached Guidelines to the attention of shipowners, shipbuilders, designers, manufacturers, port State control authorities and other parties concerned in conjunction with SOLAS regulation II-1/3-9 (Means of embarkation on and disembarkation from ships).

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ANNEX

GUIDELINES FOR CONSTRUCTION, INSTALLATION, MAINTENANCE AND INSPECTION/SURVEY OF MEANS OF EMBARKATION AND DISEMBARKATION

1 APPLICATION

This document is intended to provide Guidelines for the construction, installation, maintenance and inspection/survey of means of embarkation and disembarkation required under regulation II-1/3-9 of the 1974 SOLAS Convention, adopted by resolution MSC.256(84). Where means of embarkation and disembarkation other than those specifically covered by these Guidelines are fitted, an equivalent level of safety should be provided.

2 CONSTRUCTION

2.1 Accommodation ladders and gangways for means of embarkation and disembarkation which are provided on board ships constructed on or after 1 January 2010 should meet applicable international standards such as ISO 5488:1979, *Shipbuilding – accommodation ladders*, ISO 7061:1993, *Shipbuilding – aluminium shore gangways for seagoing vessels* and/or national standards and/or other requirements recognized by the Administration. Such accommodation ladders and gangways fitted on ships constructed before 1 January 2010, which are replaced after that date, should, in so far as is reasonable and practicable, comply with these Guidelines.

2.2 The structure of the accommodation ladders and gangways and their fittings and attachments should be such as to allow regular inspection, maintenance of all parts and, if necessary, lubrication of their pivot pin. Special care should be taken to ensure that the welding connection works are properly performed.

2.3 The construction and test of accommodation ladder winches should be in accordance with applicable international standards such as ISO 7364:1983 *Shipbuilding and marine structures – deck machinery – accommodation ladder winches*.

3 INSTALLATION

3.1 Location

As far as practicable, the means of embarkation and disembarkation should be sited clear of the working area and should not be placed where cargo or other suspended loads may pass overhead.

3.2 Lighting

Adequate lighting should be provided to illuminate the means of embarkation and disembarkation, the position on deck where persons embark or disembark and the controls of the arrangement.

3.3 Lifebuoy

A lifebuoy equipped with a self-igniting light and a buoyant lifeline should be available for immediate use in the vicinity of the embarkation and disembarkation arrangement when in use.

3.4 Arrangement

3.4.1 Each accommodation ladder should be of such a length to ensure that, at a maximum design operating angle of inclination, the lowest platform will be not more than 600 mm above the waterline in the lightest seagoing condition, as defined in SOLAS regulation III/3.13.

3.4.2 The arrangement at the head of the accommodation ladder should provide direct access between the ladder and the ship's deck by a platform securely guarded by handrails and adequate handholds. The ladder should be securely attached to the ship to prevent overturning.

3.4.3 For ships on which the height of the embarkation/disembarkation deck exceeds 20 m above the waterline specified in paragraph 3.4.1 and on other ships for which the Administration considers compliance with the provisions of paragraph 3.4.1 impractical, an alternative means of providing safe access to the ship or supplementary means of safe access to the bottom platform of the accommodation ladder may be accepted.

3.5 Marking

Each accommodation ladder or gangway should be clearly marked at each end with a plate showing the restrictions on the safe operation and loading, including the maximum and minimum permitted design angles of inclination, design load, maximum load on bottom end plate, etc. Where the maximum operational load is less than the design load, it should also be shown on the marking plate.

3.6 Test

3.6.1 After installation, the winch and the accommodation ladder should be operationally tested to confirm proper operation and condition of the winch and the ladder after the test.

3.6.2 The winch should be tested as a part of the complete accommodation ladder unit through a minimum of two times hoisting and lowering of the accommodation ladder in accordance with the onboard test requirement specified in applicable international standards such as ISO 7364:1983.

3.6.3 Every new accommodation ladder should be subjected to a static load test of the specified maximum working load upon installation.

3.7 Positioning

3.7.1 Gangways should not be used at an angle of inclination greater than 30° from the horizontal and accommodation ladders should not be used at an angle greater than 55° from the horizontal, unless designed and constructed for use at angles greater than these and marked as such, as required by paragraph 3.5.

3.7.2 Gangways should never be secured to a ship's guardrails unless they have been designed for that purpose. If positioned through an open section of bulwark or railings, any remaining gaps should be adequately fenced.

3.7.3 Adequate lighting for means of embarkation and disembarkation and the immediate approaches should be ensured from the ship and/or the shore in hours of darkness.

3.8 Rigging (safety net)

A safety net should be mounted in way of the accommodation ladders and gangways where it is possible that a person may fall from the means of embarkation and disembarkation or between the ship and quayside.

3.9 Verification

Upon installation, the compliance of the entire arrangement with these Guidelines should be verified.

4 MAINTENANCE

4.1 Accommodation ladders and gangways, including associate winch and fittings, should be properly maintained and inspected at appropriate intervals as required by SOLAS regulation III/20.7.2, in accordance with manufacturers' instructions. Additional checks should be made each time the accommodation ladder and gangway is rigged, looking out for signs of distortion, cracks and corrosion. Close examination for possible corrosion should be carried out, especially when an aluminium accommodation ladder/gangway has fittings made of mild steel.

4.2 Bent stanchions should be replaced or repaired and guard ropes should be inspected for wear and renewed where necessary.

4.3 Moving parts should be free to turn and should be greased as appropriate.

4.4 The lifting equipment should be inspected, tested and maintained paying careful attention to the condition of the hoist wire. The wires used to support the means of embarkation and disembarkation should be renewed when necessary, as required by SOLAS regulation II-1/3-9.

4.5 Arrangements should also be made to examine the underside of gangways and accommodation ladders at regular intervals.

4.6 All inspections, maintenance work and repairs of accommodation ladders and gangways should be recorded in order to provide an accurate history for each appliance. The information to be recorded appropriately on board should include the date of the most recent inspection, the name of the person or body who carried out that inspection, the due date for the next inspection and the dates of renewal of wires used to support the embarkation and disembarkation arrangement.

5 EXAMINATION AND OPERATIONAL TEST DURING SURVEYS REQUIRED BY SOLAS REGULATIONS I/7 AND I/8

5.1 Accommodation ladders/gangways and davits

5.1.1 Accommodation ladder

5.1.1.1 The following items should be thoroughly examined during annual surveys required by SOLAS regulations I/7 and I/8 and checked for satisfactory condition of the accommodation ladder:

.1 steps;

.2 platforms;

.3 all support points such as pivots, rollers, etc.;

.4 all suspension points such as lugs, brackets, etc.;

.5 stanchions, rigid handrails, hand ropes and turntables;

.6 davit structure, wire and sheaves, etc.; and

.7 any other relevant provisions stated in these Guidelines.

5.1.1.2 At every five-yearly survey, upon completion of the examination required by paragraph 5.1.1.1, the accommodation ladder should be operationally tested with the specified maximum operational load of the ladder.

5.1.2 Gangway

5.1.2.1 The following items should be thoroughly examined during annual surveys required by SOLAS regulations I/7 and I/8 and checked for satisfactory condition of the gangway:

.1 treads;

.2 side stringers, cross-members, decking, deck plates, etc.;

.3 all support points such as wheel, roller, etc.;

.4 stanchions, rigid handrails, hand ropes; and

.5 any other relevant provisions stated in these Guidelines.

5.1.2.2 At every five-yearly survey, upon completion of the examination required by paragraph 5.1.2.1, the gangway should be operationally tested with the specified maximum operational load of the gangway.

5.2 Winch

5.2.1 During annual surveys required by SOLAS regulations I/7 and I/8, the following items should be examined for satisfactory condition:

.1 brake mechanism including condition of brake pads and band brake, if fitted;

.2 remote control system; and

.3 power supply system (motor).

5.2.2 At every five-yearly survey, upon completion of the examination required by paragraph 5.2.1, the winch should be operationally tested with the specified maximum operational load of the accommodation ladder.

5.3 Tests

5.3.1 The tests specified in sections 5.1 and 5.2 are for the purpose of confirming the proper operation of the accommodation ladder, gangway and/or winch, as appropriate.

5.3.2 The load used for the test should be:

.1 the design load; or

.2 the maximum operational load, if this is less than the design load and marked as per paragraph 3.5; or

.3 the load nominated by the shipowner or operator only in those cases where the design load or maximum operational load is not known (e.g., for accommodation ladders or gangways which are provided on board ships constructed prior to 1 January 2010), in which case that nominated load should be used as the maximum operational load for all purposes within these Guidelines.

5.3.3 The tests should be carried out with the load applied as uniformly as possible along the length of the accommodation ladder or gangway, at an angle of inclination corresponding to the maximum bending moment on the accommodation ladder or gangway.

5.3.4 Following satisfactory completion of the applicable test(s) without permanent deformation or damage to the tested item, the load used for that test should be marked as the maximum operational load in accordance with paragraph 3.5.

5.4 Fittings and davits

During annual surveys required by SOLAS regulations I/7 and I/8, all fittings and davits on the ship's deck associated with accommodation ladders and gangways should be examined for satisfactory condition.

5.5 Means of access to deck

During annual surveys required by SOLAS regulations I/7 and I/8, the fittings or structures for means of access to decks such as handholds in a gateway or bulwark ladder and stanchions should be examined for satisfactory condition.

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MSC CIRCULAR

NON-MANDATORY GUIDELINES ON SECURITY ASPECTS OF THE OPERATION OF VESSELS WHICH DO NOT FALL WITHIN THE SCOPE OF SOLAS CHAPTER XI-2 AND THE ISPS CODE

1 The Maritime Safety Committee, at its eighty-first session (10 to 19 May 2006), recalling the request of the Tokyo Ministerial Conference on International Transport Security, held on 12 and 13 January 2006, for the Organization to undertake a study and make, as necessary, recommendations to enhance the security of ships other than those already covered by SOLAS chapter XI-2 and the ISPS Code, agreed that the development of recommendations aimed at enhancing the security of those ships would be desirable and would contribute to the efforts of the Organization to enhance maritime security and that such recommendations would need to be practical, sustainable and proportionate to the risks and threats involved.

2 The Committee, at its eighty-second session (29 November to 8 December 2006), began consideration of issues relating to the security aspects of the operation of vessels which do not fall within the scope of SOLAS chapter XI-2 and the ISPS Code (non-SOLAS vessels), and established a correspondence group on these issues.

3 The Committee, at its eighty-third session (3 to 12 October 2007), considered how to progress the issue of security aspects of the operation of non-SOLAS vessels and re-established a correspondence group on these issues and agreed the following categories of vessel to be covered by the Guidelines:

.1 commercial non-passenger and special purpose vessels;

.2 passenger vessels;

.3 fishing vessels; and

.4 pleasure craft.

4 The Committee, at its eighty-fifth session (26 November to 5 December 2008), approved the non-mandatory Guidelines on security aspects of the operation of ships which do not fall within the scope of SOLAS chapter XI-2 and the ISPS Code, as set out in the annex, as guidance for Member States.

5 This guidance is non-mandatory and has not been designed to form the basis of a mandatory instrument.

6 It has been formatted in two parts. Part 1 of the annex contains information of interest to Member States and other authorities with responsibility for administering non-SOLAS vessels (other authorities). Part 2 of the annex contains information pertinent to the owners, operators and users (operators) of non-SOLAS vessels and related facilities, with appendices containing information specific to the four vessels categories.

7 Member States are invited to consider these non-mandatory Guidelines and take action as appropriate.

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ANNEX

GUIDELINES ON SECURITY ASPECTS OF THE OPERATION OF VESSELS WHICH DO NOT FALL WITHIN THE SCOPE OF SOLAS CHAPTER XI-2 AND THE ISPS CODE

Foreword

These Guidelines are intended to provide information and best practice guidance to Member States and other authorities with responsibility for administering non-SOLAS vessels (other authorities), and operators of non-SOLAS vessels.

The Guidelines may be utilized by Member States and other authorities at their own discretion. They are non-mandatory and their application should be under the purview of individual Member States proportionate to assessed levels of threat and risk. The Guidelines are not intended to form the basis for a mandatory instrument. The Guidelines reiterate the importance of undertaking a risk assessment to determine if and to what extent such Guidelines are to be applicable.

The Guidelines have been formatted in two parts. The first part contains information of interest to Member States and other authorities with responsibility for administering non-SOLAS vessels (other authorities). The second part contains information pertinent to the operators of non-SOLAS vessels and related facilities, with appendices containing information specific to the four categories of vessels.

Member States and other authorities may wish to use the annex and its appendices to assist the operators of non-SOLAS vessels and related facilities to implement effective security. In doing so, Member States and other authorities are encouraged to promulgate appropriate contact information.

The Guidelines should not be interpreted or applied in a manner inconsistent with the proper respect of fundamental rights and freedoms as set out in international instruments, particularly those relating to maritime workers and refugees.

The Guidelines take into account the risk context for non-SOLAS vessels. Non-SOLAS vessels have been used for terrorist attacks and actions resulting in injury of innocent persons and destruction of ships and structures. They have also been used for smuggling operations.

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Foreword

Part 1: Information for Member States and other authorities with responsibility for administering non-SOLAS vessels (other authorities)

Part 2: Information for use by owners, operators and users (operators) of non-SOLAS vessels and related facilities

Part 1: Information for Member States and other authorities with responsibility for administering non-SOLAS vessels (other authorities)

1 Risk Assessment

1.1 Member States and other authorities with responsibility for administering non-SOLAS vessels (other authorities) may wish to consider the risk context for each category of non-SOLAS vessel.[1]

1.2 A tool to assist Member States and other authorities with undertaking risk assessments is attached in the Appendix.

2 Maintaining security awareness and reporting suspicious activity

2.1 Member States and other authorities may wish to encourage operators of non-SOLAS vessels to provide all personnel with information on how to reach appropriate officials and authorities in the event of security problems or if suspicious activity is observed. This information should include contact information for the officials responsible for emergency response, the national response centre(s) (if appropriate) and any authorities that may need to be notified.

2.2 Member States and other authorities may wish to engage with operators of non-SOLAS vessels and relevant organizations in developing security initiatives with respect to education, information sharing, coordination, and outreach programmes. Member States and other authorities may wish to consider establishing programmes to improve vessel operators' security awareness[2] and to promote links with the Administration's maritime security services.

2.3 Authorities responsible for establishing and maintaining security awareness and culture should be mindful of the need for the proper balance between the needs of security and the requirement to maintain the safe and working efficiency of vessels. These authorities should take into account the Human Element and the rights and welfare of seafarers and maritime workers, including the relevant provisions of the ISPS Code, when implementing these Guidelines.

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[1] Examples of guidance and tools for undertaking a risk assessment of vessels may be found in:

- ILO/IMO Code of Practice on Security in Ports.
- MSC.1/Circ.1193: Guidance on voluntary self-assessment by Administrations and for ship security.
- American Bureau of Shipping: Ship Security Plan Review Checklist.
- United States Coast Guard Navigation and Vessel Inspection Circular 10-02: Security Guidelines for Vessels.
- Norwegian Shipowners' Association: Guideline for performing Ship Security Assessment.

[2] Two programmes are offered as models. In the United Kingdom, Project Kraken delivers an enhanced counter terrorist "vigilance" capability within the maritime environment of the Solent area on the South Coast. It engages key stakeholders together with local communities to provide a hostile environment to terrorists and criminals looking to disrupt the everyday lives and safety of those who live, work, or travel through the Solent. Project Kraken provides a single central phone number for the reporting of unusual activity or behaviour within the maritime environment that might be linked to criminal or terrorist acts. Similarly, in the United States, the *America's Waterway Watch* programme utilizes existing reporting systems within a public outreach programme, encouraging participants to report suspicious activity to the U.S. Coast Guard and/or other law enforcement agencies.

3 Training and personnel practices

3.1 Member States and other authorities may wish to develop security policies and procedures, taking into consideration security assessments, to ensure that all operators and crew members (and passengers where appropriate) are familiar with basic security measures applicable to each of the vessel categories.

3.2 Basic security familiarization training is recommended for crew members enabling them to have the capability to respond to security threats. In higher-risk environments, this training should also have the purpose of testing and assessing competence and knowledge for effective implementation of the recommendatory security measures contained in these Guidelines.

3.3 Operator proficiency training for pleasure craft owners and operators could encompass security awareness familiarization.

4 Non-SOLAS vessels on international voyages

4.1 Non-SOLAS vessels engaged in international voyages may be required to declare arrival and departure information for purposes of obtaining a port clearance from the relevant authorities. This declaration may be required within a specified period as determined by local authorities following arrival and/or prior to departure. The information to be submitted may include the particulars of vessel, date/time of arrival, position in port, particulars of Master/owner/shipping line/agent, purpose of call, amount of cargo on board, passenger and crew list, and emergency contact numbers. This declaration would enable the relevant authorities to better conduct monitoring and enforcement activities on the movement of vessels arriving/departing their port.[3]

4.2 Additionally pleasure craft or any other non-SOLAS vessel departing a port could be required to submit voyage information when applying for port clearance. The voyage information may include the estimated time of departure, destination and the planned route of the trip. The additional information may be useful to the relevant authorities not only in monitoring and enforcement activities, but also when conducting search and rescue operations should the vessel run into trouble and require assistance.

5 Using available means of vessel identification (where appropriate)

5.1 The IMO vessel identification number is made of the three letters "IMO" followed by the seven-digit number assigned to all vessels by the Lloyd's Register Fairplay when constructed. This is a unique seven-digit number that is assigned to propelled, seagoing merchant vessels of 100 gross tonnage and upwards and all cargo vessels of 300 gross tonnage and upwards upon keel laying with the exception of the following:

- Vessels solely engaged in fishing;
- Vessels without mechanical means of propulsion;
- Pleasure yachts;
- Vessels engaged on special service (e.g., light vessels, SAR vessels);
- Hopper barges;

[3] An example of such a programme is the declaration of information by pleasure craft currently required by Singapore via their Maritime and Port Authority Port Marine Circular No.17 of 2003.

- Hydrofoils, air cushion vehicles;
- Floating docks and structures classified in a similar manner; and
- Wooden vessels.

5.2 Member States and other authorities may wish to consider encouraging operators of pleasure craft to register with the Administration or a suitable organization which could provide a database available for authorized online access to assist in both preventative and response activities related to both safety and security.[4,5] It should be noted however that registration in itself offers no protection against the misuse of a registered pleasure craft which may be stolen, hijacked or even legally acquired.

5.3 Pleasure craft engaged in international voyages present unique circumstances. Even when registered, information regarding vessel characteristics, ownership, etc., is often not shared between countries of departure and arrival. This can result in a lack of transparency for security and safety organizations, leading to, for example, complications in validating an arriving vessels identity. Member States and other authorities may wish to seek agreements to provide for such information sharing, within the context of their individual laws and regulations, possibly as part of their individual coastal security initiatives.[6]

5.4 Member States and other authorities may consider (where appropriate) recommending the fitting of automated tracking equipment for ships which are not included in the requirements of SOLAS chapter V. The benefits of such a system could include:

- Enhanced safety and security;
- More rapid emergency response to maritime accidents and casualties;
- Better and more effective SAR capabilities;
- Better control of smuggling and human-trafficking attempts;
- Better control of illegal, unregulated and unreported fishing.

5.5 Such an automated tracking system could include the Automatic Identification System (AIS), Radio Frequency Identification Device (RFID) tags, Vessel Tracking Systems (VTS), and radar-based systems.

[4] Such a registration system may be seen in Finland, where all pleasure craft with a minimum length of 5.5 metres, or with an engine power of at least 15 kW, including sailboats, are required to be registered. The vessels are required to be visibly marked with a registration number, and registration documentation containing information regarding the owner, vessel and engine technical specifications and serial numbers is mandatory in order for the pleasure craft to be used. The register of information is kept by local city administrative courts and the registration number can be traced to the appropriate register.

[5] Another example may be found in the United Kingdom, where the authorities have created the United Kingdom Small Ships Register (SSR). This is simpler and cheaper than full vessel registration and specifically aimed at pleasure craft. Owners benefit by having details of their craft's nationality and registered keeper recorded by an authoritative organization. SSR can be applied for on line and is inexpensive.

[6] The European Commission and French Maritime Administration EQUASIS database provides this international type of transparency currently for commercial vessels.

6 International quality standards

6.1 Member States and other authorities may wish to consider recommending the implementation of an appropriate quality standard which specifies the requirements for a security management system to ensure security in the supply chain.[7]

7 Assisting operators of non-SOLAS vessels to understand practices for interacting with ISPS Code-compliant vessels and port facilities

7.1 Member States and other authorities may wish to assist the operators of non-SOLAS vessels to become aware of the security framework applying to ships and port facilities subject to SOLAS chapter XI-2 and the ISPS Code. Key aspects of this framework relevant to non-SOLAS vessels are:

- Awareness of security levels set by Contracting Governments;
- Requirements for interacting with ISPS-compliant vessels; and
- Requirements for interacting with ISPS-compliant port facilities.

7.2 Guidance on these three points is set out in paragraphs 3 and 4 of part 2.

8 ISPS Code as industry best practice for certain non-SOLAS vessels

8.1 Member States and other authorities may wish to encourage operators of non-SOLAS vessels engaged on international voyages to adopt, where appropriate, the provisions of the ISPS Code as industry best practice.

[7] The ISO 28000 series of international standards is an example of such a quality standard.

Appendix

RISK ASSESSMENT AND MANAGEMENT TOOLS

1 Introduction

1.1 The methodology presented herein includes five main phases:

.1 **Threat assessment** – identifying the different threat scenarios and determining the likelihood of each occurring based on intent and capability.

.2 **Impact assessment** – considering what the consequence of each threat scenario materializing would be and how much effect this would have.

.3 **Vulnerability assessment** – determining what the key assets are and how they can be exploited, examining the mitigating controls in place and their effectiveness and considering residual weaknesses.

.4 **Risk scoring** – making an assessment of the risk given all the factors noted in phases 1, 2 and 3.

.5 **Risk management** – developing action plans, where appropriate, to address weaknesses and mitigate identified residual risks.

2 Risk register and terminology

2.1 The risk register

2.1.1 The risk register is a tool to document different scenarios and the associated findings on threat (likelihood based on intent and capability), impact, vulnerability and risk score. The format (at Table 1, below) is listed below along with accompanying explanations for each column. A step-by-step guide for completing the risk register follows the definition as well as details on the scoring mechanism.

Table 1

Reference number	Threat scenario	Lead organization	Support organizations	Threat (likelihood)	Impact	Vulnerability			Risk score
						Key assets	Mitigating controls	Vulnerability score	
1									
2									

Column 1: Reference number

- Each scenario should be listed with an assigned number so that it can be easily identified and its development tracked.

Column 2: Threat scenario

- This column is for the listing of the threat by name and a brief description of what it entails.

Column 3: Lead organization

- Each scenario needs to have a lead organization or coordinating body identified so that initial points of contact and responsibilities may be established.

Column 4: Support organizations

- List of those agents directly involved but not leading such as local police, fire departments, coast guards, etc.

Column 5: Threat (likelihood)

- This column gives the likelihood or probability of the situation coming to fruition if there were no security measures or mitigating controls in place to prevent them. It is scored on the basis of the intent and capability of those wishing to commit the act. Scoring for this element is explained later on in paragraph 3.4.

Column 6: Impact

- This column indicates the impact or consequence should the incident occur. Again scoring for this element is explained further in paragraph 4.

Column 7: Key assets

- This column contains a list of the most important resource key assets which could be affected by the scenario; this should include people, objects, physical infrastructure and equipment. By listing these assets a risk assessor is better able to consider what safeguards are in place and hence assess the vulnerability more accurately.

Column 8: Mitigating controls

- List and consider any mitigating controls (security measures) which are already in place to protect the key assets.

Column 9: Vulnerability score

- This is an assessment of the characteristics of a target or asset that can be exploited, balanced against mitigating controls (listed above). The scoring for this is also included later in paragraph 5.4 and considers what effect the mitigating controls have on the threat, the associated impact or both.

Column 10: Risk score

- All of the information gathered on threat, impact and vulnerability is used to score the risk. Groups or individuals should use the following formula to produce the score for each scenario:

RISK = THREAT x IMPACT x VULNERABILITY

3 Threat assessment

3.1 What to consider

- Threat scenarios which could exist (or do exist);
- Who the lead and support organizations are for each scenario; and
- How to score accurately the threat and impact.

3.2 Decide which threat scenarios apply

3.2.1 The process should identify criminal acts which could take place.

3.2.2 The first task when completing a risk register is to consider and agree on which scenarios or events could apply.

3.2.3 It is useful to have a "brainstorming" session where subject matter experts consider:

- whether there are any additional scenarios, which should be listed; and
- any refinements needed to develop to the initial list.

3.2.4 It is useful when producing this list to consider potential perpetrators:

.1 Who are the groups and individuals who may act? For example:

- Terrorists
- Criminals
- Political groups
- Ideological groups
- Activists (e.g., animal rights/environmental)
- Disruptive passengers
- Employees
- Mentally unstable
- Those with inadequate documentation

.2 How do perpetrators operate?

.3 Some variables to consider in how they operate include:

- Reconnaissance, advanced planning; and
- Is there a precedent?

.4 What is their intent and their capability to act?

.4.1 Intent

- Definition: Motivation is what drives a perpetrator (e.g., financial gain, publicity, vengeance). Intent is who/what they want to harm to achieve their goal.

.4.2 Capability

Variables to consider include:

- numbers/organization
- status
- training
- funding
- weapons available
- track record
- support
- operational security

3.3 Decide lead and support organizations

3.3.1 The lead organization(s) should either:

.1 own the assets;

.2 set the policy;

.3 have legal responsibility for, or have the major role in, mitigating or responding to a particular threat; or

.4 a combination of the above.

3.3.2 Distinctions should be made where appropriate between responsibilities for (i) preventive/protective security measures, (ii) contingency planning and reactive security measures to deal with and contain an incident, and (iii) implementation of the measures in (i) and (ii). There may be a different lead organization for each of these where responsibilities vary depending on type of threat, location and method.

3.3.3 Support organizations will be those which have a supporting role in mitigating the threat but don't meet the criteria above. The risk assessor may decide all stakeholders are support organizations in being vigilant, providing a deterring presence and sharing information with others.

➢ For some threats, identifying lead and support organizations is not a simple task. There may be differing views but it is important that consensus is reached, particularly as later on lead organizations will have a primary role in developing and delivering action plans, where these are necessary.

- There may, quite correctly, be more than one lead organization but if the group has listed several, it may be worth re-evaluating to check accuracy and minimize the potential for confusion and duplication.

3.4 Scoring the threat

- The score should reflect the likelihood of each of the threat scenarios in the register occurring if there were no security measures or mitigating controls in place to prevent them.

3.4.1 Checklist

To accurately score the threat, assessors should:

- consider local and international intelligence/knowledge about similar events which have or could have occurred;
- discuss how likely it would be for each of the scenarios in the register to occur at the port if there were no security measures in place;
- read the definitions in Table 2 below and decide which score best applies. N.B. this is the score without any mitigating factors in place.

Table 2 – Risk register – scoring definitions – threat

Score	Likelihood	Criteria
4	PROBABLE	✓ There have been previous reported incidents ✓ There is intelligence to suggest that there are groups or individuals capable of causing undesired event ✓ There is specific intelligence to suggest that the vessel or type of vessel is a target
3	LIKELY	✓ There have been previous reported incidents ✓ There is intelligence to suggest that there are groups or individuals currently capable of causing undesired event ✓ There is general intelligence to suggest that the vessel or type of vessel may be a likely target
2	UNLIKELY	✓ There is intelligence to suggest that there are groups or individuals capable of causing undesired event ✓ There is nothing to suggest that the vessel or type of vessel is a target for the undesired event
1	IMPROBABLE	✓ There have been no previously reported incidents anywhere worldwide ✓ There is no intelligence to suggest that there are groups or individuals capable of causing undesired event

- The risk register is a template, rather than a straightjacket. Administrations are free to employ an alternative method of scoring if they find it produces a more logical and accurate assessment of the threats and risks.
- Remember to apply the agreed rules around confidentiality.

4 Impact assessment

4.1 Checklist

- List examples of the type and magnitude of impact that might be expected if the event happened; e.g., loss/damage to people, infrastructure, operations, finance or reputation;
- Assessors may wish to consider using or modifying the table at Table 3 below to record discussions. Note that the list of possible impacts highlighted below is not exhaustive.

