INTERNATIONAL MARITIME ORGANIZATION

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SUB-COMMITTEE ON SHIP DESIGN AND EQUIPMENT
48th session
Agenda item 25

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REPORT TO THE MARITIME SAFETY COMMITTEE

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LIST OF ANNEXES

1 GENERAL

Introduction

1.1 The Sub-Committee held its forty-eighth session from 21 to 25 February 2005 under the chairmanship of Mr. I. Ponomarev (Russian Federation). The Vice-Chairman, Mrs. Xiang Yang (China), was also present.

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

ALGERIA
ANGOLA
ARGENTINA
AUSTRALIA
BAHAMAS
BOLIVIA
BRAZIL
CANADA
CHILE
CHINA
CROATIA
CUBA
CYPRUS
DEMOCRATIC REPUBLIC OF THE CONGO
DENMARK
DOMINICA
ECUADOR
EGYPT
FINLAND
FRANCE
GERMANY
GREECE
HONDURAS
ICELAND
INDONESIA
IRAN (ISLAMIC REPUBLIC OF)
IRAQ
IRELAND
ITALY
JAPAN
LATVIA
LIBERIA
MARSHALL ISLANDS
MEXICO
NETHERLANDS
NIGERIA
NORWAY
PANAMA
PERU
PHILIPPINES
POLAND
REPUBLIC OF KOREA
ROMANIA
RUSSIAN FEDERATION
SAUDI ARABIA
SINGAPORE
SPAIN
SWEDEN
TURKEY
TUVALU
UKRAINE
UNITED KINGDOM
UNITED STATES
URUGUAY
VENEZUELA

and the following Associate Member of IMO:

HONG KONG, CHINA

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

EUROPEAN COMMISSION (EC)

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

INTERNATIONAL CHAMBER OF SHIPPING (ICS)
INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

INTERNATIONAL CONFEDERATION OF FREE TRADE UNIONS (ICFTU)
BIMCO
INTERNATIONAL ASSOCIATION OF CLASSIFICATION SOCIETIES (IACS)
OIL COMPANIES INTERNATIONAL MARINE FORUM (OCIMF)
INTERNATIONAL MARITIME PILOTS' ASSOCIATION (IMPA)
INTERNATIONAL ASSOCIATION OF DRILLING CONTRACTORS (IADC)
INTERNATIONAL ASSOCIATION OF INSTITUTES OF NAVIGATION (IAIN)
INTERNATIONAL FEDERATION OF SHIPMASTERS' ASSOCIATION (IFSMA)
INTERNATIONAL LIFE-SAVING APPLIANCES MANUFACTURERS' ASSOCIATION (ILAMA)
COMMUNITY OF EUROPEAN SHIPYARDS' ASSOCIATION (CESA)
INTERNATIONAL ASSOCIATION OF INDEPENDENT TANKER OWNERS (INTERTANKO)
SOCIETY OF INTERNATIONAL GAS TANKER AND TERMINAL OPERATORS LIMITED (SIGTTO)
INTERNATIONAL LIFEBOAT FEDERATION (ILF)
INTERNATIONAL COUNCIL OF CRUISE LINES (ICCL)
INTERNATIONAL ASSOCIATION OF DRY CARGO SHIPOWNERS (INTERCARGO)
THE INSTITUTE OF MARINE ENGINEERING, SCIENCE AND TECHNOLOGY (IMarEST)
INTERNATIONAL SAILING FEDERATION (ISAF)
THE INTERNATIONAL MARINE CONTRACTORS ASSOCIATION (IMCA)
ASSOCIATION OF EUROPEAN MANUFACTURERS OF INTERNAL COMBUSTION ENGINES (EUROMOT)
WORLD NUCLEAR TRANSPORT INSTITUTE (WNTI)
THE ROYAL INSTITUTION OF NAVAL ARCHITECTS (RINA)
INTERFERRY.

Opening address

1.4 In welcoming the participants on behalf of the Secretary-General, Mr. K. Sekimizu, Director, Maritime Safety Division, referred to the decision of the Council in November 2004 that the theme for this year's World Maritime Day be "International Shipping – Carrier of World Trade", a theme which would direct attention to the image of shipping as it is widely perceived nowadays. He shared the view of the Secretary-General that the overall contribution shipping makes to the global economy and the community as a whole, by providing the facilitation mechanism for more than 90 per cent of world trade, was far too easily overlooked. Overall, shipping could claim to be largely safe, secure, efficient and environmentally friendly and constantly striving to improve its overall performance, yet it was on occasions taken for granted, at best, and, at worst, condemned as an uncaring and selfish industry displaying scarce concern about the environment. He did not think such a perception was fair and called on those who care about shipping to work together to reverse this mistaken perception, using every opportunity available, including the occasion of the World Maritime Day celebrations, to highlight the role of shipping and the progress it has made in terms of safety and the environment.

The Director drew attention to the important safety issues before the Sub-Committee, including passenger ship safety, life-saving appliances (LSA), amendments to the Enhanced Survey Programme for bulk carriers and oil tankers and the 2000 HSC Code, performance standards for protective coatings and also a number of tasks referred by the Marine Environment Protection Committee, mainly relating to MARPOL Annex VI.

With regard to passenger ship safety, he recalled that the MSC approved casualty threshold criteria for return to port, a time to remain habitable for evacuation and a time to recover which would guide the technical bodies involved to develop, from their own perspective, relevant requirements for passenger ships to enable them to maintain their essential systems and return safely to a port in order to provide the Committee with expert advice on the vital aspects of the matters that fall within their competence, to enable it to complete its consideration of this issue in a timely manner.

He then referred to the comprehensive work, started some sessions ago, on various issues related to life-saving appliances, including such subjects as measures to prevent accidents with lifeboats; performance testing and approval standards for SOLAS personal LSA; compatibility of life-saving appliances; test standards for extended service intervals of inflatable liferafts; and inconsistencies in IMO instruments regarding requirements for LSA, with a view to preparing amendments to relevant IMO instruments.

Recalling the role of the Sub-Committee as co-ordinator with regard to the review of the 2000 HSC Code and amendments to the DSC Code and the 1994 HSC Code, he expressed the expectation that a comprehensive set of standards aimed at enhancing the safety of high-speed craft would be developed.

Further important items on the work programme mentioned by the Director were the review of resolution A.744(18) on Guidelines on the enhanced programme of inspections during surveys of bulk carriers and oil tankers which need to be kept up-to-date with all new developments, requiring regular review of their provisions, and the introduction of requirements for double-hull oil tankers and bulk carriers to ensure that protective coatings are of an adequate standard.

Noting that the MEPC had assigned to the Sub-Committee a number of tasks, some of which were of particular urgency because they are related to the entry into force of Annex VI of the MARPOL Convention on 19 May of this year, the Director was confident that the Sub-Committee would meet the expectations of the Committee.

Referring to the Tsunami disaster in South Asia, the Director outlined the efforts undertaken by IMO, including the Tsunami Maritime Relief Fund, the secondment of an IMO expert from the Marine Environment Division to help establish an environmental crisis centre in Indonesia and the development of a joint plan for future actions to be undertaken together with the International Association of Marine Aids to Navigation and Lighthouse Authorities and the International Hydrographic Organization, reiterating IMO's readiness to send a joint needs' assessment mission, as soon as possible, in conjunction with IHO and IALA, to countries affected by the tsunami, and reporting that discussions with representatives of those countries had begun. He also mentioned the Tsunami Special Session organized during COMSAR 9 and briefly informed the Sub-Committee on the progress of discussions on relevant issues, including IMO's contribution towards the establishment of an early Tsunami warning system in the Indian Ocean. The Director noted the full support of the entire shipping sector and its willingness to provide further help wherever practical and appropriate.

Chairman's remarks

1.5 The Chairman, in thanking the Director of the Maritime Safety Division, stated that the Secretary-General's and his words of encouragement as well as the advice and requests would be given every consideration by the Sub-Committee.

Adoption of the agenda

1.6 The Sub-Committee adopted the agenda for the forty-eighth session (DE 48/1) and agreed to be guided in its work, in general, by the annotations contained in document DE 48/1/1. The agenda, as adopted, together with the list of documents considered under each agenda item, is set out in document DE 48/INF.7.

1.7 The Sub-Committee noted a statement by the delegation of Norway regarding the documents submitted to the session, expressing the view that a number of submissions expanded the scope of the agenda item they had been submitted under, in contradiction of the statement of the MSC Chairman at MSC 79, who had requested that a compelling need should be demonstrated when documents were submitted which expanded on the scope of the relevant agenda item (see also paragraph 2.2 below). This concerned, in particular, documents submitted under agenda items 5 and 10.

2 DECISIONS OF OTHER IMO BODIES

2.1 The Sub-Committee noted the decisions and comments pertaining to its work made by FSI 12, MEPC 51, MSC 78, C 92, NAV 50, SLF 47, DSC 9, MEPC 52, MSC 79, STW 36 and FP 49 as reported in documents DE 48/2, DE 48/2/1, DE 48/2/2, DE 48/2/3 and DE 48/2/4, and COMSAR 9, as reported orally by the Secretariat, and took them into account in its deliberations when dealing with relevant agenda items.

Method of work related to new work programme items

2.2 The Sub-Committee noted that MSC 78 had agreed that a decision to include a new item in a sub-committee's work programme did not mean that the Committee agreed with the technical aspects of the proposal. If it was decided to include the item in a sub-committee's work programme, detailed consideration of the technical aspects of the proposal and the development of appropriate requirements and recommendations should be left to the sub-committee concerned. MSC 78 also noted that a number of submissions by Member Governments supporting proposals for new work items made by other Member Governments often expanded the scope of the original proposal. The Committee decided that, in order to facilitate proper consideration of the proposals, these submissions should also include a justification for this expanded scope, as appropriate, in accordance with paragraphs 2.9 to 2.20 of the Guidelines on the organization and method of work (MSC/Circ.1099).

Requests from news media to attend IMO meetings

2.3 The Sub-Committee noted that C 92, in considering the issue of the news media attendance at IMO meetings, had approved the Guidelines for media access to meetings of Committees and their subsidiary bodies and that, since then, IMO had established an accreditation system, based on similar systems operated by the United Nations and other agencies, which allows automatic access to meetings of IMO technical bodies to accredited representatives of the media.

Distribution of IMO documents

2.4 The Sub-Committee noted that C 92, having considered matters related to the distribution of IMO documents, had decided that:

.1 the distribution of hard copies of meeting documents to IMO Member States be limited to one copy per delegation, as from 1 July 2004, subject to some flexibility in recognition of the fact that some Member States may have difficulties in accessing the documents on the IMODOCS website; and

.2 non-governmental organizations would not receive meeting documents in hard copy as from 1 July 2004.

Trial reporting system

2.5 The Sub-Committee noted that MSC 79, noting that MEPC 52 had recommended that the trial new reporting procedure be halted and the previous reporting procedure be re-established and that C 93 had agreed with that recommendation subject to a concurrent decision by MSC 79, had decided to halt the trial new reporting procedure and to re-establish the previous reporting procedure with immediate effect. The Secretariat was instructed to inform C 94 of the decision. Notwithstanding that decision, MSC 79 noted with appreciation the Secretariat's intention to continue with the practice of placing all working papers on the secure IMO website.

3 AMENDMENTS TO RESOLUTION A.744(18)

General

3.1 The Sub-Committee recalled that DE 47, in view of expected further work on the item, including procedural requirements for surveyor monitoring of thickness measurements, hull condition assessment for aged double hull oil tankers and hull survey requirements for double-skin bulk carriers, had recommended to the Committee an extension of the target completion date for this item. Consequently, MSC 78 extended the target completion date to 2006.

3.2 The Sub-Committee noted that MEPC 51 had instructed it to consider proposals by Japan to amend the Condition Assessment Scheme (CAS) (MEPC 51/17 and MEPC 51/17/1), relating to inspection requirements for fillet welds between deck plating and longitudinals and the issue of major repair work of hull girders with a view to reporting the outcome to MEPC 53. MEPC 51 further instructed the Sub-Committee to consider the level of documentation that the receiving flag Administration must require from the issuing flag Administration in cases where there is a change of flag during the CAS survey or after the Statement of Compliance has been issued (MEPC 51/17/4 by the Marshall Islands).

Amendments to the ESP Guidelines (resolution A.744(18))

3.3 The Sub-Committee considered document DE 48/3 (IACS), containing the text of IACS UR Z10.5 "Hull surveys of double skin bulk carriers", recalling that DE 47 invited IACS to submit the survey requirements to this session so that their inclusion in the ESP Guidelines could be considered.

3.4 There was general support to include the survey requirements for double-side skin bulk carriers in the ESP Guidelines. The Sub-Committee agreed that a working group should be established at DE 49 to finalize relevant draft amendments to the Guidelines and invited submissions from Members and international organizations to that session.

3.5 Recalling that there are two more issues which DE 47 agreed to consider further, i.e. procedural requirements for surveyor monitoring of thickness measurements and requirements for provision and maintenance of as-built drawings covering items such as machinery installations, electrical installations and control systems, etc., the Sub-Committee invited Members and international organizations to also submit proposals regarding these two issues to DE 49, so that their inclusion in the draft amendments to the ESP Guidelines to be prepared could be considered.

Amendments to the Condition Assessment Scheme (CAS) (resolution MEPC.94(46))

3.6 The Sub-Committee noted that the two submissions by Japan (MEPC 51/17 and MEPC 51/17/1) referred to the Sub-Committee by MEPC 51 were modified by Japan and submitted to this session as documents DE 48/3/1, DE 48/3/2 and DE 48/3/3. The documents are proposing amendments to CAS, including two sets of guidelines concerning major repair work of hull girders and inspection of fillet welds between deck plates and longitudinals.

3.7 The Sub-Committee invited submissions by Members and international organizations on the issue to DE 49 so that the working group at the next session could be instructed to prepare relevant amendments to CAS, if appropriate.

3.8 The Sub-Committee then considered document DE 48/WP.8 by the Marshall Islands, presenting a revision of their document MEPC 51/17/4, proposing to amend CAS with regard to issues affecting flag Administration procedures on the occasion of a change of flag during the course of a CAS survey.

3.9 While there was general agreement with the importance of the proposed amendments, various views were expressed in the ensuing debate concerning the legal issues involved in the matter, the obligation of Administrations to issue their own Document of Compliance and to conduct a full technical review of the CAS documentation and the appropriateness of referencing the IACS Transfer of Class Agreement (TOCA) in CAS. Consequently, the Sub-Committee agreed to further consider the proposed CAS amendments as contained in document DE 48/WP.8 at the next session and invited Members and international organizations to submit concrete proposals to DE 49 so that the working group at the next session could be instructed to finalize relevant draft amendments to CAS, if appropriate.

4 PASSENGER SHIP SAFETY

BACKGROUND

4.1 The Sub-Committee recalled that DE 47, after extensive consideration of the issue, had established a correspondence group to progress the work intersessionally. The report of the group was submitted and issued as document DE 48/4.

4.2 The Sub-Committee noted that MSC 78 had instructed it to consider the preparation of appropriate amendments to SOLAS regulation III/21.1.4 to clearly state that the "30 minute timeframe", stipulated in the regulation, starts when all the passengers have been mustered, with lifejackets donned, and the master gives the abandon ship signal, taking into account that ships may have different types of marine escape systems (MES) employed for ship abandonment purposes.

4.3 The Sub-Committee noted that MSC 78 had further instructed it to consider the report of the Working Group on Large Passenger Ship Safety established at MSC 78 (MSC 78/WP.14), in particular the revised work plan (annex 4 of the group's report), for action as appropriate.

4.4 The Sub-Committee further noted that MSC 79 had taken a number of important decisions on the matter, in particular on the deletion of the word "large" from the title of this agenda item and on a five-day maximum timeframe for which persons should be expected to stay in survival craft, and had consolidated the tasks given to the Sub-Committee by MSC 78. Detailed information on the outcome of MSC 79, as contained in document DE 48/4/1, was noted.

REPORT OF THE CORRESPONDENCE GROUP

4.5 The Sub-Committee considered the report of the correspondence group (DE 48/4), thanking the members of the group, in particular the United States as the co-ordinator, for their good work, and took action as outlined in the following paragraphs.

4.6 The Sub-Committee considered the group's recommendation to develop performance standards for survival craft used on future passenger ships, using resolution A.520(13) as a starting point and incorporating the specific areas identified in paragraphs 6 to 10 and annexes 1 and 2 of the group's report, and noted that MSC 79 had already instructed it to prepare such performance standards.

4.7 The Sub-Committee agreed with the group's views regarding matters related to the required specificity of standards used to approve alternative designs and arrangements of LSA (paragraphs 11 and 12 of the group's report) and with the group's specific recommendations to include human factor and maintenance issues as discussed in paragraphs 13 and 14 of the report.

4.8 The Sub-Committee further considered and generally agreed, for finalization of the proposed text by the working group to be established, with:

.1 the group's recommended basic concept to be followed for approving alternative designs and arrangements related to ship construction, as described in annex 3 and paragraph 15 of the report;

.2 the proposed essential systems (paragraph 17 of the report) and equipment performance standards (annex 4 of the report);

.3 the proposed carriage requirements for infant personal LSA (paragraphs 19 to 21 of the report); and

.4 the proposed definition for "damage control concept" (annex 5 of the report).

ESTABLISHMENT OF A WORKING GROUP

4.9 As agreed at DE 47, the Sub-Committee established the working group and instructed it as follows:

.1 on the basis of the report of the correspondence group (DE 48/4) and taking into account comments and proposals made in plenary, finalize the following:

.1.1 SOLAS carriage requirements for infant personal LSA and review of existing requirements for children's LSA;

.1.2 guidelines for the approval of alternative designs and arrangements;

.1.3 requirements and performance standards to maintain essential systems and services; and

.1.4 working definition for the damage control concept;

.2 consider the starting point for the time to remain habitable, taking into account the views of FP 49, and provide recommendations, as appropriate;

.3 if time allows, start consideration of the remaining tasks given to the Sub-Committee by MSC 79;

.4 prepare terms of reference for the correspondence group for consideration by the Sub-Committee; and

.5 present a written report to plenary by Thursday, 24 February 2005.

REPORT OF THE WORKING GROUP

4.10 Having received the report of the working group (DE 48/WP.4), the Sub-Committee approved in general and took action as outlined in the following paragraphs.

SOLAS carriage requirements for infants' life-saving appliances

4.11 The Sub-Committee noted that the group had prepared draft amendments to SOLAS regulation III/7.2.1 to specify the carriage requirements for personal life-saving appliances suitable for infants and that the aforementioned proposed amendments were divided to cover carriage requirements for voyages of more than 24 hours and voyages of less than 24 hours, taking into account that ships on short voyages (such as ferries) would find it difficult to pre-determine the number of infants to be carried on any single voyage.

4.12 In considering matters for voyages of less than 24 hours, the Sub-Committee noted that the group had agreed that the carriage requirements for infant lifejackets should be equal to at least 2.5% of the number of passengers on board. For voyages longer than 24 hours, the Sub-Committee noted that the group had agreed that a lifejacket suitable for infants should be provided for each infant on board.

4.13 The Sub-Committee noted that the group had discussed whether size or age criteria should be developed for determining the application of infant lifejackets and, after having noted the criteria contained in the draft amendments to section 2.2 of the LSA Code, as set out in annex 1 to document DE 48/9, had agreed that the development of such criteria and any supporting approval guidelines should be dealt with under agenda item 9 (Performance testing and approval standards for SOLAS personal life-saving appliances). The group, therefore, invited the Working Group on Performance Testing and Approval Standards for SOLAS Personal Life-Saving Appliances to consider the draft amendments set out in annex 1 to document DE 48/WP.4 with a view to providing recommendations directly to the Sub-Committee (see paragraph 9.11).

Alternative designs and arrangements

Alternative designs and arrangements for SOLAS chapters II-1 and III

4.14 The Sub-Committee noted that the group had considered the draft framework for alternative designs and arrangements for SOLAS chapter II-1 prepared by the correspondence group (DE 48/4, annex 3) and agreed that the draft provisions should only be applicable for parts C, D and E of chapter II-1, as instructed by MSC 79.