Table 3

	Loss of life	**Personal injury**	**Loss/damage to vessel**	**Damage to vessel infrastructure**	**Loss of use of equipment**	**Disruption to services**	**Financial loss to vessel**	**Damage to reputation**	**Publicity to perpetrator**
Improvised Explosive Device (IED)									
Sabotage									
Arson									
Unauthorized access									
Theft of vessels									

4.2 This information should provide a robust basis for scoring. To score the impact accurately, groups or individuals should, in the same way as for threat:

- consider the impact should the event occur;
- consider the impact on the vessel (to safety, security, finance and reputation) of each of the risks occurring if there were there no security measures in place;
- consider how to record the scores allocated under each of the sub-headings. For simplicity an average may be taken in most cases. Where one score differs markedly from the other three it may be best to record it separately for future consideration rather than "losing" it in an average;
- read the definitions in Table 4 below and decide which one best applies (remember the score is without mitigating factors in place):

Table 4 – Risk register – Scoring definitions – Impact

Score	Impact	Criteria
4	SUBSTANTIAL	✓ Potential for: multiple fatalities ✓ Serious loss or damage to assets, infrastructure, vessel ✓ Economic cost of more than (agreed figure) ✓ Widespread coverage resulting in serious reputational damage
3	SIGNIFICANT	✓ Potential for: loss of life ✓ Significant but repairable loss or damage to assets, infrastructure or craft ✓ Economic cost of less than (agreed figure) ✓ National adverse media coverage
2	MODERATE	✓ Potential for: major injuries ✓ Short-term minor loss or damage ✓ Economic cost of less than (agreed figure) ✓ Major local reputational damage
1	MINOR	✓ Potential for: minor injuries ✓ Minimal operational disruption ✓ Economic cost of less than (agreed figure) ✓ Minor reputational damage

5 Vulnerability assessment

The next step involves identifying the key assets or targets, their relevant characteristics and consideration of the controls in place to protect them and prevent criminal acts taking place. Assessors should first draw up a list of key assets that could be affected by a particular threat. This should include people (crew and passengers), objects and physical infrastructure.

5.1 Mitigating controls

Identifying the current mitigating controls and assessing how effective they are is a vital but time consuming and intensive process. It may be useful to use the following processes:

5.2 Process mapping

5.2.1 Drawing up process maps can be helpful in understanding complete processes, how each process works, who plays what role and what point, what the key points, strengths and weaknesses are and in identifying where and how aspects may be exploited.

5.2.2 The perceived benefits of process mapping are that it provides a genuinely holistic view of a process and is potentially a better way of:

- appreciating and accurately evaluating the various processes that take place;
- identifying synergies, duplication and gaps; and
- evaluating what action planning is required and how effective it is.

5.2.3 Rather than considering each threat separately, process mapping requires examination of the crime and security picture either:

- by article: vessel's stores; cargo; or
- by individual: crew or passengers.

5.2.4 Process mapping involves mapping the complete journey of a person or item and the evaluation and plotting of each potential threat, early warning indicator and mitigating measure in place. It should encompass all areas where and all times when the criminal act could be perpetrated.

5.3 Event cause analysis

5.3.1 This is a useful method to establish how a risk could materialize at the port and what areas of control need to work well.

5.3.2 Taking in turn the risks, the following five questions should be considered:

- What type of individuals or groups would want to carry out this event?
- Where is this event likely to take place? (Targeted at what?)
- How would it be carried out?
- What is going to deter or delay or detect or deal with them?
- What can go wrong? (e.g., poor communication).

5.3.3 Assessors may want to use the table in Table 5 below to note all this information down.

➢ This is a useful review tool to reconsider the effectiveness of control measures highlighted in the risk register and identify where there are weaknesses and gaps.

Table 5

CONTROL MEASURES REVIEW **Breach of Security**	**Possible Actions**
Security patrols Monitoring of security equipment Education and training of crew	Deterrence and Detection Pre-empt breach or Swift response Crew awareness
Inadequate resources Gaps in security coverage Insufficient training	Discuss issues with relevant personnel Consider redeployment of resources Organize crew training programme

5.3.4 Assessors may find it useful to complete Table 6, below, as they go through the Vulnerability stage.

.1 What are the key targets – people, critical infrastructure, communications and control, and support services?

.2 What are the systems designed to deter, detect, delay or deal with unlawful acts?

.3 What are the weaknesses in these systems, including consideration of predictability and opportunity?

Table 6

Target	Strengths (i.e. systems in place to deter …)*	Weaknesses**	Opportunities	Predictability	Target Vulnerability (High/Medium/Low)	What Stakeholders have a part to play in reducing the vulnerability of this target?	How?

Key

Strengths = systems designed to deter, detect, or deal with unlawful acts;

Weaknesses = includes things like limited intelligence to hand indicating the likelihood of attack and the desirability of the target for the perpetrator;

Opportunities = opportunities for the perpetrator to exploit a loophole, conduct reconnaissance, etc.; and

Predictability = the ways in which a target operates which make it predictable.

* **Examples of systems designed to deter, detect or deal with unlawful acts**

- Company employee vetting system
- Port security vetting – pass system
- Criminal record checks
- Crew search and vehicle checks
- CCTV
- Restricted area, perimeter fencing and access control
- Control authority exercises
- Uniformed police presence
- Public awareness
- Cargo/catering/cleaning regimes
- Business continuity plans

** **Examples of weaknesses**

- Accountability and funding
- Sheer volume of people and goods
- No searching (or regular searching)
- No search on exit as routine/norm
- Ability to respond to regulatory demands
- Exemptions in general (e.g., VIPs)
- Crew shortages
- Indifference
- Corruption
- Confusing legislation
- False documentation
- Poor surveillance

Key issues to consider in vulnerability work

- Need to consider high value assets
- Identify which stakeholders have a part to play in reducing the vulnerability of the target and how. This will assist in defining "who" should work together on what

5.4 Vulnerability assessment and scoring

5.4.1 Evaluation of targets' characteristics on the one hand and the early warning indicators, embedded monitors and existing mitigating controls on the other should be translated into a vulnerability score. Table 7 below illustrates a possible scoring system to be used for assessing vulnerability:

Table 7 – Access to sensitive area not inside boundary of RA

4	No mitigating controls	No counter measures in place
3	Some mitigating controls	Some counter measures in place
2	Acceptable management of the risk	Measures in place sufficiently reasonable to manage the threat down to an acceptable level
1	Robust and effective counter measures	Full and complete counter measures in place

6 Risk scoring

6.1 Risk score

6.1.1 Finally, all of the information gathered on threat, impact and vulnerability should be used to identify and assess the residual risk. To score the risk accurately, groups or individuals should use the formula:

RISK = THREAT x IMPACT x VULNERABILITY

6.1.2 So, for example, using an initial threat score of 2, an impact score of 4 and, where there are no mitigating measures in place (a vulnerability score of 4) the residual risk score would be 32 (2 x 4 x 4 = 32). Where measures are adjudged to reduce the vulnerability to some extent, but not to an acceptable level, the residual score would be 24. The threat and impact scores of 2 and 4 remain but the vulnerability score is now 3; hence 2 x 4 x 3 = 24. And so on. There is a presumption that no threat scenario can be managed totally out of existence, i.e. you can never have a threat, impact or vulnerability score of 0.

6.1.3 It should be noted that scenarios with differing individual threat, impact and vulnerability scores can have the same overall risk score. For instance a particular scenario may have a threat score of 2 an impact score of 2 and a vulnerability score of 2 whereas another scenario may have a threat score of 1, an impact score of 4 and a vulnerability score of 4. Both scenarios produce a risk score of 16 despite having differing individual values of threat, impact and vulnerability.

6.1.4 Risk can then be ranked into three broad categories: high, medium and low:

- HIGH - A residual risk score of 27 or more.
- MEDIUM - A residual risk score of between 8 and 24.
- LOW - A residual risk score of 6 or less.

7 Risk management

7.1 The risk management phase considers how best to address the weaknesses identified during the vulnerability and risk scoring stages and how to mitigate the risk effectively and practically on a sustainable long-term basis.

7.2 This can be achieved by all stakeholders working together to agree joint tactical action plans. The checklist below gives some pointers on how to work through the process:

7.3 Drawing up action plans

- Consider the overall risk profile from the risk register:
  High = Unacceptable Risk – seek alternative and/or additional control measures,
  Medium = Manageable risk – requires management/monitoring,
  Low = Tolerable risk – no further control measures needed.

- Reconsider the Control Measures Review table. The “concerns” and “do nexts” should assist in drawing up action plans.
- Agree the priorities for action. These should be the “high” risks in the first instance.
- Identify what actions can and need to be taken to bring the risk down to a “medium”: manageable risk and from there to a “low”: tolerable risk.
- Agree who will be the lead agency in implementing changes.
- Consider the resource implications.
- Document recommendations.
- Document actions taken and link these back to the threats in the risk register:
  - Timetable for action
  - Review of actions

➢ Agreed actions should be recorded and progress monitored. Such records are also evidence of decisions taken.
➢ Assessors may need to develop further systems for sharing information and intelligence.
➢ Look for opportunities to share resources and assist others.

7.4 Actions will probably fall into the following categories:

- Actions that may be implemented by the group;
- Tactical or operational issues; and
- National, policy or strategic issues.

8 Re-evaluation

8.1 Risk assessments should be reviewed as conditions change, or on a regular schedule (e.g., annually).

Part 2: Information for use by owners, operators and users (operators) of non-SOLAS vessels and related facilities

1 Risk assessment

1.1 The implementation of security measures for non-SOLAS vessel operations should be informed by a risk assessment. Such a risk assessment[8] may be conducted by Member States or other authorities or by the vessel owners, operators and users.

1.2 A tool to assist with undertaking risk assessments is attached as the Appendix to annex 1.

2 Maintaining security awareness and reporting suspicious activity

2.1 Operators of non-SOLAS vessels may wish to provide all personnel with information on how to reach appropriate officials and authorities in the event of security problems or if suspicious activity is observed.[9] This information should include contact information for the officials responsible for emergency response, the national response centre(s) (if appropriate) and any authorities that may need to be notified.

2.2 Operators of non-SOLAS vessels and relevant organizations may wish to engage with Member States and other authorities in developing security initiatives with respect to education, information sharing, coordination, and outreach programmes. Such engagement could be considered toward establishing programmes to improve vessel operators' security awareness and to promoting links with Administration maritime security services.

2.3 Entities responsible for establishing and maintaining security awareness and culture should be mindful of the need for the proper balance between the needs of security and the requirement to maintain the safe and working efficiency of vessels. Vessel operators should take into account the Human Element and the rights and welfare of seafarers and maritime workers, including the relevant provisions of the ISPS Code, when implementing these Guidelines.

3 Awareness of basic security requirements of SOLAS chapter XI-2 and the ISPS Code

3.1 The ISPS Code defines three Security Levels:

- Security Level 1: Normal
- Security Level 2: Heightened
- Security Level 3: Exceptional

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[8] Examples of guidance and tools for undertaking a risk assessment of vessels may be found in:

- ILO/IMO Code of Practice on Security in Ports.
- MSC.1/Circ.1193: Guidance on voluntary self-assessment by Administrations and for ship security.
- American Bureau of Shipping: Ship Security Plan Review Checklist.
- United States Coast Guard Navigation and Vessel Inspection Circular 10-02: Security Guidelines for Vessels.
- Norwegian Shipowners' Association: Guideline for performing Ship Security Assessment.

[9] Examples of suspicious activity can be found at paragraph 7.2.4 of this annex.

3.2 At Security Level 1, vessels and port facilities are required to have basic security measures in place. Security Level 2 represents a heightened level of threat, and vessels and port facilities are required to increase their levels of protective security. Security Level 3 represents an imminent and specific threat, and vessels and port facilities will be required to increase security provision still further and respond to instructions from relevant control authorities.

3.3 Part of the IMO requirement is that all ISPS-compliant port facilities and ships create and maintain a Port Facility Security Plan (PFSP) or a Ship Security Plan (SSP). Security measures and standards should be developed on the basis of security assessments.

4 Awareness of basic requirements for interacting with ISPS-compliant ships and port facilities

4.1 Interacting with ISPS-compliant ships

4.1.1 Operators of non-SOLAS vessels should be aware of the requirements of SOLAS chapter XI-2 and the ISPS Code, which apply to all ships engaged on international voyages of 500 gross tonnage and above or those which carry more than 12 passengers, for interacting with ISPS-compliant ships. Non-SOLAS vessels may be required to complete a "Declaration of Security" (DoS) when interfacing with an ISPS-compliant ship. The purpose of the DoS is to ensure that agreement is reached on the respective security measures each will undertake under such circumstances.

4.1.2 When there is a requirement for non-SOLAS vessels to enter into a DoS, the operator of the non-SOLAS vessel may expect the following procedures to be applied:

- the ISPS-compliant ship should contact the non-SOLAS vessel well in advance of the non-SOLAS vessel's interaction with the ISPS-compliant ship, giving the master of the non-SOLAS vessel reasonable time to prepare for those security measures that might be required;
- the Ship Security Officer for the ISPS-compliant ship should detail the security measures which the non-SOLAS vessel is being asked to comply with;
- the agreed details of security measures to be implemented should be inserted into a DoS using the appropriate form;
- the DoS should be completed and signed by both parties.

4.1.3 It is important that all operators of non-SOLAS vessels are aware of the need to stay a reasonable distance from ISPS-compliant ships when using shared waterways. The appropriate distance will vary due to navigational safety considerations. Non-SOLAS vessels should take care not to undertake any manoeuvres close to the vessel which may give the crew of the ISPS-compliant ship cause for concern. Non-SOLAS vessels are encouraged to clearly indicate their intentions to the crew of the ISPS-compliant ship by radiotelephone or other means.

4.2 Interacting with ISPS-compliant port facilities

4.2.1 Operators of non-SOLAS vessels should be made aware of the requirements for interacting with ISPS-compliant port facilities. Non-SOLAS vessels may be required to complete a DoS when arriving at an ISPS-compliant port facility. The purpose of the DoS is to ensure that agreement is reached on the respective security measures each will undertake under such circumstances.

4.2.2 When there is a requirement for non-SOLAS vessels to enter into a DoS, the Port Facility Security Officer of the regulated facility should follow the procedures below:

- the ISPS-compliant port facility should contact the non-SOLAS vessel well in advance of the non-SOLAS vessel's interaction with the ISPS-compliant port facility, giving the master of the non-SOLAS vessel reasonable time to prepare for those security measures that might be required;
- the Port Facility Security Officer for the ISPS-compliant port facility should detail the security measures which the non-SOLAS vessel is being asked to comply with;
- the agreed details of security measures to be implemented should be inserted into a DoS using the appropriate form; and
- the DoS should be completed and signed by both parties.

5 Training and personnel practices

5.1 Operators of non-SOLAS vessels may wish to develop security policies and procedures, taking into consideration security assessments, to ensure that all personnel (including passengers where appropriate) are familiar with basic security measures applicable to the vessel.

5.2 Basic security familiarization training is recommended for crew members enabling them to have the capability to respond to security threats. In higher-risk environments, this training should also have the purpose of testing and assessing competence and knowledge for effective implementation of the recommendatory security measures contained in these Guidelines. Crew members operating in higher-risk environments could receive additional security familiarization training to enable them to better respond to specific security threats.

5.3 Operator proficiency training for pleasure craft owners and operators could encompass security awareness familiarization.

5.4 Hiring practices, such as reference checking, which might include background checks, can help a company identify potential security threats from employees. Seafarers and other workers should be allowed to appeal adverse employment determinations that are based upon disputed background information. There should also be adequate protections for workers' rights to privacy.

6 Security measures

6.1 Mitigating the risk of theft, piracy and armed robbery against non-SOLAS vessels[10]

6.1.1 Operators of non-SOLAS vessels should consider the risk to the vessel of theft, piracy and armed robbery and mitigate the risk by implementing appropriate security measures. The following are examples of good practice which may be implemented to reduce the likelihood of theft, piracy and armed robbery against non-SOLAS vessels:

[10] Operators may wish to apply the guidance given in MSC/Circ.622/Rev.[2] on Recommendations to Governments for preventing and suppressing piracy and armed robbery against ships, and MSC/Circ.623/Rev.[4] on Guidance to shipowners and ship operators, shipmasters and crews on preventing and suppressing acts of piracy and armed robbery against ships.

i) **Be vigilant**

Early detection of a possible attack is the most effective deterrent. The majority of attacks will be deterred if the robbers/hijackers are aware that they have been observed. Advance warning of a possible attack will give the opportunity to sound alarms, alert coastal authorities, undertake evasive manoeuvring where possible, secure access points to the vessel and where appropriate and possible prepare defences such as water hoses. Pirates and armed robbers are usually well organized and equipped with weapons. Crew should not display aggressive responses, once an attempted boarding or attack is underway and, in particular, once the attackers have boarded the vessel, as this could significantly increase the risk to the vessel and those on board.

ii) **Maintain a 24-hour visual and security watch**

Security watch includes short range radar surveillance of the waters around the vessel. The use of a small marine radar, fitted in such a way to ensure complete coverage of the stern, un-obscured by the radar shadow of the vessel itself, should be considered. Keep a special look-out for small boats and fishing boats that attackers often use because they are difficult to observe on radar. In piracy "hotspots", discourage passengers and crew from trading with locals using small craft which may approach the vessel.

iii) **Strengthen night watches**

Strengthen night watches especially around the rear of the vessel and anchor chains/mooring ropes and particularly between the hours of 0100 and 0600 when most attacks occur. Continuous patrols linked by "walkie-talkie" to the bridge should be established, especially in high risk ports of transit areas. A drill should be established for regular two-way communication between the watch and the bridge. If possible, an additional officer should assist the normal bridge watch keepers at night, in order to provide a dedicated radar and visual watch for small craft that might attempt to manoeuvre alongside, and allow the watch keepers to concentrate on normal navigational duties. Night patrols of the vessel should be staggered to avoid forming patterns which an adversary could observe.

iv) **Seal off means of access to the vessel**

Fit hawse pipe plates, lock doors and secure hatches, etc. While taking due account of the need for escape in the event of fire or other emergency, so far as possible all means of access to the accommodation should be sealed off and portholes and doors of crew members' quarters should be secured at all times. Where applicable blocking access between the aft deck and the crew members' quarters is particularly important.

v) **Establish radio contact**

Establish radio contact and agree on emergency signals specifically for attacks with crew, shore authorities, etc.

vi) **Provide adequate lighting**

Deck and over-side lights, particularly at the bow and stern, should be provided to illuminate the deck and the waters beyond and to dazzle potential boarders. Searchlights should be available on the bridge wings, and torches should be carried by the security patrols to identify suspicious craft. Such additional lighting should not however be so bright as to obscure navigation lights or interfere with the safe navigation of other vessels.

vii) **Evasive manoeuvring**

Provided that navigational safety allows, Masters may consider "riding off" attacking vessels by heavy wheel movements as they approach or by attempting to out run the attackers vessel. The effect of evasive manoeuvring may deter would-be attackers and make it difficult for them to attach poles or grappling devices.

viii) **Water hoses and other equipment**

A vessel's rear deck is vulnerable to attempted boarding by robbers/hijackers and as an option can be sprayed with water to deter an attempted boarding. The use of water hoses to deter boarding of robbers/hijackers should only be considered if the Master is convinced he can use them to advantage, and without risk of provoking reprisals from the attackers. Consider fitting or equipping the vessel with passive security/detection equipment, e.g., Perimeter Intruder Detection Systems, CCTV, Night Vision equipment. Where possible, such equipment should be linked to an alarm system.

ix) **Reduce opportunities for theft**

Remove all portable equipment from the deck, so far as is possible stow containers containing valuables door-to-door and in tiers, and seal off access to accommodations.

x) **Establish a secure area(s)**

If large numbers of armed robbers/hijackers succeed in boarding the vessel, it may be necessary for crewmembers and passengers to retreat to a secure area(s). Depending upon the construction of the accommodations and the extent to which areas can be effectively sealed off, such a secure area should be identified in advance. Provision should be made, however, for escape during a fire or other emergency.

6.2 Preventing unauthorized access to the vessel

6.2.1 Guidance on preventing unauthorized access to each of the four non-SOLAS vessel categories is set out in the Appendices.

6.3 Conducting a search of a vessel

6.3.1 The following are examples of good practice which should be implemented to assist crew undertaking patrolling duties when operating in a higher-risk environment:

- **Define the search area** – crew members should be fully briefed and aware of what is required and have clearly defined start and finish points.
- **Plans** – laminated plans of search areas should be produced in advance, highlighting the key features of the areas to be searched (such as storage bins and emergency exits).
- **Thoroughness** – thorough searches help detect concealed items and attention should be paid to vulnerable areas. Crew should not rely solely on visual checks, but should take note of unusual sounds, smells, etc.
- **Use of seals** – un-lockable equipment boxes such as lifejacket boxes can be fitted with tamper evident seals eliminating the need to search inside unless the seal is no longer intact.
- **Pre-planned action** – crew members should be fully briefed on their expected actions in the event a search identifies a security concern.

6.4 Verifying identity of persons on board a vessel

6.4.1 The following are examples of good practice which could be implemented to verify the identity of persons on board a vessel when operating in a higher-risk environment:

- All visitors (other than passengers) should report to the Master of the vessel, or other responsible person, to notify them of their arrival and departure. All visitors should have a form of identity, for example an ID card, passport or some other form of identification bearing the individual's photograph.
- Passengers must present a valid ticket before boarding (except where tickets are bought on board the vessel) and where applicable have a form of identity such as an ID card, passport or some other form of identification bearing the individual's photograph. For chartered vessels where no tickets are required, the chartering party should give some thought as to how they will control access. This could be achieved through the provision of paper authorization such as an invitation to be shown or for names on a list to be checked off on presentation of identification.

7 Planning for security events

7.1 Responding to bomb threats or discovery of suspicious items

7.1.1 Bomb threats are usually anonymous and communicated by telephone. While bomb threats are usually hoaxes intended to cause a nuisance, they must be taken seriously as a small number have been genuine and have preceded a terrorist or criminal act. It is recommended that advice is sought from local authorities on how to handle any genuine bomb threats that may be received.

7.1.2 Plans and procedures should be in place for dealing with health and safety alerts both on a vessel and at piers. These plans may be adapted to cover security alerts. Responsible individuals should consider various possible scenarios and appropriate responses. Scenarios could include:

i) Suspect packages found on board a vessel or at a pier;

ii) Individuals behaving suspiciously either on a vessel or at a pier;

iii) Security alert at another pier or on another vessel requiring suspension of operations; and

iv) A direct attack against a vessel or pier by unknown persons which could include ramming or the successful explosion of an Improvised Explosive Device.

7.1.3 Responsible individuals should similarly consider how to isolate a suspect package if found without removing or touching it and how to evacuate the vessel and piers quickly and safely. Planning should include being aware of who to contact, such as the police, emergency services, or other operators and how to document the incident.

7.1.4 Any Guidelines relating to management of bomb threats should include contact details for police or other public authorities responsible for immediate actions in the event of bomb threats.

7.2 Maintaining a means for reporting security concerns

7.2.1 Operators of non-SOLAS vessels should provide all personnel with contact information for authorities responsible for emergency response, the national response centre(s) (if appropriate) and any other authorities that may need to be notified.

7.2.2 Operators of non-SOLAS vessels should consider and identify the actions that crew members should take in the event of a security incident. Such actions might include:

- what the crew should do when a vessel is moored or underway;
- how to notify authorities that a security incident is taking place (e.g., making radio calls, sounding alarms, etc.); and
- how crew members should protect themselves, their vessel and the public.

7.2.3 Reports of security incidents on board a vessel should be reported to the Master or Vessel Security Officer as appropriate.

7.2.4 All personnel should report suspicious activities to appropriate authorities. The report should include details of the activity and its location. The list below gives examples of activities which may by themselves constitute suspicious behaviour, any one of which may be considered suspicious by itself. However, those suspicions may warrant particular attention when one or more behaviour or a pattern of behaviour is observed or detected. The list is not exhaustive.

i) Information gathering activities:

- Unknown persons photographing vessels or facilities.
- Unknown persons contacting, by any media, a ship or facility for the purpose of ascertaining security, personnel or standard operating procedures.
- Unknown persons attempting to gain information about vessels or facilities by walking up to ship or facility personnel or associated individuals, or their families, and engaging them in conversation.
- Theft or the unexplained absence of standard operating procedures documents.

ii) Attempted inappropriate access:

- Inappropriate or unauthorized persons attempting to gain access to vessels or facilities.
- Unknown or unauthorized workmen trying to gain access to facilities to repair, replace, service, install or remove equipment.

iii) Activities in a port and its environs:

- Theft of facility vehicles, vehicle passes, personnel identification or personnel uniforms.
- Inappropriate use of Global Maritime Distress Safety and Security procedures.
- Suspicious individuals establishing *ad hoc* businesses or roadside stands either adjacent to or in proximity of port facilities.
- Repeated or suspicious out of ordinary attempts at communication by voice media with duty personnel.
- Vehicles or small vessels loitering in the vicinity of a facility without due cause for extended periods of time.
- Unknown persons loitering in the vicinity of a facility without due cause for extended periods of time. [11]

7.3 Prevention of trafficking in drugs and transportation of illicit cargoes

7.3.1 The following are general Guidelines for precautionary measures which may be taken to safeguard a non-SOLAS vessel while in port, irrespective of whether at anchor or alongside a berth, to protect the vessel against trafficking in drugs and the transportation of illicit cargoes:

- The crew should be warned about the risks of knowingly transporting illicit cargoes and trafficking in drugs.
- Crew going ashore should be advised that they should take care to ensure that persons they are meeting with are not connected with illegal activities.
- The vessel might maintain a security log book at the point of entry/exit to the vessel, recording the identity of all persons boarding or disembarking. No unauthorized persons should be allowed to board.
- A permanent watch may be advisable in working areas. If appropriate, areas such as the forecastle, poop deck, main decks, etc., must be well lit during the hours of darkness.
- The vessel should maintain a good lookout for approaching small boats, or the presence of unauthorized divers, or other attempts by unauthorized persons to board the vessel.
- In the event of drugs or illicit cargoes are found on board, the crew should cooperate fully with the local authorities for the duration of the investigation.

[11] Lawful gatherings and assemblies should not be misconstrued as being suspicious.

7.4 Prevention of stowaways

7.4.1 For the purposes of the Guidelines a stowaway is defined as a person who is secreted on a vessel, or in cargo which is subsequently loaded onto a vessel, without the consent of the vessel owner or the master or other responsible person, and who is detected on board after the vessel has departed from a port and is reported as a stowaway by the master to the appropriate authorities.

7.4.2 The visible actions of the crew in implementing security measures will act as a deterrent to potential stowaways. Examples of general precautionary measures for the prevention of stowaways are set out below:

- Prior to entering port, doors and hatchways should be securely fastened and locked with due regard to the need to facilitate escape in the event of an emergency.

- Fitting plates over anchor hawse pipes can prevent stowaways from boarding at anchorage or before a vessel is berthed.

- Accommodation doors could also be secured and locked, leaving only one open entrance. In the interests of safety, keys to the locked doors should be placed in convenient positions so that doors can be opened in the event of emergency.

- Store rooms, equipment lockers on deck, the engine room and the accommodations should remain locked throughout a port call, only being opened for access and re-secured immediately thereafter.

- Once alongside, a gangway watch is the first line of defence against stowaways, smugglers and theft. For this reason, it is important to ensure that an effective gangway watch is maintained at all times.

- At the commencement of loading only the hold access doors of the compartments that are going to be used for the immediate loading of cargo should be opened. As soon as cargo operations cease, the compartment should be secured.

- The vessel’s storerooms should also be kept locked at all times, only being opened when access is required.

- There may be some areas of the vessel that cannot be locked, for instance the funnel top. Any unlocked areas that can be accessed should be inspected on a regular basis.

- On completion of cargo loading operations and the disembarkation of all shore-based personnel, accessible areas of the vessel should be searched again.

- In high-risk ports consideration should be given to anchoring in some convenient position outside the port and making a final stowaway search after tugs and pilots depart.

7.4.3 A detected stowaway should be reported to the appropriate authorities. Any stowaways detected should be treated in accordance with humanitarian principles. However, some stowaways may be violent, and the safety and security of the vessel and its crew should not be compromised.

Appendix A

GUIDELINES FOR COMMERCIAL NON-PASSENGER VESSELS

Introduction

These Guidelines apply to all commercial non-passenger vessels and special purpose vessels that fall outside the requirements of the International Ship and Port Facility Security (ISPS) Code.

The Guidelines are intended to provide information and best practice guidance to operators of non-SOLAS vessels. They are not mandatory and are not intended to form the basis for a mandatory instrument.

Vessel security

1 Searching

The vessel should be searched to ensure that nothing illegal or harmful has been placed on board. The vessel should be searched at the end of an outward trip before starting the return voyage to ensure that nothing has been concealed or left behind. To the extent possible, checks should include any crew areas, stores, holds, underwater hull if concern prevails and areas that could conceal persons or articles that may be used for illegal purposes.

There should be agreed procedures on how to isolate a suspect package if found and how to evacuate the vessel quickly and safely.

2 Securing

With due regard to the need to facilitate escape in the event of an emergency, external doors and storage areas should be locked and portholes secured. If the vessel is to be left unattended for a lengthy period of time such as overnight, it is recommended that the engine is disabled to prevent theft/unauthorized use and that it is moored securely in compliance with local port by-laws. Masters should ensure that the gangway is raised when the vessel is left unattended.

3 Preventing unauthorized access to vessels

Members of the public should not be able to gain access to operational areas of the vessel, or maintenance/storage facility such as crew rest rooms, store rooms, cleaning cupboards, hatches and lockers. All doors leading into operational areas should be kept locked or controlled to prevent unauthorized access. The only exception to this should be where access is required to reach safety equipment or to use emergency escapes. Keys for doors should be kept in a secure location and controlled by a responsible person. If access is controlled by keypad, the code should only be given to people with a legitimate need to know. It is also recommended that codes are changed periodically. Where such access controls are in place, crew should be reminded of the importance of ensuring that nobody following can bypass the access controls.

The following are suggested measures to deter unauthorized access to the vessel:

- over-the-side lighting which gives an even distribution of light on the whole hull and waterline

- keeping a good watch from the deck
- challenging all approaching boats. If unidentified, they should, where possible, be prevented from coming alongside.

4 Controlling access

All visitors should report to the Master of the vessel, or other responsible person to notify them of their arrival. It is recommended that they be advised on security procedures, such as the following:

- The need to be escorted at all times;
- The need to wear a permit, if issued, at all times;
- The need for vigilance at all times when on the vessel. Should they find a suspicious item, they should not touch it but should contact a member of crew as soon as possible. Similarly, they should contact a member of crew if they see a person acting suspiciously; and
- The need to secure all doors behind them when leaving, particularly those doors which lead to operational areas of the vessel. If they are leaving a work site, they must ensure that it is locked and that all equipment has been securely stored.

The vessel might maintain a security log book at the point of entry/exit to the vessel, recording the identity of all persons boarding or disembarking.

5 Contingency measures for security alerts

Contingency measures should be in place for dealing with emergency navigational and health and safety alerts on board vessels. These plans may be adapted to include procedures for security alerts and incidents.

If a suspicious device or package is found while a vessel is at sea, the master should take into account:

- the size and location of the device;
- the credibility of the threat;
- the vessel's location and the time it will take for security services and other assistance to arrive;
- the need to keep everyone well clear of the suspect device; and
- the need for all on board to keep clear of all doors, trunks and hatches leading from the space containing the device to avoid possible blast injuries.

6 Reporting security incidents

Vessel operators should implement procedures and processes for reporting and recording security incidents.

In the event of a security incident occurring while the vessel is at sea the master, in addition to activating an appropriate response, should alert the nearest coastal State or authorities and/or vessels in vicinity and provide details of the incident.

Appendix B

GUIDELINES FOR NON-SOLAS PASSENGER VESSELS

Introduction

These Guidelines apply to all passenger vessels that fall outside the requirements of the International Ship and Port Facility Security (ISPS) Code.

The Guidelines are intended to provide information and best practice guidance to operators of non-SOLAS passenger vessels. They are not mandatory and are not intended to form the basis for a mandatory instrument.

Terrorists perceive passenger vessels and ferries as attractive targets because they carry large numbers of people, are high profile and economically important.

Given that information on schedules, routes and vessel schematics are all readily available, these vessels may be more vulnerable to attack.

Vessel security

1 Searching

The vessel should be searched to ensure that nothing illegal or harmful has been placed on board. The vessel should be searched at the end of an outward trip before starting the return voyage to ensure that nothing has been concealed or left behind. It is recommended that passengers are not permitted to board until the security check of the vessel has been completed. To the extent possible, checks should include all public areas with special attention paid to underneath seating, toilets, and any storage areas, e.g., for luggage, on the vessel. To the extent possible, checks should include any crew areas, stores, holds, under-water hull if concern prevails and areas that could conceal persons or articles that may be used for illegal purposes.

There should be agreed procedures on how to isolate a suspect package if found and how to evacuate the vessel quickly and safely.

2 Securing

With due regard to the need to facilitate escape in the event of an emergency, external doors and storage areas should be locked and portholes secured. If the vessel is to be left unattended for a lengthy period of time such as overnight, it is recommended that the engine is disabled to prevent theft/unauthorized use and that it is moored securely in compliance with local port by-laws. Masters should ensure that the gangway is raised when the vessel is left unattended.

3 Control of passengers boarding and disembarking

Passengers must only be allowed to embark and disembark if crew or shore staff are present. Where ticket facilities exist for scheduled services, crew or shore staff should ensure that passengers present valid tickets before boarding. For chartered vessels where no tickets are required, the chartering party should seek to control access on to the boat, for example through the provision of an authorization card. If the vessel carries vehicles special additional measures, including spot checks, may be required.

4 Passenger security awareness

Passengers should be reminded not to leave bags unattended and to report any unattended or suspect packages. Security messages should be displayed on posters and information screens and should be frequently delivered over public address systems either as separate announcements or as part of the pre-sailing safety announcement.

5 Preventing unauthorized access to vessels

Passengers should not be able to gain access to operational areas of the vessel, or maintenance/storage facility such as crew rest rooms, store rooms, cleaning cupboards, hatches and lockers. All doors leading into operational areas should be kept locked or controlled to prevent unauthorized access. The only exception to this should be where access is required to reach safety equipment or to use emergency escapes. Keys for doors should be kept in a secure location and controlled by a responsible person. If access is controlled by keypad, the code should only be given to people with a legitimate need to know. It is also recommended that codes are changed periodically. Where such access controls are in place, crew should be reminded of the importance of ensuring that nobody following can bypass the access controls.

The following are suggested measures to deter unauthorized access to the vessel:

- over-the-side lighting which gives an even distribution of light on the whole hull and waterline;
- keeping a good watch from the deck; and
- challenging all approaching boats. If unidentified, they should, where possible, be prevented from coming alongside.

6 Controlling access

All visitors (other than passengers) should report to the master of the vessel, or other responsible person to notify them of their arrival. It is recommended that they should be advised on security procedures, such as the following:

- The need to be escorted at all times;
- The need to wear a permit, if issued, at all times;
- The need for vigilance at all times when on the vessel. Should they find a suspicious item, they should not touch it but should contact a member of crew as soon as possible. Similarly, they should contact a member of crew if they see a person acting suspiciously; and
- The need to secure all doors behind them when leaving, particularly those doors which lead to operational areas of the vessel. If they are leaving a work site, they must ensure that it is locked and that all equipment has been securely stored.

7 Contingency measures for security alerts

Contingency measures should be in place for dealing with emergency navigational and health and safety alerts on board vessels. These plans may be adapted to include procedures for security alerts and incidents.

If a suspicious device or package is found while a vessel is at sea, the master should take into account:

- the size and location of the device;
- the credibility of the threat;
- the vessel's location and the time it will take for security services and other assistance to arrive;
- the need to keep everyone well clear of the suspect device; and
- the need for all on board to keep clear of all doors, trunks and hatches leading from the space containing the device to avoid possible blast injuries.

8 Reporting security incidents

Vessel operators should implement procedures and processes for reporting and recording security incidents.

In the event of a security incident occurring while the vessel is at sea the master, in addition to activating an appropriate response, should alert the nearest coastal State or authorities and/or vessels in vicinity and provide details of the incident.

Appendix C

GUIDELINES FOR FISHING VESSELS

Introduction

These Guidelines apply to fishing vessels.

The Guidelines are intended to provide information and best practice guidance to operators of fishing vessels. They are not mandatory and are not intended to form the basis for a mandatory instrument.

The operator, as well as the master of a fishing vessel should evaluate and enforce appropriate measures as provided for in this annex, taking into consideration the security environment and the risk areas related to the operating area and the security risk that may be encountered during the intended voyage.

Vessel security

1 Searching

Vessels should be searched after having been left unattended to ensure that nothing has been placed aboard while the vessel was unattended and for the purpose of concealing trespassing persons and articles placed on board for illegal purposes. To the extent possible, checks should include all spaces accessible to non-authorized persons while the vessel was unattended, e.g., any crew areas stores, holds, under-water hull, if concern prevails and areas that could conceal persons or articles that may be used for illegal purposes.

2 Securing

With due regard to the need to facilitate escape in the event of an emergency, where possible external doors, hatches and storage areas should be kept locked and windows secured while the ship is left unattended. If the vessel is left unattended for a lengthy period of time such as overnight, it is recommended that the engine is disabled to prevent theft/unauthorized use.

3 Preventing unauthorized access to vessels

Measures preventing unauthorized access to vessels should be implemented and maintained. Such measures could be:

- over-the-side lighting which gives an even distribution of light on the whole hull and waterline;
- keeping a good watch from the deck;
- challenging all approaching boats. If unidentified, they should, where possible, be prevented from coming alongside; and
- all visitors and contractors should report to the master of the vessel, or other responsible person to notify them of their arrival.

4 Contingency measures for security alerts

Contingency measures should be in place for dealing with emergency navigational and health and safety alerts on board vessels. These plans may be adapted to include procedures for security alerts and incidents.

If a suspicious device or package is found while a vessel is at sea, the master should take into account:

- the size and location of the device;
- the credibility of the threat;
- the vessel's location and the time it will take for security services and other assistance to arrive;
- the need to keep everyone well clear of the suspect device; and
- the need for all on board to keep clear of all doors, trunks and hatches leading from the space containing the device to avoid possible blast injuries.

5 Reporting security incidents

Vessel operators should implement procedures and processes for reporting and recording security incidents.

In the event of a security incident occurring while the vessel is at sea the master, in addition to activating an appropriate response, should alert the nearest coastal State or authorities and/or vessels in vicinity and provide details of the incident.

Appendix D

GUIDELINES FOR PLEASURE CRAFT

1 Introduction

These Guidelines apply to pleasure craft. Pleasure craft, recreational vessels, and leisure craft (hereinafter referred to as pleasure craft) are vessels which are not subject to the International Convention for the Safety of Life at Sea (SOLAS) and do not routinely engage in commercial activities such as carrying cargo or passengers for hire. This class of vessels might also encompass vessels being used as residences provided the vessel maintains a means of propulsion.

The International Maritime Organization does not define the term pleasure craft in the Convention on the International Regulations for Preventing Collisions at Sea, 1972 (COLREGs). Each Member State will have its own definition and may apply these Guidelines as appropriate.

The pleasure craft sector is generally less regulated than SOLAS Convention and ISPS-regulated vessels, and where regulations do exist they are mainly focused on safety. However, pleasure craft frequently use the same waters as other vessels and while the vast majority of pleasure craft are operated by legitimate, law-abiding owners and operators, they may be used for criminal objectives and terrorism.

The Guidelines are intended to provide information and best practice guidance to operators of pleasure craft. However, pleasure craft owners and operators should remember that the overall safety and security of the vessel, crew, and passengers is their responsibility. Prudent mariners are proactive in preventing incidents, planning in advance how best to respond to an incident, and ensuring that all passengers and crew members know their roles.

The Guidelines are not mandatory and are not intended to form the basis for a mandatory instrument.

2 Applicability

The primary focuses of this appendix are pleasure craft operating in waters where they might interact with or operate in close proximity to vessels or facilities subject to SOLAS chapter XI-2 and the ISPS Code; and also those pleasure craft engaged in international voyages. However, where appropriate, Member States, based on their assessed levels of threat and risk, may consider broader implementation as many pleasure craft are highly mobile, both via land and connecting waterways.

General security guidelines

3 The best security is preventative security. Pleasure craft owners and operators are encouraged to consider their security relevant to their intended area of operations and when passage planning to ensure that all onboard are aware of their roles and responsibilities. Pleasure craft owners and operators should be familiar with any particular directions that exist for an intended port or destination. This information is available in nautical almanacs, notices to mariners and from harbour authority and administration websites.

4 Pleasure craft should be checked by their owners or operators at regular intervals, to ensure that nothing has been placed aboard or removed while the vessel has been unattended. In the event that something suspicious is found, the appropriate local authorities should be notified promptly. Pleasure craft operators should not, under any circumstances, directly handle suspicious packages or objects but should follow any instructions from notified authorities with respect to evacuation of the vessel and the area around it.

5 Where possible, external doors, hatches and storage areas should be locked and windows secured when a pleasure craft will be left unattended. If a vessel is to be left unattended for some time, it is recommended that steps be taken to prevent theft or unauthorized use, and that the vessel is moored securely in compliance with local rules or regulations. Such security steps could include:

- Ignition switches should be locked.
- Consider fitting a small craft alarm system, possibly with an autodial facility to alert an operator to any unauthorized movement, or the activation of a variety of on board security sensors, via Cell Phone or e-mail. The alarm system could also be integrated with smoke and fire sensors for a complete vessel protection system.
- Consider securing high value items such as televisions, DVDs, etc., so that they are out of sight and in lockable compartments.
- Never leave anything valuable on display. Valuables that can be removed should be taken home not put in cupboards.
- Consider using steering locks if practical.
- Mark all your equipment where possible with your details using approved property marking equipment.
- Consider etching the hull identification number onto windows and hatches.
- When you leave your vessel, always take the ignition key with you.
- Consideration should be given to installing a hidden device to shut off the fuel line, or to the installation of an engine immobilizer.
- Outboard motors should be secured with a strong case-hardened steel chain padlock and hardened steel chain or some form of proprietary locking bar.
- In some cases it may be possible to cover the boat as far as the design allows and to then secure the cover.

6 Pleasure craft owners should photograph their vessel and equipment and mark it accordingly. This will assist authorities in returning equipment if it is stolen. All serial numbers on all individually identifiable parts of the boat and equipment should also be recorded and stored in a safe place on and off the vessel.

7 Where Radio Frequency Identification Tag (RFID) anti-theft systems are available, they should be given strong consideration. Not only do such systems have the potential to reduce theft risk, but they also have been shown to increase recovery rates and in some instances to reduce insurance fees.

8 Higher risk environments

Pleasure craft operators should carefully scrutinize their intended route and ports of call prior to a voyage. If the voyage will include areas of heightened security concern, where terrorism and criminal activities including piracy and armed robbery are a major threat, careful consideration should be given to possible alternative routeings. Where safe and secure routes are not practicable, transits should be accomplished in the presence of other vessels, as expeditiously as possible, and prior notification made to the maritime authorities for the area whose advice should be followed. A rigorous contact schedule should be maintained, preferably via satellite or mobile telephone or similar system which cannot be used to locate the vessel via radio direction finding.

9 Contingency measures for security alerts

Prior to operating in high risk environments, pleasure craft owners and operators should establish procedures for dealing with emergency navigational, health and safety, and security alerts and incidents. It is recommended that all crew be briefed fully on their roles and responsibilities prior to the voyage and that plans and procedures be rehearsed. A list of emergency actions should be posted in conspicuous places, such as near radios. Such lists should include contact information for appropriate port authority, police, coast guard and emergency services.

Owners and operators should consider designating one crew member as responsible for all aspects of the security on the vessel. Some companies now offer courses specifically tailored for blue-water yachtsmen.

10 Prevention of stowaways

As outlined previously, checking or searching a pleasure craft carefully prior to getting underway is both a safety and security best practice. This is especially true in areas of heightened risk; when extra care should be taken in searching places on the vessel where a stowaway might hide, such as lazarettes, sail lockers, etc. Under these circumstances and if possible, the search should be conducted by two crew members. In the event that a stowaway is found, this will reduce the risk of the stowaway attacking or overpowering the searcher. As with finding a suspicious package or object, direct engagement is discouraged and appropriate authorities should be notified immediately.

Appendix E

GUIDELINES FOR MARINA, PORT AND HARBOUR AUTHORITIES[12]

The Guidelines are intended to provide information and best practice guidance to operators of marinas, ports, and harbours. They are not mandatory and are not intended to form the basis for a mandatory instrument.

1 Marina, port, and harbour operators should communicate information about:

- the current security environment;
- parts of the port which are subject to security conditions;
- areas of restricted navigation;
- descriptions of areas where there might be interaction with large commercial vessels subject to SOLAS and the ISPS Code; and
- any local regulations produced for the guidance and direction of non-SOLAS vessels.

2 Marinas, ports and harbours not covered by a Port Facility Security Plan but located in a complex of ISPS-compliant port facilities should consider regularly reviewing their security arrangements, in cooperation with the ISPS-compliant facilities.

3 Depending on the size and complexity of the marina, port or harbour, consideration could also be given to implementing appropriate physical security measures, such as:

- adequate illumination;
- effective access controls;
- passive monitoring devices;
- segregation of visiting vessels in one particular area such that the visitors can be effectively monitored;
- holding transient vessels arriving at night in a specific area, with vessel and personnel details recorded; and
- installing RFID or similar systems to monitor the movements of vessels in and out of marinas, ports and harbours.

4 Marina, port and harbour facilities might consider implementing appropriate security procedures. These procedures might include:

- training staff to be familiar with security operating procedures for their facility and for the safety of their customers and the public;
- implementing regular security patrols, which should include:
  - walking all pontoons/docks;
  - checking that boats are moored normally;
  - being alert for any suspicious activity;
  - monitoring access gates, storage shed doors, overhead doors and fuel points; and
  - inspecting restroom facilities; and

[12] Further guidance may be found in the ILO/IMO Code of Practice on Security in Ports.

- maintaining a security log of events, which should include:
    - details of incidents and events that occurred while on patrol;
    - the identity of anyone or any organization called in for emergencies and the time/results of the call;
    - details of issues for referral to a supervisor; and
    - any information which should be noted for the awareness of the next shift personnel.

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Ref. T2-MSS/2.11.1

MSC.1/Circ.1305
9 June 2009

REVISED GUIDANCE TO MASTERS, COMPANIES AND DULY AUTHORIZED OFFICERS ON THE REQUIREMENTS RELATING TO THE SUBMISSION OF SECURITY-RELATED INFORMATION PRIOR TO THE ENTRY OF A SHIP INTO PORT

1 The Maritime Safety Committee (the Committee), at its eighty-sixth session (27 May to 5 June 2009) decided to include, in the standard data set of security-related information a ship might be expected to submit prior to entry into port, the IMO Company identification number and to this end it also decided to amend accordingly the Guidance to masters, Companies and duly authorized officers on the requirements relating to the submission of security-related information prior to the entry of a ship into port set out in the annex to MSC/Circ.1130.

2 As a result the Committee approved, based on the requirements of SOLAS regulation XI-2/9.2.1 and taking into account the guidance provided in part B of the ISPS Code and resolution MSC.159(78) on Interim guidance on control and compliance measures to enhance maritime security, a Revised guidance to masters, Companies and duly authorized officers on the requirements relating to the submission of security-related information prior to the entry of a ship into port (the Revised guidance) which is set out at annex. The Committee has developed the Revised guidance in an effort to prevent the proliferation of different demands for security-related information, which are neither conducive to the enhancement of maritime security nor promote the facilitation of maritime traffic.

3 The attached Revised guidance cites the salient provisions of SOLAS regulation XI-2/9 and the guidance provided in paragraphs B/4.37 to B/4.40 of the ISPS Code, contains some practical advice and sets out in the appendix thereto a standard data set of security-related information a ship might be expected to submit prior to entry into port if requested to do so.

4 The Committee invites SOLAS Contracting Governments to bring the attached Revised guidance to the attention of masters, Companies and, if appropriate to the attention of port facility security officers. In addition, the Committee urges SOLAS Contracting Governments to bring the attached Revised guidance to the attention of those officers they have authorized or they may authorize to carry out control and compliance measures pursuant to the provisions of SOLAS regulation XI-2/9.

5 The Committee also invites SOLAS Contracting Governments, international organizations and non-governmental organizations with consultative status to bring to the attention of the Committee the results of the experience they have gained from the use of the Revised guidance and in particular from the use of the standard data set of security-related information.

6 MSC/Circ.1130 is hereby revoked and any reference in any report of the Committee or in any MSC resolution or circular to MSC/Circ.1130 should be read, henceforth in connection with the implementation of the provisions of SOLAS chapter XI-2 and the ISPS Code, as a reference to this circular.

***

ANNEX

REVISED GUIDANCE TO MASTERS, COMPANIES AND DULY AUTHORIZED OFFICERS ON THE REQUIREMENTS RELATING TO THE SUBMISSION OF SECURITY-RELATED INFORMATION PRIOR TO THE ENTRY OF A SHIP INTO PORT

PURPOSE

1 The purpose of this Guidance is to provide a standard data set of security-related information a ship might expect to provide prior to entry into port. In addition, this Guidance, in an effort to clarify the requirements of SOLAS regulation XI-2/9 on Control and compliance measures and taking into account the guidance provided in part B of the ISPS Code, cites the salient provisions of SOLAS regulation XI-2/9 and of paragraphs B/4.37 to B/4.40 of the ISPS Code.

CONTROL AND COMPLIANCE MEASURES

2 SOLAS regulation XI-2/9 describes the control and compliance measures applicable to ships to which SOLAS chapter XI-2 applies. It is divided into three distinct sections: control of ships already in port; control of ships intending to enter a port of another SOLAS Contracting Government (Contracting Government); and additional provisions applicable to both situations.

3 SOLAS regulation XI-2/9 should always be read in association with the guidance provided in paragraphs B/4.29 to B/4.40 of the ISPS Code and resolution MSC.159(78) on Interim guidance on control and compliance measures to enhance maritime security.

THE REQUIREMENT TO SUBMIT INFORMATION PRIOR TO ENTRY INTO PORT AND THE CONSEQUENCES OF FAILING TO DO SO

4 SOLAS regulation XI-2/9.2.2 requires every ship to which SOLAS chapter XI-2 applies intending to enter the port of another Contracting Government to provide the information described in SOLAS regulation XI-2/9.2.1 on the request of the officers duly authorized by that Government. The master may decline to provide such information on the understanding that failure to do so may result in denial of entry into port.

5 Paragraph B/4.40 of the ISPS Code states that SOLAS regulation XI-2/9.2.5 allows the master of a ship, upon being informed that the coastal or port State will implement control measures under SOLAS regulation XI-2/9.2, to withdraw the intention for the ship to enter port. If the master withdraws that intention, SOLAS regulation XI-2/9 no longer applies, and any other steps that are taken must be based on, and consistent with, international law.

THE STANDARD DATA SET OF SECURITY-RELATED INFORMATION

6 The appendix to this Guidance provides the standard data set of security-related information a ship might be expected to submit prior to entry into port.

7 The development of the standard data set of security-related information should not be construed as preventing any Contracting Government from seeking the submission of information supplementary to that contained in the standard data set, or requiring additional information as a condition for entry into a port located within its territory.

8 In addition, the development of the standard data set of security-related information should not be construed as preventing any Contracting Government or any duly authorized officer from seeking, at any stage during the stay of the ship within port, documentary or other evidence to validate or verify the information submitted or from taking any control measures or steps against the ship pursuant to the provision of SOLAS regulation XI-2/9 during the exercise of any control and compliance measures. In this respect it is noted that SOLAS regulation XI-2/9.2.1 provides that, if requested by the Contracting Government, the ship or the Company shall provide confirmation, acceptable to that Contracting Government, of the information required.

WHO SHOULD SUBMIT THE INFORMATION, TO WHOM, WHEN AND HOW

9 The information described in SOLAS regulation XI-2/9.2.1 should be submitted by the master of the ship. However, the Ship Security Officer and the Company Security Officer may submit the information on behalf of the master. In addition, the Agent of the ship at the port where the ship seeks entry may, under the expressed authority of the master, also submit the information on behalf of the master.

10 Contracting Governments are expected to advise Companies and ships to whom, including the relevant contact details, the security-related information is to be sent.

11 As indicated above, SOLAS regulation XI-2/9.2.2 requires every ship to which SOLAS chapter XI-2 applies intending to enter the port of another Contracting Government to provide the information described in SOLAS regulation XI-2/9.2.1 on the request of the officers duly authorized by that Government. However it is understood that a number of Contracting Governments have established national requirements which require every ship intending to enter their ports to provide such information. In such cases duly authorized officers do not make individual requests to ships for the submission of information. Those Contracting Governments who have established such practices are expected to advise Companies and ships on the standing requirements in place.

12 Contracting Governments should consider establishing either central or regional points of contact, or other means of providing up to date information on the submission of security-related information. The existence of such contact points should be publicized.

13 Unless a Contracting Government has established a different time period prior to the arrival of the ship in port for the submission of the required information the recommended default minimum period for the submission of such information is not to be less than 24 hours prior to the expected entry of the ship into port.

14 The information described in SOLAS regulation XI-2/9.2.1 and the standard data set of the security-related information set in the appendix may be submitted in an electronic format. In such a case it is understood that the submission will not bear the signature of the person submitting the information unless a secure form of electronic signatures is available.

OTHER SECURITY-RELATED INFORMATION WHICH MAY BE REQUIRED

15 SOLAS regulation XI-2/9.2.1.6 allows Contracting Governments to seek the submission of other practical security-related information (but not details of the ship security plan), taking into account the guidance given in part B of the ISPS Code (paragraph B/4.39 of the ISPS Code). SOLAS regulation XI-2/5 is one of the examples of practical security related information cited in paragraph B/4.39 of the ISPS Code.

16 SOLAS regulation XI-2/5 requires the Company to ensure that the master has available on board, at all times, information through which officers duly authorised by a Contracting Government can establish:

.1 who is responsible for appointing the members of the crew or other persons currently employed or engaged on board the ship in any capacity on the business of that ship;

.2 who is responsible for deciding the employment of the ship; and

.3 in cases where the ship is employed under the terms of charter party(ies), who are the parties to such charter party(ies).

17 SOLAS regulation XI-2/5 should always be read in association with the provisions of paragraphs B/6.1 to B/6.8 of the ISPS Code.

APPENDIX

STANDARD DATA SET OF SECURITY-RELATED INFORMATION

1 *Particulars of the ship and contact details*

1.1 IMO Number[1, 2]

1.2 Name of ship[1, 2]

1.3 Port of registry[1, 2]

1.4 Flag State[1, 2]

1.5 Type of ship[1]

1.6 Call Sign

1.7 Inmarsat call numbers[3]

1.8 Gross Tonnage[1]

1.9 Name of Company[1, 2]

1.10 IMO Company identification number[2]

1.11 Name and 24-hour contact details of the Company Security Officer[4]

2 *Port and port facility information*

2.1 Port of arrival and port facility where the ship is to berth, if known

2.2 Expected date and time of arrival of the ship in port *(paragraph B/4.39.3 of the ISPS Code)*

2.3 Primary purpose of call

3 *Information required by SOLAS regulation XI-2/9.2.1*

3.1 The ship is provided *(SOLAS regulation 9.2.1.1)* with a valid:

- International Ship Security Certificate ☐ Yes ☐ No
- Interim International Ship Security Certificate ☐ Yes ☐ No

3.1.1 The certificate indicated in 3.1 has been issued by <*enter name of the Contracting Government*[1, 2] *or the Recognized Security Organization*[1, 2]> and which expires on <*enter date of expiry*[1]>.

3.1.2 If the ship is not provided with a valid International Ship Security Certificate or a valid Interim International Ship Security Certificate, explain why?