4.15 In considering the Committee's instruction that SOLAS regulation II-2/17 was to be used as a basis, the Sub-Committee noted the group's opinion that it was not necessary to amend chapter II-1 to include a purpose statement and functional requirements for each regulation (similar to SOLAS chapter II-2) since the engineering analysis required by the aforementioned provisions took into account the intent of the requirements for which the alternative design was proposed.

4.16 The Sub-Committee noted that the group had decided to add a similar provision to SOLAS chapter III in lieu of regulation III/4.3, taking into account that the definition for novel craft may need to be revised.

Draft Guidelines on alternative designs and arrangements for SOLAS chapters II-1 and III

4.17 The Sub-Committee noted that the group had agreed that supporting guidelines would be necessary to implement the aforementioned draft regulations and had prepared draft Guidelines on alternative designs and arrangements for SOLAS chapters II-1 and III.

General

4.18 Having considered the above issues, the Sub-Committee noted that the aforementioned draft amendments and draft guidelines would be further considered by a correspondence group so that they could be finalized at DE 49 (see also paragraph 4.30).

Requirements and performance standards for essential systems and services

4.19 The Sub-Committee noted that the group had considered the draft performance standards prepared by the correspondence group (DE 48/4, annex 4), taking into account the outcome of FP 49 (FP 49/WP.1), and agreed that the standards should be divided into separate standards for "return to port" and "time to remain habitable". The Sub-Committee noted that the draft Performance standards for essential systems and services, set out in annexes 5 and 6 of document DE 48/WP.4, respectively, would be further considered at DE 49 with a view to finalization.

4.20 In this context, the Sub-Committee invited the FP, NAV and SLF Sub-Committees to provide comments on the draft performance standards, to DE 49, for the essential systems under their purview. The Sub-Committee also invited FP 50 to align, as appropriate, the text of draft SOLAS regulation II-2/21, as contained in annex 1 to document FP 49/WP.1, with the draft performance standards set out in annexes 5 and 6 to document DE 48/WP.4.

Working definition for the damage control concept

4.21 The Sub-Committee noted that the group had reviewed the working definition for the damage control concept prepared by the correspondence group and did not reach a consensus on how the definition should be applied for supporting the passenger ship safety initiative. The

group therefore agreed that the correspondence group should reconsider the draft definition with a view to determining how it would be applied by the Sub-Committee to assist in the work on this initiative and provide recommendations as appropriate (see paragraph 4.30).

Starting point for the time to remain habitable

4.22 The Sub-Committee noted that the group had considered the comments made in plenary regarding the confusion over the starting point for the time to remain habitable and had reviewed in detail documents MSC 78/WP.14 and MSC 79/WP.13 with a view to determining whether the time began with the initiating event or began after the casualty threshold had been exceeded.

4.23 In considering document MSC 78/WP.14, the Sub-Committee noted that paragraph 17 of the document clearly stated:

> "The 3-hour criteria includes the length of time beginning with the initiating event until all persons have safely abandoned the ship."

and agreed that this was the intent of the Committee when approving the holistic approach diagram set out in annex 1 to document MSC 78/WP.14. The Sub-Committee also noted that MSC 78 had extensive discussions on the time to remain habitable criteria and that this matter had not been discussed in any depth at MSC 79.

4.24 In considering paragraph 30 of document MSC 79/WP.13, the Sub-Committee endorsed the group's view that this paragraph was taken out of context and was only placed in the report to reiterate the Committee's support for the 3-hour time to remain habitable in light of the decision to allow the aforementioned time to be reduced if based on an evacuation analysis, taking into account that the initiative was broadened to include all size passenger ships and that small passenger ships could be evacuated quicker than large passenger ships. Thus, the Sub-Committee was of the view that the intent of the aforementioned paragraph was not to modify the starting time for the 3-hour time to remain habitable. The Sub-Committee invited MSC 80 to consider the above views and take action, as appropriate.

Statement by the delegation of the United Kingdom

4.25 It was the opinion of the delegation of the United Kingdom that, in cases of damage less than the casualty threshold, the ship is expected to survive indefinitely and abandonment is not considered. Therefore, in their view, the "time to remain habitable" should begin after the casualty threshold is exceeded when abandonment is a possible outcome. The delegations of Chile, France, Germany, the Marshall Islands, the Russian Federation and Uruguay associated themselves with this statement.

Tasks assigned in the revised work plan

Performance standards for survival craft

4.26 The Sub-Committee endorsed the group's view that more time was necessary to progress work on the performance standards for survival craft and agreed that the correspondence group should prepare a base document for consideration at DE 49, taking into account document DE 48/4.

Towing arrangements for passenger ships

4.27 The Sub-Committee, having noted that it agreed to develop functional requirements for towing arrangements (see section 14), endorsed the group's view that this task should be incorporated into such work. Therefore, the Sub-Committee invited MSC 80 to remove this task from the revised work plan on passenger ship safety.

Time for abandonment

4.28 The Sub-Committee noted that the group had prepared a draft amendment to SOLAS regulation III/21.1.4, as set out in annex 7 to document DE 48/WP.4, for further consideration at DE 49 with a view to finalization.

Auxiliary cabin lighting

4.29 The Sub-Committee noted that the group had prepared a draft amendment to SOLAS regulation II-1/41, as set out in annex 7 to document DE 48/WP.4, for further consideration at DE 49 with a view to finalization.

Establishment of the Correspondence Group

4.30 The Sub-Committee agreed to establish a Correspondence Group on Passenger Ship Safety, under the co-ordination of the United States*, and instructed it, taking into account the progress made at this session and in particular document DE 48/WP.4, to:

.1 prepare performance requirements for survival craft used on future passenger ships, taking into account document DE 48/4;

.2 further consider the draft definition for the damage control concept, as set out in annex 5 to document DE 48/4, with a view to clarifying how the definition should be applied in support of the passenger ship safety initiative;

.3 further consider the draft amendments to SOLAS chapters II-1 and III and supplementary guidelines on alternative designs and arrangements, set out in annexes 2, 3 and 4 to document DE 48/WP.4, taking into account resolution A.520(13), and provide recommendations, as appropriate; and

.4 submit a report to DE 49.

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5 MEASURES TO PREVENT ACCIDENTS WITH LIFEBOATS

General

5.1 The Sub-Committee recalled that DE 47, in view of the tasks contained in the Sub-Committee's updated work plan, had agreed to recommend to the Committee the extension of the target completion date for the item to 2006 and invited Members and international organizations to submit comments and proposals on the tasks in the aforementioned work plan to DE 48. MSC 78 concurred with the recommendation of DE 47 and extended the target completion date for the item to 2006.

5.2 The Sub-Committee further recalled that DE 47 had agreed to further consider the preparation of guidelines for the development of operation and maintenance manuals for lifeboat systems at this session and had invited Members and international organizations to submit comments on the issue.

5.3 The Sub-Committee noted that MSC 78 had approved MSC/Circ.1115 on Prevention of accidents in high free-fall launching of lifeboats, noting that the circular had been developed by DE 47 on the basis of available data pertaining to accidents with lifeboats launched from heights greater than 20 m, as a short-term measure in an attempt to stem loss of life and injury among the crew engaged in high free-fall launching of lifeboats during drills, and that further work would be carried out in this respect. MSC 78, therefore, referred document MSC 78/8/2 (ICS), containing comments on the requirement for ships fitted with free-fall lifeboats to conduct drills with the operating crew aboard, to this session for consideration.

5.4 The Sub-Committee further noted that FSI 12 had requested DE 48 to comment on a proposed new life-saving appliance casualty record (DE 48/2/2, annex 1), prepared by FSI 12 as part of the amendments to MSC/Circ.953 - MEPC/Circ.372 on Reports on marine casualties and incidents.

Proposed amendments to LSA-related instruments

5.5 Before consideration of the documents submitted, the Sub-Committee noted that it was intended to establish a correspondence group on item 10 (Inconsistencies in IMO instruments regarding requirements for life-saving appliances) to prepare relevant amendments to SOLAS chapter III, the LSA Code, the Revised Recommendation on testing of LSA (resolution MSC.81(70)) and the Standardized LSA evaluation and test report forms (MSC/Circ.980 and addenda). The Sub-Committee agreed that amendments to the above instruments proposed in the documents to be considered under this agenda item could be included for consideration by that correspondence group.

5.6 Subsequently, the Sub-Committee considered the following submissions proposing amendments to LSA-related instruments and with regard to:

.1 document DE 48/5 (France), proposing amendments to the LSA Code concerning the launching of fast rescue boats, agreed to the proposal and referred it to the correspondence group established under agenda item 10, for finalization, clarifying that the proposal applied to the lowering of fast rescue boats (FRB) only and that a footnote referring to MSC/Circ.809 should be added;

.2 documents DE 48/5/2 (Germany) and DE 48/5/3 (ILAMA), proposing amendments to SOLAS chapter III, MSC/Circ.1093 and the Revised

Recommendation on testing of LSA concerning requirements for davit brake tests of loaded lifeboats, agreed to the proposal and referred it to the correspondence group established under agenda item 10, for finalization;

.3 document DE 48/5/5 (Republic of Korea), proposing amendments to the LSA Code concerning recovery procedures for free-fall lifeboats, agreed in general to the proposal and referred it to the correspondence group established under agenda item 10, for consideration and re-drafting in the form of a functional requirement;

.4 document DE 48/5/7 (Japan), proposing amendments to MSC/Circ.1093 concerning statements and signature by the manufacturer's representative, agreed in principle to the proposal for amendments to paragraph 15 of MSC/Circ.1093 concerning the statement by the manufacturer's representative and further agreed to keep the proposal in abeyance until such time when further amendments to the circular would be prepared; and

.5 document DE 48/5/8 (United States), proposing amendments to the LSA Code concerning requirements for lifeboat release mechanisms, agreed in principle to the proposal and referred it to the correspondence group established under agenda item 10 for further consideration, in particular with regard to the hook systems and the proposed load force of 2,000 N.

Guidelines for the development of operation and maintenance manuals for lifeboats

5.7 The Sub-Committee considered document DE 48/5/1 (Japan), proposing guidelines for developing operation and maintenance manuals for lifeboats, following the agreement at DE 47 to further deal with the issue at this session. Having debated the matter, the Sub-Committee referred the draft guidelines to the correspondence group established under item 10, for finalization.

Proposed MSC circular on failure of on-load release gear

5.8 Having considered document DE 48/5/4 (Australia), proposing the development of an MSC circular to address the failure of on-load release gear of lifeboats, the Sub-Committee agreed to refer the proposal to the correspondence group established under item 10, for further consideration. The Sub-Committee noted in this regard that it might be useful to consolidate the various MSC circulars dealing with lifeboat issues.

LSA casualty record

5.9 The Sub-Committee considered document DE 48/5/6 (Republic of Korea), proposing the collation of information on accidents with free-fall lifeboats by IMO for dissemination to Member States and noted in this connection that the FSI Sub-Committee is currently working on a casualty module for inclusion in the IMO Global Integrated Shipping Information System (GISIS) which will contain, *inter alia,* information on accidents with free-fall lifeboats. GISIS will be available to the public on the IMO website.

5.10 In this connection, the Sub-Committee recalled that it had been requested to review the draft LSA casualty record, as prepared by FSI 12 and, subsequently, considered document DE 48/2/2, annex 1, which contains the text of the proposed record. Following a brief debate, the Sub-Committee agreed with the draft LSA casualty record, as prepared by FSI 12, subject to the following proposed amendments:

.1 a new item "Warm climates" should be inserted in section 2 – Local conditions;

.2 a new item "Launching appliances" should be inserted in section 3 – Type of life-saving appliance involved;

.3 a new item "Anti-exposure suit" should be inserted in section 4 – Type of personal life-saving appliance used;

.4 in section 4 – Type of personal life-saving appliance used, item 4.3 "Personal flotation device (PDF)" should be deleted since it duplicates item 4.2 "Lifejackets"; and

.5 the five items listed in the appendix "Guidance for preparing the life-saving appliances casualty record" should be replaced with the following:

"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."

The Secretariat was instructed to inform the FSI Sub-Committee accordingly.

Free-fall lifeboats

5.11 The Sub-Committee recalled that MSC 78 referred document MSC 78/8/2 (ICS), containing comments on MSC/Circ.1115 on Prevention of accidents in high free-fall launching of lifeboats, concerning the requirement for ships fitted with free-fall lifeboats to conduct drills with the operating crew aboard, to this session for consideration.

5.12 The Sub-Committee noted a statement by the delegation of Norway, concerning training launches at the Nutec training facility in Bergen between 1985 and 1992, results of which had been quoted in document DE 48/INF.2. The statement clarified that the data used in the document were not correct. There had not been 16 injuries to personnel in the period mentioned with Nutec Bergen or any other Nutec training centres, either with free-fall lifeboat or during any other activity within Nutec. For the period mentioned, a study was performed for AS Norske Shell regarding the loads on passengers during free fall training which states the following:

.1 in the period from 1985 to 1992, there have been approximately 60,000 person drops with the free-fall lifeboat FF 48. During this period, there have been 16 incidents of minor pain in the back or neck region;

.2 the probability of structural injury to the normal human body associated with free-fall training appears negligible. The pain reported after free-fall lifeboat training was not due to any structural injury; and

.3 pains, as well as other physiological effects, found after free-fall lifeboat training are consequences of the physiological stress. Muscle pain is most likely to occur in subjects that often have these types of pain.

It was pointed out that the type of free-fall lifeboat (FF 48) used for the training at Nutec in the relevant period was not a type that is used on board ships. The FF 48 is special designed for big oil installations and the principle for the free-fall is totally different from that of the models designed for use onboard ships and other floaters. The height used with the FF 48 is 28 m and 12.5 m and this is higher than what is normal on most ships where the standard free-fall lifeboats of "skid type" are used.

5.13 The Sub-Committee considered the following documents pertaining to the matter:

.1 DE 48/5/10 (ICS), proposing to remove the references to "20 m" and "simulated free-fall launch" in circular MSC/Circ.1115;

.2 DE 48/INF.2 (Sweden), assessing possibilities to minimize risks of injury for occupants during training with free-fall lifeboat launches; and

.3 DE 48/INF.5 (Canada, Sweden, United States), containing a report on the evaluation of occupant seats and seating space in free-fall lifeboats.

5.14 Following a very intensive debate, in which various delegations expressed their views on drills with free-fall lifeboats, the Sub-Committee agreed that the issue should be further considered at DE 49 and invited submissions with concrete proposals from Members and international organizations to that session. The Sub-Committee further agreed to instruct the correspondence group established under item 10 to consider the need for additional guidance concerning simulated launching of free-fall lifeboats, taking into account the contents of MSC/Circ.1137 and document DE 48/5/10.

5.15 The Sub-Committee noted that STW 36 had agreed that Administrations should be permitted to accept that, during drills, all free-fall lifeboats, irrespective of their launching heights, be launched by falls in lieu of free-fall launching, provided that a simulated free-fall launch is conducted at least every six months in accordance with the Organization's guidelines. STW 36 was aware that this advice was in conflict with the existing provisions of SOLAS regulation III/19.3.3.4. Accordingly, STW 36 invited the MSC, subject to its endorsement, to instruct the DE Sub-Committee to consider the need to amend the SOLAS Convention when addressing this issue. The Sub-Committee agreed to await the instructions of the Committee on the matter.

Comments on the work plan for preventing accidents with lifeboats

5.16 The Sub-Committee considered document DE 48/5/9 (United Kingdom), commenting on issues related to the work plan to prevent accidents with lifeboats, in particular concerning launching, davit design, location of launching appliances and use of lifeboats in emergency situations and, having agreed that the issues raised should be further considered at DE 49, invited submissions with concrete proposals from Members and international organizations to that

session, where a working group could be established to deal with all outstanding matters concerning lifeboats.

6 ANCHORING, MOORING AND TOWING EQUIPMENT

Draft new SOLAS regulation on Mooring and towing equipment

6.1 The Sub-Committee recalled that DE 47 had agreed to a draft new SOLAS regulation on Anchoring, mooring and towing equipment, for submission to MSC 79 for approval with a view to adoption. DE 47 had also requested NAV 50 to consider the proposed new SOLAS regulation and provide its comments to MSC 79.

6.2 The Sub-Committee noted that MSC 79, taking into account the outcome of NAV 50 in the matter, had approved the draft new SOLAS regulation on Mooring and towing equipment, for consideration with a view to adoption at MSC 80 (MSC 79/23, annex 24).

Draft MSC circular on requirements for mooring and towing

6.3 The Sub-Committee recalled that DE 47, noting the progress made during the session with the development of a draft MSC circular on Shipboard fittings and supporting hull structures associated with towing and mooring on conventional ships, had agreed to finalize the draft MSC circular at this session. To this end, DE 47 had instructed the Secretariat to prepare a document providing the text of the draft circular including the provisions of IACS Unified Requirement A1 (Mooring and anchoring) and A2 (Shipboard fittings and supporting hull structures associated with towing and mooring on conventional ships), for consideration at this session (DE 48/6).

6.4 The Sub-Committee noted that MSC 79 had considered a proposal by Australia (MSC 79/8/4) to amend the above instructions given to the Secretariat by DE 47 by deleting the instruction for IACS UR A1 to be included in the draft MSC circular, in order to reflect the deletion of "anchoring" from the regulation, as proposed by NAV 50 and agreed by the Committee. MSC 79 instructed DE 48 to consider the proposal by Australia when finalizing the draft circular.

6.5 The Sub-Committee had for its consideration the following documents:

.1 DE 48/6 (Secretariat), containing the text of a draft MSC circular on requirements for mooring and anchoring, prepared following the instructions of DE 47;

.2 DE 48/6/1 (Republic of Korea), containing a proposal for a draft MSC circular on Shipboard fittings and supporting hull structures associated with anchoring, towing and mooring;

.3 DE 48/6/2 (Australia), containing amendments to the draft MSC circular proposed in document DE 48/6 and commenting on the draft circular proposed in document DE 48/6/1; and

.4 DE 48/6/3 (China), commenting on documents DE 48/6 and DE 48/6/1.

6.6 Following debate, the Sub-Committee established a drafting group and instructed it to finalize the draft MSC circular on requirements for mooring and towing, on the basis of documents DE 48/6 and DE 48/6/1, taking into account documents DE 48/6/2 and DE 48/6/3 and comments and proposals made in plenary, and to present a written report to plenary.

Report of the drafting group

6.7 Having received the report of the drafting group (DE 48/WP.7), the Sub-Committee did not agree with the proposed draft MSC circular on Guidance on shipboard towing and mooring equipment and the modification of draft new SOLAS regulation II-1/3-8, set out in the report.

6.8 A group of experts was established and instructed to review the draft MSC circular attached at annex 1 of document DE 48/WP.7. Having received the report of the group of experts (DE 48/WP.10), the Sub-Committee agreed to the draft MSC circular on Guidance on shipboard towing and mooring equipment, set out in annex 1, for submission to MSC 80 for approval.

Completion of the item

6.9 Since work on the item has been completed, the Sub-Committee agreed to invite the Committee to delete the item from the Sub-Committee's work programme.

7 PROTECTION OF FUEL TANKS

7.1 The Sub-Committee recalled that DE 47 had established a Correspondence Group on Protection of Fuel Tanks under the co-ordination of Germany and instructed it to develop a draft MARPOL regulation, or regulations, on the protection of fuel tanks for consideration at this session. DE 47 had further agreed to earmark a working group to finalize the draft MARPOL requirements at this session.

7.2 The Sub-Committee had for its consideration the following documents:

.1 the report of the correspondence group, submitted by Germany (DE 48/7), containing a draft MARPOL regulation on the protection of fuel oil tanks, and a relevant validation work assessment;

.2 DE 48/7/1 and DE 48/INF.4 (Japan), containing proposals for amendments to the draft new MARPOL regulation as contained in document DE 47/WP.3 and the report of the correspondence group (DE 48/7) and providing information on the results of design studies of the application of the draft new MARPOL regulation carried out by Japan; and

.3 DE 48/7/2 (United States), containing comments on the report of the correspondence group, in particular regarding the alternative provisions for accidental oil fuel outflow performance.