3.1.2.1 Does the ship have an approved ship security plan on board? ☐ Yes ☐ No

3.2 Current security level *(SOLAS regulation XI-2/9.2.1.2)*: ☐

3.2.1 Location of the ship at the time the report is made *(paragraph B/4.39.2 of the ISPS Code)*

3.3 List the last ten calls, in chronological order with the most recent call first, at port facilities at which the ship conducted ship/port interface[5] together with the security level at which the ship operated *(SOLAS regulation XI-2/9.2.1.3)*:

	Date			
No.	From[6]	To[6]	Port, Country, Port Facility and UNLOCODE[3]	Security level

3.3.1 Did the ship, during the period specified 3.3, take any special or additional security measures, beyond those specified in the approved ship security plan? ☐ Yes ☐ No

3.3.2 If the answer to 3.3.1 is YES, for each of such occasions please indicate the special or additional security measures which were taken by the ship *(SOLAS regulation XI-2/9.2.1.4)*:

	Date			
No.	From[6]	To[6]	Port, Country, Port Facility and UNLOCODE[3]	Special or additional security measures

3.4 List the ship-to-ship activities[7], in chronological order with the most recent ship-to-ship activity first, which have been carried out during the period specified in 3.3:

☐ Not applicable

	Date			
No.	From[6]	To[6]	Location or Latitude and Longitude	Ship-to-ship activity

3.4.1 Have the ship security procedures, specified in the approved ship security plan, been maintained during each of the ship-to-ship activities specified in 3.4 *(SOLAS regulation XI-2/9.2.1.5)*? ☐ Yes ☐ No

3.4.2 If the answer to 3.4.1 is NO, identify the ship-to-ship activities for which the ship security procedures were not maintained and indicate, for each, the security measures which were applied in lieu:

	Date			
No.	From[6]	To[6]	Security measures applied	Ship-to-ship activity

3.5 Provide a general description of cargo aboard the ship (*SOLAS regulation XI-2/9.2.1.6 and paragraph B/4.39.5 of the ISPS Code)*:

3.5.1 Is the ship carrying any dangerous substances[8] as cargo? ☐ Yes ☐ No

3.5.2 If the answer to 3.5.1 is YES, provide details or attach a copy of the Dangerous Goods Manifest (IMO FAL Form 7)

3.6 A copy of the ship's Crew List (IMO FAL Form 5) is attached ☐
(SOLAS regulation XI-2/9.2.1.6 and paragraph B/4.39.4 of the ISPS Code)

3.7 A copy of the ship's Passenger List (IMO FAL Form 6) is attached ☐
(SOLAS regulation XI-2/9.2.1.6 and paragraph B/4.39.6 of the ISPS Code)

4 *Other security-related information*

4.1 Is there any security-related matter you wish to report? ☐ Yes ☐ No

4.1.1 If the answer to 4.1 is YES, provide details[9]

5 *Agent of the ship at the intended port of arrival*

5.1 Name and contact details (telephone number) of the agent of the ship at the intended port of arrival:

6 *Identification of the person providing the information*

6.1 Name:

6.2 Title or position[10]:

6.3 Signature:

This report is dated at <*enter place*> on <*enter time and date*>.

EXPLANATORY NOTES

1 As appearing on the ship's International Ship Security Certificate or the ship's Interim International Ship Security Certificate.

2 If a copy of the ship's current Continuous Synopsis Record (CSR) is submitted there is no need to complete this entry.

3 If available.

4 Refer to paragraph 27 of the Guidance relating to the implementation of SOLAS chapter XI-2 and of the ISPS Code (MSC/Circ.1132).

5 *Ship/port interface* means the interactions that occur when a ship is directly and immediately affected by actions involving the movement of persons, goods or the provisions of port services to or from the ship *(SOLAS regulation XI-2/1.1.8).*

6 Provide the date.

7 *Ship-to-ship activity* means any activity not related to a port facility that involves the transfer of goods or persons from one ship to another *(SOLAS regulation XI-2/1.1.10)*.

Information would not normally be required to include records of transfers of pilots or of customs, immigration or security officials nor bunkering, lighting, loading of supplies and unloading of waste by ship within port facilities as these would normally fall within the auspices of the Port Facility Security Plan (PFSP) *(paragraph B/4.38 of the ISPS Code)*.

Ascertaining whether these activities fall within the PFSP should form part of the dialogue between the Ship Security Officer and the Port Facility Security Officer. It should be remembered that the physical boundaries of port facilities may not always coincide with the boundaries of the port or harbour authority.

8 *Dangerous substances as cargo* means the carriage of substances, materials and articles covered by the IMDG Code and falling under the following classes of dangerous goods irrespective of whether these are carried in bulk or packaged form:

- Class 1: Explosives
- Class 2.1 : Flammable gas
- Class 2.3 : Toxic gases
- Class 3: Flammable liquids
- Class 4.1: Flammable solids, self-reactive substances and desensitized explosives
- Class 5.1: Oxidizing substances
- Class 6.1 : Toxic substances
- Class 6.2: Infectious substances
- Class 7: Radioactive material
- Class 8: Corrosive substances

This information may be extracted from the Dangerous Goods Manifest (IMO FAL Form 7) or the whole Dangerous Goods Manifest may be submitted.

9 Other security-related matters include but are not limited to the carriage of stowaways or any persons rescued at sea. When reporting stowaways please see the Guidelines on the allocation of responsibilities to seek the successful resolution of stowaway cases adopted by the Organization with resolution A.871(20). This resolution provides in the Appendix to the Annex a Stowaway details report which should be completed and forwarded to the extent that is practically possible. When reporting persons rescued at sea please see the guidance provided in paragraph B/4.38.3 of the ISPS Code.

10 Master, Ship Security Officer, Company Security Officer or Agent of the ship at the intended port of arrival.

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COLREG.2/Circ.60
10 December 2008

NEW AND AMENDED EXISTING TRAFFIC SEPARATION SCHEMES

1 The Maritime Safety Committee, at its eighty-fifth session (26 November to 5 December 2008) adopted, in accordance with the provisions of resolution A.858(20), new and amended existing traffic separation schemes and associated routeing measures listed, in annexes 1 to 7, as follows:

.1 "In the approaches to the Port of Thessaloniki" (new scheme);

.2 "The Åland Sea" (new scheme);

.3 "In Liverpool Bay" (new scheme);

.4 "In the approach to Boston, Massachusetts" (amended scheme);

.5 "Off Land's End, between Seven Stones and Longships" (amended scheme);

.6 "In the approaches to the River Humber" (amended scheme); and

.7 "At Hatter Barn" (amended scheme).

2 The new and amended traffic separation schemes listed in subparagraphs 1.1 and 1.4 above and detailed in annexes 1 and 4 will be implemented at 0000 hours UTC on 1 June 2009; those listed in subparagraphs 1.3, 1.5, 1.6 and 1.7 and detailed in annexes 3, 5, 6 and 7 will be implemented at 0000 hours UTC on 1 July 2009 and the one listed in subparagraph 1.2 and detailed in annex 2 will be implemented at 0000 hours UTC on 1 January 2010.

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NEW AND AMENDED TRAFFIC SEPARATION SCHEMES AND ASSOCIATED ROUTEING MEASURES

ANNEX 1

NEW TRAFFIC SEPARATION SCHEME "IN THE APPROACHES TO THE PORT OF THESSALONIKI"

(Reference chart: Hellenic Navy Hydrographic Service Chart No.255, edition May 1979 – as updated.
Note: The chart is based on European Datum (RE 50), however the positions mentioned below are in accordance with Word Geodetic System 1984 Datum (WGS 84).)

Description of the traffic separation scheme

The routeing measures consist of a traffic separation scheme southwest of the Ak. Mikro Emvolon.

(a) A separation line connects the following geographical positions:

(4) 40° 33′.39 N 022° 51′.96 E
(5) 40° 29′.94 N 022° 46′.66 E

(b) A separation zone connects the following geographical positions:

(5) 40° 29′.94 N 022° 46′.66 E
(6) 40° 27′.24 N 022° 46′.11 E
(7) 40° 27′.24 N 022° 45′.18 E

(c) A traffic lane for northbound traffic is established between the separation line and the separation zone and a line connecting the following geographical positions:

(1) 40° 27′.24 N 022° 47′.21 E
(2) 40° 29′.94 N 022° 47′.46 E
(3) 40° 33′.06 N 022° 52′.36 E

(d) A traffic lane for southbound traffic is established between the separation line and the separation zone and a line connecting the following geographical positions:

(8) 40° 27′.24 N 022° 43′.86 E
(9) 40° 30′.12 N 022° 46′.11 E
(10) 40° 33′.69 N 022° 51′.61 E

***

ANNEX 2

NEW TRAFFIC SEPARATION SCHEME "THE ÅLAND SEA"

Note: See "Åland Sea Deep-Water routes" in part C.

(Reference chart: Finnish chart number 953, Edition 2007 V and Swedish chart SE61 (INT1205) Edition 21/2-2008.
Note: This chart is based on the World Geodetic System 1984 Datum (WGS 84).)

Description of the traffic separation scheme

North Åland Sea

Part I

(a) A separation line connecting the following geographical positions:

(1) 60° 29′.52 N 019° 00′.30 E (2) 60° 26′.94 N 019° 00′.36 E

(b) A traffic lane for southbound traffic is established between separation line and a line connecting the following geographical positions:

(3) 60° 29′.54 N 018° 56′.36 E (4) 60° 26′.89 N 18° 57′.05 E

(c) A traffic lane for northbound traffic is established between separation line and a line connecting the following geographical positions:

(5) 60° 26′.89 N 19° 03′.88 E (6) 60° 29′.51 N 019° 04′.56 E

Part II

(d) A separation zone 1.1 mile wide is centred upon the following geographical positions:

(7) 60° 11′.06 N 019° 03′.21 E (8) 60° 10′.09 N 019° 04′.80 E

(e) A traffic lane for the southbound traffic is established between the traffic separation zone and a line connecting the following geographical positions:

(9) 60° 09′.79 N 019° 00′.12 E (10) 60° 08′.83 N 019° 01′.71 E

(f) A traffic lane for the northbound traffic is established between the traffic separation zone and a line connecting the following geographical positions:

(11) 60° 11′.36 N 019° 07′.89 E (12) 60° 12′.33 N 019° 06′.30 E

South Åland Sea TSS

Part I

(g) A separation zone 1.1 mile wide is centred upon the following geographical positions:

(13)	59° 47′.28 N	019° 42′.44 E	(14)	59° 46′.30 N	019° 44′.04 E

(h) A traffic lane for the southbound traffic is established between the traffic separation zone and a line connecting the following geographical positions:

(15)	59° 46′.01 N	019° 39′.39 E	(16)	59° 45′.04 N	019° 40′.99 E

(i) A traffic lane for the northbound traffic is established between the traffic separation zone and a line connecting the following geographical positions:

(17)	59° 47′.57 N	019° 47′.10 E	(18)	59° 48′.55 N	019° 45′.50 E

Part II

(j) A separation zone is bounded by a line connecting the following geographical positions:

(19)	59° 46′.03 N	019° 52′.85 E	(21)	59° 45′.36 N	019° 58′.85 E
(20)	59° 45′.96 N	019° 58′.87 E	(22)	59° 45′.42 N	019° 53′.83 E

(k) A traffic lane for the eastbound traffic is established between the separation zone, and a line connecting the following geographical positions:

(23)	59° 44′.24 N	019° 55′.74 E	(24)	59° 44′.25 N	019° 58′.80 E

(l) A traffic lane for the westbound traffic is established between the separation zone, and a line connecting the following geographical positions:

(25)	59° 46′.96 N	019° 58′.92 E	(26)	59° 47′.37 N	019° 50′.68 E

Part III

(m) A separation line connecting the following geographical positions:

(27)	59° 41′.22 N	020° 31′.98 E	(28)	59° 43′.32 N	020° 28′.38 E
(29)	59° 44′.76 N	020° 23′.10 E			

(n) A traffic lane for the eastbound traffic is established between the separation line, and the following geographical positions:

(30)	59° 44′.32 N	020° 19′.60 E	(32)	59° 40′.56 N	020° 30′.34 E
(31)	59° 42′.87 N	020° 27′.57 E			

(o) A traffic lane for the westbound traffic is established between the separation line, and a line connecting the following geographical positions:

(33)	59° 41′.93 N 020° 33′.72 E	(34)	59° 45′.68 N 020° 24′.51 E

Part IV

(p) A separation line connecting the following geographical positions:

(35)	59° 42′.26 N 019° 51′.55 E	(37)	59° 34′.26 N 020° 08′.40 E
(36)	59° 39′.70 N 019° 55′.19 E	(38)	59° 30′.27 N 020° 08′.40 E

(q) A separation line connecting the following geographical positions:

(39)	59° 30′.27 N 020° 06′.51 E	(41)	59° 39′.44 N 019° 54′.13 E
(40)	59° 33′.75 N 020° 06′.51 E	(42)	59° 41′.91 N 019° 50′.60 E

(r) A traffic lane for the southbound traffic is established between the separation line above in paragraph (q) and a line connecting the following geographical positions:

(43)	59° 40′.89 N 019° 47′.83 E	(45)	59° 34′.89 N 019° 57′.20 E
(44)	59° 39′.57 N 019° 51′.58 E	(46)	59° 30′.27 N 019° 54′.70 E

(s) A traffic lane for the northbound traffic is established between the separation line above in paragraph (p) and the following two lines connecting the following geographical positions:

Line 1

(47)	59° 30′.27 N 020° 15′.79 E	(49)	59° 33′.90 N 020° 30′.13 E
(48)	59° 33′.90 N 020° 15′.79 E		

Line 2

(50)	59° 37′.92 N 020° 30′.13 E	(52)	59° 43′.59 N 019° 55′.17 E
(51)	59° 37′.92 N 020° 06′.72 E		

(t) The traffic is separated by natural obstructions (Svenska Björn lighthouse in geographical position 59°32′.86 N 020°01′.24 E and two shallow waters) inside the traffic lane for the southbound traffic by a line connecting the following geographical positions:

(53)	59° 30′.27 N 020° 01′.84 E	(55)	59° 34′.15 N 019° 59′.68 E
(54)	59° 34′.15 N 020° 01′.84 E	(56)	59° 30′.27 N 019° 59′.68 E

Precautionary areas

(u) A precautionary area is bounded by a line connecting the following geographical positions:

(16)	59° 46′.01 N 019° 39′.39 E	(23)	59° 44′.24 N 019° 55′.74 E
(17)	59° 47′.57 N 019° 47′.10 E	(52)	59° 43′.59 N 019° 55′.17 E
(26)	59° 46′.96 N 019° 58′.92 E	(43)	59° 40′.89 N 019° 47′.83 E

(v) A circular precautionary area of radius of 6.5 nautical miles is centred upon the following geographical position:

(57) 59° 52′.03 N 019° 34′.66 E

***

ANNEX 3

NEW TRAFFIC SEPARATION SCHEME
"IN LIVERPOOL BAY"

Note: See ATBA "In Liverpool Bay"

(Reference Chart: British Admiralty 1978, Edition 2007
Note: This chart is based on World Geodetic System 1984 Datum (WGS 84).)

Description of the traffic separation scheme

(a) A separation zone (east of the "Douglas Oil Field" Platform), 1.0 nautical mile wide, is bounded by lines connecting the following geographical positions:

(1) 53° 32′.76 N 003° 32′.18 W
(2) 53° 32′.74 N 003° 33′.83 W
(3) 53° 31′.74 N 003° 33′.80 W
(4) 53° 31′.76 N 003° 32′.15 W

(b) A separation zone (west of the "Douglas Oil Field" Platform), 1.0 nautical mile wide, is bounded by lines connecting the following geographical positions:

(5) 53° 32′.72 N 003° 35′.51 W
(6) 53° 32′.64 N 003° 41′.30 W
(7) 53° 31′.64 N 003° 41′.27 W
(8) 53° 31′.72 N 003° 35′.48 W

(c) A traffic lane for east-bound traffic, 1.8 nautical miles wide, is established between the separation zones and a separation line connecting the following geographical positions:

(9) 53° 29′.96 N 003° 32′.10 W
(10) 53° 29′.84 N 003° 41′.21 W

(d) A traffic lane for west-bound traffic, 1.8 nautical miles wide is established between the separation zones and a separation line connecting the following geographical positions:

(11) 53° 34′.56 N 003° 32′.24 W
(12) 53° 34′.44 N 003° 41′.36 W

***

ANNEX 4

AMENDMENTS TO THE EXISTING TRAFFIC SEPARATION SCHEME "IN THE APPROACH TO BOSTON, MASSACHUSETTS"

(Reference charts: United States 13009, 2007 edition; 13200, 2007 edition.
Note: These charts are based on North American 1983 Datum which is equivalent to WGS 1984 Datum (WGS 84).)

Description of the amended traffic separation scheme

(a) A separation zone, one mile wide, is centred upon the following geographical positions:

(1)	42° 20′.73 N 070° 39′.06 W	(3)	40° 49′.25 N 069° 00′.81W
(2)	42° 18′.28 N 070° 01′.14 W		

(b) A traffic lane for northbound traffic is established between the separation zone and a line connecting the following geographical positions:

(4)	40° 50′.47 N 068° 58′.67 W	(6)	42° 22′.71 N 070° 38′.62 W
(5)	42° 20′.17 N 069° 59′.40 W		

(c) A traffic lane for southbound traffic is established between the separation zone and a line connecting the following geographical positions:

(7)	42° 18′.82 N 070° 40′.49 W	(9)	40° 48′.03 N 069° 02′.96 W
(8)	42° 16′.39N 070° 02′.88 W		

Precautionary areas

(a) A precautionary area of radius 6.17 nautical miles is centred upon the following geographical position (12) 42° 22′.71 N, 070° 46′.97 W.

(b) A precautionary area is bounded to the east by a circle of radius 15.5 miles, centred upon geographical position (13) 40° 35′.01 N, 068° 59′.96 W, intersected by the traffic separation schemes "In the approach to Boston, Massachusetts" and "Eastern Approach, Off Nantucket" (part II of the traffic separation scheme "Off New York") at the following geographical positions:

(4)	40° 50′.47 N 068° 58′.67 W	(11)	40° 23′.75 N 069° 13′.95 W

The precautionary area is bounded to the west by a line connecting the two traffic separation schemes between the following geographical positions:

(9)	40° 48′.03 N 069° 02′.95 W	(10)	40° 36′.76 N 069° 15′.13 W

***

ANNEX 5

AMENDED TRAFFIC SEPARATION SCHEME
"OFF LAND'S END, BETWEEN SEVEN STONES AND LONGSHIPS"

(Reference Charts: British Admiralty 1148 (published 06/2001), 2565 (published 06/2001)
Note: These charts are based on World Geodetic System 1984 Datum (WGS 84).)

Description of the amended traffic separation scheme

(a) A separation zone, two miles wide, is bounded by lines connecting the following geographical positions:

(1)	49º 58′.02 N	005º 55′.76 W
(2)	50º 20′.03 N	005º 55′.76 W
(3)	50º 20′.03 N	005º 58′.88 W
(4)	49º 56′.52 N	005º 58′.88 W

(b) A separation zone, one mile wide, is bounded by lines connecting the following geographical positions:

(5)	50º 00′.99 N	005º 49′.58 W
(6)	50º 20′.03 N	005º 49′.58 W
(7)	50º 20′.03 N	005º 51′.11 W
(8)	50º 00′.22 N	005º 51′.11 W

(c) A separation zone, one mile wide, is bounded by lines connecting the following geographical positions:

(9)	49º 54′.29 N	006º 03′.56 W
(10)	50º 20′.03 N	006º 03′.56 W
(11)	50º 20′.03 N	006º 05′.06 W
(12)	49º 53′.54 N	006º 05′.06 W

(d) A traffic lane for northbound traffic, three miles wide, is established between the separation zones described in paragraphs (a) and (b) above.

(e) A traffic lane for southbound traffic, three miles wide, is established between the separation zones described in paragraphs (a) and (c) above.

Inshore Traffic Zones

(f) The area between the eastern boundary of the TSS and Land's End, and which lies between a line drawn from position (5) above in a direction of 078° to the coast and a line drawn from position (13) 50º 08′.00 N, 005º 49′.52 W, 005º 49′.58 W in a direction of 090° to the coast at Pendeen Point, is designated an inshore traffic zone.

(g) The area between the western boundary of the TSS and the Isles of Scilly, and which lies between a line drawn from position (12) above in a direction of 270° to the islands and a line drawn from position (14) 50º 08′.00 N, 006º 05′.00 W, 50º 08′.00 N, 006º 05′.06 W in a direction of 225° to Round Island Lighthouse, is designated an inshore traffic zone.

***

ANNEX 6

AMENDED TRAFFIC SEPARATION SCHEME
"IN THE APPROACHES TO THE RIVER HUMBER"

(Reference Charts: British Admiralty 109, (published 06/2006), 107, (published 09/2004)
Note**:** These charts are based on World Geodetic System 1984 Datum (WGS 84).)

Description of the Traffic Separation Scheme (TSS)

The proposed amendment to the Humber Traffic Separation Scheme (TSS) comprises:

- Extending the existing TSS by 18 nautical miles in a NNE direction to enhance the safety of navigation in the area between Mid New Sand Buoy and the pilot boarding area north of Humber Light Float.

Part I

Entrance to River Humber within Port Area

(a) A precautionary area established by a line connecting the following geographical positions:

(1)	53° 34′.22 N	000° 06′.32 E	
(2)	53° 33′.54 N	000° 05′.70 E	
(3)	53° 33′.14 N	000° 06′.80 E	(Hobo)
(4)	53° 33′.92 N	000° 07′.43 E	(No. 3A Binks)
(1)	53° 34′.22 N	000° 06′.32 E	

(b) A separation line connecting the following geographical positions:

(5)	53° 33′.54 N	000° 07′.13 E	(Delta)
(6)	53° 32′.73 N	000° 09′.65 E	(Charlie)

(c) A traffic lane for inbound traffic established between the separation line specified in paragraph (b) above and a straight line connecting the following geographical positions:

(4)	53° 33′.92 N	000° 07′.43 E	(No. 3A Binks)
(7)	53° 33′.16 N	000° 10′.27 E	

(d) A traffic lane for outbound traffic established between the separation line specified in paragraph (b) above and a straight line connecting the following geographical positions:

(3)	53° 33′.14 N	000° 06′.80 E	(Hobo)
(8)	53° 32′.34 N	000° 09′.11 E	(No. 2B)

(e) A precautionary area established by a line connecting the following geographical positions:

(7)	53° 33′.16 N	000° 10′.27 E	
(8)	53° 32′.34 N	000° 09′.11 E	(No. 2B)
(9)	53° 32′.38 N	000° 11′.12 E	

(10)	53° 33′.16 N	000° 11′.17 E	
(11)	53° 33′.07 N	000° 10′.63 E	(No. 3 Chequer)
(7)	53° 33′.16 N	000° 10′.27 E	

(f) A separation line connecting the following geographical positions:

(12)	53° 32′.67 N	000° 11′.15 E	(Bravo)
(13)	53° 32′.82 N	000° 13′.20 E	(Alpha)

(g) A traffic lane for inbound traffic established between the separation line specified in paragraph (f) above and a straight line connecting the following geographical positions:

(10)	53° 33′.16 N	000° 11′.17 E
(14)	53° 33′.52 N	000° 13′.80 E

(h) A traffic lane for outbound traffic established between the separation line specified in paragraph (f) above and a straight line connecting the following geographical positions:

(9)	53° 32′.38 N	000° 11′.12 E
(15)	53° 32′.41 N	000° 12′.80 E

Part II

River Humber Approaches

(i) A precautionary area established by a line connecting the following geographical positions:

(15)	53° 32′.41 N	000° 12′.80 E	
(16)	53° 32′.42 N	000° 13′.18 E	(No. 2 Haile Sand)
(17)	53° 30′.59 N	000° 16′.61 E	
(18)	53° 31′.90 N	000° 18′.29 E	(Hotspur)
(19)	53° 33′.57 N	000° 18′.29 E	
(20)	53° 34′.22 N	000° 17′.59 E	(S. Haile)
(21)	53° 34′.74 N	000° 16′.54 E	(S. Binks)
(22)	53° 33′.56 N	000° 14′.19 E	(Spurn Light Float)
(14)	53° 33′.52 N	000° 13′.80 E	
(15)	53° 32′.41 N	000° 12′.80 E	

Eastern Approaches (Sea Reach)

(j) A separation line connecting the following geographical positions:

(23)	53° 32′.72 N	000° 18′.29 E	(Inner Sea Reach)
(24)	53° 32′.72 N	000° 22′.95 E	(Outer Sea Reach)

(k) A traffic lane for inbound traffic established between the separation line specified in paragraph (j) above and a straight line connecting the following geographical positions:

(19)	53° 33′.57 N	000° 18′.29 E
(25)	53° 33′.57 N	000° 22′.95 E

(l) A traffic lane for outbound traffic established between the separation line specified in paragraph (j) above and a straight line connecting the following geographical positions:

(18)	53° 31′.90 N	000° 18′.29 E	(Hotspur)
(26)	53° 31′.90 N	000° 22′.95 E	

South-east Approaches (Rosse Reach)

(m) A separation line connecting the following geographical positions:

(27)	53° 31′.24 N	000° 17′.44 E	(Inner Rosse Reach)
(28)	53° 29′.89 N	000° 20′.79 E	(Outer Rosse Reach)

(n) A traffic lane for inbound traffic established between the separation line specified in paragraph (m) above and a straight line connecting the following geographical positions:

(18)	53° 31′.90 N	000° 18′.29 E	(Hotspur)
(29)	53° 30′.56 N	000° 21′.57 E	

(o) A traffic lane for outbound traffic established between the separation line specified in paragraph (m) above and a straight line connecting the following geographical positions:

(17)	53° 30′.59 N	000° 16′.61 E
(30)	53° 29′.19 N	000° 19′.97 E

Part III

North-east Approaches (New Sand Hole)

(p) A separation line connecting the following geographical positions:

(31)	53° 34′.48 N	000° 17′.06 E
(32)	53° 36′.99 N	000° 20′.64 E
(35)	53° 38′.52 N	000° 21′.87 E

(q) A traffic lane for inbound traffic established between the separation line specified in paragraph (p) above and a straight line connecting the following geographical positions:

(21)	53° 34′.74 N	000° 16′.54 E	(S. Binks)
(33)	53° 37′.27 N	000° 20′.10 E	(Outer Binks)
(36)	53° 38′.70 N	000° 21′.24 E	

(r) A traffic lane for outbound traffic established between the separation line specified in paragraph (p) above and a straight line connecting the following geographical positions:

(20)	53° 34′.22 N	000° 17′.59 E	(S. Haile)
(34)	53° 36′.72 N	000° 21′.20 E	(Mid New Sand)
(37)	53° 38′.35 N	000° 22′.49 E	(North New Sand)

***

ANNEX 7

AMENDED TRAFFIC SEPARATION SCHEME "AT HATTER BARN"

Note: See mandatory ship reporting system "In the Storebælt (Great Belt) Traffic Area (BELTREP)" in part G, section I.

(Reference chart: Danish chart no. 128, 9th edition, October 2007.
Note: The chart is based on World Geodetic System 1984 Datum (WGS 84).)

Description of the amended traffic separation scheme

(a) A separation line connects the following geographical positions:

(1)	55° 54′.67 N	010° 56′.40 E	(2)	55° 50′.03 N	010° 49′.58 E

(b) A traffic lane of 675 metres wide at the narrowest part, for north-eastbound traffic, is established between the separation line and a separation zone connecting the following geographical positions:

(3)	55° 54′.75 N	010° 57′.87 E	(7)	55° 47′.89 N	010° 50′.24 E
(4)	55° 53′.88 N	010° 56′.08 E	(8)	55° 47′.89 N	010° 51′.64 E
(5)	55° 52′.42 N	010° 53′.93 E	(9)	55° 53′.27 N	010° 59′.53 E
(6)	55° 49′.64 N	010° 50′.24 E	(10)	55° 54′.75 N	011° 00′.00 E

(c) A traffic lane of 800 metres wide, for south-westbound traffic is established between the separation line and a separation line connecting the following geographical positions:

(11)	55° 54′.61 N	010° 55′.31 E	(12)	55° 50′.54 N	010° 49′.34 E

Notes:

1 The minimum depth of water below mean sea level in the traffic separation scheme is 15 m.

2 Ships with a draught of more than 13 m should use the deep-water route which lies northwest of the traffic separation scheme.

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SN.1/Circ.272
10 December 2008

ROUTEING MEASURES OTHER THAN TRAFFIC SEPARATION SCHEMES

1 The Maritime Safety Committee, at its eighty-fifth session (26 November to 5 December 2008) adopted, in accordance with the provisions of resolution A.858(20), the following new routeing measures other than traffic separation schemes including amendments to existing routeing measures other than traffic separation schemes, annexed hereto:

.1 new recommendatory seasonal Area To Be Avoided "In the Great South Channel";

.2 new Area To Be Avoided and two new mandatory No Anchoring Areas in the vicinity of the proposed "Excelerate Northeast Gateway Energy Bridge Deepwater Port";

.3 new deep-water routes inside the borders of the "North Åland Sea" and "South Åland" TSS;

.4 new two-way route leading to the "Åland Sea"; and

.5 new Area To Be Avoided (ATBA) "In Liverpool Bay".