7.3 Following introduction of the above-mentioned documents, the Sub-Committee thanked the members of the group, in particular Germany as the co-ordinator, for their good work and noted that there were still issues to be resolved which the correspondence group had not been able to finalize due to time constraints, such as side and bottom protection distances for oil fuel tanks; oil fuel piping arrangements; effect of oil capture by non-oil compartments in case of bottom damage; minimum oil outflow for bottom damage; and the use of an accidental oil fuel outflow performance standard as an alternative to double hull protection for oil fuel tanks.

7.4 In the discussion that followed it was noted that:

.1 the phasing-in period for the new regulation should be reasonable in order to facilitate the work of shipbuilders worldwide; and

.2 the new regulation should be included in the revised MARPOL Annex I, adopted by MEPC 52 and expected to take effect from 1 January 2007.

Establishment of a working group

7.5 As agreed at DE 47, the Sub-Committee established a working group and instructed it to:

.1 finalize the draft MARPOL regulation on the protection of oil fuel tanks, on the basis of document DE 48/7, taking into account documents DE 48/7/1, DE 48/7/2 and DE 48/INF.4 and comments and proposals made in plenary; and

.2 present a written report to plenary on Thursday, 24 February 2005.

Report of the working group

7.6 Having received the report of the working group (DE 48/WP.2), the Sub-Committee approved it in general and took action as outlined in the following paragraphs.

7.7 The Sub-Committee agreed to the draft new regulation [13A] on Oil fuel tank protection of the revised MARPOL Annex I, set out in annex 2, and to consequential draft amendments to the IOPP Certificate Supplement (Forms A and B), set out in annex 3, for submission to MEPC 53, for approval with a view to a subsequent adoption.

7.8 The Sub-Committee noted the following main amendments and improvements made by the group to the draft proposed MARPOL Annex I, regulation [13A]:

.1 the minimum double hull distance from the side shell to oil fuel tanks has been raised to 1 m. However, for individual tanks of under 500 m^3 capacity or less, the minimum value is to remain as 0.76 m;

.2 having discussed the possibility of amending the definition for "oil fuel" to make it consistent with that for Heavy Grade Oil as defined in MARPOL Annex I regulation 13H, it was decided to maintain the definition agreed by the correspondence group, taking into account that oil fuels, other than Heavy Grade Oils, can also be severe marine pollutants, so that "oil fuel" for the purpose of this regulation is defined as "heavy fuel oil, marine diesel oil and gas oil";

.3 provisions for protection against pollution through oil pipes following damage were developed, taking into account requirements relating to cargo piping in the revised MARPOL Annex I, regulation 19.3.6;

.4 in considering the need for individual tank size limitation when using the probabilistic methodology, it was agreed that the probabilistic methodology sufficiently accounts for tank size concerns. However, to avoid possible extreme designs, a maximum capacity limitation of 2,500 m^3 per tank was included in the regulation;

.5 in connection with the possible inclusion of the factor for oil capture C_{DB} in the proposed draft regulation for consistency with a similar provision in regulation 23

of the revised MARPOL Annex I, it was agreed that it was appropriate to include this factor in the probabilistic methodology to properly account for the reduction of oil outflow from oil fuel tanks located above the double bottom;

.6 the mean oil outflow parameter O_M limit was set at 0.015 for vessels of an aggregate oil fuel capacity of 600 m^3 and at 0.01 for vessels of an aggregate oil fuel capacity of 5,000 m^3 and linear interpolation in between and, for vessels of an aggregate oil fuel capacity of over 5,000 m^3, the O_M outflow limit was set at 0.01;

.7 a factor $O_B(i)$ for minimum oil outflow following bottom damage to tanks bounding the bottom shell plating was developed. $O_B(i)$ is based on a height factor rather than on a percentage of tank capacity, as the expected oil fuel loss is more accurately reflected by this parameter; and

.8 the development of the minimum oil outflow for bottom damage is based on a number of scientific research studies, namely Model Tests by the David Taylor Research Centre (MEPC 33/INF.11); IMO Comparative Study on Oil Tanker Design – Model Tests by the Tsukuba Institute (MEPC 32/INF.13); Probabilistic Oil Outflow Analysis of Alternative Tanker Designs (U.S. Coastguard Report No.CG-D-14-92); and Regulation Research RR761 (1992) by the Shipbuilding Research Association of Japan.

7.9 The Sub-Committee expressed its thanks and congratulations to the working group and its Chairman, Mr. H. Bruhns (Germany), for the excellent job done in finalizing this technically complex draft regulation. This important achievement will no doubt signify an important step forward in the incessant struggle for the prevention of oil pollution in the marine environment.

Completion of the item

7.10 Since work on the item has been completed, the Sub-Committee agreed to invite the MEPC to delete the item from the Sub-Committee's work programme.

8 COMPATIBILITY OF LIFE-SAVING APPLIANCES

8.1 The Sub-Committee recalled that, at DE 47, when considering document DE 47/5/6 (China) on the compatibility of lifeboats and immersion suits, there had been general agreement that this issue needs further consideration. DE 47 recommended to the Committee the inclusion of a separate agenda item on "Compatibility of life-saving appliances" in the Sub-Committee's work programme and provisional agenda for DE 48 and invited submissions from Member Governments and international organizations to the next session. MSC 78 concurred with the recommendation and assigned a target completion date of 2006 to the item.

8.2 The Sub-Committee had for its consideration document DE 48/8 (Canada), recommending a re-evaluation of the present weight and space allocations in the LSA-related IMO instruments, also taking into account the increase in physical space required when seafarers are wearing insulated immersion suits, and the part of the report of the correspondence group on SOLAS personal LSA dealing with the item (DE 48/9, paragraphs 46 to 48).

8.3 The Sub-Committee ascertained that there are three main issues to be discussed under the item, namely:

.1 compatibility of immersion suits and lifejackets;

.2 compatibility of immersion suits and lifeboat access and capacity; and

.3 compatibility of lifejackets and MES.

8.4 The submission by Canada was generally supported, and several other delegations reported their own findings with regard to changes in the anthropometric data used for the present weight and space allocations in lifeboats, concluding that these needed to be re-evaluated. The Sub-Committee recognized that the real problem was not the relation of lifeboat capacity and immersion suits but rather the increased weight and size of seafarers and passengers.

8.5 The Sub-Committee agreed to consider the matter further at the next session, and invited Member Governments and international organizations to submit concrete proposals for amendments to relevant IMO instruments to DE 49 for consideration.

9 PERFORMANCE TESTING AND APPROVAL STANDARDS FOR SOLAS PERSONAL LIFE-SAVING APPLIANCES

General

9.1 The Sub-Committee recalled that DE 47 had re-established the Correspondence Group on Performance Testing and Approval Standards for SOLAS Personal Life-Saving Appliances (LSA), under the co-ordination of the United States and instructed it to prepare relevant amendments to SOLAS chapter III, the LSA Code and the Revised Recommendation on testing of life-saving appliances (resolution MSC.81(70)). DE 47 had further agreed to earmark a working group to finalize the above draft amendments at this session.

Amendments to the LSA Code and the Revised Recommendation on testing of life-saving appliances (resolution MSC.81(70))

9.2 The Sub-Committee had for its consideration the report of the correspondence group (DE 48/9), containing draft amendments to the LSA Code and the Revised Recommendation on testing of life-saving appliances. The Sub-Committee expressed its thanks to the members of the group and, in particular, the United States as the co-ordinator, for the enormous amount of work carried out. The Sub-Committee noted that paragraphs 46 to 48 of the report, regarding compatibility of life-saving appliances, had been considered under agenda item 8 on "Compatibility of life-saving appliances" (see paragraph 8.2).

9.3 Following consideration, the Sub-Committee referred the proposed draft amendments to the LSA Code and to the Revised Recommendation on testing of life-saving appliances (resolution MSC.81(70)) to the working group (see paragraph 9.8), for finalization.

Reference test devices specification and calibration

9.4 The Sub-Committee considered document DE 48/9/1 (United States), containing specifications for adult, child and infant size reference test devices for the evaluation of in-water performance of candidate SOLAS life-jackets and proposing to include the test specifications in suitable IMO instruments.

9.5 Following debate, the Sub-Committee generally agreed with the proposed test specifications and referred them to the working group (see paragraph 9.8) for advice on how they could be integrated in existing IMO instruments and for the preparation of relevant amendments to such instruments.

Effect of lifejacket head support on cold water survival

9.6 The Sub-Committee considered document DE 48/9/3 (United States), containing information on the results of a study on the effect the head position when wearing a life-jacket has on hypothermia and cold water survival and proposing to include relevant information in the LSA Code or the Revised Recommendation on testing of LSA, and agreed to instruct the working group to take the document into account when finalizing the amendments to the LSA Code and the Revised Recommendation on testing of LSA.

Remaining issues on personal LSA

9.7 The Sub-Committee considered document DE 48/9/2 (ILAMA), proposing that remaining issues on personal LSA emanating from DE 47 be considered under agenda item 10 on "Inconsistencies in IMO instruments regarding requirements for LSA" and agreed with the proposal.

Establishment of a working group

9.8 As agreed at DE 47, the Sub-Committee proceeded with the establishment of a working group on SOLAS personal LSA and instruct it, taking into account comments and proposals made in plenary, to:

.1 finalize the draft amendments to the LSA Code and the Revised Recommendation on testing of life-saving appliances, on the basis of the report of the correspondence group (DE 48/9), taking into account document DE 48/9/3;

.2 finalize the specifications for adult, child and infant size reference test devices on the basis of document DE 48/9/1, advise the Sub-Committee how they could be integrated into existing IMO instruments and prepare relevant amendments to such instrument(s); and

.3 present a written report to plenary on Thursday, 24 February 2005.

Report of the working group

9.9 Having received the report of the working group (DE 48/WP.3), the Sub-Committee approved in general and took action as outlined in the following paragraphs.

Draft amendments to the SOLAS Convention

9.10 With regard to oversized persons, in case that the adult size lifejacket is not designed to fit such persons on board ship, the Sub-Committee agreed that suitable accessories (such as an extension strap) should be available to allow the lifejacket to be secured to persons with a chest girth of up to 1,750 mm, and agreed to the draft new SOLAS regulation III/7.2.1.5 prepared by the group to this effect, as set out in annex 4, for submission to MSC 80 for approval with a view to adoption.

9.11 The Sub-Committee noted that the group had considered the proposed amendments to SOLAS chapter III on infant life-saving appliances, as forwarded for its consideration by the Working Group on Passenger Ship Safety (see paragraph 4.13), and concurred with the changes

made to the text using the term "infant lifejackets" in the proposed regulations III/7.2.1.1 and III/7.2.1.2, as set out in annex 4, for submission to MSC 80 for approval with a view to adoption.

9.12 In this regard, the Sub-Committee considered and, after discussion, did not agree with the advice of the group that for passenger ships on voyages less than 24 hours, sufficient infant lifejackets should be provided for each infant on board, if the number of infants is greater than 2.5% of the number of passengers on board the ship and decided not to amend the text of the draft amendments set out in annex 4.

Draft infant lifejacket symbol

9.13 The Sub-Committee agreed, in principle, to the draft infant lifejacket symbol, as contained in annex 2 to document DE 48/WP.3, for further consideration under the work programme item on "Revision of resolution A.760(18)".

Draft amendments to the LSA Code

9.14 The Sub-Committee noted the group's discussion, as reflected in paragraphs 4 to 24 of document DE 48/WP.3, and agreed to the draft amendments to the LSA Code, as set out in annex 5, for submission to MSC 80 for approval with a view to adoption.

Draft amendments to resolution MSC.81(70)

9.15 The Sub-Committee, having noted the group's discussion, as reflected in paragraphs 26 to 31 in document DE 48/WP.3, agreed to the draft amendments to the Revised Recommendation on testing of life-saving appliances (resolution MSC.81(70)), as set out in annex 6, for submission to MSC 80 for adoption.

Buoyancy inflated by mouth for insulated immersion suits

9.16 The Sub-Committee noted the group's discussion on whether the LSA Code or the Revised recommendation on testing of life-saving appliances should specifically address the use of orally inflated buoyancy to achieve the required freeboard for buoyant insulated immersion suits, and agreed to add the following item in the terms of reference of the correspondence group established under agenda item 10:

> "Consider whether the LSA Code or the Revised Recommendation on testing of life-saving appliances should specifically address the use of buoyancy inflated by mouth to achieve the required freeboard for buoyant insulated immersion suits, and if so, how."

Completion of the item

9.17 Since work on the item has been completed, the Sub-Committee agreed to recommend to the Committee the deletion of the item from the Sub-Committee's work programme.

10 INCONSISTENCIES IN IMO INSTRUMENTS REGARDING REQUIREMENTS FOR LIFE-SAVING APPLIANCES

10.1 The Sub-Committee recalled that DE 47 had recommend to the Committee the inclusion of the item in the work programme of the Sub-Committee, following consideration of document DE 47/9/1 (ILAMA) containing a list of outstanding issues and proposals for relevant amendments to various instruments dealing with life-saving appliances. DE 47 found that the

item was necessary to enable the Sub-Committee to appropriately address inconsistencies and ambiguities which had been identified between the LSA Code and the Revised Recommendation on testing (resolution MSC.81(70)), and to take full advantage of the Standardized LSA evaluation and test report forms (MSC/Circ.980 and addenda). MSC 78 concurred with the recommendation and included the item in the provisional agenda for DE 48.

10.2 The Sub-Committee had for its consideration the following documents:

.1 DE 48/10 (Poland), proposing amendments to the LSA Code in order to simplify implementation of the requirements by Administrations;

.2 DE 48/10/1 (Poland), proposing the inclusion of a new section on radar reflectors for liferafts in the Revised Recommendation on testing of LSA (resolution MSC.81(70));

.3 DE 48/10/2 (ILAMA), proposing the establishment of an intersessional correspondence group to progress the matter;

.4 DE 48/10/3 (Finland), proposing to co-ordinate the requirements in the revised SOLAS chapter II-1, as approved by MSC 79, with other parts of the Convention, in particular chapter III;

.5 DE 48/10/4 (ISO), informing about the publication of the new ISO standard 18813:2005 "Ships and marine technology – Survival equipment for survival craft and rescue boats"; and

.6 DE 48/10/5 (Norway), concerning the need for clarification of terms used in SOLAS chapter III pertaining to installation, stowage and launching of survival craft.

10.3 After a brief debate of the documents submitted, the Sub-Committee agreed to refer them to the correspondence group to be established (see paragraph 10.10), except for document DE 48/10/3 (see paragraph 10.4).

10.4 In considering document DE 48/10/3 (Finland), indicating the need for aligning the draft revised SOLAS chapter II-1 with the requirements of other respective SOLAS chapters, the Sub-Committee noted that the document provided an update of the proposals contained in document MSC 79/11/3, which MSC 79 instructed the Sub-Committee to consider and provide appropriate recommendations to MSC 80, when the Committee is expected to adopt the revised SOLAS chapter II-1.

10.5 In this connection, the delegation of Italy stated that, with regard to SOLAS regulation II-1/6.2.3, it recommended to use the formula $N = N_1 + N_2$ in general, without distinction between lifeboats and other life-saving appliances.

10.6 The Sub-Committee did not feel it appropriate, at this stage, to propose any modifications to the draft revised SOLAS chapter II-1, as prepared by the SLF Sub-Committee and approved by MSC 79. However, the Sub-Committee agreed that it should consider possible consequential amendments to SOLAS regulation III/21.1 concerning relaxation from the life-saving requirements for passenger ships engaged in short international voyages, as outlined in paragraph 4.4.1 of document DE 48/10/3.

10.7 In this respect, the Sub-Committee felt, subject to further advice from the correspondence group, that the concept of relaxation from the life-saving requirements for passenger ships engaged in short international voyages should be retained and appropriate amendments to SOLAS regulation III/21.1 be developed.

10.8 In order to progress the consideration of the issues referred to the Sub-Committee by MSC 79, the Sub-Committee instructed the correspondence group referred to in paragraph 10.10 below to study documents MSC 79/11/3 and DE 48/10/3 and to consider the following:

.1 the proposed amendments to SOLAS regulation III/21.1 concerning relaxation from life-saving appliances requirements for passenger ships engaged in short international voyages;

.2 provision of interpretation to "reduce degree of hazard" in draft SOLAS regulation II-1/6.2.4; and

.3 which limits are essential to different systems due to penetration risk (in collision or in grounding) and whether the limit B/5 is valid for them,

and to advise the DE Sub-Committee as appropriate.

10.9 Considering that the development of the relevant amendments to SOLAS chapter III as well as dealing with other issues referred to in paragraph 10.8 above would require their detailed consideration, the Sub-Committee was of the view that the time period between the adoption of the revised SOLAS chapter II-1 and its entry into force should be sufficient for the Sub-Committee to deal with the above issues, so that the aforementioned consequential amendments to SOLAS chapter III, if developed, could enter into force simultaneously with the revised SOLAS chapter II-1.

Establishment of a correspondence group

10.10 Consequently, the Sub-Committee agreed to establish a correspondence group under the co-ordination of Japan and the United States* with the following terms of reference:

.1 on the basis of document DE 47/9/1 and taking into account documents DE 48/10, DE 48/10/1, DE 48/10/4 and DE 48/10/5 and comments and proposals made in plenary, prepare relevant amendments to SOLAS chapter III, the LSA Code, the Revised Recommendation on testing of LSA (resolution MSC.81(70)) and the Standardized LSA evaluation and test report forms (MSC/Circ.980 and addenda); and

.2 to submit a report to DE 49.

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11 REVIEW OF THE 2000 HSC CODE AND AMENDMENTS TO THE DSC CODE AND THE 1994 HSC CODE

11.1 The Sub-Committee recalled that DE 47 had established a correspondence group under the co-ordination of Australia and instructed it to prepare draft amendments to the 2000 and 1994 HSC Codes and the DSC Code, based on document DE 47/10 and taking into account comments and proposals made in plenary; and to submit a report to DE 48.

11.2 DE 47 had also earmarked a working group at this session to finalize the draft amendments to the Codes, subject to receipt of the contributions from the FP, COMSAR, NAV and SLF Sub-Committees which had also been instructed by the MSC to prepare relevant amendments.

11.3 The Sub-Committee noted the information in documents DE 48/11/1 and DE 48/2/4 (Secretariat) and that given orally by the Secretariat with regard to the outcome of COMSAR 9, outlining that the FP and COMSAR Sub-Committees had finalized their work on the draft amendments to the 2000 and 1994 HSC Codes and the DSC Code. The NAV and SLF Sub-Committees were still considering the item and had established correspondence groups which will report to the forthcoming sessions of the respective sub-committee.

11.4 The Sub-Committee considered the report of the above-mentioned correspondence group (DE 48/11), containing draft amendments to the 2000 and 1994 HSC Codes and the DSC Code and approved it in general. In view of the fact that the inputs from the NAV and SLF Sub-Committees were not yet finalized, the Sub-Committee agreed that the correspondence group under the co-ordination of Australia should continue its work with a view to incorporating the contributions from the NAV and SLF Sub-Committees, as and when they were ready.

11.5 The Sub-Committee discussed the other documents submitted to this session, with a view to give clear instructions to the correspondence group, as follows:

.1 considering document DE 48/11/2 (France), proposing an amendment to regulation 1.4.35 of the 2000 HSC Code concerning the definition of machinery spaces, the Sub-Committee, noting that the proposed terminology needed to be further discussed, referred the proposal to the correspondence group for consideration;

.2 considering document DE 48/11/3 (France), proposing the inclusion of a standard format for a Document of Compliance with special requirements for high-speed craft carrying dangerous goods as required by regulation 7.17.4 of the 2000 HSC Code, the Sub-Committee agreed with the proposal, subject to the change of the term “port of registration” to “port of registry”;

.3 considering document DE 48/11/4 (Interferry), proposing amendments to chapter 4.8 of the 2000 HSC Code relating to test procedures for MES, the Sub-Committee exchanged views concerning the risk of injuries to participants in demonstration trials, the sufficiency of the simplified evacuation technique, the difficulties of assembling a demographically correct sample of persons participating in the trials and crews’ ability to evacuate passengers. Subsequently, the Sub-Committee instructed the correspondence group to consider possibilities to reduce the number of injuries occurring during full scale demonstration evacuation trials, taking into account Interferry’s proposals and giving special

consideration to the suggestion not to actually have the full passenger complement enter the MES but to file past it and to have a sample of the crew enter the MES and to extrapolate their evacuation time in order to arrive at an overall evacuation time;

.4 considering document DE 48/11/5 (Germany), proposing an amendment to regulation 4.4.5 of the 2000 HSC Code concerning the requirement for handholds, the Sub-Committee agreed with the proposal, subject to amending the term "seats" to "seats furnished appropriately"; and

.5 considering document DE 48/11/6 (Norway), proposing amendments to chapter 8 of the 2000 HSC Code, concerning rescue boat launching and recovery requirements, the Sub-Committee did not agree to the proposal.

11.6 As agreed earlier (see paragraph 11.4), the Sub-Committee re-established the correspondence group under the co-ordination of Australia* with the following terms of reference:

.1 to continue with the preparation of amendments to the 2000 and 1994 HSC Codes and the DSC Code, taking into account the decisions taken by the Sub-Committee regarding the documents submitted to this session (see paragraph 11.5) together with comments and proposals made in plenary;

.2 to incorporate in the above amendments the contributions from the FP, COMSAR, NAV and SLF Sub-Committees, as and when they are finalized; and

.3 to submit a report to DE 49.

11.7 Realizing that the target completion date for the item was 2005, the Sub-Committee agreed to invite the Committee to extend it to 2006 in order to enable the Sub-Committee to properly incorporate the contributions from the other sub-committees working on the item. The Sub-Committee also agreed to earmark a working group at DE 49 to finalize the draft amendments to the 1994 and 2000 HSC Codes and the DSC Code.

12 PERFORMANCE STANDARDS FOR PROTECTIVE COATINGS

12.1 The Sub-Committee recalled that DE 47, noting that IACS and the industry were currently engaged in developing guidelines for coatings in ballast tanks and that further standards for coatings in double-side skin spaces of bulk carriers could be developed if requested, had agreed that the development of the proposed IMO performance standards for protective coatings referred to in SOLAS regulation XII/6.4 should only be undertaken when industry standards, or an advanced draft thereof, were available. DE 47, therefore, invited the Committee to extend the target completion date for this item to 2006 and MSC 78 agreed to that request.

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12.2 The Sub-Committee noted that MSC 79, in the context of its consideration of bulk carrier safety, had requested IACS and the industry to consider developing draft performance standards for protective coatings in double-side skin spaces of bulk carriers and to submit their proposals to this session.

12.3 The Sub-Committee had for its consideration the following documents:

.1 DE 48/12 (BIMCO, IACS, ICS, INTERCARGO, INTERTANKO), containing a draft performance standard for protective coatings of the double-side skin spaces of bulk carriers and of ballast tanks;

.2 DE 48/12/1 (Japan), containing comments on the verification methods in the draft performance standards for protective coatings;

.3 DE 48/12/2 (Japan), containing comments on alternative procedures in the draft performance standards for protective coatings;

.4 DE 48/12/3 (Japan), containing comments on the removal of pre-construction primer in the draft performance standards for protective coatings;

.5 DE 48/12/4 (Japan), containing comments on the definition and record of coatings in the draft performance standards for protective coatings;

.6 DE 48/12/5 (Japan), containing comments on the draft basic coating system requirements in the draft performance standards for protective coatings; and

.7 DE 48/12/6 (Republic of Korea), containing proposed amendments to the draft performance standards for protective coatings.

12.4 The Sub-Committee agreed to advise the MEPC that IMO's Procedures for the Approval of Active Substances (G9)*, currently under development, should take into account that the relevant substances/chemicals are compatible with the coating system.

12.5 The Sub-Committee expressed appreciation for the draft performance standards prepared by the industry (DE 48/12) and had a general debate on the issue during which the following views were expressed:

.1 the draft standards were prepared by the industry, using as a basis resolution A.798(18) and taking into account safety and cost aspects;

.2 the standards should be widely acceptable and a balance of building and operating costs should be ensured;

.3 the standards should be goal-based in nature, with provisions for alternative procedures, which would encourage technological development;

.4 classification societies should not be involved in the survey of coatings, which should be carried out by specialized inspection organizations. The role of

* Guideline numbers as assigned by the MEPC.

recognized organizations would be to approve the coating specifications and to ensure that coating inspectors are suitably qualified and submit useful reports;

.5 the standards should apply to ballast tanks in general, and one-coat systems should not be acceptable;

.6 the standards need to be clear and transparent and a verification procedure should be established. Areas of responsibility need to be determined;

.7 the introduction of performance standards would improve the quality of new buildings and although significant up-front costs would be involved, this would be offset by a reduction in maintenance costs;

.8 any alternative solutions accepted in accordance with proposed section 5 of the draft performance standards should be proven by tests to be equivalent to solutions prescribed by the standards;

.9 the standards should take into account environmental friendliness; and

.10 a correspondence group should be established to progress the matter intersessionally.

12.6 The observer from IACS advised the Sub-Committee with regard to the verification procedure proposed in document DE 48/12/1 that IACS members did not have any qualified surveyors to carry out this task and that, therefore, they could not agree to the text in paragraph 4.2.2 of the document and would not be able to carry out this service on behalf of Administrations, if authorized. IACS believed that it was essential that specialized coating inspectors, which should not be employees of recognized organizations (ROs), should be used for the task of verification. IACS members acting as ROs would be able to carry out the following tasks in support of the process:

.1 approval of the coating specification according to the new performance standards;

.2 checking that the coating inspector's report verifies that the building yard coating procedures are followed; and

.3 verification of the coating inspector's qualifications.

IACS was of the view that IMO would need to develop the qualification parameters for the coating inspectors.

12.7 Following the above general debate, the Sub-Committee took the following decisions:

.1 with regard to the applicability of the coating performance standards, the Sub-Committee agreed that they should apply to all ballast and void spaces on all types of ships. Recalling the instructions of the MSC to develop performance standards for double-side skin spaces and seawater ballast tanks of bulk carriers, the Sub-Committee agreed to invite the Committee to concur with this expansion of the scope of the item. The delegation of Japan, supported by the delegation of the Republic of Korea, expressed the view that the application of the standards to void spaces should be further considered;

.2 the Sub-Committee agreed on a target coating life of 15 years;

.3 the Sub-Committee supported the concept of a Coating Technical File and agreed to instruct the correspondence group (see paragraph 12.8) to consider it in detail, in particular issue regarding approval and maintenance of such files;

.4 with regard to verification and inspection issues, the Sub-Committee agreed that the correspondence group should be instructed to establish how it could be efficiently proven that the performance standards have been followed; and

.5 with regard to steel primers, the Sub-Committee generally agreed that the requirements as drafted in document DE 48/12 were acceptable and that any other solutions should be treated as equivalents and should follow the relevant procedures. However, it was also agreed that the correspondence group should consider the matter further.

Establishment of a correspondence group

12.8 The Sub-Committee agreed to establish a correspondence group under the co-ordination of China* to progress the work intersessionally, with the following terms of reference:

.1 to further develop the draft performance standards for protective coatings, on the basis of document DE 48/12, taking into account documents DE 48/12/1, DE 48/12/2, DE 48/12/3, DE 48/12/4, DE 48/12/5 and DE 48/12/6 and comments and proposals made in plenary; and

.2 to submit a report to DE 49.

13 GUIDELINES ON ON-BOARD EXHAUST GAS CLEANING SYSTEMS

13.1 The Sub-Committee recalled that DE 47 had established a correspondence group under the co-ordination of the United States and instructed the group to prepare draft Guidelines on onboard exhaust gas cleaning systems, for consideration at this session. DE 47 had further recommended to the MEPC to change the priority of the item from low to high, in view of the expected entry into force of MARPOL Annex VI in the near future. MEPC 51 concurred with that recommendation.

13.2 The Sub-Committee had for its consideration the report of the correspondence group (DE 48/13), containing draft Guidelines on on-board exhaust gas cleaning systems and also a proposal for an exhaust gas cleaning system certification programme and related ship compliance scheme, and document DE 48/INF.3 (Japan), enclosing draft Guidelines for marine selective catalytic reduction systems.

13.3 The Sub-Committee considered the report of the correspondence group and, in particular, questions related to type approval of exhaust gas cleaning systems, their application to all fuel oil

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burning units, the minimum discharge criteria for wash water and the use of reference test fuels for certification. With regard to the proposed exhaust gas cleaning system certification programme and the related ship compliance scheme contained in annex 2 to the report, the Sub-Committee concluded that they should be included in the draft Guidelines.

Establishment of a drafting group

13.4 As agreed at DE 47, the Sub-Committee established a drafting group and instructed it, taking into account comments and proposals made in plenary, to finalize the draft Guidelines on on-board exhaust gas cleaning systems, on the basis of the report of the correspondence group (DE 48/13), including the exhaust gas cleaning system certification programme and related ship compliance scheme, and to present a written report to plenary.

Guidelines for marine selective catalytic reduction systems

13.5 The Sub-Committee noted document DE 48/INF.3 (Japan), containing draft Guidelines for marine selective catalytic reduction systems, and agreed to consider it further under agenda item 22 (Work programme), when deciding on the inclusion of the work programme item "Guidelines on equivalent methods to reduce on-board NO_x emissions" in the provisional agenda for DE 49 (see also paragraphs 22.1.4.1 and 22.3).

Report of the drafting group

13.6 Having received the report of the drafting group (DE 48/WP.5), the Sub-Committee approved in general and took action as outlined in the following paragraphs.

SO_x and CO_2 calculation method

13.7 The Sub-Committee agreed to the SO_x over CO_2 monitoring method, as set out in annex 7, for submission to MEPC 53 for consideration with a view to approval. SO_x (ppm)/CO_2 (%) ratio of 65 represents SO_x emission of 69/kWh very well and simplifies the SO_x emission monitoring. This formula is used in Scheme B of the Guidelines referred to in paragraph 13.8 below. The Sub-Committee was informed that the value of 65 was placed in square brackets in order to allow final check before the MEPC adoption of the Guidelines.

Guidelines for on-board exhaust gas SO_x cleaning systems

13.8 The Sub-Committee agreed to the draft Guidelines for on-board exhaust gas SO_x cleaning systems, as developed by the intersessional correspondence group (DE 48/13, annex 2) and further amended by the drafting group, and an associated draft MEPC resolution, set out in annex 8, for submission to MEPC 53 for consideration with a view to adoption.

13.9 The delegation of the United Kingdom, noting that Scheme A relied on monitoring input parameters only, and that without addressing emissions output the Guidelines might be incomplete, proposed to submit further comments for consideration by MEPC 53.

Wash water discharge

13.10 The Sub-Committee noted the discussion on wash water discharge and, having agreed that there was a need for the development of wash water discharge criteria, recommended that MEPC 53 should consider the development of such criteria.

Completion of the item

13.11 Since work on the item has been completed, the Sub-Committee agreed to invite the MEPC to delete the item from the Sub-Committee's work programme.

14 MANDATORY EMERGENCY TOWING SYSTEMS IN SHIPS OTHER THAN TANKERS GREATER THAN 20,000 DWT

14.1 The Sub-Committee recalled that DE 47 had noted information provided by Germany (DE 47/24/1 and DE 47/INF.3) and IMCA (DE 47/24/3) and agreed that the item should be included in the provisional agenda for this session where the above documents could be discussed in detail. The delegation of Germany kindly volunteered to submit to this session a composite proposal for draft amendments to SOLAS regulation II-1/3-4 on Emergency towing arrangements on tankers, taking into account the comments and proposals made at DE 47. Interested Members were invited to contribute to the preparation of the proposal.

14.2 The Sub-Committee had for its consideration the following documents:

.1 DE 47/24/1 and DE 48/14 (Germany), proposing draft amendments to SOLAS regulation II-1/3-4 on Emergency towing arrangements on tankers, in order to include a requirement for emergency towing procedures on ships other than tankers with not less than 20,000 dwt and vessels with redundant propulsion systems, e.g. offshore support vessels;

.2 DE 47/INF.3 (Germany), containing the results of an FSA study by Germany, showing that the mandatory equipment of all merchant ships with emergency towing systems (ETS), down to a size of 300 gross tonnage, appears not only justified by the increased safety potential but also profitable in the long term;

.3 DE 47/24/3 (IMCA), outlining problems in the implementation of the proposed draft amendments for offshore support vessels; and

.4 DE 48/14/1 (Japan), presenting the results of an FSA study by Japan, showing that the mandatory application of the requirement for ETS for all types of ships of not less than 300 gross tonnage has not been proven necessary.

14.3 In the ensuing discussion, there was general agreement that functional requirements, as proposed by Germany in document DE 48/14, were acceptable, but that no mandatory hardware requirements for mandatory emergency towing systems should be introduced. It was also agreed that the text of the proposed draft SOLAS amendments (DE 48/14, annex 1) and the proposed guidelines for the assessment of deck equipment to be used in emergency towing (DE 48/14, annex 2) needed further consideration.

14.4 Consequently, the Sub-Committee agreed that the matter should be further considered and established a correspondence group under the co-ordination of Germany* and instructed it to

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prepare a revised proposal for draft SOLAS amendments and related guidelines for the assessment of deck equipment to be used in emergency towing, taking into account comments and proposals made in plenary, and to submit a report to DE 49.

15 REVIEW OF THE OSV GUIDELINES

15.1 The Sub-Committee noted that MSC 75, following a proposal by Australia (MSC 75/22/2) had included, in the work programmes of the FP, COMSAR, NAV, DE (co-ordinator) and SLF Sub-Committees, a high priority item on "Review of the OSV Guidelines", with three sessions needed to complete the item. The Sub-Committee further noted that MSC 78, following a request by the SLF Sub-Committee, had transferred the co-ordinating role for the item from the DE Sub-Committee to the SLF Sub-Committee, on the basis that most of the provisions in the Guidelines address intact and damage stability matters.

15.2 The Sub-Committee had for its consideration document DE 48/15 (Secretariat), giving background information on the item and containing the text of the parts of the OSV Guidelines falling under the responsibility of the Sub-Committee, i.e. section 4 on machinery and electrical installations and section 6 on life-saving appliances.

15.3 Following discussion, the Sub-Committee agreed to draft amendments to sections 4 and 6 of the OSV Guidelines, as set out in annex 9 and instructed the Secretariat to convey the draft amendments to the SLF Sub-Committee for co-ordination purposes.

15.4 The Sub-Committee noted information by the observer from IMCA that they had submitted a request for the inclusion of dynamic positioning (DP) systems in the OSV Guidelines, to MSC 80 and agreed to keep the item on the work programme, pending a decision by the Committee with regard to the IMCA request, since this might necessitate further work by the Sub-Committee.

16 INSPECTION AND SURVEY REQUIREMENTS FOR ACCOMMODATION LADDERS

16.1 The Sub-Committee noted that MSC 77 had considered a proposal by Canada (MSC 77/23/1), in view of a number of accidents involving accommodation ladders resulting in loss of life and injury, to develop amendments to SOLAS regulations I/7 and I/8 to require inspections of the means of crew access to, and egress from, the ship, such as gangways and accommodation ladders as part of the survey of the ship's equipment. Subsequently, MSC 77 included, in the Sub-Committee's work programme, a high priority item on "Inspection and survey requirements for accommodation ladders", with two sessions needed to complete the item. DE 47 included the item in the provisional agenda for this session with a target completion date of 2006.

16.2 The Sub-Committee noted that for amendments to SOLAS chapter I, as proposed in the Canadian document, the explicit amendment procedure (acceptance by two thirds of the SOLAS Contracting Governments) applies, which could potentially delay the entering into force of any such amendments substantially and that it would, therefore, be advisable to consider preparing a relevant new SOLAS regulation which could be placed in another chapter than chapter I, e.g. chapter II-1 or XI-1.

16.3 In the following discussion, the Sub-Committee agreed that this was not mainly a design and specification issue, but very much related to maintenance. It was established that a number of national and international standards, including an ISO standard, addressing the matter, already

existed. These could be used in the preparation of relevant inspection and survey requirements. The Sub-Committee agreed that pilot ladders should also be considered under the item.

16.4 The Sub-Committee invited Members and international organizations to submit concrete proposals on inspection and survey requirements for accommodation and pilot ladders to DE 49 for consideration.

17 SAFETY ASPECTS OF BALLAST WATER MANAGEMENT

Transitory non-compliance with safety regulations when conducting ballast water exchange

17.1 The Sub-Committee recalled that DE 47 had agreed to a proposal by Australia (DE 47/22/1) to include the work programme item on "Safety aspects of water ballast management" in the provisional agenda for DE 48, in view of the conclusion of the International Conference on Ballast Water Management for Ships, in February 2004, giving special attention to the proposed introduction of permission for transitory deviations from particular regulations of SOLAS and MARPOL. DE 47 had also requested the Committees to task the NAV and SLF Sub-Committees to similarly specify the permissible limits of transitory deviation for safety problem areas.

17.2 The Sub-Committee noted that MSC 78, when considering the matter, had recalled the proposal of MEPC 49 to confirm the acceptability of transitory non-compliance with safety regulations when conducting ballast water exchange, and had instructed the NAV and SLF Sub-Committees to consider the issue and to report to the Committee.

17.3 The Sub-Committee further noted that NAV 50, when considering the matter, had noted information by the United Kingdom that they had submitted to MEPC 52 guidelines including precautionary advice to masters when undertaking ballast water exchange sequences that involve periods when the criteria for propeller immersion, minimum draft and/or trim and bridge visibility cannot be met. They also informed NAV 50 that proposals to amend SOLAS regulation V/22 in the context of ballast water exchange were being considered. After an exchange of views, NAV 50 had concluded that, with the information presently available, it was not possible to make progress. MSC 79 approved the proposed amendments to SOLAS regulation V/22, with a view to adoption at MSC 81, and MSC/Circ.1145 on Precautionary advice to masters when undertaking ballast water exchange.

17.4 The Sub-Committee also noted that SLF 47 had agreed to place the item on its agenda for SLF 48 and had invited Member Governments and international organizations to submit to SLF 48 comments and proposals on the matter, in particular on permissible limits of transitory deviation for safety problem areas.

17.5 Following debate, the Sub-Committee agreed that the remaining areas of transitory non-compliance with safety regulations when conducting ballast water exchange were dealt with by other sub-committees and, therefore, the Sub-Committee did not need to consider the matter any further.

Guidelines for approval of ballast water management (BWM) systems

17.6 The Sub-Committee noted that MEPC 51 had approved a programme for the development of guidelines for the uniform implementation of the Ballast Water Management Convention and had invited comments from the Sub-Committee on the following:

.1 guidelines for approval of ballast water management systems (G8);

.2 guidelines for ballast water exchange design and construction standards (G11);

.3 guidelines for sediment control on ships (G12); and

.4 procedure for approval of prototype ballast water treatment technologies (G10).

17.7 The Sub-Committee further noted that MEPC 52, when considering the report of its Ballast Water Working Group, had noted the progress made on the draft Guidelines for approval of ballast water management systems (MEPC 52/WP.7, annex 1), but had not been in a position to approve the draft Guidelines as further consideration was needed on the issue of biological efficacy of on-board testing. MEPC 52 asked DE 48 to consider the draft Guidelines as a top priority and provide comments to MEPC 53.

17.8 The Sub-Committee had for its consideration the following documents:

.1 DE 48/17 (Brazil), proposing a questionnaire on the evaluation and approval of BWM systems for inclusion in the G8 guidelines;

.2 DE 48/17/1 (Brazil), proposing a requirement for a full scale shipboard test for inclusion in the G8 guidelines; and

.3 DE 48/17/2 (Japan), proposing in the annex to the document amendments to the guidelines.

17.9 The Sub-Committee considered the above-mentioned amendments to the draft guidelines for approval of BWM systems and concluded as follows:

.1 regarding the proposal by Brazil to include a questionnaire on the evaluation and approval of BWM systems in the G8 guidelines (DE 48/17), the Sub-Committee supported the proposal in general but was not in a position to decide whether or where to include the proposed questionnaire and agreed to refer it to the MEPC for further consideration. The Sub-Committee noted a comment by the delegation of Liberia regarding the need for increased objectivity in the formulation of some of the questions;

.2 regarding the proposal by Brazil to include a requirement for a full scale shipboard test for inclusion in the G8 guidelines (DE 48/17/1), the Sub-Committee agreed that biological efficacy testing on board should be carried out for type approval, but did not need to be carried out during installation tests of type-approved equipment; and

.3 regarding the amendments to the G8 guidelines proposed by Japan (DE 48/17/2), the Sub-Committee agreed that the proposals were outside its remit and referred them to MEPC 53 for consideration.