2 The aforementioned routeing measures other than traffic separation schemes will be implemented as follows: routeing measure listed in subparagraph 1.1 will be implemented at 0000 hours UTC on 1 June 2009; routeing measures listed in subparagraphs 1.3 and 1.4 at 0000 hours UTC on 1 January 2010 and routeing measure listed in subparagraph 1.5 at 0000 hours UTC on 1 July 2009. The United States will advise the Organization about the implementation date of the routeing measure listed in subparagraph 1.2, since the proposed "Excelerate Northeast Gateway Energy Bridge Deepwater Port" has still to be built.

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ANNEX

ROUTEING MEASURES OTHER THAN TRAFFIC SEPARATION SCHEMES

ESTABLISHMENT OF A NEW RECOMMENDATORY SEASONAL AREA TO BE AVOIDED "IN THE GREAT SOUTH CHANNEL", OFF THE EAST COAST OF THE UNITED STATES

(Reference charts: United States 13009, 2007 edition; 13200, 2007 edition. ***Note***: These charts are based on North American 1983 Datum which is equivalent to WGS 1984 Datum.)

Description of the Area To Be Avoided

In order to significantly reduce ship strikes of the highly endangered North Atlantic right whale, ships of 300 gross tonnage and above – during the period of April 1st through July 31st – should avoid the area bounded by lines connecting the following geographical positions:

(1) 41° 44′.14 N	069° 34′.83 W
(2) 42° 10′.00 N	068° 31′.00 W
(3) 41° 24′.89 N	068° 31′.00 W
(4) 40° 50′.47 N	068° 58′.67 W

ESTABLISHMENT OF A NEW AREA TO BE AVOIDED AND TWO NEW MANDATORY NO ANCHORING AREAS IN THE VICINITY OF THE PROPOSED "EXCELERATE NORTHEAST GATEWAY ENERGY BRIDGE DEEPWATER PORT" IN THE ATLANTIC OCEAN

(Reference charts: United States 13009, 2007 edition; 13200, 2007 edition; 13246, 2006 edition; 13267, 2007 edition. ***Note***: These charts are based on North American 1983 Datum which is equivalent to WGS 1984 Datum.)

Description of an Area To Be Avoided and mandatory no anchoring areas

Area To Be Avoided

An area of approximately 2.86 nautical square miles contained within an oval of radius 1,250 metres vectored from the two centre positions for STL Buoys "A" and "B", respectively, an Area to be Avoided for all ships except authorized ships is established in the area bounded as follows:

Starting at	(1)	42° 24′.29 N	070° 35′.27 W
A rhumb line to	(2)	42° 24′.59 N	070° 36′.76 W
Then an arc with a 1250 m radius centred at	(3)	42° 23′.94 N	070° 37′.01 W
To a point	(4)	42° 23′.29 N	070° 37′.25 W
Then a rhumb line to	(5)	42° 22′.99 N	070° 35′.76 W
Then an arc with a 1250 m radius centred at	(6)	42° 23′.64 N	070° 35′.52 W
Then to point	(1)	42° 24′.29 N	070° 35′.27 W

Mandatory no anchoring areas

Two areas contained within a circle of radius 1,000 metres centred upon the following geographical positions are established as mandatory no anchoring areas:

STL Buoy "A" – 42° 23′.64 N, 070° 35′.52 W
STL Buoy "B" – 42° 23′.94 N, 070° 37′.01 W

ESTABLISHMENT OF NEW DEEP-WATER ROUTES LEADING TO THE ÅLAND SEA

Note: See Traffic Separation Scheme for "The Åland Sea".

(Reference chart: Finnish chart number 953, Edition 2007 V and Swedish chart SE61 (INT1205) Edition 21/2-2008.
Note: Those charts are based on the World Geodetic System 1984 Datum (WGS 84).)

Description of the deep-water routes:

Inside the borders of the "North Åland Sea" TSS

A deep-water route forming part of the "North Åland Sea" TSS is established between the lines connecting the following geographical positions:

(i)	60° 29′.54 N	018° 56′.36 E	(iv)	60° 15′.26 N	019° 03′.50 E
(ii)	60° 18′.87 N	018° 59′.16 E	(v)	60° 18′.47 N	019° 01′.68 E
(iii)	60° 15′.28 N	018° 58′.08 E	(vi)	60° 29′.51 N	019° 04′.56 E

Inside the borders of the "South Åland Sea" TSS

A deep-water route forming part of the "South Åland Sea" TSS is established between the lines connecting the following geographical positions:

(vii)	59° 42′.26 N	019° 51′.55 E	(xi)	59° 30′.27 N	020° 06′.51 E
(viii)	59° 39′.70 N	019° 55′.19 E	(xii)	59° 33′.75 N	020° 06′.51 E
(ix)	59° 34′.26 N	020° 08′.40 E	(xiii)	59° 39′.44 N	019° 54′.13 E
(x)	59° 30′.27 N	020° 08′.40 E	(xiv)	59° 41′.91 N	019° 50′.60 E

ESTABLISHMENT OF A NEW TWO-WAY ROUTE LEADING TO THE ÅLAND SEA

(Reference chart: Finnish chart number 953, Edition 2007 V and Swedish chart SE61 (INT1205) Edition 21/2-2008.
Note: This chart is based on the World Geodetic System 1984 Datum (WGS 84).)

Description of the two-way route in the South Åland Sea

A recommended two-way route is established in the area joining the following geographical positions:

(24) 59° 44′.25 N 019° 58′.80 E	(34) 59° 45′.68 N 020° 24′.51 E
(30) 59° 44′.32 N 020° 19′.60 E	(25) 59° 46′.96 N 019° 58′.92 E
(29) 59° 44′.76 N 020° 23′.10 E	

ESTABLISHMENT OF A NEW AREA TO BE AVOIDED "IN LIVERPOOL BAY"

Note: See Traffic Separation Scheme "In Liverpool Bay".

(Reference Chart: British Admiralty 1978, Edition 2007.
Note: This chart is based on World Geodetic System 1984 Datum (WGS 84).)

Description of the Area To Be Avoided

In order to provide access to the Douglas Oil Field Platform an Area To Be Avoided (ATBA) of 1 nautical mile square centred on the Douglas Field Platform has been established within the Liverpool Bay Traffic Separation Scheme joining the following geographical positions:

(2)	53° 32′.74 N	003° 33′.83 W
(3)	53° 31′.74 N	003° 33′.80 W
(5)	53° 32′.72 N	003° 35′.51 W
(8)	53° 31′.72 N	003° 35′.48 W

Note: The ATBA should be avoided by all vessels, except in cases of emergency to avoid immediate danger, other than the following types (to the extent necessary to carry out their operations):

(a) a vessel restricted in her ability to manoeuvre when engaged in the laying, servicing or picking up a navigation mark, submarine cable or pipeline;

(b) offshore supply, support, maintenance and Emergency Response and Rescue vessels attending the Douglas Field Platform;

(c) vessels engaged in hydrographic survey operations; and

(d) vessels engaged in fishing.

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12 February 2009

ROUTEING MEASURES OTHER THAN TRAFFIC SEPARATION SCHEMES

1 The Maritime Safety Committee, at its eighty-fifth session (26 November to 5 December 2008), adopted in accordance with the provisions of resolution A.858(20), *inter alia*, a new Area To Be Avoided and two new mandatory No Anchoring Areas in the vicinity of the proposed "Excelerate Northeast Gateway Energy Bridge Deepwater Port".

2 At the time when the proposal was approved by the Sub-Committee on Safety of Navigation, at its fifty-fourth session, the United States delegation advised the Sub-Committee that it would notify the Organization when the Deepwater Port was in place before requesting an entry into force date. The measure was subsequently adopted by the Maritime Safety Committee, at its eighty-fifth session, and the relevant details circulated by SN.1/Circ.272 with the entry into force date still unspecified.

3 The Government of the United States has recently informed the Organization that the Excelerate Northeast Gateway Energy Bridge Deepwater Port is now operational and they have requested that the above-mentioned IMO adopted routeing measures other than traffic separation schemes should enter into force officially on 1 June 2009 at 0000 hours UTC.

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

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10 December 2008

MANDATORY SHIP REPORTING SYSTEMS

1 The Maritime Safety Committee, at its eighty-fifth session (26 November to 5 December 2008), adopted resolutions MSC.278(85) and MSC.279(85), as attached to this circular, in accordance with the provisions of Assembly resolution A.858(20), adopting a new mandatory ship reporting system including amendments to an existing ship reporting system, as follows:

.1 Off the coast of Portugal (new system); and

.2 The Papahānaumokuākea Marine National Monument Particularly Sensitive Sea Area (PSSA) (amended system).

2 The new mandatory ship reporting system, "Off the coast of Portugal", including the amendments to the existing ship reporting system for "The Papahānaumokuākea Marine National Monument", will be implemented at 0000 hours UTC on 1 June 2009.

3 Member Governments are requested to bring the attached information to the attention of masters of ships under their flags and advise them that they are required to comply with the requirements of the adopted ship reporting systems, in accordance with regulation V/11.7 of the International Convention for the Safety of Life at Sea, 1974, as amended.

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ANNEX 1

DRAFT RESOLUTION MSC.278(85)
(adopted on 1 December 2008)

ADOPTION OF THE NEW MANDATORY SHIP REPORTING SYSTEM "OFF THE COAST OF PORTUGAL – COPREP"

THE MARITIME SAFETY COMMITTEE,

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

RECALLING ALSO regulation V/11 of the International Convention for the Safety of Life at Sea, 1974 (SOLAS Convention), in relation to the adoption of ship reporting systems by the Organization,

RECALLING FURTHER resolution A.858(20) resolving that the function of adopting ship reporting systems shall be performed by the Committee on behalf of the Organization,

TAKING INTO ACCOUNT the guidelines and criteria for ship reporting systems adopted by resolution MSC.43(64), as amended by resolutions MSC.111(73) and MSC.189(79),

HAVING CONSIDERED the recommendations of the Sub-Committee on Safety of Navigation at its fifty-fourth session,

1. ADOPTS, in accordance with SOLAS regulation V/11, the new mandatory ship reporting system "Off the coast of Portugal – COPREP";

2. DECIDES that the mandatory ship reporting system, "COPREP", will enter into force at [0000] hours UTC on [1 June 2009]; and

3. REQUESTS the Secretary-General to bring this resolution and its Annex to the attention of the Member Governments and SOLAS Contracting Governments to the 1974 SOLAS Convention.

ANNEX

MANDATORY SHIP REPORTING SYSTEM
"OFF THE COAST OF PORTUGAL – COPREP"

1 Categories of ships required to participate in the system

The following vessels are required to participate in COPREP System:

(a) all vessels of 300 gross tonnage or above;

(b) all vessels carrying dangerous, hazardous and/or potentially polluting cargo;

(c) all passenger vessels;

(d) vessels engaged in towing or pushing where the combined length of the vessel and tow or pushed vessel is more than 100 m LOA;

(e) fishing vessels with an LOA of 24 m or above; and

(f) any other type of vessel is invited to voluntarily participate in the System.

2 Geographical coverage of the proposed systems and the number and edition of the reference chart used for delineation of the system

2.1 Geographical coverage of the proposed systems

The Ship Reporting System area is bounded by the shore and:

(a) In the North: latitude 39º 45′ N

(b) In the West and South: By a line joining the following geographical positions:

(i) 39º 45′ N
010º 14′ W

(ii) 38º 41′ N
010º 14′ W

(iii) 36º 30′ N
009º 35′ W

(iv) 36º 15′ N
008º 30′ W

(c) In the East: longitude 008º 30′ W

2.2 Reference chart

The reference chart is "Cabo Finisterra a Casablanca", Number 21101, Catalogue of Nautical Charts of the Portuguese Hydrographic Office, 4th impression – April 2002 (Note: This chart is based on WGS 84 Datum).

3 Reports and Procedures (Format and content of reports, authority to which reports should be sent)

3.1 Format

The format of information required in the COPREP reports is derived from the format given in resolution A.851(20) – General Principles for Ship Reporting Systems and Reporting Requirements, including guidelines for reporting incidents involving dangerous goods, harmful substances and/or marine pollutants.

3.2 Content

Vessels required to participate in the System shall make a report, with the short title "COPREP", to Roca Control and shall contain the following information, which is considered essential for the purpose of the System:

DESIGNATOR	INFORMATION REQUIRED
A	Ship's name and callsign IMO identification or MMSI number on request
C	Position (Latitude – Longitude), or
D	Distance and bearing from a landmark
E	True course in a three(3)-digit group
F	Speed in knots
G	Last port of call
H	Time (UTC) and point of entry in the reporting sector
I	Next port of call and ETA
P	Hazardous cargo, IMO class or UN number and quantity
Q or R	Breakdown, damage and/or deficiencies affecting, the structure, cargo or equipment of the vessel or any other circumstances affecting normal navigation, in accordance with the provisions of the SOLAS and MARPOL Conventions
W	Total number of persons on board (when requested)
X	Miscellaneous remarks (when requested)

Any vessel may elect, for reasons of commercial confidentiality, to communicate the information regarding cargo (designator P of the report), by non-verbal means prior to entering the System.

3.3 Time and geographical position for submitting reports

3.3.1 Ships must submit a report:

(a) on entering the reporting area as defined in paragraph 2.1; or

(b) immediately after leaving a port, terminal or anchorage situated in the reporting area; or

(c) when deviating from the route leading to the originally declared destination, port, terminal, anchorage or position "for orders" given on entry into the reporting area; or

(d) when it is necessary to deviate from the planned route owing to weather conditions, damaged equipment or a change in navigational status; or

(e) when something is detected that could affect safety of navigation in the area; or

(f) on finally leaving the reporting area; or

(g) when requested by COPREP operator.

3.3.2 Ships who have submitted a voluntary report with the same designator letters prior to entering the reporting area are only required to submit a mandatory report:

(a) if there are any changes in previously submitted information;

(b) with designator letters "A" and "H" when entering the reporting area.

3.4 Shore-based authority

The shore-based authority for COPREP mandatory ship reporting system, to which these reports should be sent, is ROCA CONTROL (identified in paragraph 7).

4 Information to be provided to the participating ship and the procedures to be followed:

ROCA CONTROL is an information service. Ships are provided with information broadcasts on weather, hazards affecting the safety of navigation and other traffic in the area.

These broadcasts include:

(a) traffic information;

(b) hampered vessels such as vessels not under command or vessels restricted in their ability to manoeuvre;

(c) adverse weather conditions;

(d) weather warnings and forecast;

(e) displaced or defective aids to navigation;

(f) radar assistance; and

(g) information on local harbours.

Information is broadcast on request or whenever necessary. Information broadcasts on ROCA CONTROL VHF main channel are preceded by an announcement on VHF channel 16. Information may be more frequent on occasions of adverse weather conditions, reduced visibility and imminent incident or accident.

The VTS centre is linked to MRCC LISBON and pollution control authorities in order to allow a prompt response to any emerging distress or urgent situation.

5 Communication requirements for the system, including frequencies on which reports should be transmitted and information to be reported:

The communications required for the COPREP are as follows:

(a) The call to the shore-based authority shall be made on the VHF channel assigned to Vessel Traffic Service in the Portuguese Coast, or by the other available means based on the following contact information:

CALL:	**Roca Control**
TELEPHONE:	**351-214464830**
FAX:	**351-214464839**
E-mail:	**oper.vts@imarpor.pt**
VHF CHANNELS	
Primary channels:	**22** and **79** Secondary channel: **69**
CALL SIGN:	**CSG229**
MMSI:	**00 263 3030**

(b) The language used for communication shall be Portuguese or English, using the IMO Standard Marine Communications Phrases, where necessary.

(c) Information of commercial confidentiality may be transmitted by non-verbal means.

6 Rules and regulations in force in the area of the proposed system

Portugal has taken appropriate action to implement international conventions to which it is a party including, where appropriate, adopting domestic legislation and promulgating regulations through domestic law. Relevant laws in force include domestic legislation and international regulations such as:

(a) International Regulations for Preventing Collisions at Sea (COLREGs), 1972, as amended;

(b) International Convention for the Safety of Life at Sea (SOLAS), 1974, as amended;

(c) International Convention on the Prevention of Pollution from Ships (MARPOL 73/78); and

(d) Directive 2002/59/CE.

7 Shore-based facilities and personnel qualifications and training required to support the operation of the proposed system

7.1 Shore-based facilities

ROCA CONTROL maintains a continuous 24-hour watch over COPREP area. The facilities of the Roca Control are the following:

(a) 8 Coastal Radars:

(i) Long-range SCANTER primary radars

(ii) Focus of long distance sea side coverage

(iii) Special high gain 21" antennas

(iv) Surveillance of all the continental Portuguese Coast

(v) Video from selected radar and combined radar data available to main centre's VTS operator;

(b) 8 Harbour Radars:

(i) Short range primary radars (for 3 of those)

(ii) Surveillance of the harbours approach area (for 5 of those)

(iii) Video from selected radar and combined radar data available to main centre's VTS operator;

(c) 11 AIS Sites:

(i) Automatic identification of ships:

- IMO standards

- 3 types of information: ship static, dynamic and voyage

(ii) Based on GPS positioning

(iii) AIS position data merged with radar data at operator display (TDS)

(iv) Ship identification correlated with National Maritime Ship Database;

(d) 11 Voice Radio Communication Sites:

(i) VHF voice radio communication with ships and aeronautical emergency channel

(ii) Complete coverage of continental Portuguese Coast

(iii) VTS operators are able to communicate within the coverage area

(iv) Telephone and electronic communication between harbours and VTS control centres;

(e) 11 VHF Direction Finder Sites:

(i) Azimuthing of radio communication

(ii) Complete coverage of continental Portuguese Coast

(iii) Data from all sites available for the VTS operators

(iv) RDF data is present on operator displays (TDS);

(f) 6 Meteorological Sites with:

(i) Anemometer, Thermometer, Barometer, Hygrometer, Rainfall indicator, Visibility sensors

(ii) Meteorological data of all sites will be presented to the VTS operators.

7.2 Personnel qualifications and training

The training given to ROCA CONTROL staff complies with the national and international recommendations and include a general study of navigational safety measures and the relevant national and international (IMO) provisions/requirements to support the operation of the proposed system.

8 Alternative procedures if the communication facilities of the shore-based authority fail

The system is designed to avoid, as far as possible, any irretrievable breakdown of equipment which would hinder the functioning of the services normally provided by ROCA CONTROL.

The most important items of equipment and power sources are duplicated and the facilities are provided with emergency generating sets as well as with Uninterruptible Power Supply (UPS) units. A maintenance team is available 24 hours a day to attend to any breakdown.

The system is also designed in such a manner that if one station fails, the adjacent station can provide the necessary coverage.

9 Actions to take in the event of emergency or ship's non-compliance with the system requirements

The main objectives of the system are to improve ships' safety in and off the Portuguese coastal waters, support the organization of search and rescue and protect and improve the marine environment in the coast, developing the actions as fast and effective as possible if an emergency is reported or a report from a ship fails to appear, and it is impossible to establish communication with the ship. All means will be used to obtain the full participation of ships required to submit reports.

The mandatory ship reporting system COPREP is for the exchange of information only and does not provide any additional authority for mandating changes in the ship's operations. This reporting system will be implemented consistent with UNCLOS, SOLAS and other relevant international instruments so that the reporting system will not constitute a basis for preventing the passage of a ship through the reporting area.

Infringements of these regulations shall be punishable under Portuguese law, or reported to the ship's flag State in accordance with IMO resolution A.432(XI) – Compliance with the Convention on the International Regulations for Preventing Collisions at Sea, 1972, as amended.

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ANNEX 2

RESOLUTION MSC.279(85)
(adopted on 1 December 2008)

ADOPTION OF AMENDMENTS TO THE EXISTING SHIP REPORTING SYSTEM FOR THE "PAPAHĀNAUMOKUĀKEA MARINE NATIONAL MONUMENT", PARTICULARLY SENSITIVE SEA AREA, "CORAL SHIPREP"

THE MARITIME SAFETY COMMITTEE,

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

RECALLING ALSO regulation V/11 of the International Convention for the Safety of Life at Sea, 1974 (SOLAS Convention), in relation to the adoption of ship reporting systems by the Organization,

RECALLING FURTHER resolution A.858(20) resolving that the function of adopting ship reporting systems shall be performed by the Committee on behalf of the Organization,

TAKING INTO ACCOUNT the guidelines and criteria for ship reporting systems adopted by resolution MSC.43(64), as amended by resolutions MSC.111(73) and MSC.189(79),

HAVING CONSIDERED the recommendations of the Sub-Committee on Safety of Navigation at its fifty-fourth session,

1. ADOPTS, in accordance with SOLAS regulation V/11, the amendments to the existing ship reporting system for the Papahānaumokuākea Marine National Monument, PSSA, "CORAL SHIPREP", as given at Annex;

2. DECIDES that the said amendments to the existing ship reporting system "CORAL SHIPREP" will enter into force at [0000] hours UTC on 1 June 2009]; and

3. REQUESTS the Secretary-General to bring this resolution and its annex to the attention of the Member Governments and SOLAS Contracting Governments to the 1974 SOLAS Convention.

ANNEX

AMENDMENTS TO THE EXISTING SHIP REPORTING SYSTEM FOR THE PAPAHĀNAUMOKUĀKEA MARINE NATIONAL MONUMENT, PSSA, "CORAL SHIPREP"

1 Amend the annex to resolution MSC.248(83) as follows:

The reporting address given in paragraphs 3.4.1, 5.3 and 5.4 is replaced by the following:

"nwhi.notifications@noaa-gov"

2 Amend the appendix to resolution MSC.248(83), as follows:

Appendix

Geographical coordinates

Ship reporting system

(Reference charts: United States 19016, 2007 edition; 19019, 2007 edition; 19022, 2007 edition. These charts are based on World Geodetic Survey (WGS) 1984 and astronomic Datum.)

1 Outer Boundary

The outer boundary of the "CORALSHIPREP" reporting area consists of lines connecting the following geographical positions:

Starting at	(1)	29° 24′.21 N,	178° 06′.45 W
A rhumb line to	(2)	29° 12′.16 N,	177° 04′.25 W
Then a rhumb line to	(3)	28° 43′.78 N,	175° 13′.76 W
Then a rhumb line to	(4)	27° 00′.28 N,	173° 25′.37 W
Then a rhumb line to	(5)	26° 44′.85 N,	171° 28′.22 W
Then a rhumb line to	(6)	26° 23′.95 N,	170° 20′.25 W
Then a rhumb line to	(7)	25° 56′.49 N,	167° 32′.03 W
Then a rhumb line to	(8)	24° 50′.23 N,	165° 58′.56 W
Then a rhumb line to	(9)	24° 02′.61 N,	161° 42′.30 W
Then an arc with a 60.25 nm radius centred at	(21)	23° 03′.61 N,	161° 55′.22 W
To a point	(10)	22° 04′.59 N,	162° 08′.14 W
Then a rhumb line to	(11)	22° 35′.32 N,	164° 53′.46 W
Then a rhumb line to	(12)	22° 47′.86 N,	166° 40′.44 W
Then a rhumb line to	(13)	24° 03′.30 N,	168° 27′.53 W
Then a rhumb line to	(14)	24° 26′.59 N,	170° 50′.37 W
Then a rhumb line to	(15)	24° 46′.49 N,	171° 52′.87 W
Then a rhumb line to	(16)	25° 07′.23 N,	174° 30′.23 W
Then a rhumb line to	(17)	27° 05′.50 N,	176° 35′.40 W
Then a rhumb line to	(18)	27° 15′.11 N,	177° 35′.26 W
Then a rhumb line to	(19)	27° 26′.10 N,	178° 32′.23 W
Then an arc with a 60.17 nm radius centred at	(20)	28° 25′.23 N,	178° 19′.51 W
Then to point	(1)	29° 24′.21 N,	178° 06′.45 W

2 Inner Boundary

The inner boundaries of the “CORAL SHIPREP” SRS reporting area are coterminous with the outer boundaries of the IMO-adopted Areas To Be Avoided “In the Region of the Papahānaumokuākea Marine National Monument”, which consist of the following:

1 Those areas contained within circles of radius of 50 nautical miles centred upon the following geographical positions:

a. 28° 25′.18 N, 178° 19′.75 W (Kure Atoll)
b. 28° 14′.20 N, 177° 22′.10 W (Midway Atoll)
c. 27° 50′.62 N, 175° 50′.53 W (Pearl and Hermes Atoll)
d. 26° 03′.82 N, 173° 58′.00 W (Lisianski Island)
e. 25° 46′.18 N, 171° 43′.95 W (Laysan Island)
f. 25° 25′.45 N, 170° 35′.32 W (Maro Reef)
g. 25° 19′.50 N, 170° 00′.88 W (Maro Reef and Raita Bank)
h. 25° 00′.00 N, 167° 59′.92 W (Gardner Pinnacles)
i. 23° 45′.52 N, 166° 14′.62 W (French Frigate Shoals)
j. 23° 34′.60 N, 164° 42′.02 W (Necker Island)
k. 23° 03′.38 N, 161° 55′.32 W (Nihoa Island)

2 Those areas contained between the following geographical coordinates:

		Begin Coordinates		End Coordinates	
		Latitude	Longitude	Latitude	Longitude
Area 1	Lisianski Island (N) ---> Laysan Island	26° 53′.22 N	173° 49′.64 W	26° 35′.58 N	171° 35′.60 W
	Lisianski Island (S) ---> Laysan Island	25° 14′.42 N	174° 06′.36 W	24° 57′.63 N	171° 57′.07 W
Area 2	Gardner Pinnacles (N)--> French Frigate Shoals	25° 38′.90 N	167° 25′.31 W	24° 24′.80 N	165° 40′.89 W
	Gardner Pinnacles (S) ---> French Frigate Shoals	24° 14′.27 N	168° 22′.13 W	23° 05′.84 N	166° 47′.81 W

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Ref. T2-OSS/2.7.1

SN.1/Circ.275
10 December 2008

AMENDMENTS TO THE GENERAL PROVISIONS ON SHIPS' ROUTEING

1 The Maritime Safety Committee, at its eighty-fifth session (26 November to 5 December 2008), adopted by resolution MSC.280(85), subject to confirmation by the Assembly, amendments to the General Provisions on Ships' Routeing (resolution A.572(14), as amended).

2 Member Governments and SOLAS Contracting Governments are invited to bring the annexed General Provisions to the attention of all concerned.

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ANNEX

DRAFT RESOLUTION MSC.280(85)
(adopted on 1 December 2008)

ADOPTION OF AMENDMENTS TO THE GENERAL PROVISIONS ON SHIPS' ROUTEING (RESOLUTION A.572(14), AS AMENDED)

THE MARITIME SAFETY COMMITTEE,

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

RECOGNIZING the importance that the routeing measures boundary symbology and charting of archipelagic sea lanes used in the General Provisions on Ships' Routeing should correctly reflect those adopted by IHO,

TAKING INTO ACCOUNT the decision of the Sub-Committee on Safety of Navigation at its fifty-fourth session to align the routeing measures boundary symbology and charting of archipelagic sea lanes in Annexes 1 and 2 of General Provisions on Ships' Routeing,

HAVING CONSIDERED, at its eighty-fifth session, the text of proposed amendments to Annexes 1 and 2 of the General Provisions on Ships' Routeing (resolution A.572(14), as amended), to align them with the specifications for routeing measures boundary symbology and charting of archipelagic sea lanes adopted by IHO,

1. ADOPTS the Amendments to the General Provisions on Ships' Routeing (resolution A.527(14), as amended), to align them with the specifications for routeing measures boundary symbology and charting of archipelagic sea lanes adopted by IHO, the text of which is set out in the Annex to the present resolution;

2. DETERMINES that amendments to the General Provisions on Ships' Routeing including amendments to the General Provisions for the adoption, designation and substitution of archipelagic sea lanes shall be adopted, brought into force and shall take effect in accordance with the provisions of A.572(14), as amended;

3. INVITES Governments intending to submit proposals for the adoption of ships' routeing systems including, designation and substitution of archipelagic sea lanes to take account of the annexed General Provisions;

4. REQUESTS the Secretary-General to bring this resolution and its Annex to the attention of all Contracting Governments to the SOLAS Convention and to Members of the Organization which are not Contracting Governments to the Convention.