17.10 The Sub-Committee instructed the Secretariat to convey the comments in paragraph 17.9 to MEPC 53 for consideration and appropriate action.

17.11 Regarding the remaining guidelines and procedure listed in paragraphs 17.6.2 to 17.6.4, the Sub-Committee agreed to consider them when viable drafts were available and as instructed by the MEPC.

18 REVISION OF THE GUIDELINES FOR SYSTEMS FOR HANDLING OILY WASTES IN MACHINERY SPACES OF SHIPS (MEPC/CIRC.235)

18.1 The Sub-Committee recalled that MEPC 51 had considered a proposal by Japan (MEPC 51/20) for a revision of MEPC/Circ.235 (Guidelines for systems for handling oily waters in machinery spaces of ships) by incorporating the design concepts of the integrated bilge water treatment system (IBTS). Consequently, MEPC 51 had agreed to include a high priority item on the revision of MEPC/Circ.235 in the work programme of the Sub-Committee and in the provisional agenda of this session, with a target completion date of 2006.

18.2 The Sub-Committee had for its consideration a submission by Japan (DE 48/18), containing a proposal for a revised text of circular MEPC/Circ.235, incorporating guidelines for integrated bilge water treatment systems (IBTS).

18.3 During the discussion, concerns were expressed with regard to the avoidance of oil contamination of ballast water and the filling of the sludge tanks from purifiers. One delegation mentioned that the proposal would lead to an increase in the workload of the engine crew. The delegation of Japan clarified that the proposal did not affect any requirements in the MARPOL Convention.

18.4 Following debate, the Sub-Committee agreed to further consider the proposed revised text of circular MEPC/Circ.235 on Guidelines for systems for handling oily waters in machinery spaces of ships and Guidelines for integrated bilge water treatment systems (IBTS), at the next session.

18.5 The delegation of Japan expressed its intention to further develop the draft amendments to circular MEPC/Circ.235, on the basis of the comments and proposals made in plenary, and invited Members and international organizations which might wish to contribute to the work to submit comments to their contact point*.

19 DEVELOPMENT OF PROVISIONS FOR GAS-FUELLED SHIPS

19.1 The Sub-Committee recalled that MSC 78 had considered a proposal by Norway (MSC 78/24/8) to develop provisions for gas-fuelled ships, aiming at establishing an international standard for the installation and operation of internal combustion engine installations using gas as fuel in all types of ships other than LNG carriers and, consequently, had included a high priority item on "Development of provisions for gas-fuelled ships", with a target completion date of 2007, in the work programmes of the DE (co-ordinator), BLG and FP Sub-Committees and provisional agendas for their forthcoming sessions, requesting the

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Sub-Committees to develop appropriate draft Guidelines and advise the Committee when the development of respective mandatory regulations could commence.

19.2 The Sub-Committee considered submissions by Norway (DE 48/19), containing a proposal for draft provisions regarding gas-fuelled engine installations in ships, and the United States (DE 48/19/1), providing comments on the development of provisions for gas-fuelled ships and proposing to expand their scope to also cover other potential gas fuels such as hydrogen and propane.

19.3 Following discussion, the Sub-Committee agreed that relevant mandatory regulations for gas-fuelled ships should be developed. The Sub-Committee further agreed in principle that the provisions to be developed should not only consider natural gas but also other potential gas fuels such as hydrogen and propane, but that this should be further considered at a later stage. The Sub-Committee noted information by the IACS observer that an IACS working group was currently in the process of developing requirements for gas-fuelled ships and that they would keep the Sub-Committee abreast of developments.

19.4 The Sub-Committee agreed to consider the draft provisions for gas-fuelled ships further at DE 49 and invited Members and international organizations to submit relevant comments and proposals to the next session, where the outcome of the consideration of the item by the BLG and FP Sub-Committees could also be taken into account.

20 TEST STANDARDS FOR EXTENDED SERVICE INTERVALS OF INFLATABLE LIFERAFTS

20.1 The Sub-Committee noted that MSC 78, following consideration of document MSC 78/24/10 (Denmark), proposing to develop test standards for inflatable liferafts that are allowed extended service intervals, for inclusion in resolution MSC.81(70) on Revised Recommendation on testing of life-saving appliances and to also develop amendments to resolution A.761(18) on Recommendation on conditions for the approval of servicing stations for inflatable rafts, for consistency, had decided to include, in the work programme of the Sub-Committee and the provisional agenda for DE 48, a high priority item on "Test standards for extended service intervals of inflatable liferafts", with a target completion date of 2006.

20.2 The Sub-Committee further noted that MSC 78 had also considered a proposal by Italy (MSC 78/24/7) to amend resolution A.761(18) to require that some important provisions like medicines, food and water rations are checked to ensure that they are in good condition and that items with a use-by date are suitable for use until the next due date of servicing. Subsequently, MSC 78 decided to include, in the Sub-Committee's work programme, a high priority item on "Amendments to resolution A.761(18)", with two sessions needed to complete the item. In this context, MSC 78 agreed that the Sub-Committee should also consider, under this item, the amendments proposed in paragraphs 5 and 6 of document MSC 78/24/10.

Test standards for extended service intervals of inflatable liferafts

20.3 The Sub-Committee had for its consideration document DE 48/20/1 (Denmark), informing the Sub-Committee of a Danish project for the development of test standards for extended service intervals of inflatable liferafts and containing in the annex a relevant work plan.

20.4 The Sub-Committee agreed to await the Danish progress report and eventual proposals resulting from the project and to consider the matter further at the next session. It was also agreed to invite the Committee to extend the target completion date of the item to 2007. The

Danish delegation agreed to establish a contact point* for Members and organizations that might wish to contribute to their efforts.

Amendments to resolution A.761(18)

20.5 The Sub-Committee had for its consideration document DE 48/20 (Italy), proposing an amendment to resolution A.761(18) to require that some important provisions like medicines, food and water rations are checked to ensure that they are in good condition and that items with a use-by date are suitable for use until the next due date of servicing.

20.6 The Sub-Committee noted that this matter should be dealt with under the item "Amendments to resolution A.761(18)" which MSC 78 had included in the Sub-Committee's work programme but not in the agenda for this session. Consequently, the Sub-Committee agreed to note the Italian document for further consideration at DE 49 and to include the item "Amendments to resolution A.761(18)" in the provisional agenda for that session.

21 CONSIDERATION OF IACS UNIFIED INTERPRETATIONS

General

21.1 The Sub-Committee noted that MSC 78 had instructed it to consider document MSC 78/22/1 with a view to reviewing the IACS unified interpretations annexed to the document which fall within its purview and preparing appropriate interpretations for approval by the Committee. MSC 78 further instructed the Sub-Committee to consider document MSC 78/22/2, containing unified interpretations of SOLAS regulation II-1/3-6 and the associated Technical provisions, likewise with a view to preparing appropriate interpretations for approval by the Committee.

21.2 The Sub-Committee also noted that MEPC 52 had instructed it to consider documents MEPC 52/4/6 and MEPC 52/4/7 (IACS) and MEPC 52/4/11 (INTERTANKO), concerning interpretations to MARPOL Annex VI, with a view to preparing appropriate interpretations for approval by the MEPC.

21.3 The Sub-Committee further noted that MSC 79 had considered a proposal by Germany (MSC 79/8/5) to include in the draft MSC circular on Interpretations to SOLAS chapter II-1, as prepared by DE 47, an additional unified interpretation to SOLAS regulations II-1/42 and II-1/43. Following support for the proposal from other delegations and further requests for amendments, MSC 79 referred the draft MSC circular to DE 48 for review, in particular with regard to section 1 (SOLAS regulation II-1/26.11) and section 6 (SOLAS regulations II-1/42 and II-1/43).

UNIFIED INTERPRETATIONS (UI) TO MARPOL ANNEX VI

21.4 The Sub-Committee considered the following documents:

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.1 MEPC 52/4/6 (IACS), requesting clarifications on regulations 9 and 13 of MARPOL Annex VI;

.2 MEPC 52/4/7 (IACS), containing unified interpretations to MARPOL Annex VI and the NO_x Technical Code;

.3 MEPC 52/4/11 (INTERTANKO), commenting on the IACS UI to MARPOL Annex VI and the NO_x Technical Code in document MEPC 52/4/7; and

.4 DE 48/21/6 (Euromot) commenting on the IACS UI to MARPOL Annex VI and the NO_x Technical Code in document MEPC 52/4/7,

recalling that MEPC 52 had instructed the Sub-Committee to consider the proposed unified interpretations as a matter of urgency, in view of the impending entry into force of MARPOL Annex VI on 19 May 2005, and report its considerations to MEPC 53.

21.5 Following debate, the Sub-Committee agreed to instruct the Working Group on the Guidelines on on-board exhaust gas cleaning systems, established under agenda item 13, to finalize the text of the UIs and the requested clarifications in documents MEPC 52/4/6 and MEPC 52/4/7 in the form of a draft MEPC circular, taking into account documents MEPC 52/4/11 and DE 48/21/6 and comments and proposals made in plenary.

Report of the group

21.6 Having considered the report of the group (DE 48/WP.6), the Sub-Committee took action as described in the following paragraphs.

Unified interpretations

21.7 The Sub-Committee agreed to the unified interpretations (UIs) to MARPOL Annex VI and the NO_x Technical Code, as set out in annex 10, for submission to MEPC 53 for approval.

21.8 The Sub-Committee highlighted concerns with regard to the following provisions in the unified interpretations to MARPOL Annex VI and the NO_x Technical Code respectively, as contained in document MEPC 52/4/7, which were considered to potentially alter MARPOL Annex VI or the NO_x Technical Code and therefore could not be handled as UIs:

MARPOL Annex VI

Regulation 13(1)(a)(i) (MPC 16):

The text of the regulation refers to 'installed' engines. In view of the implications which may arise from the IACS requested clarifications (MEPC 52/4/6), consideration should be given as to which engines should be considered as 'installed'.

Regulation 13(2)(a)(i) (MPC 20):

The application of regulation 13(3)(a) to engines additional to those as installed 1 January 2000. The definition of a "new engine" as it pertains to a replacement engine i.e. direct replacement or not. The definition of "date of build" of an engine.

Regulation 14(6) (MPC 24):

The text refers to recording data on "completion" of the changeover procedure. The need for data to be recorded on commencing the changeover procedure when exiting an SO_x Emission Control Area should also be considered.

Regulations 14 and 18:

A definition of "fuel oil" is needed in MARPOL Annex VI.

NO_x Technical Code

Paragraph 5.6 (MPC 64):

While agreeing on the text of the UI, the Sub-Committee noted that inconsistencies exist between paragraphs 5.6 and 1.3.1 of appendix 4 of the Code with regard to defining standards for the calibration of measuring instruments as to whether these should be 'international' or 'international or national'.

Paragraphs 5.9.2.3, 5.9.3.1 and 5.11 (MPC 67, 68):

The Code refers to the measurement of hydrocarbons. However, the analysis and sample treatment requirements appropriate to hydrocarbon measurement together with calibration, adjustment and operation requirements are not given in appendices 3 or 4. Consideration should be given to incorporating the relevant provisions of ISO 8178, Part 1, 1996, sections 7 and 8.

Paragraphs 5.2.2.1, 5.2.5 and 5.9.1.2 (MPC 61, 65):

The text of these sections comprises a number of requirements in respect to engine testing which may not be possible to achieve in practice due to, for example, the size of engines being tested, the attached test bed system or the prevailing ambient conditions. Considerations should therefore be given to allowing some flexibility in these requirements. It was further noted that the terminology of chapter 5 of the NO_x Technical Code should take into account pressure charged as well as naturally aspirated engines.

21.9 The following IACS UIs, as contained in document MEPC 52/4/7, were discussed but were found to be unacceptable to the majority, and the Sub-Committee agreed that their further consideration should not be pursued: MPC 14, MPC 15, MPC 16, MPC 17, MPC 20, MPC 22, MPC 23, MPC 24, MPC 29, MPC 31, MPC 32, MPC 41, MPC 61, MPC 65, MPC 67, MPC 68, MPC 69.

21.10 There were significant concerns and alternative viewpoints expressed with regard to the following IACS UIs, as contained in document MEPC 52/4/7: MPC 34, MPC 36, MPC 40, MPC 44, MPC 45, MPC 46, MPC 49, MPC 50, MPC 51, MPC 52, MPC 53, MPC 54, MPC 55, MPC 56, MPC 57, MPC 58, MPC 59, MPC 70, MPC 71, MPC 73, MPC 74, MPC 75, MPC 77. These could not be discussed due to time constraints and cover procedural issues which still need to be resolved.

21.11 The Sub-Committee invited Members and international organizations to submit proposals, including draft amendments to MARPOL Annex VI and the NO_x Technical Code, as appropriate, which address the highlighted matters of concern, to MEPC 53.

Clarification on regulations 9 and 13 of MARPOL Annex VI

Regulation 9

21.12 The Sub-Committee considered MEPC 52/4/6 (IACS), noting that engine pre-certification survey and the certification of engine groups or families are events which cannot be readily repeated, and highlighted the need for Members and international organizations to consider the full implications on an engine's certification on a transfer of flag and the ability of the receiving Administration to undertake surveys and approve amendments to an engine's certification as a result of such a transfer. The Sub-Committee was of the view that Members and international organizations should be invited to contribute to the clarification of regulation 9(4)(c).

Regulation 13

21.13 The Sub-Committee further noted the three clarifications (3, 4 and 5) given for regulation 13 in document MEPC 52/4/6, highlighting the need for Members and international organizations to consider the implications thereof. The Sub-Committee was of the view that further consideration of the implications of the term "installed" was needed in regulation 13.

IACS UNIFIED INTERPRETATIONS REFERRED BY MSC 78

21.14 The Sub-Committee considered document MSC 78/22/1, containing a large number of IACS UI, and established that the following unified interpretations (see list in paragraph 1 of the document) were falling under its responsibility:

.1 HSC 7: Machinery installations – Dead craft condition (HSC Code, section 9.1.5);

.2 SC 136: Connection means by which the main busbars of the main source of electrical power are normally connected (SOLAS chapter II-1, regulation 41.4);

.3 SC 179: Dewatering of forward spaces of bulk carriers (SOLAS chapter XII, regulation 13.1; MSC.134(76); MSC/Circ.1069);

.4 SC 180: Hold, ballast and dry space water level detectors (SOLAS chapter XII, regulation 13; MSC.134(76)) and Performance Standards for water level detectors on bulk carriers (MSC.145(77));

.5 SC 182: Bulk carriers not complying with SOLAS chapter XII, regulation 9 as of January 2004 (SOLAS chapter XII, regulation 9);

.6 SC 184: Machinery installations – Dead ship condition (SOLAS chapter II-1, regulation 26.4); and

.7 SC 185: Starting arrangements for emergency generating sets (SOLAS chapter II-1, regulations 44.1 and 44.2).

21.15 The Sub-Committee considered the UIs identified in paragraph 21.4 above one by one and agreed to accept the text of the interpretations without any changes. The Secretariat was instructed to prepare a draft MSC circular on Interpretations to SOLAS chapters II-1 and XII, which is set out in annex 11, containing the text of the interpretations listed in paragraphs 21.14.2 to 21.14.7 above, and a draft MSC circular on Interpretations to the 2000 HSC Code, which is set

out in annex 12, containing the text of the interpretation listed in paragraph 21.14.1 above, for submission to MSC 80 for approval as an urgent matter.

21.16 With regard to document MSC 78/22/2 (IACS), containing Unified Interpretations of SOLAS regulation II-1/3-6 and the Technical Provisions as adopted at MSC 76 by resolutions MSC.134(76) and MSC.133(76), the Sub-Committee noted that the document had been superseded by document DE 48/21/2 (IACS), taking into account amendments to the regulation and the Technical Provisions adopted at MSC 78 by resolutions MSC.151(78) and MSC.158(78) which are expected to enter into force on 1 January 2006.

21.17 Following consideration of document DE 48/21/2 (IACS), the Sub-Committee agreed with the text of the interpretation contained in the document and instructed the Secretariat to include it in the draft MSC circular on Interpretations to SOLAS chapters II-1 and XII referred to in paragraph 21.15 above.

DRAFT MSC CIRCULAR ON INTERPRETATIONS TO SOLAS CHAPTER II-1 PREPARED BY DE 47

21.18 The Sub-Committee recalled that MSC 79 referred the draft MSC circular on Interpretations to SOLAS chapter II-1 prepared at DE 47 (DE 47/25, annex 15) to DE 48 for review, in particular with regard to section 1 (SOLAS regulation II-1/26.11) and section 6 (SOLAS regulations II-1/42 and II-1/43).

21.19 The Sub-Committee considered the following documents:

.1 DE 48/21 (IACS), suggesting to reconsider the decision at DE 47 regarding IACS UI SC156, where the Sub-Committee did not agree to the use of structural analysis with hose tests in lieu of hydrostatic pressure tests for doors in subdivision boundaries in passenger ships;

.2 DE 48/21/1 (IACS), proposing amendments to section 2 of the draft circular regarding fire pumps and other fire extinguishing medium pumps and automatic load shedding;

.3 DE 48/21/3 (Germany), proposing to include in the draft circular provisions regarding the exceptional use of the emergency generator in port;

.4 DE 48/21/4 (IACS), proposing amendments to section 1 of the draft circular regarding fuel oil service tank arrangements; and

.5 DE 48/21/5 (IACS), proposing to include in the draft circular provisions regarding the use of the emergency generator, as suggested by Germany in document DE 48/21/3.

21.20 Following debate, the Sub-Committee agreed:

.1 to change the term “HFO” in the right hand box under the heading “1.2 Equivalent arrangement” in section 1 (SOLAS regulation II-1/26.11 - Machinery installations – service tank arrangements) to “MDO”;

.2 to the changes to section 2 (SOLAS regulations II-1/40 and II-1/41 - Essential services and arrangements of sources of power, supply, control and monitoring to the different categories of essential services), paragraphs 9.2 and 9.3, as set out in paragraph 4.2 of document DE 48/21/1;

.3 to the changes to section 6 (SOLAS regulations II-1/42 and II-1/43 - Emergency source of power in passenger and cargo ships), as set out in the annex to document DE 48/21/3; and

.4 to the changes to section 7 (SOLAS chapter II-1 part B and B-1 - Doors in watertight bulkheads of passenger ships and cargo ships), sub-section 5 (Testing), paragraphs 5.1 and 5.1.1, as set out in paragraph 7 of document DE 48/21.

The Secretariat was instructed to prepare the draft revised MSC circular on Interpretations to SOLAS chapter II-1, which is set out in annex 13, for submission to MSC 80 for approval as an urgent matter.

21.21 When agreeing on the changes to section 7 (SOLAS chapter II-1 parts B and B-1 - Doors in watertight bulkheads of passenger ships and cargo ships), the Sub-Committee noted that this would necessitate corresponding modifications to draft new SOLAS regulation II-1/16 (which is expected to be adopted at MSC 80), as shown in paragraph 8 of document DE 48/21. The Sub-Committee, having supported the changes as proposed, noted that IACS would submit these modifications to the draft regulation to MSC 80 for consideration.