ANNEX

**AMENDMENTS TO RESOLUTION A.572(14),
AS AMENDED – GENERAL PROVISIONS ON SHIPS' ROUTEING**

1 Annex 1 – General Provisions on Ships' Routeing

1.1 Amend section 9.4, as follows:

Section 9.4 Boundary symbols in detail

5	Inshore traffic zone (ends) ------------------------------------ Open sea	 or no symbol (limits undefined)
15	Two-way route ----------------------------------- All other areas	Same rules as for deep-water route

2 Annex 2 – General Provisions for the Adoption, Designation and Substitution of Archipelagic Sea Lanes.

2.1 Amend section 7.6 as follows:

7.6 Symbol for outer limits of archipelagic sea lanes

Unless otherwise specified, symbols are printed on charts in colour, usually magenta.

Description		Symbol	Note
1	Outer limit of archipelagic sea lane, including where 10% rule applies		1

Note:

1 The solid triangle indicator points into the archipelagic sea lane. The full outer limit of archipelagic sea lane may be charted where it is considered appropriate.

2.2 Amend section 7.7 as follows:

Replace the existing symbol for outer limit of ASL with the following symbol:

2 Outer limit 

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SN.1/Circ.227/Corr.1
10 December 2008

CORRIGENDA TO SN/CIRC.227 ON GUIDELINES FOR THE INSTALLATION OF A SHIPBORNE AUTOMATIC IDENTIFICATION SYSTEM (AIS)

1 The Sub-Committee on Safety of Navigation (NAV), at its fifty-fourth session (30 June to 4 July 2008), agreed on an amendment to annex 2 of the guidelines for the installation of a Shipborne Automatic Identification System (AIS).

2 The amendment contains the consequential change with regard to the entry into force of resolution MEPC.118(52), concerning the change in the categorization and listing of Noxious Liquid Substances and other substances. The Sub-Committee noted that the number of categories to be reported was the same, and therefore it was sufficient to revise the reference documentation SN/Circ.227, annex 2, to reflect the new classification letters corresponding to the same digits as currently in use by the AIS shipborne equipment. Practically this means that the reference hazard or pollutant categories A, B, C and D are changed to the hazard or pollutant categories X, Y, Z and OS, by using the same digits 1, 2, 3 and 4.

3 Users of AIS equipment are invited to note this equivalence when using the displays of existing AIS installations.

4 The Maritime Safety Committee, at its eighty-fifth session (26 November to 5 December 2008), concurred with the Sub-Committee's views, approved the corrigenda to the Guidelines for the installation of a shipborne Automatic Identification System (AIS), as set out at annex.

5 Member Governments are invited to bring the annexed amended annex 2 of the guidelines to the attention of all concerned.

***

ANNEX

ANNEX 2

TYPE OF SHIP TABLE

Identifiers to be used by ships to report their type			
Identifier No.	Special craft		
50	Pilot vessel		
51	Search and rescue vessels		
52	Tugs		
53	Port tenders		
54	Vessels with anti-pollution facilities or equipment		
55	Law enforcement vessels		
56	Spare – for assignments to local vessels		
57	Spare – for assignments to local vessels		
58	Medical transports (as defined in the 1949 Geneva Convention and Additional Protocols)		
59	Ships according to Resolution No 18 (Mob-83)		
Other ships			
First digit (*)	Second digit (*)	First digit (*)	Second digit (*)
1 – reserved for future use	0 – All ships of this type	-	0 – Fishing
2 – WIG	1 – Carrying DG, HS, or MP IMO hazard or pollutant category **X** (**)	-	1 – Towing
3 – see right column	2 – Carrying DG, HS, or MP IMO hazard or pollutant category **Y** (**)	3 – Vessel	2 – Towing and length of the tow exceeds 200 m or breadth exceeds 25 m
4 – HSC	3 – Carrying DG, HS, or MP IMO hazard or pollutant category **Z** (**)	-	3 – Engaged in dredging or underwater operations
5 – see above	4 – Carrying DG, HS, or MP IMO hazard or pollutant category **OS** (**)	-	4 – Engaged in diving operations
	5 – reserved for future use	-	5 – Engaged in military operations
6 – Passenger ships	6 – reserved for future use	-	6 – Sailing
7 – Cargo ships	7 – reserved for future use	-	7 – Pleasure Craft
8 – Tanker(s)	8 – reserved for future use	-	8 – reserved for future use
9 – Other types of ship	9 – No additional information	-	9 – reserved for future use

DG: Dangerous Goods.
HS: Harmful Substances.
MP: Marine Pollutants.

(*) **NOTE** – The identifier should be constructed by selecting the appropriate first and second digits.
(**) **NOTE** – The digits 1, 2, 3 and 4 reflecting categories X, Y, Z and OS formerly were categories A, B, C and D.

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SN.1/Circ.276
10 December 2008

TRANSITIONING FROM PAPER CHART TO ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEMS (ECDIS) NAVIGATION

1 The Sub-Committee on Safety of Navigation (NAV), at its fifty-fourth session (30 June to 4 July 2008), while developing draft carriage requirements for ECDIS, recognizing that proper training will be an important factor in the successful implementation of an ECDIS carriage requirement; and, notwithstanding the expectation that the current review of the STCW Convention and STCW Code, due for completion in 2010, will fully take into account the human element and training requirements necessary for a smooth transition from the use of paper charts to ECDIS, agreed that Administrations, seafarers, shipowners and operators, maritime training organizations and ECDIS equipment manufacturers would all benefit from corresponding guidance transitioning from paper chart to ECDIS navigation, whenever ships are first equipped with ECDIS, regardless of whether or not it is part of a mandatory carriage requirement.

2 The NAV Sub-Committee therefore developed Guidance on transitioning from paper chart to Electronic Chart Display and Information Systems (ECDIS) navigation, as set out in the annex.

3 The Maritime Safety Committee, at its eighty-fifth session (26 November to 5 December 2008), concurred with the Sub-Committee's views, approved the Guidance on transitioning from paper chart to Electronic Chart Display and Information Systems (ECDIS) navigation, as set out in the annex and encouraged their use by the relevant authorities.

4 Contracting Governments and international organizations are invited to bring the annexed Guidance to the attention of all concerned.

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ANNEX

GUIDANCE ON TRANSITIONING FROM PAPER CHART TO ECDIS NAVIGATION

Introduction

1 The following guidance and information is provided to assist those involved with the transition from paper chart to ECDIS navigation.

Transition and training

2 As an initial step, shipowners and operators should undertake an assessment of the issues involved in changing from paper chart to ECDIS navigation. Ships' crews should participate in any such assessment so as to capture any practical concerns or needs of those that would be required to use ECDIS. Such a process will help facilitate an early understanding of any issues to be addressed and will aid ships' crews prepare for change.

3 Documenting the assessment of issues, combined with the development of ECDIS standard operating procedures, will help lead to the adoption of robust ECDIS navigation practices, simplification of crew training and facilitate smooth handovers between crews.

4 In addition, shipowners and operators should ensure that their ships' crews are provided with a comprehensive familiarization programme[*] and type-specific training; and that the ships' crew fully understand that the use of electronic charts aboard ship continues to require the need for passage planning.

IHO catalogue of chart coverage

5 The International Hydrographic Organization (IHO) provides an online chart catalogue that details the coverage of Electronic Navigational Charts (ENC) and Raster Navigational Charts (RNC) (where they exist and where there is not yet ENC coverage) together with references to coastal State guidance on any requirements for paper charts (where this has been provided). The catalogue also provides links to IHO Member States' websites where additional information may be found. The IHO online chart catalogue can be accessed from the IHO website at: www.iho.int.

Additional information

6 In addition to national and international rules, regulations, the IMO model course and performance standards, the IHO has published an online publication *Facts about electronic charts and carriage requirements*. It is a recommended source of information on ECDIS hardware, training and the technical aspects of electronic chart data. Copies are available free of charge from various sources including: www.iho.int and http://www.ic-enc.org/page_news_articles2.asp?id=12.

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[*] IMO Model Course 1.27 on Operational Use of Electronic Chart Display and Information Systems (ECDIS).

7 Another useful source of information on ECDIS is *The Electronic Chart*, 2nd edition, by Hecht, Berking, Büttgenbach, Jonas and Alexander (2006). This book describes the basic components, functionality and capabilities and limitations of ECDIS. *The Electronic Chart* is published by GITC, The Netherlands, ISBN: 90-806205-7-2 and is available via: www.hydro-international.com.

8 Reference should also be made to other Safety of Navigation Circulars (SN/Circs.) issued by the Organization, in particular, SN/Circ.207/Rev.1 on Differences between RCDS and ECDIS; SN/Circ.213 on Guidance on chart datums and the accuracy of positions on charts; SN/Circ.255 on Additional guidance on chart datums and the accuracy of positions on charts; and SN/Circ.266 on Maintenance of Electronic Chart Display and Information System (ECDIS) software. These and other IMO guidance material can be downloaded from the IMO website, www.imo.org.

9 Shipowners and operators should always refer to their national Administrations for the latest information on ECDIS carriage and use.

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MSC.1/Circ.1293
10 December 2008

PARTICIPATION IN THE WMO VOLUNTARY OBSERVING SHIPS' (VOS) SCHEME

1 The Maritime Safety Committee (MSC), at its sixty-fourth session (5 to 9 December 1994), in response to a request for assistance from the World Meteorological Organization (WMO) on enhancing the recruitment of merchant ships into the Voluntary Observing Ships' (VOS) Scheme, approved and circulated MSC/Circ.674 regarding this matter. Since the merger in 1999 of the marine activities of the WMO and the Intergovernmental Oceanographic Commission (IOC) of UNESCO, the VOS Scheme has been a programme of the Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM).

2 The Maritime Safety Committee, at its seventy-fourth session (30 May to 8 June 2001), in response to a further proposal from the WMO, subsequently updated and re-issued this circular as MSC/Circ.1017. It was noted at the time that the *Report of the Re-opened Formal Investigation into the Loss of the* ***MV Derbyshire*** had underlined the potential value of VOS observations to maritime safety, and recommended, *inter alia*, that consideration be given to reissuing this MSC circular.

3 Unfortunately, there has been further decline in the number of ships recruited into the VOS Scheme, regardless of the re-issuance of this circular. In December 2004, there were approximately 6,500 ships listed with the WMO as observing ships from 53 participating countries. By mid-2005, this figure had fallen to fewer than 6,000 ships; however, the analysis of ships' weather reports show that the number of VOS that are actively reporting is actually far less than indicated. Based on reports, during the first six months of 2005, there were approximately 3,025 ships worldwide reporting pressure, and only 2,652 reporting sea surface temperature.

4 The VOS meteorological reports provide vital real time feedback on ocean weather conditions to Weather Forecasters who use the data to improve the quality of the forecasts and warnings issued through the SafetyNET Maritime Safety Information (MSI) and the international NAVTEX services for mariners at sea. The VOS reports, therefore, form an important element in ensuring the safety of ships, their cargoes and crews. Furthermore, it should be noted that these reports also provide a valuable data source for studying the changes in climate which have become a matter of global concern in recent years.

5 IMO and, in particular, its Marine Environment Protection Committee are giving high priority to the work relating to the issue of climate change. Ships' meteorological observations are not only recognized as being essential for the provision of safety-related services for ships at sea, but also for climatological purposes, since the VOS reports' contribution to global climate studies is unique, when considering the role of the oceans in the global climate system.

6 Whilst the weather data collected under the VOS Scheme is provided for Forecasting, Climatology and Research applications, some VOS data have become available on public websites causing concern to ships' owners and masters because of the publication of ship identification and position data. WMO has therefore established a high-level dialogue, involving affected Members, IMO, ICS, shipping companies, relevant organizations and technical commissions, to propose a general and universally acceptable solution to the issue. This solution would address shipowners' and masters' concerns as well as those of the WMO community regarding data monitoring and quality information feedback requirements. This high-level dialogue resulted in the recommendation that ship's identification and location should not appear on public websites, including those of National Meteorological Services (NMS), in real time when this is not authorized by the shipowners and masters. As a temporary measure, WMO Executive Council therefore adopted Resolution 7 (EC-LVIII, 2006) and Resolution 7.7 (EC-LIX, 2007) authorizing its Members to implement open data distribution schemes where the ship's identification is masked. The continued participation of ships in the VOS Scheme remains critical.

7 It is essential that the volume of data provided by ships recruited to the VOS Scheme be maximized and, as such, the number of VOS participating in the Scheme increased wherever/whenever possible. It should be made clear that participation in the VOS Scheme is entirely voluntary and no charges are incurred by the ship, shipowner or ship operator, as the meteorological instruments and, in most cases, the cost of the observation transmission are borne by meteorological services.

8 In accordance with the provisions of SOLAS regulation V/5, Member Governments are invited to bring the relevant information in the attached brochure regarding the VOS Scheme to the attention of shipowners, ship operators, ship managers, masters and crews, and other parties concerned and to encourage them to support the JCOMM and their National Meteorological Service (NMS), by offering their ships to participate in the VOS Scheme. More information on this issue can be located at the following web address: http://www.bom.gov.au/jcomm/vos/index.html. Ships that pass through or operate in the data-sparse areas (shown by the lack of dots on the attached ship data coverage chart), are strongly encouraged to volunteer and join the VOS Scheme.

9 This circular revokes MSC/Circ.1017.

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ANNEX

THE VOLUNTARY OBSERVING SHIPS' (VOS) SCHEME

1 Background

The international scheme by which ships plying the various oceans and seas of the world are recruited by National Meteorological Services (NMS) for taking and transmitting meteorological observations is called **the Voluntary Observing Ships' (VOS) Scheme**. (See the following web address for further information: http://www.bom.gov.au/jcomm/vos/index.html).

The VOS Scheme is operated under the auspices of the Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM), which was formed in 1999 through a merger of the marine activities of the World Meteorological Organization (WMO) and the Intergovernmental Oceanographic Commission (IOC) of UNESCO.

The forerunner of the scheme dates back as far as 1853, the year in which delegates of ten maritime countries came together at a conference in Brussels, on the initiative of Matthew F. Maury, then Director of the United States Navy Hydrographic Office, to discuss his proposal to establish a uniformed system for collecting meteorological and oceanographic data from the oceans and the use of these data for the benefit of shipping in return.

The Conference accepted Maury's proposal and adopted a standard form of ships' logs and a set of standard instructions for the required observations.

From the very beginning, ships' meteorological observations were recognized as being essential for the provision of safety-related meteorological services for ships at sea, as well as for climatological purposes.

2 The situation today

At present, the contribution that VOS meteorological reports make to operational meteorology, to marine meteorological services, weather routeing services and to global climate studies is unique and irreplaceable. During the past few decades, the increasing recognition of the role of the oceans in the global climate system has placed an even greater emphasis on the importance of marine meteorological and oceanographical observing systems.

One of the continuing major problems facing meteorology is the scarcity of data from vast areas of the world's oceans (so-called data sparse areas) in support of basic weather forecasting, the provision of marine meteorological and oceanographic services and climate analysis and research.

While meteorological satellites help substantially to overcome these problems, data from more conventional platforms (in particular VOS data) will remain essential for the foreseeable future, to provide ground-truthing for the satellite observations, and to provide important information that satellites cannot easily observe (notably pressure measurements). In addition, the VOS provide an essential contribution to the data input for the numerical weather prediction (NWP) models, which are the basis of most present-day forecasts and warnings, and provide real-time reports which can be used immediately in services for the mariner. The reports from the ships at sea are also used operationally in the preparation and promulgation of Maritime Safety Information (MSI) forecasts and warnings of gales, as well as storms required by the GMDSS (e.g., SafetyNET and NAVTEX), and issued to mariners in accordance with the SOLAS Convention requirements.

Thus, without VOS observations, reliable and timely weather forecasts for mariners could not be provided.

3 The VOS Fleet Size

A peak in the total number of VOS was reached in 1984/85, when 7,700 ships worldwide were listed as participating in the VOS Scheme. Since then, there has been an irregular but noticeable decline. In December 2004, there were some 6,500 ships listed at WMO as observing ships from 53 countries and by mid-2005 there were fewer than 6,000 ships. However, analysis of ships' weather reports show that the number of VOS that are actively reporting is actually far less. Based on the first six months of 2005, there were approximately 3,025 ships worldwide reporting pressure, and only 2,652 reporting sea surface temperature. It is recognized that priority must often be given to other navigational duties, particularly in areas of dense shipping, and that there will be periods when a ship is in port or dry-dock and when it will not be possible to perform weather observations. However, the number of actively participating ships is clearly in a decline and needs to be reversed.

As might be expected, real-time reports from the VOS are heavily concentrated along the major shipping routes, primarily in the North Atlantic and North Pacific Oceans. The attached chart shows details of the geographical distribution of ships weather reports for December 2006, and the most striking feature is the large data-void areas in all southern hemisphere oceans. While this situation certainly reflects the relatively small numbers of ships sailing in these waters, it also makes it more essential that ships sailing in these areas actively participate in the VOS, thus contributing to the global observing programme and the consequent enhancement of the forecast and warning services to the mariner.

Of course, as the VOS reports are part of a global data capture programme, these reports are of value from all the oceans and seas of the world, and even the relatively well-frequented North Atlantic and North Pacific Oceans require more observational data.

4 What are the charges to be part of the VOS Scheme?

THERE ARE NO CHARGES TO THE SHIP OR TO THE SHIP OPERATOR

In accordance with the provisions of SOLAS regulation V/5, "Contracting Governments undertake to encourage the collection of meteorological data by ships at sea and to arrange for a selection of ships to be equipped with tested marine meteorological instruments (such as a barometer, a barograph, a psychrometer, and suitable apparatus for measuring sea temperature)".

The calibrated marine meteorological instruments that are required to undertake weather observing at sea are supplied free of charge to the ship by the National Meteorological Services (NMS). The installation of the equipment is usually performed by a Port Meteorological Officer (PMO), appointed and trained by the NMS, who will provide advice on observing the various meteorological elements at sea. The appointed PMO will also explain the use of the WMO SHIP code for reporting the observation, and offer guidance on transmitting the observations from the ship to shore using the ships satellite or terrestrial communications equipment.

THERE ARE NO CHARGES TO THE SHIP FOR THE TRANSMISSION OF VOS WEATHER REPORTS

Ships which send messages through Land Earth Stations (LESs) using special Access Code 41 will not incur any transmission charges.

After recruitment into a national VOS Fleet, the meteorological instruments will be regularly serviced, without charge to the ship or shipowner, generally by a PMO from the 'recruiting NMS' or by a PMO from the international PMO network.

5 How can you become involved?

If an Administration:

.1 Be aware that ships' meteorological reports can make a significant contribution to safety of life and navigation through higher quality forecasts and warnings.

.2 Ensure that your ship operators are aware of the VOS Scheme and encourage their active participation.

If a Ship Operator:

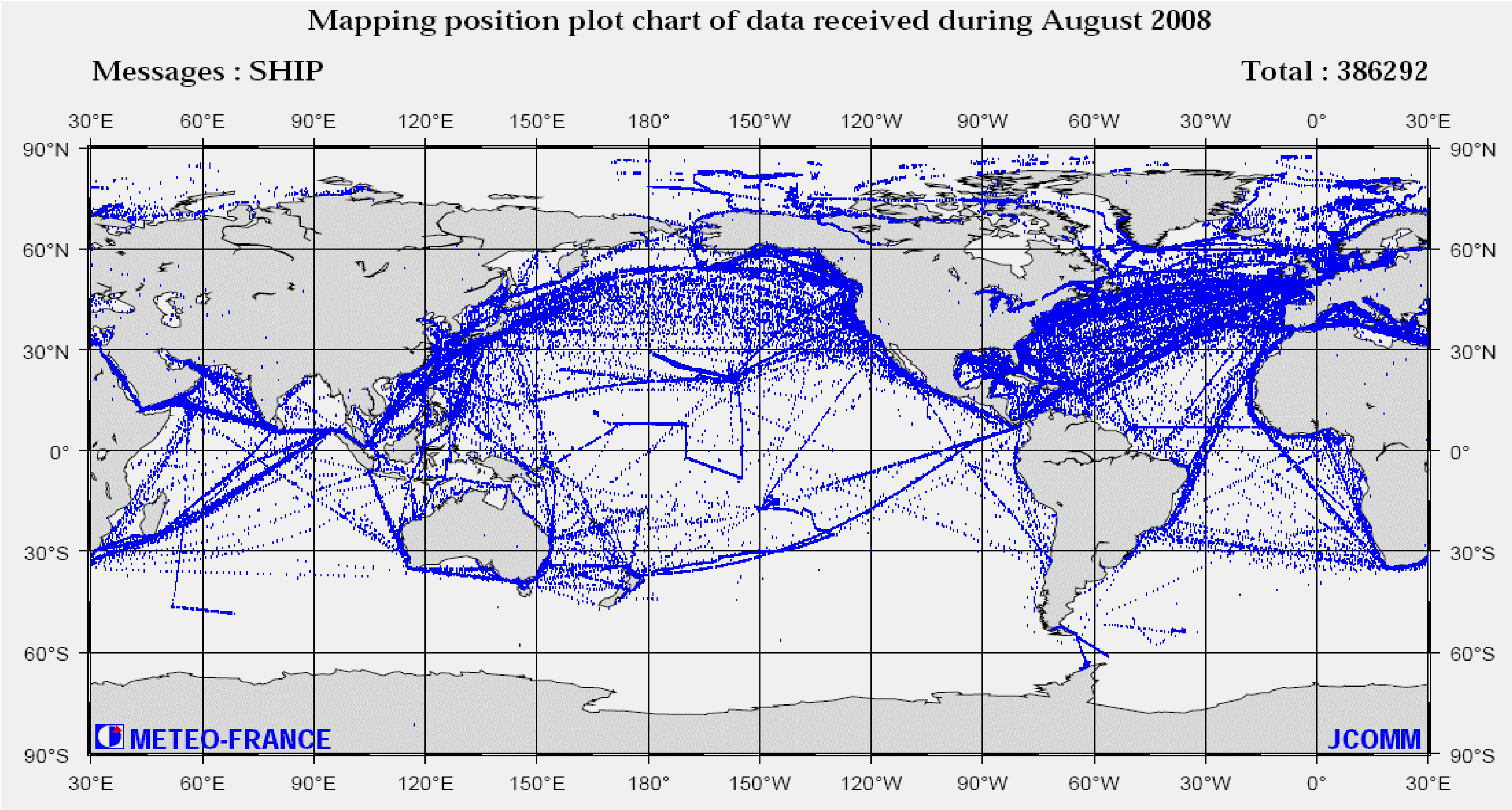
.1 Contact your National Meteorological Services (NMS), or a local Port Meteorological Officer (PMO), and nominate your ship(s) for recruitment into the VOS Scheme.

For further information contact:

Ocean Affairs Division
World Meteorological Organization
7 bis, avenue de la Paix
Case Postale No. 2300
CH-1211, GENEVA 2
Switzerland
Telephone: +41-22 730 82 37
Telefax: +41-22 730 81 28
E-mail: mmo@wmo.int

REMEMBER:

HELP IMPROVE THE QUALITY OF FORECASTS AND WARNINGS AND CONTRIBUTE TO THE ENHANCEMENT OF SAFETY AT SEA BY JOINING THE VOLUNTARY OBSERVING SHIPS' SCHEME


Mapping position plot chart of data received during August 2008
Messages : SHIP
Total : 386292
30°E
60°E
90°E
120°E
150°E
180°
150°W
120°W
90°W
60°W
30°W
0°
30°E
90°N
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METEO-FRANCE
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INTERNATIONAL MARITIME ORGANIZATION

IMO

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SUB-COMMITTEE ON DANGEROUS GOODS, SOLID CARGOES AND CONTAINERS
14th session
Agenda item 16

DSC 14/INF.9
17 July 2009
ENGLISH ONLY

REVISION OF THE RECOMMENDATIONS FOR ENTERING ENCLOSED SPACES ABOARD SHIPS

Enclosed space entry issues

Submitted by the Marine Accident Investigators' International Forum (MAIIF)

SUMMARY

Executive summary:	This document provides information on enclosed space entry incidents that have occurred since 1998, and which have given MAIIF serious cause for concern and discussion at recent meetings
Strategic direction:	5.2
High-level action:	5.2.1
Planned output:	-
Action to be taken:	Paragraph 8
Related documents:	IMO resolution A.864(20); DSC 13/20, annex 4; MSC 85/26, paragraph 23.7; FSI 17/20, paragraphs 6.6 and 6.7 and MSC 86/26, paragraphs 10.18 and 13.22

Background

1 IMO resolution A.864(20) on Recommendations for entering enclosed spaces aboard ship was adopted at the twentieth Assembly on 27 November 1997. It invites Governments to bring the recommendations to the attention of shipowners, ship operators and seafarers, urging them to apply the recommendations, as appropriate, to all ships.

2 The object of the Recommendations is to encourage the adoption of safety procedures aimed at preventing casualties to ships personnel entering enclosed spaces where there may be an oxygen deficient, flammable and/or toxic atmosphere. They are practical recommendations that apply to all types of ships and provide guidance to seafarers, which are intended to complement national laws or regulations, accepted standards or particular procedures which may exist for specific trades, ships or types of shipping operations.

3 A preliminary survey of MAIIF members (attached at annex) reveals that there have been at least 101 enclosed space incidents resulting in 93 deaths and 96 injuries, since the Recommendations were adopted in November 1997.

4 Areas of concern identified in the reports include, *inter alia*:

.1 lack of knowledge, training and understanding of the dangers of entering enclosed spaces;

.2 Personal Protective Equipment (PPE) or rescue equipment not being used, not available of inappropriate type, improperly used, or in disrepair;

.3 inadequate or non-existent signage;

.4 inadequate or non-existent identification of enclosed spaces on board;

.5 inadequacies in Safety Management Systems; and

.6 poor management commitment and oversight.

5 MAIIF believes that the investigations show that, from many of the casualties investigated, it is evident that training was inadequate, and that the necessary drills were not carried out in the procedures for safe entry and safe rescue from enclosed spaces. Training may remain ineffective if not backed up by a positive management level commitment to managing safety, assessing competence and training needs on board, and developing a safety culture from the company head-office to the master, the officers and the ratings.

6 MAIIF notes from the report of the MSC 85 the new work programme item to revise, as necessary, the specific provisions of the Recommendations for Entering Enclosed Spaces Aboard Ship, under the coordination of the DSC Sub-Committee.

7 At the eighty-sixth session of the Maritime Safety Committee, the Committee agreed to invite MAIIF to provide the Organization with the outcome of its work on deaths in enclosed spaces, as the findings thereof may be relevant to the consideration of the issue of explosions on small chemical tankers. However, it is clear from the work already done by MAIIF, that some of the provisions of the Recommendations for Entering Enclosed Spaces Aboard Ship are not being universally applied. MAIIF therefore considers that the information provided will assist the work of the Sub-Committee in coordinating the revision of the Recommendations for entering enclosed spaces aboard ship, and will provide any additional information as may become available.

Action requested of the Sub-Committee

8 The Sub-Committee is invited to note the contents of this document in the context of consideration of agenda item 16 and to take action as appropriate.