22 WORK PROGRAMME AND AGENDA FOR DE 49

22.1 The Sub-Committee revised its work programme (DE 48/WP.1) based on that approved by MSC 79 (DE 48/2/3, annex) and, taking into account the progress made during this session, prepared a draft revised work programme and draft provisional agenda for DE 49. While reviewing the work programme, the Sub-Committee agreed to invite the Committee and the MEPC, as appropriate, to:

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

.1.1 item H.5 - Protection of fuel tanks;

.1.2 item H.6 - Anchoring, mooring and towing equipment;

.1.3 item H.7 - Performance testing and approval standards for SOLAS personal life-saving appliances; and

.1.4 item H.15.2 - Guidelines on on-board exhaust gas cleaning systems;

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

.2.1 item H.9 - Review of the 2000 HSC Code and amendments to the DSC Code and the 1994 HSC Code, to 2006; and

.2.2 item H.20 - Test standards for extended service intervals of inflatable liferafts, to 2007;

.3 replace the target completion date with the number of sessions needed for completion of the following work programme item:

item H.2	Safety aspects of ballast water management	2 sessions;

.4 replace the number of sessions needed for completion with the target completion date for the following work programme items as they have been selected for inclusion in the provisional agenda for DE 49:

.4.1	item H.15.1	Guidelines on equivalent methods to reduce on-board NO_x emissions	2007;
.4.2	item H.17	Review of the SPS Code	2007;
.4.3	item H.18	Amendments to resolution A.761(18)	2007;
.4.4	item H.22	Revision of the Code on alarms and indicators	2007;
.4.5	item H.23	Amendments to the MODU Code	2007;

.5 in the title of item H.12 - Mandatory emergency towing systems in ships other than tankers greater than 20,000 dwt, replace the word "greater" with the words "of not less", in order to exclude tankers of 20,000 dwt and above, as these are already covered by SOLAS regulation II-1/3-4; and

.6 renumber the work programme items accordingly.

22.2 The Committee was invited to approve the draft revised work programme and draft provisional agenda for DE 49, as set out in annex 14.

22.3 The Sub-Committee recalled that under agenda item 13 (see paragraph 13.5) it agreed to consider document DE 48/INF.3 (Japan), containing draft Guidelines for marine selective catalytic reduction systems, under the item on "Guidelines on equivalent methods to reduce on-board NO_x emissions" if it was included in the provisional agenda for DE 49 and, therefore, in view of its decision referred to in paragraph 22.1.4.1, instructed the Secretariat to issue the document in the three working languages as session document for DE 49.

Arrangements for the next session

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

.1 review of the 2000 HSC Code and amendments to the DSC Code and the 1994 HSC Code;

.2 life-saving appliances;

.3 amendments to resolution A.744(18);

.4 passenger ship safety;

.5 performance standards for protective coatings; and

.6 mandatory emergency towing systems in ships other than tankers of not less than 20,000 dwt.

22.5 The Sub-Committee established correspondence groups on the following subjects, due to report to DE 49:

.1 passenger ship safety;

.2 measures to prevent accidents with lifeboats and inconsistencies in IMO instruments regarding requirements for LSA;

.3 review of the 2000 HSC Code and amendments to the DSC Code and the 1994 HSC Code;

.4 performance standards for protective coatings; and

.5 mandatory emergency towing systems in ships other than tankers of not less than 20,000 dwt.

22.6 The Sub-Committee noted that its forty-ninth session had been tentatively scheduled to take place from 20 to 24 February 2006.

Urgent matters emanating from DE 49

22.7 Noting the close proximity between DE 49 (February 2006) and MSC 81 (May 2006), the Sub-Committee invited MSC 80 to agree that, in addition to its work programme and agenda for DE 50, the outcome of DE 49 on the following items would be urgent matters to be considered by MSC 81:

.1 amendments to resolution A.744(18);

.2 passenger ship safety;

.3 measures to prevent accidents with lifeboats;

.4 compatibility of life-saving appliances;

.5 inconsistencies in IMO instruments regarding requirements for life-saving appliances;

.6 review of the 2000 HSC Code and amendments to the DSC Code and the 1994 HSC Code;

.7 performance standards for protective coatings;

.8 mandatory emergency towing systems in ships other than tankers of not less than 20,000 dwt; and

.9 inspection and survey requirements for accommodation ladders.

23 ELECTION OF CHAIRMAN AND VICE-CHAIRMAN FOR 2006

23.1 In accordance with the Rules of Procedure of the Maritime Safety Committee, the Sub-Committee unanimously re-elected Mr. I. Ponomarev (Russian Federation) as Chairman and Mrs. Xiang Yang (China) as Vice-Chairman, both for 2006.

24 ANY OTHER BUSINESS

Measures to prevent brittle fractures in ships

24.1 The Sub-Committee considered document DE 48/24 (Canada), concerning the risks of unstable brittle fracture, particularly in way of side shells, of ships constructed with steel of unqualified fracture toughness and operating in cold waters such as the North Atlantic and noted the information provided. The Sub-Committee noted in this connection that IACS and the United Kingdom were currently discussing the development of IACS requirements for guaranteed minimum steel toughness.

Results of test for visual distress signals

24.2 The Sub-Committee considered document DE 48/24/1 (Japan), providing results of test for visual distress signals such as rocket parachute flares, hand flares and buoyant smoke signals and inviting Member Governments to instruct the notifying bodies engaged in the tests for life-saving appliances to approve only products complying with relevant test procedures and criteria.

24.3 The Sub-Committee noted the information provided and agreed to recommend that Member Governments should instruct the notifying bodies engaged in the tests of life-saving appliances to approve only products complying with the relevant test procedures and criteria, in particular the requirements in the LSA Code that visual distress signals shall be so designed as not to cause discomfort to the person holding the casing and not endanger the survival craft by burning or glowing residues. The Sub-Committee invited the Committee to endorse that recommendation.

Verification of technical standards for ship construction

24.4 The Sub-Committee noted document DE 48/INF.6 (United Kingdom), informing of the results of their review of IACS UR S18, S26, S27, S30 and S31 concerning certain requirements for bulk carriers and, in particular, that the United Kingdom had submitted comments on the draft IACS Common Rules for Bulk Carriers to IACS.

Revision of circular SLS.14/Circ.115 on Issue of Exemption Certificates

24.5 The Sub-Committee noted that MSC 78, following a request by DE 46, had considered the need to update circular SLS.14/Circ.115 on Issue of Exemption Certificates under the 1974 SOLAS Convention and amendments thereto, to reflect recent amendments to chapter III and instructed the Sub-Committee to revise circular SLS.14/Circ.115 as necessary.

24.6 Following consideration, the Sub-Committee instructed the Secretariat to prepare relevant amendments to circular SLS.14/115 for consideration at the next session.

Casualty analysis

24.7 The Sub-Committee noted that STW 36 had considered results of casualty analyses related to training matters forwarded by FSI 12 (STW 36/16/7), and agreed with regard to the case of **Aratere** (operational failure) that training manuals were part of carriage requirements under SOLAS regulation III/35 and were not training issues under the STCW Convention and the results would need to be considered by the DE Sub-Committee. The relevant casualty information is attached at annex to document DE 48/2/4.

24.8 The Sub-Committee agreed that this accident had been caused by the insufficient knowledge of the servicing agent, noting that the FSI Sub-Committee had pointed out that the content of the training manual did not cover the type of liferaft on board the ship. SOLAS regulation III/35 requires that the training manual shall contain instructions and information on the life-saving appliances provided on board the ship. Therefore, the accident was a consequence of non-compliance with that regulation. Consequently, the Sub-Committee invited the Committee to instruct all parties concerned to provide appropriate training manuals suitable for their ships in accordance with SOLAS regulation III/35.

Expression of appreciation

24.9 The Sub-Committee, noting that Admiral Sergio Chagasteles, Head of the Brazilian Representation to IMO, would soon retire from his position, expressed appreciation for the valuable services rendered by Admiral Chagasteles over many years and wished him all the best for his retirement.

Expression of condolences

24.10 On being informed of the recent death of Mr. Chandra Persad of the IMO Secretariat, who had served delegates for many years behind the Documents Counter, the Sub-Committee requested the Secretariat to convey to Mr. Persad's family and colleagues its deep condolences and sympathy.

25 ACTION REQUESTED OF THE COMMITTEES

25.1 The Maritime Safety Committee, at its eightieth session, is invited to:

.1 note the progress made by the Sub-Committee with regard to the tasks assigned to it on passenger ship safety, in particular concerning SOLAS carriage requirements for infant personal LSA, draft SOLAS amendments and draft guidelines regarding the approval of alternative designs and arrangements, requirements and performance standards for essential systems and services, the working definition for the damage control concept (section 4);

.2 consider the views of the Sub-Committee with regard to the starting point for the "time to remain habitable" and take action as appropriate (paragraph 4.24);

.3 delete the development of functional requirements for towing arrangements from the revised work plan on passenger ship safety, since the matter is dealt with under the Sub-Committee's work programme item on "Mandatory emergency towing systems in ships other than tankers of not less than 20,000 dwt" (paragraph 4.27);

.4 note the proposed amendments to the draft LSA casualty record prepared by FSI 12, referred to the FSI Sub-Committee for appropriate action (paragraph 5.10);

.5 approve the draft MSC circular on Guidance on shipboard towing and mooring equipment (paragraph 6.8 and annex 1);

.6 approve the proposed amendments to SOLAS chapter III regarding personal life-saving appliances with a view to adoption (paragraphs 9.10 and 9.11 and annex 4);

.7 approve the proposed amendments to the LSA Code regarding personal life-saving appliances with a view to adoption (paragraph 9.14 and annex 5);

.8 adopt the draft amendments to the Revised recommendation on testing of life-saving appliances (resolution MSC.81(70)) (paragraph 9.15 and annex 6);

.9 note the action taken by the Sub-Committee regarding the alignment of the draft revised SOLAS chapter II-1 with chapter III and, in particular, take into consideration, when adopting the draft revised SOLAS chapter II-1 parts A, B and B-1, the Sub-Committee's view that the time period between the adoption of that chapter and its entry into force should be sufficient for the Sub-Committee to deal with consequential amendments to SOLAS chapter III (paragraphs 10.4 to 10.9);

.10 note the progress made by the Sub-Committee with regard to the development of performance standards for protective coatings and, in particular, concur with the expansion of the scope of the item to apply the performance standards to all ballast and void spaces on all types of ships (section 12 and paragraph 12.7.1);

.11 approve the draft MSC circular on Interpretations to SOLAS chapters II-1 and XII (paragraph 21.15 and annex 11);

.12 approve the draft MSC circular on Interpretations to the 2000 HSC Code (paragraph 21.15 and annex 12);

.13 approve the revised draft MSC circular on Interpretations to SOLAS chapter II-1 (paragraph 21.20 and annex 13); and

.14 approve the proposed revised work programme of the Sub-Committee and the provisional agenda for DE 48 (paragraph 22.2 and annex 14).

25.2 The Maritime Safety Committee, at its eighty-first session, is invited to:

.1 note that the Sub-Committee agreed to the draft amendments to sections 4 and 6 of the OSV Guidelines for referral to the SLF Sub-Committee for co-ordination purposes (paragraph 15.3 and annex 9);

.2 note the view of the Sub-Committee that remaining areas of transitory non-compliance with safety regulations when conducting ballast water exchange were dealt with by other sub-committees and, therefore, the Sub-Committee did not need to consider the matter any further (paragraph 17.5);

.3 note the progress made by the Sub-Committee with regard to the development of mandatory requirements for gas-fuelled ships (section 19);

.4 endorse the Sub-Committee's recommendation to Member Governments that they should instruct the notifying bodies engaged in the tests of life-saving appliances to approve only products complying with the relevant test procedures and criteria, in particular the requirements in the LSA Code that visual distress signals shall be so designed as not to cause discomfort to the person holding the casing and not endanger the survival craft by burning or glowing residues (paragraph 24.3);

.5 endorse the Sub-Committee's recommendation to Member Governments that all parties concerned should provide appropriate life-saving appliance training manuals suitable for their ships in accordance with SOLAS regulation III/35 – Training manual and on-board training aids (paragraphs 24.7 and 24.8); and

.6 approve the report in general.

25.3 The Marine Environment Protection Committee is invited to:

.1 approve the draft new regulation [13A] on Oil fuel tank protection of the revised MARPOL Annex I, with a view to subsequent adoption (paragraph 7.7 and annex 2);

.2 approve the consequential draft amendments to the IOPP Certificate Supplement (Forms A and B), with a view to subsequent adoption (paragraph 7.7 and annex 3);

.3 delete the item on "Protection of fuel tanks" from the Sub-Committee's work programme since work on it has been completed (paragraph 7.10);

.4 note the Sub-Committee's view that IMO's Procedures for the Approval of Active Substances (G9), currently under development, should take into account that the relevant substances/chemicals are compatible with the coating system and take action as appropriate (paragraph 12.4);

.5 endorse the SO_x over CO_2 monitoring method developed by the Sub-Committee and take action as appropriate (paragraph 13.7 and annex 7);

.6 adopt the draft Guidelines for on-board exhaust gas SO_x cleaning systems (paragraph 13.8 and annex 8);

.7 note the Sub-Committee's recommendation to consider the development of wash water discharge criteria and take action as appropriate (paragraph 13.10);

.8 delete the item on "Guidelines on onboard exhaust gas cleaning systems" from the Sub-Committee's work programme since work on it has been completed (paragraph 13.11);

.9 consider the outcome of the Sub-Committee's consideration with regard to proposed amendments to the draft Guidelines for approval of BWM systems and take action as appropriate (paragraphs 17.9 and 17.10);

.10 approve the unified interpretations to MARPOL Annex VI and the NO_x Technical Code and take action as appropriate (paragraph 21.7 and annex 10);

.11 consider the view of the Sub-Committee with regard to the remaining interpretations to MARPOL Annex VI and the NO_x Technical Code and take action as appropriate (paragraphs 21.8 to 21.11);

.12 consider the view of the Sub-Committee with regard to the clarifications on Regulations 9 and 13 of MARPOL Annex VI and take action as appropriate (paragraphs 21.12 and 21.13); and

.13 concur with the inclusion of the work programme item on "Guidelines on equivalent methods to reduce on-board NO_x emissions" in the provisional agenda for DE 49 (paragraph 13.5).

***

ANNEX 1

DRAFT MSC CIRCULAR

GUIDANCE ON SHIPBOARD TOWING AND MOORING EQUIPMENT

1 The Maritime Safety Committee, [at its eightieth session (11 to 20 May 2005)], following the recommendations made by the Sub-Committee on Ship Design and Equipment at its forty-eighth session, approved guidance concerning shipboard equipment, fittings and supporting hull structures associated with towing and mooring, as set out in the annex, with a view to ensuring a uniform approach towards the application of the provisions of SOLAS regulation II-1/3-8.

2 Member Governments are invited to use the annexed guidance when applying SOLAS regulation II-1/3-8, and to bring them to the attention of all parties concerned.

ANNEX

SHIPBOARD EQUIPMENT, FITTINGS AND SUPPORTING HULL STRUCTURES ASSOCIATED WITH TOWING AND MOORING

1 Application

1.1 Under regulation II-1/3-8 of the 1974 SOLAS Convention, as adopted by resolution MSC.[…] in 2005, new displacement type ships, except high-speed craft and offshore units, shall be provided with arrangements, equipment and fittings of sufficient safe working load to enable the safe conduct of all towing and mooring operations associated with the normal operations of the ship. The arrangements, equipment and fittings shall meet the appropriate requirements of the Administration or an organization recognized by the Administration.

1.2 This circular is intended to provide standards for the design and construction of shipboard fittings and supporting hull structures associated with towing and mooring which Administrations are recommended to implement. The provisions of this guidance do not require tow lines nor mandate standards for mooring lines onboard the ship.

1.3 Equipment that is used for both towing and mooring should be in accordance with 3 and 4.

2 Definitions

For the purpose of this guidance:

2.1 *Shipboard fittings* mean bollards and bitts, fairleads, stand rollers, chocks used for the normal mooring of the ship and similar components used for the normal towing of the ship. Other components such as capstans, winches, etc. are not covered by this guidance. Any weld, bolt or other fastening connecting the shipboard fitting to the supporting hull structure is part of the shipboard fitting and subject to any industry standard applicable to such fitting.

2.2 *Supporting hull structures* mean that part of the ship structure on/in which the shipboard fitting is placed and which is directly submitted to the forces exerted on the shipboard fitting. The hull structure supporting capstans, winches, etc. used for the normal towing and mooring operations mentioned above should also be subject to this guidance.

2.3 *Industry standard* means international or national standards which are recognized in the country where the ship is built subject to the approval of the Administration.

3 Towing fittings

3.1 Strength

The strength of shipboard fittings used for normal towing operations and their supporting hull structures should comply with the provisions of 3.2 to 3.6.

3.2 Arrangements

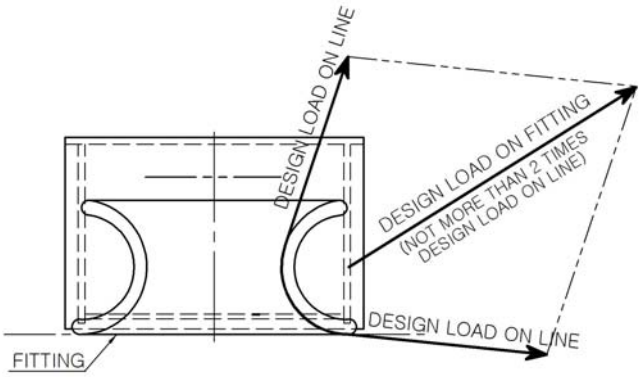
Shipboard fittings for towing should be located on longitudinals, beams and/or girders, which are part of the deck construction so as to facilitate efficient distribution of the towing load. Other equivalent arrangements may be accepted (for Panama chocks, etc.).

3.3 Load considerations

3.3.1 The design load used for normal towing operations (e.g. harbour/manoeuvring) should be 1.25 times the intended maximum towing load (e.g. static bollard pull) as indicated on the towing and mooring arrangements plan. The design load should be applied through the tow line according to the arrangement shown on the towing and mooring arrangements plan.

3.3.2 For other towage service (e.g. escort), the design load used for each fitting should be the nominal breaking strength of the tow line defined in table 1 based on the equipment number (EN) described in the appendix. The design load should be applied through the tow line according to the arrangement shown on the towing and mooring arrangements plan.

3.3.3 The method of application of the design load to the fittings and supporting hull structure should be taken into account such that the total load need not be more than twice the design load specified in 3.3.1 or 3.3.2, i.e. no more than one turn of one line (see figure below).



3.4 Shipboard fittings

The selection of shipboard fittings should be made by the shipyard in accordance with industry standards (e.g. ISO 3913 Shipbuilding Welded Steel Bollards) accepted by the Administration. When the shipboard fitting is not selected from an accepted industry standard, the design load used to assess its strength and its attachment to the ship should be in accordance with 3.3 above.

3.5 Supporting hull structure

Arrangement

3.5.1 The arrangement of the reinforced members (carling) beneath shipboard fittings should consider any variation of direction (laterally and vertically) of the towing forces (which should be not less than the design load as per 3.3) acting through the arrangement of connection to the shipboard fittings.

Acting point of towing force

3.5.2 The acting point of the towing force on shipboard fittings should be taken at the attachment point of a towing line or at a change in its direction.

Allowable stresses

3.5.3 Allowable bending stress: 100% of the specified yield point for the material used; allowable shearing stress: 60% of the specified yield point for the material used; no stress concentration factors being taken into account.

3.6 Safe working load (SWL)

3.6.1 The SWL used for normal towing operations (harbour/manoeuvring) should not exceed 80% of the design load as given in 3.3.1 and the SWL used for other towing operations (e.g. escort) should not exceed the design load as given in 3.3.2. For fittings used for both harbour and escort purposes, the greater of the design loads of 3.3.1 and 3.3.2 should be used.

3.6.2 The SWL of each shipboard fitting should be marked (by weld bead or equivalent) on the deck fittings used for towing.

3.6.3 The above provisions on SWL apply for a single post basis (no more than one turn of one line).

3.6.4 The towing and mooring arrangements plan described in section 5 should define the method of use of towing lines.

4 Mooring fittings

4.1 Strength

The strength of shipboard fittings used for mooring operations and their supporting hull structures should comply with the provisions of 4.2 to 4.6.

4.2 Arrangements

Shipboard fittings for mooring should be located on longitudinals, beams and/or girders, which are part of the deck construction so as to facilitate efficient distribution of the mooring load. Other equivalent arrangements may be accepted (for Panama chocks, etc.).

4.3 Load considerations

4.3.1 The design load applied to shipboard fittings and supporting hull structures should be 1.25 times the breaking strength of the mooring line provided in accordance with table 1 based on the equipment number (EN) described in the appendix. The design load should be applied through the mooring line according to the arrangement shown on the towing and mooring arrangements plan.

4.3.2 The design load applied to supporting hull structures for winches, etc. should be 1.25 times the breaking strength of the mooring line according to 4.3.1 above and, for capstans, 1.25 times the maximum hauling-in force. The design load should be applied through the mooring line according to the arrangement shown on the towing and mooring arrangements plan.