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PRELIMINARY SURVEY REPORT ON ENCLOSED SPACE INCIDENTS

Incident	Approx. Date	Ship Type	Reporting Authority	Confined Space	Condition of Space	Deaths	Injuries	Comments	Notes on Investigation	Vessel Flag (if other than reporting authority)
1	01/03/1998	Cargo	Cyprus	Tunnel	Tunnel, below loaded cargo holds	3	0	The vessel carried wheat and the cargo had been fumigated with Aluminum phosphide - Phostoxin. Water was observed in Hold No.1 and in the duct keel. Three crew members entered tunnel for inspection, but they lost their lives due to the presence of phosphire gas. A Fumigation notice stated that the above product generates phospire gas (PH3) and that the fumigated spaces must be completely sealed for ten days. The presence of water was due to minor hull damage.		
2	28/04/1998	RoRo Vehicle/ Passenger ferry	UK MAIB	Deck locker		0	1	Young female passenger, who was under the influence of alcohol, crossed security chains and entered restricted space on small ferry. She was located after vessel had shut down for the night in a small deck locker. She was suffering from smoke inhalation having inadvertently placed clothing on a heater.		
3	14/05/1998	Aggregates Dredger	UK MAIB	Engine Room	Unknown	0	1	Using a burning torch to cut a pipe ring in the engine room caused a vapor to be given off. Work stopped and both the personnel involved with the task moved away. One of them experienced breathing difficulty. it is thought that the burner vaporized sealant of some other substance trapped below the pipe ring. The work was completed using a grinder.		
4	02/10/1998	Fishing Vessel	U S C G	Pipe Tunnel Void	Low O2 and Toxic Environment, Access Procedures	1	4	Crewman was asphyxiated by lethal levels of hydrogen sulfide, carbon monoxide, and depleted oxygen when he entered a pipe tunnel void researching an odor and clam hold drain leak onboard moored clam dredge vessel. The following rescue personnel were also treated for hydrogen sulfide exposure: 1 crewman from the same vessel, 2 crewmen from an adjacently moored F/V, and 1 police officer.		
5	05/01/1999	Bulk/oil carrier	UK MAIB	Duct Keel	Unknown	0	1	Seaman overcome by fumes while working in duck keel of tanker. All proper precautions taken and other crew with him were not effected.		Bahamas
6	16/01/1999	Oil tanker	UK MAIB	Cargo Oil Tank	Gasoline	0	1	Crewman entered cargo oil tank. After placing eductor pump in suction well he collapsed. Atmosphere had been tested before entry. Tested immediately after incident and found gas free. Presumed cause was isolated pocket of gas in tank.		Gibraltar
7	03/02/1999	Tug/anchor handling vessel	UK MAIB	Store Space	Carbon monoxide	0	1	Use of petrol driven salvage pump in store space caused one crew member to suffer minor carbon monoxide poisoning .		
8	18/02/1999	General cargo multi-deck	UK MAIB	Hold	Oxygen depletion	1	0	Crew member entered partitioned area of hold during carriage of steel turnings. He died of asphyxiation.	Investigated by Bahamas Maritime Authority	Bahamas
9	23/04/1999	Chemical Tanker	IOM	Cargo Tank - previous cargo HMD and Nitrogen blanket	Nitrogen, Oxygen depletion	2	0	Very similar to Bow Wind comments. There was a practice on board of taking a deep breath and going to first platform to see if clean, cutting corners to save time. Pumpman died, cadet tried to rescue wearing a filter mask and also died. Subject of "Silent Assassin" video.		

10	19/07/1999	Barge	U S C G	Cargo Tank	Low O2 and Toxic Environment, Access Procedures	1	0	At a Barge Cleaning Facility, a shipyard worker entered the #1 cargo tank. He was later found by co-workers lying unconscious on the bottom of the hold and was extracted from the hold, and personnel conducted CPR until an ambulance arrived. He was transported to Hospital where he was pronounced dead. Apparent cause of death was asphyxiation due to exposure to an oxygen deficient environment. Investigation found that he had received the safety training Respirator fit test and training, Confined space entry, Workplace safety training (hazardous communications) and concluded that cleaning facility had inadequate enforcement of their confined space entry and securing procedures.		
11	26/08/1999	Naval support	UK MAIB	Unknown	Sodium metabisulphite	0	1	Accidental release of sodium metabisulphite vapor during cleaning of reverse osmosis plant. Injured crew member was not wearing sufficient personal protective equipment.		
12	25/09/1999	RoRo Vehicle/ Passenger ferry	UK MAIB		Ammonia	0	1	Crew member suffered injury due to accidentally inhaling ammonia gas while moving a faulty refrigerator. Ammonia refrigerators to be removed from vessel.		
13	03/02/2000	Tanker	Latvia	Cargo tank	Ventilated. cargo fumes	1	0	While climbing up the stairs after cargo tank cleaning sailor fell back to the tank bottom from five meter height and lost his life. The causes of the accident: 1) lack of the tank-working permit; 2) lack of the safety line while climbing up.		
14	01/04/2000	Dry Cargo -Reefer	Liberia	Cargo Hold	Oxygen Deficiency	1	0	Cocaine Smuggler found dead in Cargo Hold.		
15	05/04/2000	Ore carrier	UK MAIB	Hold	Bulk coal	2	1	Military intelligence decided to search vessel using combined naval, marine and specialized army search team. Holds to be searched if ventilated/time allowed. 2 army entered hatch, no pre-entry tests. Both men became unconscious, corporal entered space without pre-testing, became unconscious.	Investigated by MAIB http://www.maib.gov.uk/publications/investigation_reports/2001/mv_diamond_bulker.cfm	Philippines
16	18/05/2000	Tank Ship	U S C G	Cargo Tank	Entering Toxic Environment without protective clothing, access procedures	1	0	Vessel enroute Houston, TX after discharging a cargo MTBE. Two days after departure the pumpman entered number #1 center cargo tank for cleaning with a respirator & EEBA. The pumpman retrieved from inside the tank by ships crew. CPR was administered but was unsuccessful. Autopsy concluded the pumpman died of "toxic fumes intoxication secondary to MTBE exposure."		
17	10/06/2000	Fish Catching	UK MAIB	Engine Room	Carbon Monoxide	1	0	Portable petrol-engined pump being used to pump bilges of fishing vessel. Pump and engine placed in engine room with no ventilation. Engineer was fatally affected by carbon monoxide fumes from engine's exhaust.	Investigated by MAIB http://www.maib.gov.uk/publications/investigation_reports/2001/fv_mariama_k_fr242.cfm	
18	10/09/2000	General cargo - single deck	UK MAIB	Cargo hold	Carbon monoxide	1	0	Seaman found lying at bottom of no.2 hold access shaft. Atmospheric tests on access shaft to hold showed very low levels of oxygen & high levels of carbon monoxide. Apart from distinctive smell, chemical reaction in shaft or in timber in hold. Tests on timber sample showed no evidence of preservatives or any apparent reason for low oxygen & high carbon monoxide atmosphere.	Investigated by MAIB http://www.maib.gov.uk/publications/investigation_reports/2001/baltyskiy.cfm	Russia
19	19/10/2000	Tanker/ combination carrier	UK MAIB	Cargo tank	Inert gas	0	1	Crew member entered a cargo tank after cleaning to retrieve a pair of gloves despite being aware of the dangers from inert gas. He collapsed, a rescue using "SCBA SEDS" was carried out and the man rescued.		
20	29/10/2000	General cargo single deck	UK MAIB	Cargo hold	Oxygen depletion, Carbon Monoxide	1	0	Master entered cargo hold on coaster, whilst at anchor sheltering and was overcome by fumes from coal cargo. Oxygen content found to be below 3.5% and carbon monoxide found present.		Holland

21	24/11/2000	General Dry Cargo Ship	NOR NMD	Cargo Hold	Probably low O2-level in cargo hold	2	1	OS painted access hatch for cargo hold. The hatch was open. Observed unconscious. Two persons entered the cargo hold without BA to rescue the OS. One of them survived due to resuscitation.		
22	01/12/2000	Chemical tanker (Inland)	Netherlands	Cargo tank	Low O2 environment, Access Procedures	1	0	After discharging a naphtha cargo, the cargo inspector declared the cargo tank unfit for the intake of different chemical load, remains of the naphtha still being present. The master decided to clean the tank himself. Although all the right equipment was available and the master was well informed and experienced, he nevertheless entered the tank relying on a full face mask with filter for naphtha vapors. He did not take a possible low oxygen level into account and died of oxygen deficiency.		
23	10/05/2001	Oil tanker	Latvia	Ballast tank	Insufficient ventilation during spray-painting	1	1	During spray painting with toxic paint in the ballast tank safe working regulations were violated – air respirators were used instead of breathing apparatus. As a result one worker lost his life and another got toxic poisoning. The accident was facilitated by prolonged evacuation of victims from the tank (almost 5 hours).		Liberia
24	04/09/2001	Chemical Tanker	IOM	Cargo tank-previous cargo Naphtha	30% LEL and no O2 checks	1	1	Educting tank residues all day, occasionally checking atmospheres, crew refusing to wear SCBA only filter masks, condoned by C/O - lucky they didn't all die! Cutting corners to save time and effort in port. Master died of a heart attack during rescue.		
25	05/10/2001	Oil Tanker	Liberia	Ballast tank	Oxygen Deficiency	1	1	One Ship yard Worker died due to asphyxiation while painting ballast tank and one Ship yard Worker injured due to intoxication by hydrocarbon gas.		
26	02/11/2001	Pelagic Fishing Vessel	SAMSA	Fishhold	Oxygen depletion	2	0	2 crew members entered the fishhold to clean, 2 days after a catch of pelagic fish had been discharged. Oxygen content too low to sustain life.		
27	30/11/2001	Tanker	Latvia	Double bottom fuel tank	Ventilated	1	0	Severance was performed in ships double bottom fuel tank (DB FT). Gas cylinders were located on the main deck and gas hoses were put through openings down into DB FT. In same time the electrical welding was performed in the pump room above the DB FT. After a short break, steel cutting works were being recommenced and fire in DB FT broke out. As a result the worker lost his life. The probable causes of accident were: gas hose damage after contact with hot metal surface inside DB FT or hose contact with drops of melted steel from the pump room.		

28	17/11/2001	Bulk Carrier	Australia ATSB	Ballast Tank	ntilated, non-intrinsi	8	0	With the ship waiting at anchor off Dampier to load, the crew were preparing and painting the interior of no.1 port topside ballast tank. At about 1430 on a hot Sunday afternoon, the eight-man deck crew started work painting the steelwork inside the tank. One man was spray painiting inside the empty tank while the rest of the deck crew maintained the paint reservoir and tended a cargo light lowered into the tank through the after manhole. An open-ended compressed air hose was led from the forecastle, along the deck and down through this after manhole, while an electrically driven fan was positioned over the after manhole to ventilate the tank. The paint being used was a two-part epoxy mix, excessively thinned because of the hot day. At about 1640 a large explosion ripped through the tank. It is likely that the cargo light was inadvertently dropped into the tank which caused the incandescent bulb to break which then ingnited the heavier-than-air paint fumes trapped in the frames spaces at the bottom of the tank. The tank was ruptured and three men were blown down the length of the main deck, killing them all instantly. The explosion also blew four other men over the ship's side. One man, who had been inside the tank, still alive although severely burned was assisted out of the tank, through the ruptured maindeck plating, and airlifted ashore. He died 18 days later in hospital.		Hong Kong
29	17/12/2001	Bulk Carrier	Liberia	Cargo Hold	Oxygen Deficiency	1	0	Chief Mate died due to lack of oxygen in the cargo hold		
30	04/01/2002	Oil/chemical tanker	UK MAIB	Cargo Tank	Gasoline fumes	0	1	AB developed problem with BA mask and removed/lost his face mask, became unconscious. Enclosed spaces checklist and company procedures were not followed.		Gibraltar
31	10/01/2002	Oil tanker	UK MAIB	Cargo or other tank space	Unknown	0	1	Bosun entered untested enclosed space and collapsed as a result		Gibraltar
32	08/02/2002	Prawn Freezer Trawler	SAMSA	Machinery space	Oxygen depletion	1	0	Chief Engineer found dead in machinery space after working on refrigeration system.		
33	31/03/2002	Ro-Ro Cargo Ship	U S C G	Engineroom	Low O2 Environment, Fire fighting and recovery procedures	2	0	The vessel had a fire in the engine room. At approx 0645, the vessel master released CO-2 to extinguish the fire. At approx 0745, a team led by the Chief Mate entered the engine room and reported that the fire was out. At approx 0815, the team made a second entry to further evaluate the extent of the damage and the ability of the ship to get underway. During this entry, the Chief Engineer fell unconscious down a stairwell near the start-air tanks to the lower engine room deck. He was assisted by the Chief Mate, 1st Asst Engineer and 3rd Asst Engineer. The 3rd Asst Engineer exited to get help.The Chief Engineer awoke alone at the bottom of the stairwell wearing an emergency air pack (ELSA). He departed the engine room through a nearby escape trunk. A rescue team, entering to assist, found the Chief Mate and 1st Asst Engineer aft of the MDE. It appears they were in the process of exiting the engine room when they ran out of air. After extracting them from the engine room, the crew initiated CPR efforts but were unable to revive them. The autopsies ruled that the crewmembers died of asphyxia due to oxygen deficiency combined with carbon dioxide inhalation.		

34	20/04/2002	Freezer Trawler	SAMSA	Machinery Space	Oxygen depletion/refrigera tion gas	2	0	Greaser was instructed to clean the filter on a refrigeration system. Filter not isolated. R22 entered the compartment displacing the oxygen, being heavier than air. Chief Engineer went to check on progress noted the Greaser collapsed on the plates and entered the compartment. Both died.		
35	06/08/2002	Hopper Barge	MAI Hong Kong	Void Space adjacent to cargo hold	Oxygen depletion, Carbon Monoxide	2	0	Two local seamen died after entering the void space adjacent of a cargo hold. Carbon monoxide gas had accumulated in the space and depletion of oxygen took place inside the space due to rusting of vessel structure. The space had not been ventilated before they entered into it.	Investigated by MAI Hong Kong http://www.mardep.gov.hk/en/publication/pdf/mai020806.pdf	Locally licensed barge in Hong Kong
36	06/08/2002	Tanker	NOR NMD	Cargo tank	Low O2 Environment, Methane atmosphere	0	2	AB entered the Tank in connection with tank cleaning. The tank was not ventilated and the atmosphere was not tested. The AB lost consciousness due to Methane poisoning.		
37	29/08/2002	Offshore	U S C G	Leg of drilling rig, void spaces	Low 02 environment	2	0	2 shore staff were working on the rig. They were sent into a leg of the rig to install ventilation and lights. According to findings the leg was Oxygen deficient. The two personnel who entered the compartment died of "Asphyxiation".		
38	01/09/2002	General dry Cargo Ship	U S C G	Cargo Hold	Low O2 Environment, Access Procedures	0	1	While in a cargo hold collecting stacking cones, an AB fell approximately 10 feet to the level below. He was found by a shipmate several minutes later in a pool of blood. There were no witnesses to the actual fall, and the victim does not remember what happened. He sustained several injuries, including a fractured skull, a broken rib, a punctured lung, and a broken left wrist. Inestigating officer theorized that oxygen deficiency in the space may have caused the mariner to pass out and fall.		
39	09/09/2002	Fishing Vessel	U S C G	Engineroom	Refrigerant leak	0	1	In the Pacific Ocean, 112 nm west of point St. George, a refrigeration leak occurred in the engine room. Crew member attempted to repair the leak but was overcome by freon gas in the enclosed space and lost consciousness for 20-25 seconds. The victim was medevaced and transported to hospital. Vessel ventilated the engine room and the leak was repaired.		

40	02/12/2002	Bulk Carrier	U S C G	Cargo Hold	Low O2 and Toxic Environment, Access Procedures	1	1	At Dar Es Salaam, Tanzania hatches to #3, #5, #6 and #7 were opened for discharge of cargo. At about 0935 two Tanzanian Agricultural inspectors arrived to inspect holds #5 and #7 for quality of cargo. At about 1030 another inspector arrived aboard with 24 Agricultural trainees, requesting they be allowed to observe the inspection process. Although the master refused initially he eventually relented and referred the matter to the Chief Officer who instructed the students to view the cargo operations from the deck level only. At about 1125 the master was notified a man collapsed in cargo hold #3. A rescue team was formed. Deck crew responded with a first aid kit and noticed an individual lying about six feet below on top of the cargo inside the #3 cargo hold trunk hatch. The Chief Mate return with a gas mask, used for fumigant whcih had been used to fumigate the carge after loading, and an EEBD. The Chief Mate put on the gas mask and entered the space. The Chief Mate attempted to put the EEBD on the down person but collapsed. When the master arrived on scene he instructed AB to get an SCBA who then entered the space with a rescue line and block. At about 1135 the Chief Mate was recovered. The master checked the Chief Mate for vitals, found no pulse or respiration, and immediately started CPR. At about 1137 the Chief Mate responded to CPR, breathing on his own. At about the same time the original man down was brought up. The master checked for vitals, found no pulse or respiration. and immediately started CPR. He did not respond to CPR and the master then used the vessel's portable AED to defibulate the patient. He did not respond and CPR was continued until paramedics arrived at about 1215. At about 1230 the Chief Mate was removed to an awaiting ambulance and was taken to the hospital in critical condition. At about 1240 the original person found in the hold was removed to an awaiting ambulance but was pronounced dead. At 1330 atmospheric readings were taken from the #3 cargo hold trunk and found to be 3% Oxygen. The post-Mortem Examination stated that the primary cause of death was due to head injury. The deceased was not authorized entry into the #3 cargo hold. The Chief Mate did not follow proper procedures for confined space entry.		
41	12/04/2003	Pair trawler	UK MAIB	Cargo – fishroom	Hydrogen sulphide fumes	0	2	Two crew who were working in the fish hold ended up with very sore eyes and extremely bad head aches. A study following a similar accident suggested that hydrogen sulphide fumes were to blame. The problem was eventually solved by removing the concrete floor, and replacing it, sealing it correctly.		
42	21/05/2003	Scallop/ queenie dredger	UK MAIB	Cargo - fishroom	R409A	0	1	A shoreside engineer was overcome by gas R409A while working on the refrigeration system. In future the skipper intends to open all the fish room hatches when the refrigeration system is being worked on.		

43	26/06/2003	Barge	U S C G	Cargo Tank	Low O2 and Toxic Environment, Access Procedures	0	2	2 collapsed while working in the barge. The first crew member entered the barge to pump out the water when he was overcome by the lack of oxygen in the space. He fell approximately 10 ft, injuring his head. The second crew member went in to provide assistance. He was also overcome by the lack of oxygen. A third person was lowered into the tank via rope and was also overcome but was able to be pulled out. The owner of the cleaning company notify Emergency Response and then placed a ventilator into the space. A Good Samaritan provided assistance, holding his breathe went down into the tank placing a rope around both individuals. Both crew members were pulled safely out of the barge and transferred to Hospital. Both men were breathing but unconscious when they arrived at the hospital. They since recovered.		
44	08/07/2003	Bulker	RMI	#6 Fwd Cargo Hold	Oxygen Deficiency	0	2	Fitter and Chief Officer fainted in the first platform of No.6 Fwd Cargo Hold entry due to lack of oxygen.		
45	10/09/2003	Surface craft	UK MAIB	Other internal deck/space	Hydrogen sulphide	0	1	Whilst conducting planned maintenance cleaning of a sewage treatment plant with two assistants the engineer officer was overcome by hydrogen sulphide after disturbing the sludge with a fire hose. The plant had been shut down previously for several days but the hose was required to break up the heavy sludge.		
46	13/10/2003	Liquid gas carrier	UK MAIB	Engine room	Hydrogen gases	1	1	2 shore workers chemically cleaning a main boiler, the steam drum door had been opened to allow for inspection of the clean. As the contractors approached the drum a non-intrinsically safe halogen lamp was passed into the drum. There immediately followed an explosion which caused fatal injuries to the UK worker and serious 30% burns to a Danish national. The chemical used to remove the boiler scale and corrosion was nitro's descalex. This inhibited Sulphamic acid cleaner also contained a coloring agent to indicate the acid strength. The inhibitor Provided a protective coating on the internal steel surfaces of the boiler so that it was protected From acid attack, which produces hydrogen gas.	Investigated by MAIB http://www.maib.gov.uk/publications/investigation_reports/2007/hilli.cfm	
47	24/10/2003	Container	Germany	Scavenge Air Receiver	The autopsy report revealed cardiovascular failure due to hyperthermia as cause of the death	1	0	Engineer entered scavenge air receiver again after work was completed, no safety watch was posted; he got locked inside due to construction of "dogs" used for locking the access hatch; inappropriate search measures were applied when it became known that the engineer was missing; time/commercial pressure and relationship between crew members might had contributed; even though the scavenge air receiver was known to be the last working place of the engineer it had not been opened before departure as the main engine had already been started and opening of the access hatch would had required to shut down the main engine again; the engineer was found dead two days later in the next port of call.	Investigated by BSU; http://www.bsu-bund.de/	
48	18/11/2003	Bulk Carrier (Carrying lumber)	MAI Hong Kong	Access passage to cargo hold	Oxygen depletion, Carbon Monoxide	1	0	A seaman died after entering the access passage. The space had not been ventilated before entry. The bio-deterioration characteristic of lumber absorbed the oxygen from the surrounding atmosphere and through the access door into the access passage.	Investigated by MAI Hong Kong	

49	24/11/2003	Tank Ship	U S C G	Forepeak Tank	Low O2 and Toxic Environment, Access Procedures	0	1	A shipyard worker was incapacitated by paint fumes when he entered the forepeak tank. The tank had been recently painted and everyone was told not to enter the tank, however when the job supervisor returned from locating an extension cord for the forced air blower, he found the worker lying at the bottom of the tank unconscious. He immediately notified the Master, who had the ship's emergency evacuation detail don SCBAs and remove the individual from the tank. EMS and ship's medical personnel administered oxygen to the victim until he was evacuated to a nearby hospital, treated and released.		
50	12/12/2003	Oil Tanker	Liberia	Cargo Tank	Oxygen Deficiency	1	0	Death of Ordinary Seaman by asphyxiation due to explosion inside the cargo tank during repair works at Lisnave shipyard.		
51	03/01/2004	Tanker/combination carrier	UK MAIB	Engine Room	Carbon monoxide	0	2	While discharging gas oil, an engineer became unconscious. About 55 minutes later, a motorman who had been working him also lost consciousness. Engine room was vented. Higher levels of CO, were detected and the IG plant, which had been kept working to provide a positive pressure on the tanks, was immediately shut down. A high concentration of co was found aft of the funnel, where the plant's atmospheric outlet valve is sited. This was due to the low discharge rate. It was assessed that the co was carried into the engine room by a vent fan.		Germany
52	25/01/2004	General cargo	Finland	Cargo Hold casing	Low O2 Environment, Access Procedures	2	1	Young OS, new on board went look for brushes to clean hatchcovers after deck cargo (logs) discharge. Fell down to bottom of the casing. Chief officer went to help, fell down. Third man tried to go down to help, felt dozy…managed to climb back to deck.		
53	01/04/2004	Bulk Carrier	MAI Hong Kong	Bilge space enclosure beneath cargo hold	Oxygen depletion	2	0	A Chief Officer and a Cadet died inside a bilge space enclosure after entry. The space had not been opened for some time and was not ventilated before entry. The Chief Officer was likely to have consumed more alcohol than he was allowed under the prescribed limit.	Investigated by MAI Hong Kong http://www.mardep.gov.hk/en/publication/pdf/mai040104.pdf	
54	02/04/2004	Bulker	Vanuatu	Cargo hold	Oxygen deficiency	1	1	AB entered the hold to take cargo samples without standby personnel and without PPE. Cadet attempted to rescue him.		
55	27/05/2004	Oil tanker	CHILE	Cargo Tank	Gasoline	0	5	Crew members were manually cleaning the cargo tanks, which had been ventilated previously. Fuel leaks in the waste disposal hoses polluted the environment. Oil gases were detected by safety teams, however the crew did not notice this fact. There was no autonomous breathing system available.		
56	12/06/2004	Chemical Tanker	MAI Hong Kong	Cargo Tank	Nitrogen, Oxygen depletion	1	0	A pumpman died after taken a quick dash to the upper ladder platform of a cargo tank in an attempt to retrieve the helmet for the cargo surveyor. The tank had been purged with nitrogen.	Investigated by MAI Hong Kong http://www.mardep.gov.hk/en/publication/pdf/mai040612.pdf	
57	15/09/2004	Naval support	UK MAIB	Store space	Formaldehyde	0	1	Leaking cans of fluid for chemical toilets created noxious fumes, which were inhaled by this crew member. The data sheet on board was for the chemical toilet fluid that did not contain formaldehyde, however the fluid actually carried did contain formaldehyde.		
58	29/03/2005	General Dry Cargo Ship	U S C G	Cargo Hold	Low O2 Environment, Access Procedures	0	3	Vessel sailed from Oakland. A day later while approximately 150 miles West of LA, 3 crew members went into a hold (with wood pellets) to try to secure some cargo that had broken loose and were overcome by oxygen depravation. They were removed, treated and have recovered..		

59	29/04/2005	Stern trawler	UK MAIB	Machinery space	R22	0	1	Contractor inadvertently drilled into a R22 refrigerant liquid line, thinking it to be gas free. This immediately released liquid/gas into the machinery space. Four contractors were taken to hospital to be checked over and one remained in hospital for 2 Nights for observation and was then released.	Investigated by UK Health and Safety Executive	
60	21/05/2005	Tanker	RMI	Tank #5- Port COT	Oxygen Deficiency	2	0	While removing the suction hose, one AB said to another he felt bad, then his eyes rolled up and he collapsed. . The Chief Mate exited the tank to put on a SCBA and returned the tank to find another AB was motionless. The two A.B.s were unable to be revived. The autopsy revealed the 2nd individual to collapse had abrasions on his head, which could have been consistent with hitting it as a result of a fall.		
61	01/06/2005	Fishing	Sweden	Hold entry.	Non vent.	2	1	Was going to clean the hold from rotting herring		Lithuania
62	01/08/2005	Gen.cargo	Sweden	Hold entry.	Non vent.	1	0	Entered without breathing app. when fetching tools for hold cleaning	Investigated by SMSI Sweden http://www.transportstyrelsen.se/Global/Sjofart/Dokument/Haverirapporter/E_2005/2005_08_19_torrlastfartyget_eken_sbji_olycka_med_dodlig_utgang.pdf (In Swedish)	
63	24/10/2005	Oil Tanker	Liberia	Cargo Tank	Oxygen Deficiency	1	0	Ordinary Seaman asphyxiated while cleaning liquid residue from the cargo tank during vessel's passage from Mangalore, India to Dubai, UAE.		
64	10/12/2005	Fish catching	UK MAIB	Cargo – fishroom	Carbon monoxide	0	2	A portable engine driven pump was lowered into the fish room to relieve flooding. Two crewmen were overcome by the pump's exhaust fumes, one of them losing consciousness.		
65	30/01/2006	Fish catching (25gt)	UK MAIB	Cabin	Carbon monoxide	1	0	Crew member using vessel as temporary accommodation placed portable petrol driven generator in fish hold adjacent to cabin area to provide power to cabin area. The bulkhead between the spaces was not gas tight and the crewman died from inhaling exhaust fumes.	Preliminary examination carried out by MAIB http://www.maib.gov.uk/publications/comlpleted_preliminary_examinations/completed_preliminary_examinations_2006/pamela_s.cfm	
66	04/03/2006	General cargo	CHILE	Ballast tank/ Cargo hold	Sulfuric Acid	1	1	Crew members entered a tank in which fish oil had been transported and which afterwards had been filled with ballast water. They worked inside for several hours without any problems. A pocket of sulphuric acid that was formed inside the tank intoxicated them. There was no autonomous breathing system available.		
67	26/04/2006	Bulker	RMI	#4 Cargo Hold Manifold	Oxygen Deficiency	1	1	While the vessel was discharging coal one A.B. died and another A.B. was injured due to lack of oxygen in #4 Cargo Hold Manhole.		
68	10/07/2006	Container	UK MAIB	Tank container	Hydrochloric acid	0	8	8 people, 6 dock workers and two crew, were slightly injured when a cargo of titanium tetrachloride, which was being carried in a tank container, was contaminated by water in the container's steam heating system. The subsequent reaction cause hydrochloric acid to escape in vapor form and it was breathing this that caused the injuries.	German investigation carried out http://emsa.europa.eu/Docs/accidents/10-212.pdf	Korea
69	27/08/2006	Container	RMI	Hold #4	Oxygen Deficiency	1	0	While the vessel was enroute to Istanbul, Turkey, the engine cadet was engaged in entry into hold #4 in order. He consequently lost consciousness due to oxygen deficient atmosphere due to leakage of tank container containing liquid argon IMO 2.2 U.N. 1951.		

70	25/09/2006	Bulker	RMI	Cargo Hold	Oxygen Deficiency	1	1	The O/S and Bosun went down into the cargo hold for taking cargo sample without specific instruction not received from Master nor Chief Officer. The crew members went down into cargo hold #5 in order to retrieve a cargo sample, and suffocated while in the cargo hold.		
71	12/10/2006	Chemical Tanker	NOR NMD	Cargo tank	Not ventilated. Nitrogen atmosphere, Low O2	1	0	Cleaning the tank. Chief officer entered tank without Breathing Equipment. The Tank had less than 2 % O2.		
72	16/11/2006	Bulk Carrier (Carryingwooden pellets)	MAI Hong Kong	Access passage to cargo hold	Oxygen depletion, Carbon Monoxide	1	4	A seaman died and a shore worker seriously injured after entering the access passage. The space had not been ventilated before entry. The bio-deterioration characteristic of lumber absorbed the oxygen from the surrounding atmosphere and transferred to the access passage. (According to Sweden 7 others were sent to hospital but were released.)	Investigated by MAI Hong Kong and SMSI Sweden http://www.mardep.gov.hk/en/publication/pdf/mai061116_f.pdf. http://www.transportstyrelsen.se/Global/Sjofart/Dokument/Haverirapporter/D_2006/2006_11_16_bulkfartyget_saga_spray_vrww5_dodsfall.pdf (In Swedish)	Sweden
73	01/12/2006	Gen.cargo	Sweden	Hold entry.	Non vent.	1	0	Entered without breathing app.		
74	01/12/2006	Tanker	Sweden	Deck	Open air	0	2	Opened a pipe to take cargo sample	Investigated by SMSI Sweden http://www.transportstyrelsen.se/Global/Sjofart/Dokument/Haverirapporter/D_2006/2006_12-27_oljetankfartyget_stoc_regina_sgox_peronskada.pdf (In Swedish)	
75	06/12/2006	Fish catching	CHILE	Fishhold	Sulfuric Acid	1	0	A crew member entered the fish cargo hold, without previously measuring the gas conditions, after which he fell down inside the hold as he lost consciousness because of the sulphuric acid released from decomposing fish. □		
76	13/12/2006	Chemical Tanker	NOR NMD	Cargo tank	Not ventilated. Cargo atmosphere (hexene-1)	0	2	Deck cadet entered tank on bosun's order without PE, lost consciousness. Bosun entered tank without PE to assist, lost consciousness. AB stationed at hatch raised alarm, AB and Chief Officer. entered tank with PE and rescued cadet and Bosun.		
77	01/01/2007	River launch (15 gt)	UK MAIB	Wheelhouse	Carbon monoxide	0	2	Over a period of up to two months several crew from a river launch were exposed to carbon monoxide in the wheelhouse. The air intake to the heater was located in the engine compartment. The possibility of exhaust leaks in the trunking or of engine exhaust re-entering through the engine vents considered the most likely source of co.		
78	07/02/2007	Fish catching liner	UK MAIB	Shark oil storage/ cargo tank	Unknown	1	3	Shore contractors at non UK port boarded the vessel to clean the shark oil storage/cargo tank. The atmosphere was not tested before entering; no breathing apparatus was being worn and no forced ventilation was provided. One worker succumbed to the fumes (& later died). Three other workers also suffered from the effects while rescuing their colleague.	Investigated by Spanish authorities (Capitnaeria Maritime) from Vigo.	

79	04/03/2007	Oil Tanker	Liberia	Slop Tank	Oxygen Deficiency	2	0	Death of OS and AB due to entry into VOID spaces and inhalation of toxic gases. OS and AB (to rescue the OS) entered into slop tank without carrying breathing apparatus and wearing only a portable dust mask which was not appropriate. The OS and the AB did not receive the Chief Officer's permission and they apparently ignored three other crew members' protests forbidding them to enter the slop tank.		
80	15/03/2007	Refrigerated Cargo Ship	U S C G	Cargo Hold	Low O2 Environment, Access Procedures	2	0	Investigation conducted jointly with Liberia. Vessel is constructed to carry fruit concentrate. Cargo tanks are clustered independently in segregated cargo holds with typical cargo and nitrogen gas supply piping. During cargo operations, 2 officers were found unconscious in the number cargo hold and were extracted by the crew. The first responders began CPR before EMS paramedics arrived but officers were pronounced dead at the scene. The deck officer entered the cargo hold for routine pre-departure checks. When he didn't return topside, the Chief Mate entered the cargo hold to look for him. It was determeind that the rupture disk (safety device) installed on the cargo tanks, overfill tank, failed allowing nitrogen gas to be released into the cargo hold. The date and time of the breach of the rupture disc is unknown.		Liberia
81	Apr-07	Tanker	Cyprus	Cargo Tank	Empty, last cargo was naphtha, not inerted.	1	0	Pumpman carried out stripping of the tanks. Flow rate was slow, so he entered the tank without permission, without proper equipment and without notifying anybody. It was his first day as Pumpman.		
82	23/05/2007	General Cargo	IOM	Cargo hold - completed laden voyage with pulp logs	No Oxygen and carbon monoxide	2	1	Bosun entered hold via access hatch to collect equipment. Discovered missing and Master entered tank without SCBA during search. Crew aware of dangers of O2 depletion with timber cargo. Hold not treated as enclosed space and entry was quick attempt to save time.		Sweden
83	31/05/2007	Pelagic Fishing Vessel	SAMSA	Fishhold	Low O2 Access Procedures	1	3	Skipper died after entering fishold to rescue 2 crew members who had been overcome while trying to rescue another crew member who had entered to clean the hold.		
84	20/09/2007	Bulker	RMI	Cargo Hold #5	Pet Coke Fumes	1	0	While retrieving samples of the Pet Coke cargo from Cargo Hold #5 through the forward manhole, the boatswain lost consciousness while equipped with an EEBD.		
85	23/09/2007	Offshore supply	UK MAIB	Starboard chain locker	Oxygen depletion	3	0	2 persons entered chain locker to secure noisy anchor chain & collapsed, likely 2nd person entered in an attempt to recover 1st. 3rd person donned breathing apparatus & carried 10 minute Emergency Escape Breathing Device (EEBD) to place on casualty. 3rd person of large build unable to fit down hatch wearing BA so donned EEBD. EEBD became removed.		
86	27/09/2007	Tug	RMI	Barge Tank	Oxygen Deficiency	2	1	Despite the Chief Officer instructing the Bosun to not enter the tank, the Bosun went inside and shortly thereafter fell unconscious. Immediately, the A.B. went to rescue the Bosun and also fell unconscious. After witnessing the two men descend into the tank, the Messboy rushed to enter the tank and also fell unconscious. The A.B. and Bosun died inside the tank. The only survivor was the Messboy, who was hospitalized and recovered from his injuries.		

87	14/10/2007	Workboat	UK MAIB	Other internal deck/space	Carbon monoxide	0	2	Vessel flooding, 2 crew members moved portable, petrol driven, pump into the confined space adjacent to accommodation space. The pump later lost suction and one of the crew members went into the space to investigate. His colleague then joined him in the space to assist. The first crewman to enter the space then reported feeling dizzy and collapsed and lost consciousness. The second man then stopped the pump and left the space to get a rope to pull his colleague out.	Preliminary examination carried out by MAIB http://www.maib.gov.uk/publications/comlpleted_preliminary_examinations/completed_preliminary_examinations_2007/panurgic_II.cfm	
88	29/10/2007	General cargo - single deck	UK MAIB	Accommodation	Phosphine poisoning	1	0	Vessel carrying feed wheat into her two holds. Once loading was complete, the cargo was fumigated by applying aluminum phosphide pellets loose into the cargo. The fumigation process was intended to progress during the voyage, as the tablets decomposed and gave off phosphine gas. The following morning, crewman found dead in his cabin. No obvious leakage path for the fumigant gas was located, even after smoke testing the hold and stripping back the bulkhead linings. However, following de-scaling of the area, some pin holes were discovered in the underside of the cabin deck that overhung the cargo hold.	Preliminary examination carried out by MAIB http://www.maib.gov.uk/cms_resources/Fumigated_cargo_Flyer.pdf http://www.maib.gov.uk/publications/completed_preliminary_examinations/completed_preliminary_examinations_2008/monika.cfm	Antigua & Barbuda
89	13/01/2008	Chemical Tank Ship	U S C G	Cargo Tank	Low O2 Environment, Access Procedures	1	0	3rd Officer fell into one of the tanks, was exposed to nitrogen, was extracted and taken to hospital. Investigation found the 3rd Officer was taking oxygen content readings of nitrogen tank during purging operations at 15 to 30 minute intervals. The purging operation commenced at 0600. At approximately 0645-0650 3rd Officer went to take his second set of readings. After several minutes the Chief Officer tried to radio the 3rd Officer to get the readings but the 3rd Officer never responded. The Chief Officer sent an AB to check on the 3rd Officer. The AB discovered the oxygen monitoring equipment and hardhat on deck but the 3rd Officer was missing. He immediately looked into the cargo tank and saw the 3rd Officer lying on the deck. The alarm was sounded @ 0700 and the crew removed the 3rd Officer from the cargo tank. The 3rd Officer apparently dropped part of the air testing equipment into the tank and he went in to retrieve it wearing only an air purifying respirator. Once in the tank, the 3rd Officer was overcome with nitrogen. There were no signs that he fell into the tank. He remained on life-support but died 11 days later.		
90	17/01/2008	Fishing Vessel	UK MAIB	Fish Hold	Carbon Monoxide	0	1	Bilge system became blocked and pump put in fish hold to clear water. Crew member lay down to clear blockage and became unconscious. 3 other crew in hold had 12, 14 and 16% CO in their blood stream. In future pump will only be used on open deck.		UK
91	18/01/2008	Fish catching	UK MAIB	Fishhold	Carbon monoxide	0	1	Flooding. Bilge pump suction pipe blocked in fish hold. Purchased petrol driven pump which was eventually placed in hold with 4 crew standing in hold. 1 person injured. 3 others admitted to hospital for less than 24 hours, the carbon monoxide levels in their blood were 12%, 14% and 16%.		

92	18/01/2008	General Cargo	UK MAIB	Forward Store	IMDG Code Class 4.2 ferrous metal turnings had been in a nearby hold and depleted oxygen levels.	2	0	Prohibited cargo self-heated causing reduced levels of oxygen inside the forward store, resulting in the death of 2 crewmen.	http://www.maib.gov.uk/publications/investigation_reports/2008/sava_lake.cfm	Latvia
93	21/02/2008	Ro-Ro Passenger Ferry		Funnel	Carbon Monoxide	0	1	Crew member suffered carbon monoxide poisoning while cleaning inside of funnel. Fans to be left on in future, permit to work to be introduced, and gas alert micro clip to be worn.		
94	25/02/2008	Fishing Vessel	Vanuatu	Engine Room	Ammonia leak	1	0	During a blackout caused by an ammonia leak from the refrigeration plant which displaced all the oxygen in the engine room, the chief engineer attempted to enter the engineroom without breathing apparatus and succumbed in the ammonia rich/oxygen poor atmosphere.		
95	24/03/2008	General Cargo	UK MAIB	Forepeak	Tested to approx 19.6% oxygen no CO or hydrocarbons	0	1	Hydrochloric acid had been released in area. Same crew member entered on two successive days. First day had minor eye and skin irritation. Second day became unconscious and stopped breathing. No harmful substances detected	Isle of Man believed to have conducted investigation	Isle of Man
96	10/04/2008	Bulk Carrier	Liberia	Cargo Hold	Oxygen Deficiency	1	0	Cargo receiver's surveyor lost consciousness, after entering into cargo hold No. 8 to conduct survey during discharge operation at Bilbao, Spain. Extensive emergency efforts to revive him failed.		
97	11/06/2008	Cruise Ship	UK MAIB	Ballast Tank	Insufficient oxygen due to corrosion of steel	1	1	Asphyxiation in ballast tank		Bahamas
98	25/07/2008	Tanker-Gas Carrier	Liberia	Cargo Tank	Oxygen Deficiency	2	0	Two men hired by subcontractor in the shipyard died after falling into a tank on board the vessel at St. Marine Shipyard.		
99	16/10/2008	Bulker	Norway AIBN	Cargo hold	Probable oxygen deficiency	0	2	Under investigation		
100	06/04/2009	Naval Support	UK MAIB	Deep Freeze	Ozone	0	5	Seven crewmen were loading frozen meat in to the deep freeze when they displayed symptoms of respiratory distress. They immediately evacuated the refrigeration compartment. The atmosphere was tested the presence of refrigeration gas and oxygen depletion. The results appeared to be normal and the work party returned to the space. The symptoms reappeared and work was stopped again. On investigation it was found that the compartment was fitted with an ozone generator which had been commissioned a week earlier, at the end of a refit period. The compartment had remained empty for the week and ozone had accumulated within the deep freeze and food handling spaces.		

101	06/05/2009	Chemical Tanker	UK MAIB	cargo tank	Hydrogen Sulphide	0	2	AB overcome by release of hydrogen sulphide as he prepared to remove the water wash hose from the open hatch. The Ch Officer attempted a rescue and he too was overcome. Both were hospitalised in ICU. Ch Officer was released after one day and the AB after 6 days. To note that the fixed cleaning system was defective which required use of the portable cleaning system.	As at 17 June 2009 Investigation underway, vessel name is Jo Eik. Progress can be monitored at http://www.maib.gov.uk/latest_news/current_investigations.cfm	Norway
					TOTAL	**93**	**96**			

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CSC/Circ.134
27 May 2005

INTERNATIONAL CONVENTION FOR SAFE CONTAINERS (CSC), 1972, AS AMENDED

Guidance on serious structural deficiencies in containers

1 The International Convention for Safe Containers (CSC), 1972, article VI stipulates that every container which has been approved under article III shall be subject to control in the territory of the Contracting Parties by officers duly authorized by such Contracting Parties. This control shall be limited to verifying that the container carries a valid Safety Approval Plate as required by the Convention, unless there is significant evidence for believing that the condition of the container is such as to create an obvious risk to safety.

2 The Recommendations on harmonized interpretation and implementation of the Convention, approved by the Maritime Safety Committee, at its sixty-second session (24 to 28 May 1993), and circulated as CSC/Circ.100, paragraph 9.4 – Unsafe containers (article VI, paragraph 1, third sentence), stipulates that, where a container is found by the authority exercising control to have a defect which could place a person in danger, then the container should be stopped. However, if the container can be safely moved (e.g. to a place where it can be restored to a safe condition, or to its destination), the officer exercising control may permit such movement on such conditions as the officer may specify with the proviso that the container shall be repaired as expeditiously as may be practicable and not reloaded before this has been done.

3 The Maritime Safety Committee, at its eightieth session (11 to 20 May 2005), recognizing the need for guidance to the officer exercising control under the provisions of article VI of the Convention, approved the Guidance on serious structural deficiencies in containers, set out in the annex, prepared by the Sub-Committee on Dangerous Goods, Solid Cargoes and Containers, at its ninth session (27 September to 1 October 2004).

4 Administrations are urged to widely disseminate the annexed Guidance so as to encourage its use by the officer exercising control in the promotion of container safety. Administrations are further encouraged to provide training in the use of this Guidance to the appropriate enforcement elements within their Administration, so as to promote its use, enhance safety in container operations, and to avoid unnecessary concerns and enforcement actions with regard to containers that are damaged but, nonetheless, structurally sound and capable of safely continuing in transportation.

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ANNEX

GUIDANCE ON SERIOUS STRUCTURAL DEFICIENCIES IN CONTAINERS

1 PREAMBLE

1.1 The International Convention for Safe Containers (CSC), 1972, as amended, contains provisions whereby containers used in international transport are maintained in a sound and safe condition.

1.2 Article VI of the CSC refers to the control measures that may be taken by Contracting Parties.

1.3 Such control should be limited to verifying that the container carries a valid Safety Approval Plate unless there is significant evidence for believing that the condition of the container is such as to create an obvious risk to safety.

2 SCOPE

2.1 This Guidance is provided to enable authorized officers to assess the integrity of structurally sensitive components of containers (defined in article II of the Convention) as provided for by article VI of the CSC and paragraph 9.4 of the Recommendations on harmonized interpretation and implementation of the CSC (CSC/Circ.100) (hereafter "the Supplement to the Convention") and to help them decide whether a container is safe to continue in transportation or whether it should be stopped until remedial action has been taken.

2.2 The criteria given in annex 1 are to be used to make immediate out of service determinations and are be considered as a safety standard and should not be used as repair and inservice criteria under a CSC approved continuous examination programme (ACEP) or a periodic examination scheme.

3 DEFINITIONS

3.1 For the purposes of this guidance, the following definitions are used:

- *Depot* means a repair or storage facility or location.

- *Structurally sensitive components* means those described in annex 1 and shown in annex 3. These are significant in allowing the container to safely be used in transportation.

4 SERIOUS STRUCTURAL DEFICIENCIES AND CONTROL MEASURES

4.1 Authorized officers should consider the following:

.1 control should be exercised on those containers that create an obvious risk to safety. Authorized officers should notify the container owner and/or bailee whenever a container is placed under control;

.2 attention should be directed to deficiencies as described in annex 1;

.3 it should be noted that the guidance given in annex 1 is not exhaustive for all types of containers or all possible deficiencies or combination of deficiencies;

.4 annex 2 provides a safety flow chart that may be used to assess appropriate control measures;

.5 it should be borne in mind that damage to a container may appear serious without creating an obvious risk to safety. Many damages such as holes may infringe customs requirements but may not be structurally significant; and

.6 major damages may be the result of significant impact which could be caused by improper handling of the container or other containers, or significant movement of the cargo within the container. Therefore, special attention should be given to signs of recent impact damage.

5 TRAINING OF AUTHORIZED OFFICERS

5.1 The Contracting Party exercising control should ensure that authorized officers tasked to carry out these assessments and control measures receive the necessary training. This training should involve both theoretical and practical instruction.

ANNEX 1

SERIOUS STRUCTURAL DEFICIENCIES IN CONTAINERS

1 The following components are structurally sensitive and should be examined for serious deficiencies. The criteria given is to be used to make immediate out of service determinations. *It is to be considered as a safety standard and should not be used as repair and inservice criteria under a CSC ACEP or a periodic examination scheme*.

COMPONENT	SERIOUS STRUCTURAL DEFICIENCY
Top rails	Local deformation to a rail in excess of 60 mm or separation or cracks or tears in the rail material in excess of 45 mm in length
Bottom rails	Local deformation to a rail in excess of 100 mm or separation or cracks or tears in the rail's material in excess of 75 mm in length
Headers	Local deformation to a header in excess of 80 mm or cracks or tears in excess of 80 mm in length
Sills	Local deformation to a sill in excess of 100 mm or cracks or tears in excess of 100 mm in length
Corner posts	Local deformation to a post exceeding 50 mm or tears or cracks in excess of 50 mm in length
Corner and intermediate fittings (Castings)	Missing corner fittings or cracks in excess of 25 mm to the fittings, weld separation of adjoining components to the fittings in excess of 50 mm in length
Understructure	Two or more adjacent cross members missing or detached from the bottom rails*
Locking rod assemblies**	One or more inner locking rod assemblies are non-functional

2 Loaded containers with damages equal to, or in excess of, the above criteria are deemed to place a person in danger and under paragraph 9.4 of the Supplement to the Convention, the authorized officer should stop those containers. However, the authorized officer may permit the onward movement of the container, if it is to be moved to its ultimate destination without lifting from the current means of transport.

3 The safety flow chart, shown in annex 2, provides additional guidance on the decision process for allowing onward movement.

4 Empty containers are typically repositioned for repair at an owner-selected depot provided they can be safely moved; this can involve either a domestic or an international move under paragraph 9.5 of the Supplement to the Convention. Any damaged container being repositioned should be handled and transported with due regard to its structural deficiency.

* For continuing transportation, it is essential that detached cross members are precluded from falling free.

** Some containers are designed and approved (and so recorded on the CSC Plate) to operate with one door open or removed.

5 The effect of two or more incidents of damage in the same structurally sensitive component, even though each is less than in the above table, could be equal to, or greater than, the effect of this single damage noted in the table. In such circumstances, the authorized officer may stop the container and seek further guidance from the Contracting Party.

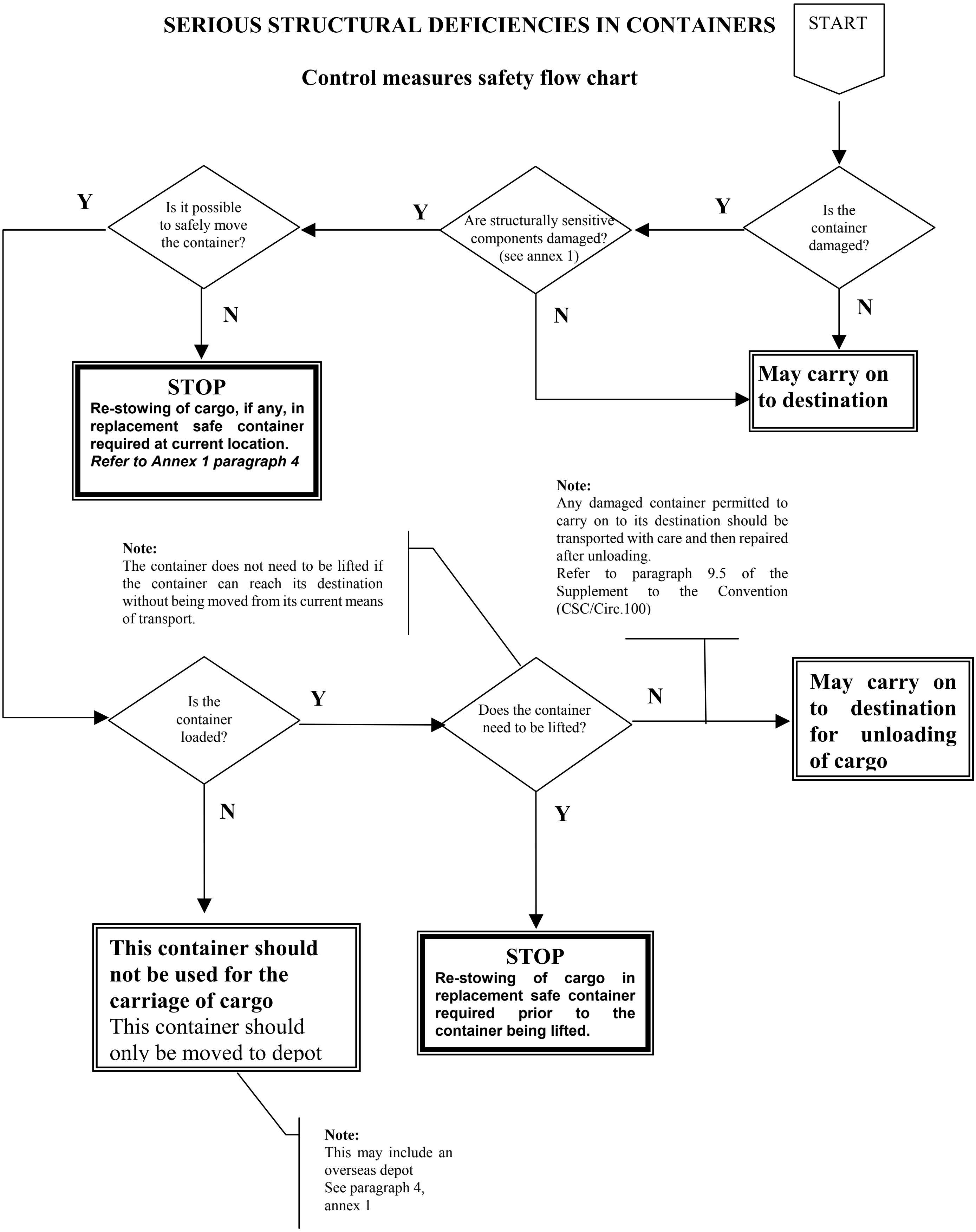
6 For tank containers, the attachment of the vessel to the container frame should also be assessed for any readily visible damage comparable to that noted in the table. If such damage is found in these components, the container may be stopped and further instructions obtained from the Contracting Party.

7 For platform containers with folding end frames, the end frame locking mechanism and the hinge pins about which the end frame rotates are structurally sensitive and should also be inspected for damage.

ANNEX 2

SERIOUS STRUCTURAL DEFICIENCIES IN CONTAINERS

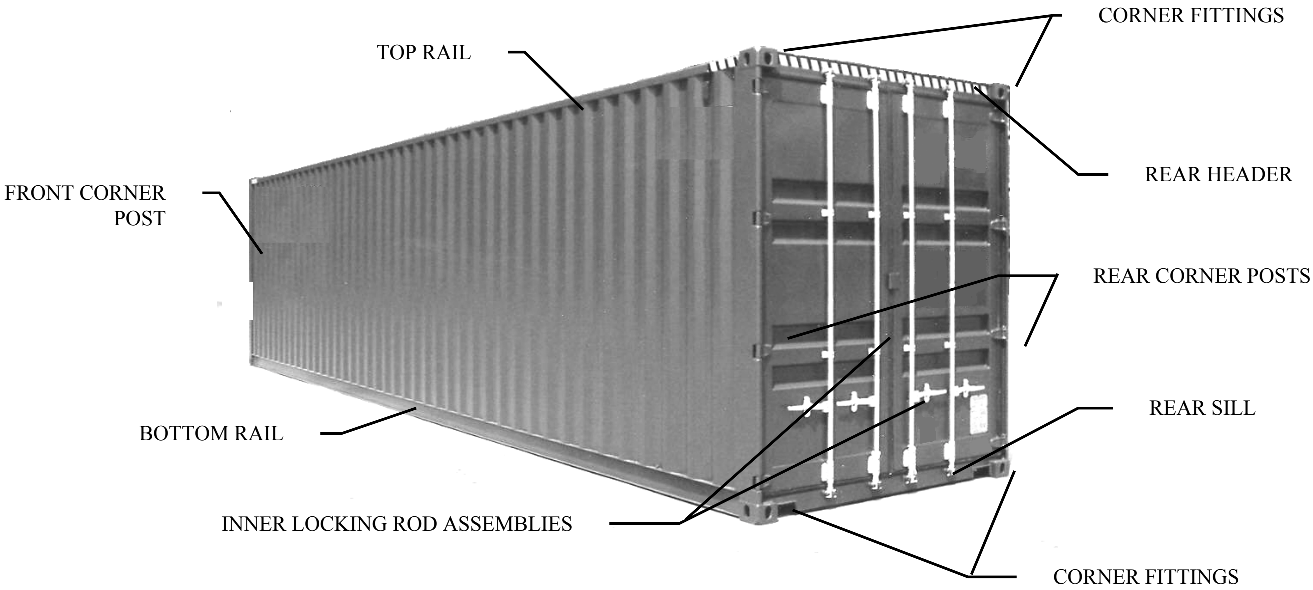
Control measures safety flow chart

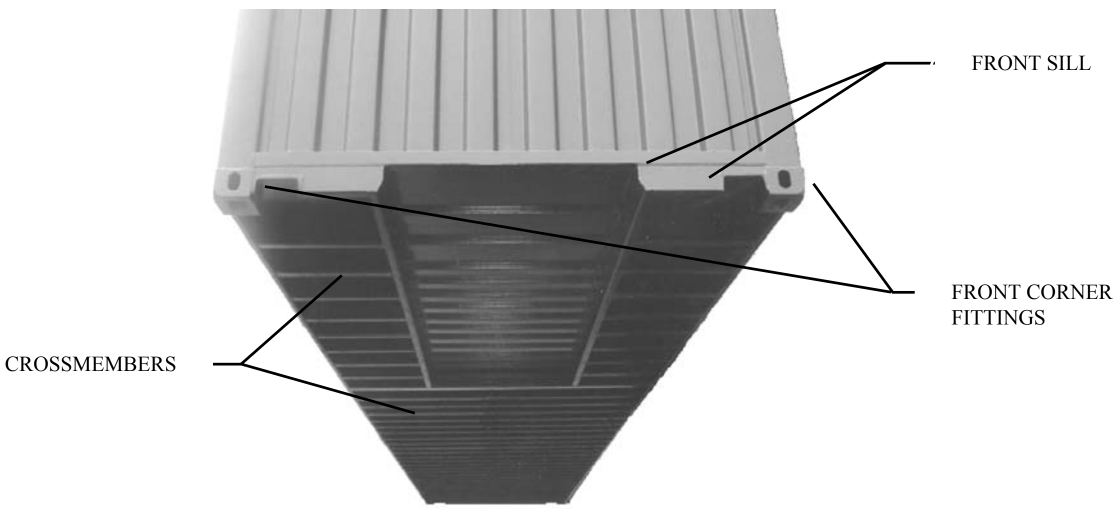


ANNEX 3

DIAGRAMS OF STRUCTURALLY SENSITIVE COMPONENTS

I. General Purpose Container





II. Tank Container

*** Treat as corner post**

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