4.3.3 The method of application of the design load to the fittings and supporting hull structure should be taken into account such that the total load need not be more than twice the design load specified in 4.3.1, i.e. no more than one turn of one line.

4.4 Shipboard fittings

The selection of shipboard fittings should be made by the shipyard in accordance with industry standards (e.g. ISO 3913 Shipbuilding Welded Steel Bollards) accepted by the Administration. When the shipboard fitting is not selected from an accepted industry standard, the fittings should be equivalent to a recognized industry standard in compliance with the design load as per 4.3.

4.5 Supporting hull structure

Arrangement

4.5.1 The arrangement of the reinforced members (carling) beneath shipboard fittings should consider any variation of direction (laterally and vertically) of the mooring forces (which should be not less than the design load given in 4.3) acting through the arrangement of connection to the shipboard fittings.

Acting point of mooring force

4.5.2 The acting point of the mooring force on shipboard fittings should be taken at the attachment point of a mooring line or at a change in its direction.

Allowable stresses

4.5.3 Allowable bending stress: 100% of the specified yield point for the material used; allowable shearing stress: 60% of the specified yield point for the material used; no stress concentration factors being taken into account.

4.6 Safe working load (SWL)

4.6.1 The SWL should not exceed 80% of the design load given in 4.3.

4.6.2 The SWL of each shipboard fitting should be marked (by weld bead or equivalent) on the deck fittings used for mooring.

4.6.3 The above provisions on SWL apply for a single post basis (no more than one turn of one line).

4.6.4 The towing and mooring arrangements plan described in section 5 should define the method of use of mooring lines.

5 Towing and mooring arrangements plan

5.1 The SWL for the intended use for each shipboard fitting should be noted in the towing and mooring arrangements plan available on board for the guidance of the Master.

5.2 Information provided on the plan should include in respect of each shipboard fitting:

.1 location on the ship;

.2 fitting type;

.3 SWL;

.4 purpose (mooring/harbour towing/escort towing); and

.5 method of applying load of towing or mooring line including limiting fleet angles.

Table 1

MOORING AND TOW LINES

EQUIPMENT NUMBER		MOORING LINES	TOW LINE*
Exceeding	**Not exceeding**	**Minimum breaking strength (kN)**	**Breaking strength (kN)**
1	***2***	***3***	***4***
50	70	34	98
70	90	37	98
90	110	39	98
110	130	44	98
130	150	49	98
150	175	54	98
175	205	59	112
205	240	64	129
240	280	69	150
280	320	74	174
320	360	78	207
360	400	88	224
400	450	98	250
450	500	108	277
500	550	123	306
550	600	132	338
600	660	147	370
660	720	157	406
720	780	172	441
780	840	186	479
840	910	201	518
910	980	216	559
980	1060	230	603
1060	1140	250	647
1140	1220	270	691
1220	1300	284	738
1300	1390	309	786
1390	1480	324	836
1480	1570	324	888
1570	1670	333	941
1670	1790	353	1024
1790	1930	378	1109
1930	2080	402	1168
2080	2230	422	1259
2230	2380	451	1356
2380	2530	480	1453
2530	2700	480	1471
2700	2870	490	1471
2870	3040	500	1471
3040	3210	520	1471
3210	3400	554	1471

EQUIPMENT NUMBER		MOORING LINES	TOW LINE*
Exceeding	**Not exceeding**	**Minimum breaking strength (kN)**	**Breaking strength (kN)**
1	***2***	***3***	***4***
3400	3600	588	1471
3600	3800	618	1471
3800	4000	647	1471
4000	4200	647	1471
4200	4400	657	1471
4400	4600	667	1471
4600	4800	677	1471
4800	5000	686	1471
5000	5200	686	1471
5200	5500	696	1471
5500	5800	706	1471
5800	6100	706	1471
6100	6500	716	
6500	6900	726	
6900	7400	726	
7400	7900	726	
7900	8400	736	
8400	8900	736	
8900	9400	736	
9400	10000	736	
10000	10700	736	
10700	11500	736	
11500	12400	736	
12400	13400	736	
13400	14600	736	
14600	16000	736	

* Information is provided in relation to 3.3.2 and provision onboard of such a line is not necessary under this guidance.

APPENDIX

EQUIPMENT NUMBER

The equipment number (EN) should be calculated as follows:

$$EN = \Delta^{2/3} + 2.0hB + \frac{A}{10}$$

where:

Δ = moulded displacement, in tonnes, to the Summer Load Waterline

B = moulded breadth, in metres

h = effective height, in metres, from the Summer Load Waterline to the top of the uppermost house; for the lowest tier "h" should be measured at centreline from the upper deck or from a notional deck line where there is local discontinuity in the upper deck

$$h = a + \Sigma h_i$$

where:

a = distance, in metres, from the Summer Load Waterline amidships to the upper deck

h_i = height, in metres, on the centreline of each tier of houses having a breadth greater than B/4

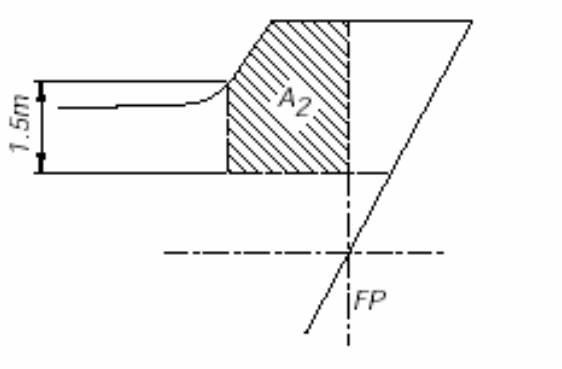
A = area, in square metres, in profile view, of the hull, superstructures and houses above the Summer Load Waterline which are within the equipment length of the ship and also have a breadth greater than B/4

NOTES

1 When calculating h, sheer and trim should be ignored, i.e. h is the sum of freeboard amidships plus the height (at centreline) of each tier of houses having a breadth greater than B/4.

2 If a house having a breadth greater than B/4 is above a house with a breadth of B/4 or less, then the wide house should be included but the narrow house ignored.

3 Screens or bulwarks 1.5 m or more in height should be regarded as parts of houses when determining h and A. The height of the hatch coamings and that of any deck cargo, such as containers, may be disregarded when determining h and A. With regard to determining A, when a bulwark is more than 1.5 m high, the area shown below as A_2 should be included in A.



4 The equipment length of the ships is the length between perpendiculars but should not be less than 96% nor greater than 97% of the extreme length on the Summer Waterline (measured from the forward end of the waterline).

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ANNEX 2

DRAFT NEW REVISED MARPOL ANNEX I, REGULATION [13A] – OIL FUEL TANK PROTECTION

1 This regulation shall apply to all ships with an aggregate oil fuel capacity of 600 m^3 and above:

.1 For which the building contract is placed on or after [1 August 2007]; or

.2 In the absence of a building contract, the keels of which are laid or which are at a similar stage of construction on or after [1 February 2008]; or

.3 The delivery of which is on or after [1 August 2010]; or

.4 Which have undergone a major conversion:

.1 for which the contract is placed after [1 August 2007]; or

.2 in the absence of contract, the construction work of which is begun after [1 February 2008]; or

.3 which is completed after [1 August 2010].

2 The application of this regulation in determining the location of tanks used to carry oil fuel does not govern over the provisions of regulation 19 of this annex.

3 For the purpose of this regulation, the following definitions shall apply:

.1 "Oil fuel" means any oil used as fuel oil in connection with the propulsion and auxiliary machinery of the ship in which such oil is carried.

.2 "Load line draught (d_S)" is the vertical distance, in metres, from the moulded baseline at mid-length to the waterline corresponding to the summer freeboard draught to be assigned to the ship.

.3 "Light ship draught" is the moulded draught amidships corresponding to the lightweight.

.4 "Partial load line draught (d_P)" is the light ship draught plus 60% of the difference between the light ship draught and the load line draught d_S. The partial load line draught (d_p) shall be measured in metres.

.5 "Waterline (d_B)" is the vertical distance, in metres, from the moulded baseline at mid-length to the waterline corresponding to 30% of the depth D_S.

.6 "Breadth (B_S)" is the greatest moulded breadth of the ship, in metres, at or below the deepest load line draught (d_S).

.7 "Breadth (B_B)" is the greatest moulded breadth of the ship, in metres, at or below the waterline (d_B).

.8 "Depth (D_S)" is the moulded depth, in metres, measured at mid-length to the upper deck at side. For the purpose of the application, "upper deck" means the highest deck to which the watertight transverse bulkheads except aft peak bulkheads extend.

.9 "Length (L)" means 96% of the total length on a waterline at 85% of the least moulded depth measured from the top of the keel, or the length from the foreside of the stem to the axis of the rudder stock on that waterline, if that be greater. In ships designed with a rake of keel the waterline on which this length is measured shall be parallel to the designed waterline. The length (L) shall be measured in metres.

.10 "Breadth (B)" means the maximum breadth of the ship, in metres, measured amidships to the moulded line of the frame in a ship with a metal shell and to the outer surface of the hull in a ship with a shell of any other material.

.11 "Small oil fuel tank" is an oil fuel tank with a maximum individual capacity not greater than 30 m^3.

.12 "C" is the vessel's total volume of oil fuel, in m^3, at 98% tank filling.

4 The provisions of this regulation shall apply to all oil fuel tanks except small oil fuel tanks, as defined in 3.11, provided that the aggregate capacity of such excluded tanks is not greater than 600 m^3.

5 Individual oil fuel tanks shall not have a capacity of over 2,500 m^3.

6 For ships having an aggregate oil fuel capacity of 600 m^3 and above, oil fuel tanks shall be located above the moulded line of the bottom shell plating nowhere less than the distance h as specified below:

h = B/20 m or,

h = 2.0 m, whichever is the lesser.

The minimum value of h = 0.76 m.

In the turn of the bilge area and at locations without a clearly defined turn of the bilge, the oil fuel tank boundary line shall run parallel to the line of the midship flat bottom as shown in figure 1.

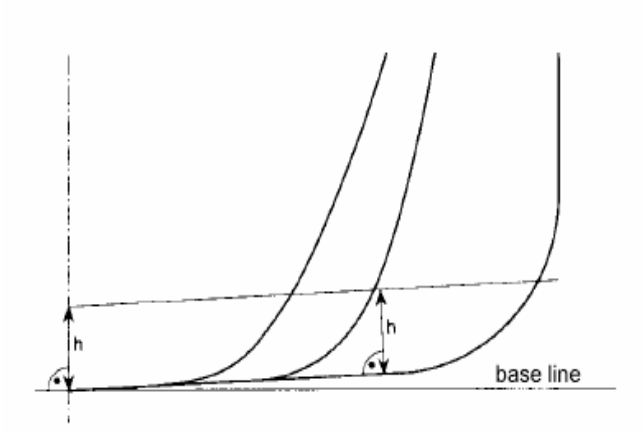

Figure 1 – Oil fuel tank boundary lines for the purpose of paragraph 6

7 For ships having an aggregate oil fuel capacity of 600 m^3 or more but less than 5,000 m^3, oil fuel tanks shall be located inboard of the moulded line of the side shell plating, nowhere less than the distance w which, as shown in figure 2, is measured at any cross-section at right angles to the side shell, as specified below:

w = 0.4 + 2.4 C/20,000 m

The minimum value of w = 1.0 m, however for individual tanks with an oil fuel capacity of less than 500 m^3 the minimum value is 0.76 m.

8 For ships having an aggregate oil fuel capacity of 5,000 m^3 and over, oil fuel tanks shall be located inboard of the moulded line of the side shell plating, nowhere less than the distance w which, as show in figure 2, is measured at any cross-section at right angles to the side shell, as specified below:

w = 0.5 + C/20,000 m or

w = 2.0 m, whichever is the lesser.

The minimum value of w = 1.0 m.

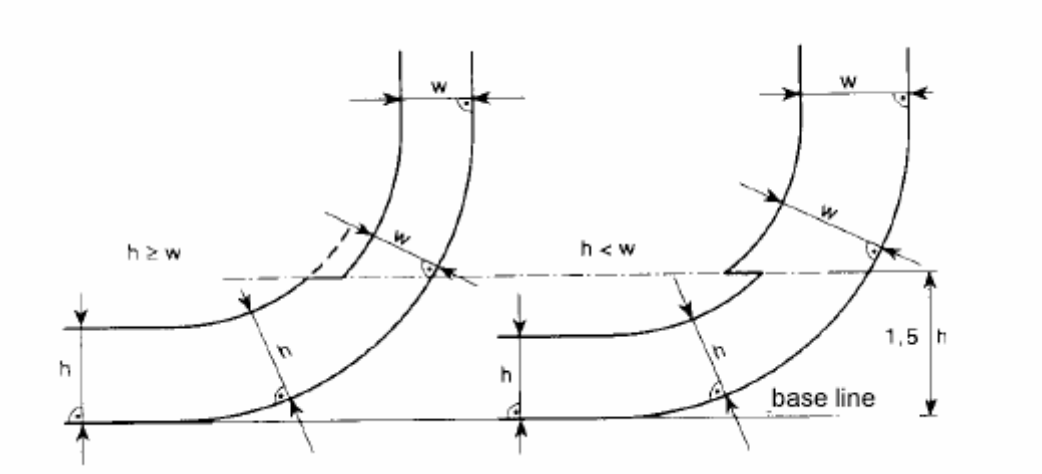

Figure 2 – Oil fuel tank boundary lines for the purpose of paragraphs 7 and 8

9 Lines of oil fuel piping located at a distance from the ship's bottom of less than *h*, as defined in paragraph 6, or from the ship's side less than *w*, as defined in paragraphs 7 and 8 shall be fitted with valves or similar closing devices within or immediately adjacent to the oil fuel tank. These valves shall be capable of being brought into operation from a readily accessible enclosed space the location of which is accessible from the navigation bridge or propulsion machinery control position without traversing exposed freeboard or superstructure decks. The valves shall close in case of remote control system failure (fail in a closed position) and shall be kept closed at sea at any time when the tank contains oil fuel except that they may be opened during oil fuel transfer operations.

10 Suction wells in oil fuel tanks may protrude into the double bottom below the boundary line defined by the distance h provided that such wells are as small as practicable and the distance between the well bottom and the bottom shell plating is not less than 0.5 h.

11 Alternatively to paragraphs 6 and either 7 or 8, ships shall comply with the accidental oil fuel outflow performance standard specified below:

.1 The level of protection against oil fuel pollution in the event of collision or grounding shall be assessed on the basis of the mean oil outflow parameter as follows:

$O_M < 0.0157\text{-}1.14E\text{-}6 \cdot C$ $\quad 600\ m^3 \leq C < 5{,}000\ m^3$

$O_M < 0.010$ $\quad C \geq 5{,}000\ m^3$

Where O_M = mean oil outflow parameter;
C = total "oil fuel" capacity as defined in 3.12.

.2 The following general assumption shall apply when calculating the mean oil outflow parameter:

.1 The ship shall be assumed loaded to the partial load line draught d_P without trim or heel.

.2 All oil fuel tanks shall be assumed loaded to 98% of their volumetric capacity.

.3 The nominal density of the oil fuel (ρ_n) shall generally be taken as 1,000 kg/m^3. If the density of the oil fuel is specifically restricted to a lesser value, the lesser value may be applied.

.4 For the purpose of these outflow calculations, the permeability of each oil fuel tank shall be taken as 0.99, unless proven otherwise.

.3 The following assumptions shall be used when combining the oil outflow parameters:

.1 The mean oil outflow shall be calculated independently for side damage and for bottom damage and then combined into a non-dimensional oil outflow parameter O_M, as follows:

$$O_M = (0.4\ O_{MS} + 0.6\ O_{MB}) / C$$

where:

O_{MS} = mean outflow for side damage, in m^3
O_{MB} = mean outflow for bottom damage, in m^3
C = total "oil fuel" capacity as defined in 3.12.

.2 For bottom damage, independent calculations for mean outflow shall be done for 0 m and 2.5 m tide conditions, and then combined as follows:

$$O_{MB} = 0.7\ O_{MB(0)} + 0.3\ O_{MB(2.5)}$$

where:

$O_{MB(0)}$ = mean outflow for 0 m tide condition, and
$O_{MB(2.5)}$ = mean outflow for minus 2.5 m tide condition, in m^3.

.4 The mean outflow for side damage O_{MS} shall be calculated as follows:

$$O_{MS} = \sum_{1}^{n} P_{S(i)}\ O_{S(i)} \quad [m^3]$$

where:

i = represents each oil fuel tank under consideration;
n = total number of oil fuel tanks;
$P_{S(i)}$ = the probability of penetrating oil fuel tank i from side damage, calculated in accordance with paragraph 11.6 of this regulation;
$O_{S(i)}$ = the outflow, in m^3, from side damage to oil fuel tank i, which is assumed equal to the total volume in oil fuel tank i at 98% filling.

.5 The mean outflow for bottom damage shall be calculated for each tidal condition as follows:

.1 $$O_{MB(0)} = \sum_{1}^{n} P_{B(i)}\ O_{B(i)}\ C_{DB(i)}\ [m^3]$$

where:

i = represents each oil fuel tank under consideration;
n = total number of oil fuel tanks;
$P_{B(i)}$ = the probability of penetrating oil fuel tank i from bottom damage, calculated in accordance with paragraph 11.7 of this regulation;
$O_{B(i)}$ = the outflow from oil fuel tank i, in m^3, calculated in accordance with paragraph 11.5.3 of this regulation; and
$C_{DB(i)}$ = factor to account for oil capture as defined in paragraph 11.5.4.

.2 $O_{MB(2.5)} = \sum_{1}^{n} P_{B(i)} O_{B(i)} C_{DB(i)}$ $[m^3]$

where:

i, n, $P_{B(i)}$ and $C_{DB(i)}$ = as defined in subparagraph .1 above
$O_{B(i)}$ = the outflow from oil fuel tank i, in m^3, after tidal change.

.3 The oil outflow $O_{B(i)}$ for each oil fuel tank shall be calculated based on pressure balance principles, in accordance with the following assumptions:

.1 The ship shall be assumed stranded with zero trim and heel, with the stranded draught prior to tidal change equal to the partial load line draught d_P.

.2 The oil fuel level after damage shall be calculated as follows:

$$h_F = \{(d_P + t_C - Z_l)(\rho_S)\}/\rho_n$$

where: h_F = the height of the oil fuel surface above Z_l, in m;
t_C = the tidal change, in m. Reductions in tide shall be expressed as negative values;
Z_l = the height of the lowest point in the oil fuel tank above the baseline, in m;
ρ_S = density of seawater, to be taken as 1,025 kg/m^3; and,
ρ_n = nominal density of the oil fuel, as defined in 11.2.3.

.3 The oil outflow $O_{B(i)}$ for any tank bounding the bottom shell plating shall be taken not less than:

$$O_{B(i)} = H_W \cdot A$$

where:

H_W = 1.0 m, when $Y_B = 0$
H_W = $B_B/50$ but not greater than 0.4 m, when Y_B is greater than $B_B/5$ or 11.5 m, whichever is less

For Y_B values outboard $B_B/5$ or 11.5 m, whichever is less, H_W is to be linearly interpolated.

Y_B = the minimum value of Y_B over the length of the oil fuel tank, where at any given location, Y_B is the transverse distance between the side shell at waterline d_B and the tank at or below waterline d_B.

A = the maximum horizontal projected area of the oil fuel tank up to the level of H_W from the bottom of the tank.

.4 In the case of bottom damage, a portion from the outflow from an oil fuel tank may be captured by non-oil compartments. This effect is approximated by application of the factor $C_{DB(i)}$ for each tank, which shall be taken as follows:

$C_{DB(i)}$ = 0.6 for oil fuel tanks bounded from below by non-oil compartments;

$C_{DB(i)}$ = 1 for oil fuel tanks bounded by the bottom shell.

.6 The probability P_S of breaching a compartment from side damage shall be calculated as follows:

.1 $P_S = P_{SL} \cdot P_{SV} \cdot P_{ST}$

where: P_{SL} = $(1 – P_{Sf} – P_{Sa})$ = probability the damage will extend into the longitudinal zone bounded by X_a and X_f;
P_{SV} = $(1 – P_{Su} – P_{Sl})$ = probability the damage will extend into the vertical zone bounded by Z_l and Z_u;
P_{ST} = $(1 – P_{Sy})$ = probability the damage will extend transversely beyond the boundary defined by y;

.2 P_{Sa}, P_{Sf}, P_{Su} and P_{Sl} shall be determined by linear interpolation from the table of probabilities for side damage provided in 11.6.3, and P_{Sy} shall be calculated from the formulas provided in 11.6.3, where:
P_{Sa} = the probability the damage will lie entirely aft of location X_a/L;
P_{Sf} = the probability the damage will lie entirely forward of location X_f/L;
P_{Sl} = probability the damage will lie entirely below the tank;
P_{Su} = probability the damage will lie entirely above the tank; and
P_{Sy} = probability the damage will lie entirely outboard the tank.

Compartment boundaries X_a, X_f, Z_l, Z_u and y shall be developed as follows:
X_a = the longitudinal distance from aft terminal of L to the aft most point on the compartment being considered, in m;
X_f = the longitudinal distance from aft terminal of L to the foremost point on the compartment being considered, in m;
Z_l = the vertical distance from the moulded baseline to the lowest point on the compartment being considered, in m. Where Z_l is greater than D_S, Z_l shall be taken as D_S;
Z_u = the vertical distance from the moulded baseline to the highest point on the compartment being considered, in m. Where Z_u is greater than D_S, Z_u shall be taken as D_S; and,
y = the minimum horizontal distance measured at right angles to the centreline between the compartment under consideration and the side shell, in m[1].

1 For symmetrical tank arrangements, damages are considered for one side of the ship only, in which case all "y" dimensions are to be measured from that side. For asymmetrical arrangements reference is made to the Explanatory Notes on matters related to the accidental oil outflow performance, adopted by the Organization by resolution MEPC.122(52).

In way of the turn of the bilge, y need not to be considered below a distance h above baseline, where h is lesser of B/10, 3 m or the top of the tank.

.3 Table of Probabilities for side damage

X_a/L	P_{Sa}		X_f/L	P_{Sf}		Z_l/D_S	P_{Sl}		Z_u/D_S	P_{Su}
0,00	0,000		0,00	0,967		0,00	0,000		0,00	0,968
0,05	0,023		0,05	0,917		0,05	0,000		0,05	0,952
0,10	0,068		0,10	0,867		0,10	0,001		0,10	0,931
0,15	0,117		0,15	0,817		0,15	0,003		0,15	0,905
0,20	0,167		0,20	0,767		0,20	0,007		0,20	0,873
0,25	0,217		0,25	0,717		0,25	0,013		0,25	0,836
0,30	0,267		0,30	0,667		0,30	0,021		0,30	0,789
0,35	0,317		0,35	0,617		0,35	0,034		0,35	0,733
0,40	0,367		0,40	0,567		0,40	0,055		0,40	0,670
0,45	0,417		0,45	0,517		0,45	0,085		0,45	0,599
0,50	0,467		0,50	0,467		0,50	0,123		0,50	0,525
0,55	0,517		0,55	0,417		0,55	0,172		0,55	0,452
0,60	0,567		0,60	0,367		0,60	0,226		0,60	0,383
0,65	0,617		0,65	0,317		0,65	0,285		0,65	0,317
0,70	0,667		0,70	0,267		0,70	0,347		0,70	0,255
0,75	0,717		0,75	0,217		0,75	0,413		0,75	0,197
0,80	0,767		0,80	0,167		0,80	0,482		0,80	0,143
0,85	0,817		0,85	0,117		0,85	0,553		0,85	0,092
0,90	0,867		0,90	0,068		0,90	0,626		0,90	0,046
0,95	0,917		0,95	0,023		0,95	0,700		0,95	0,013
1,00	0,967		1,00	0,000		1,00	0,775		1,00	0,000

P_{Sy} shall be calculated as follows:

$P_{Sy} = (24.96 - 199.6\ y/B_S)\ (y/B_S)$ for $y/B_S \leq 0.05$
$P_{Sy} = 0.749 + \{5 - 44.4\ (y/B_S - 0.05)\}\ \{(y/B_S) - 0.05\}$ for $0.05 < y/B_S < 0.1$
$P_{Sy} = 0.888 + 0.56\ (\ y/B_S - 0.1)$ for $y/B_S \geq 0.1$

P_{Sy} is not to be taken greater than 1.

.7 The probability P_B of breaching a compartment from bottom damage shall be calculated as follows:

.1 $P_B = P_{BL} \cdot P_{BT} \cdot P_{BV}$
where: P_{BL} = $(1 - P_{Bf} - P_{Ba})$ = probability the damage will extend into the longitudinal zone bounded by X_a and X_f;
P_{BT} = $(1 - P_{Bp} - P_{Bs})$ = probability the damage will extend into transverse zone bounded by Y_p and Y_s; and
P_{BV} = $(1 - P_{Bz})$ = probability the damage will extend vertically above the boundary defined by z;

.2 P_{Ba}, P_{Bf}, P_{Bp} and P_{Bs} shall be determined by linear interpolation from the table of probabilities for bottom damage provided in 11.7.3, and P_{Bz} shall be calculated from the formulas provided in 11.7.3, where:

P_{Ba} = the probability the damage will lie entirely aft of location X_a/L;
P_{Bf} = the probability the damage will lie entirely forward of location X_f/L;
P_{Bp} = probability the damage will lie entirely to port of the tank;
P_{Bs} = probability the damage will lie entirely to starboard the tank; and
P_{Bz} = probability the damage will lie entirely below the tank.

Compartment boundaries X_a, X_f, Y_p, Y_s and z shall be developed as follows:

X_a and X_f as defined in 11.6.2;

Y_p = the transverse distance from the port-most point on the compartment located at or below the waterline d_B, to a vertical plane located $B_B/2$ to starboard of the ship's centerline;

Y_s = the transverse distance from the starboard-most point on the compartment located at or below the waterline d_B, to a vertical plane located $B_B/2$ to starboard of the ship's centerline; and

z = the minimum value of z over the length of the compartment, where, at any given longitudinal location, z is the vertical distance from the lower point of the bottom shell at that longitudinal location to the lower point of the compartment at that longitudinal location.

.3 Table of probabilities for bottom damage

X_a/L	P_{Ba}		X_f/L	P_{Bf}		Y_p/B_B	P_{Bp}		Y_s/B_B	P_{Bs}
0,00	0,000		0,00	0,969		0,00	0,844		0,00	0,000
0,05	0,002		0,05	0,953		0,05	0,794		0,05	0,009
0,10	0,008		0,10	0,936		0,10	0,744		0,10	0,032
0,15	0,017		0,15	0,916		0,15	0,694		0,15	0,063
0,20	0,029		0,20	0,894		0,20	0,644		0,20	0,097
0,25	0,042		0,25	0,870		0,25	0,594		0,25	0,133
0,30	0,058		0,30	0,842		0,30	0,544		0,30	0,171
0,35	0,076		0,35	0,810		0,35	0,494		0,35	0,211
0,40	0,096		0,40	0,775		0,40	0,444		0,40	0,253
0,45	0,119		0,45	0,734		0,45	0,394		0,45	0,297
0,50	0,143		0,50	0,687		0,50	0,344		0,50	0,344
0,55	0,171		0,55	0,630		0,55	0,297		0,55	0,394
0,60	0,203		0,60	0,563		0,60	0,253		0,60	0,444
0,65	0,242		0,65	0,489		0,65	0,211		0,65	0,494
0,70	0,289		0,70	0,413		0,70	0,171		0,70	0,544
0,75	0,344		0,75	0,333		0,75	0,133		0,75	0,594
0,80	0,409		0,80	0,252		0,80	0,097		0,80	0,644
0,85	0,482		0,85	0,170		0,85	0,063		0,85	0,694
0,90	0,565		0,90	0,089		0,90	0,032		0,90	0,744
0,95	0,658		0,95	0,026		0,95	0,009		0,95	0,794
1,00	0,761		1,00	0,000		1,00	0,000		1,00	0,844

P_{Bz} shall be calculated as follows:

$P_{Bz} = (14.5 – 67\ z/D_S)\ (z/D_S)$ for $z/D_S \leq 0.1$
$P_{Bz} = 0.78 + 1.1\ \{(z/D_S - 0.1)\}$ for $z/D_S > 0.1$
P_{Bz} is not to be taken greater than 1.

.8 Any oil fuel tanks that do not border the outer shell plating shall be located no closer to the bottom shell plating than the minimum value of *h* in paragraph 6 and no closer to the side shell plating than the applicable minimum value of *w* in paragraph 7 or 8.

12 In approving the design and construction of ships to be built in accordance with this regulation, Administrations shall have due regard to the general safety aspects, including the need for maintenance and inspection of wing and double bottom tanks or spaces.

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ANNEX 3

DRAFT AMENDMENTS TO THE IOPP CERTIFICATE SUPPLEMENT (FORMS A AND B)

The following new paragraph [2A] is added to the Supplement of the IOPP Certificate (Forms A and B):

"2A.1 The ship is required to be constructed according to regulation [13A] and complies with the requirements of:

paragraph (6), (7) or (8) (double hull construction) ☐

paragraph (11) (accidental oil fuel outflow performance). ☐

2A.2 The ship is not required to comply with the requirements of regulation [13A]. ☐ "

***

ANNEX 4

DRAFT AMENDMENTS TO SOLAS CHAPTER III

Regulation 7 – Personal life-saving appliances

1 The following new subparagraphs are added to paragraph 2.1:

"**.1** for passenger ships on voyages less than 24 hours, a number of infant lifejackets equal to at least 2.5% of the number of passengers on board shall be provided;

.2 for passenger ships on voyages 24 hours or greater, infant lifejackets shall be provided for each infant on board;"

and the existing subparagraphs .1 and .2 are renumbered as .3 and .4.

2 The following new subparagraph is added to paragraph 2.1:

"**.5** if the adult lifejackets provided are not designed to fit persons with a chest girth of up to 1,750 mm, a sufficient number of suitable accessories shall be available on board to allow them to be secured to such persons."

***

ANNEX 5

DRAFT AMENDMENTS TO THE INTERNATIONAL LIFE-SAVING APPLIANCE (LSA) CODE

Chapter I

General

1 Subparagraph .2 of paragraph 1.2.2 is replaced with the following:

"**.2** not be damaged in stowage throughout the air temperature range -30°C to +65°C and, in the case of personal lifesaving appliances, unless otherwise specified, remain operational throughout the air temperature range -15°C to +40°C;"

2 Subparagraph .6 of paragraph 1.2.2 is replaced with the following:

"**.6** be of international or vivid reddish orange, or a comparably highly visible colour on all parts where this will assist detection at sea;"

Chapter II

Personal life-saving appliances

3 The words "sufficient to operate the quick release arrangement" in paragraph 2.1.1.7 are replaced with "of not less than 4 kg".

4 In paragraph 2.1.3, move the word "and" from the end of subparagraph .4 to the end of subparagraph .5, and add the following new subparagraph .6:

"**.6** be provided with a quick-release arrangement that will automatically release and activate the signal and associated self-igniting light connected to a lifebuoy having a mass of not more than 4 kg."

5 Replace the existing section 2.2 with the following:

"**2.2 Lifejackets**

2.2.1 *General requirements for lifejackets*

2.2.1.1 A lifejacket shall not sustain burning or continue melting after being totally enveloped in a fire for a period of 2 s.

2.2.1.2 Lifejackets shall be provided in three sizes in accordance with table 2.1. If a lifejacket fully complies with the requirements of two adjacent size ranges, it may be marked with both size ranges, but the specified ranges shall not be divided. Lifejackets shall be marked by either weight or height, or by both weight and height, according to table 2.1.

Table 2.1 – Lifejacket sizing criteria

Lifejacket marking	Infant	Child	Adult
User's size:			
Weight (kg)	less than 15	15 or more but less than 43	43 or more
Height (cm)	less than 100	100 or more but less than 155	155 or more

2.2.1.3 If an adult lifejacket is not designed to fit persons weighing up to 140 kg and with a chest girth of 1,750 mm, suitable accessories shall be available to allow it to be secured to such persons.

2.2.1.4 The in-water performance of a lifejacket shall be evaluated by comparison to the performance of a suitable size standard reference lifejacket, i.e. Reference Test Device (RTD) complying with the recommendations of the Organization.*

2.2.1.5 An adult lifejacket shall be so constructed that:

.1 at least 75% of persons who are completely unfamiliar with the lifejacket can correctly don it within a period of 1 min without assistance, guidance or prior demonstration;

.2 after demonstration, all persons can correctly don it within a period of 1 min without assistance;

.3 it is clearly capable of being worn in only one way or inside–out and, if donned incorrectly, it is not injurious to the wearer;

.4 the method of securing the lifejacket to the wearer has quick and positive means of closure that do not require tying of knots;

.5 it is comfortable to wear; and

.6 it allows the wearer to jump into the water from a height of at least 4.5 m while holding on to the lifejacket, and from a height of at least 1m with arms held overhead, without injury and without dislodging or damaging the lifejacket or its attachments.

2.2.1.6 When tested according to the recommendations of the Organization on at least 12 persons, adult lifejackets shall have sufficient buoyancy and stability in calm fresh water to:

.1 lift the mouth of exhausted or unconscious persons by an average height of not less than the average provided by the adult RTD;

* Refer to the Revised Recommendation on Testing of Life-saving Appliances, adopted by the Organization by resolution MSC.81(70)[, as amended].

.2 turn the body of unconscious, face-down persons in the water to a position where the mouth is clear of the water in an average time not exceeding that of the RTD, with the number of persons not turned by the lifejacket no greater than that of the RTD;

.3 incline the body backwards from the vertical position for an average torso angle of not less than that of the RTD minus 5°;

.4 lift the head above horizontal for an average faceplane angle of not less than that of the RTD minus 5°; and

.5 return the wearer to a stable face-up position after being destabilized when floating in the flexed foetal position.*

2.2.1.7 An adult lifejacket shall allow the person wearing it to swim a short distance and to board a survival craft.

2.2.1.8 An infant or child lifejacket shall perform the same as an adult lifejacket except as follows:

.1 donning assistance is permitted for small children and infants;

.2 the appropriate child or infant RTD shall be used in place of the adult RTD; and

.3 assistance may be given to board a survival craft, but wearer mobility shall not be reduced to any greater extent than by the appropriate size RTD.

2.2.1.9 With the exception of freeboard and self-righting performance, the requirements for infant lifejackets may be relaxed, if necessary, in order to:

.1 facilitate the rescue of the infant by a caretaker;

.2 allow the infant to be fastened to a caretaker and contribute to keeping the infant close to the caretaker;

.3 keep the infant dry, with free respiratory passages;

.4 protect the infant against bumps and jolts during evacuation; and

.5 allow a caretaker to monitor and control heat loss by the infant.

2.2.1.10 In addition to the markings required by paragraph 1.2.2.9, an infant or child lifejacket shall be marked with:

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* Refer to the illustration on page 11 of the IMO Pocket Guide to Cold Water Survival and the Revised Recommendation on Testing of Life-saving Appliances adopted by the Organization by resolution MSC.81(70)[, as amended].

.1 the size range in accordance with 2.2.1.2; and

.2 an "infant" or "child" symbol as shown in the "infant's lifejacket" or "child's lifejacket" symbol adopted by the Organization.*

2.2.1.11 A lifejacket shall have buoyancy which is not reduced by more than 5% after 24 h submersion in fresh water.

2.2.1.12 The buoyancy of a lifejacket shall not depend on the use of loose granulated materials.

2.2.1.13 Each lifejacket shall be provided with means of securing a lifejacket light as specified in paragraph 2.2.3 such that it shall be capable of complying with paragraphs 2.2.1.4.6 and 2.2.3.1.3.

2.2.1.14 Each lifejacket shall be fitted with a whistle firmly secured by a lanyard.

2.2.1.15 Lifejacket lights and whistles shall be selected and secured to the lifejacket in such a way that their performance in combination is not degraded.

2.2.1.16 A lifejacket shall be provided with a releasable buoyant means to secure it to a lifejacket worn by another person in the water.

2.2.1.17 A lifejacket shall be provided with a suitable means to allow a rescuer to lift the wearer from the water into a survival craft or rescue boat.

2.2.2 *Inflatable lifejackets*

A lifejacket which depends on inflation for buoyancy shall have not less than two separate compartments, shall comply with the requirements of paragraph 2.2.1, and shall:

.1 inflate automatically upon immersion, be provided with a device to permit inflation by a single manual motion and be capable of having each chamber inflated by mouth;

.2 in the event of loss of buoyancy in any one compartment be capable of complying with the requirements of paragraphs 2.2.1.5, 2.2.1.6 and 2.2.1.7; and

.3 comply with the requirements of paragraph 2.2.1.11 after inflation by means of the automatic mechanism.

2.2.3 *Lifejacket lights*

2.2.3.1 Each lifejacket light shall:

.1 have a luminous intensity of not less than 0.75 cd in all directions of the upper hemisphere;

* Refer to Symbols related to Life-Saving Appliances and Arrangements adopted by the Organization by resolution A.760(18)[, as amended].

.2 have a source of energy capable of providing a luminous intensity of 0.75 cd for a period of at least 8 h;

.3 be visible over as great a segment of the upper hemisphere as is practicable when attached to a lifejacket; and

.4 be of white colour.

2.2.3.2 If the light referred to in paragraph 2.2.3.1 is a flashing light it shall, in addition:

.1 be provided with a manually operated switch; and

.2 flash at a rate of not less than 50 flashes and not more than 70 flashes per minute with an effective luminous intensity of at least 0.75 cd."

6 The word "The" in the beginning of paragraph 2.3.1.1 is replaced with "An".

7 The words "if the immersion suit is to be worn in conjunction with a lifejacket" in paragraph 2.3.1.1.1 are replaced with "if the immersion suit must be worn in conjunction with a lifejacket to meet the requirements of paragraph 2.3.1.2".

8 The existing subparagraph .3 of paragraph 2.3.1.1 is replaced with the following:

"**.3** it will cover the whole body with the exception of the face, except that covering for the hands may be provided by separate gloves which shall be permanently attached to the suit;"

9 Existing paragraph 2.3.1.2 is replaced with the following:

"**2.3.1.2** An immersion suit on its own, or worn in conjunction with a lifejacket if necessary, shall have sufficient buoyancy and stability in calm fresh water to:

.1 lift the mouth of an exhausted or unconscious person clear of the water by not less than 120 mm; and

.2 allow the wearer to turn from a face-down to a face-up position in not more than 5 s."

10 Insert the words "or its attachments," in between "the immersion suit" and "or being injured" in paragraph 2.3.1.3.3.

11 The number "2.2.1.8" is replaced with "2.2.1.14" in paragraph 2.3.1.4.

12 Insert the following new paragraphs 2.3.1.5 and 2.3.1.6 after existing paragraph 2.3.1.4:

"**2.3.1.5** An immersion suit which has buoyancy and is designed to be worn without a lifejacket shall be provided with a releasable buoyant means to secure it to a suit worn by another person in the water.

2.3.1.6 An immersion suit which has buoyancy and is designed to be worn without a lifejacket shall be provided with a suitable means to allow a rescuer to lift the wearer from the water into a survival craft or rescue boat."

13 Existing paragraph 2.3.1.5 is replaced with the following:

"**2.3.1.7** If an immersion suit is to be worn in conjunction with a lifejacket, the lifejacket shall be worn over the immersion suit. Persons wearing such an immersion suit shall be able to don a lifejacket without assistance. The immersion suit shall be marked to indicate that it must be worn in conjunction with a compatible lifejacket."

14 Add the following new paragraph 2.3.1.8:

"**2.3.1.8** An immersion suit shall have buoyancy which is not reduced by more than 5% after 24 h submersion in fresh water and does not depend on the use of loose granulated materials."

15 Existing paragraph 2.3.3 is deleted.

16 The word "The" in the beginning of paragraph 2.4.1.1 is replaced with "An".

17 The subparagraph .3 of paragraph 2.4.1.1 is replaced with the following:

"**.3** covers the whole body except, where the Administration so permits, the feet; covering for the hands and head may be provided by separate gloves and a hood, both of which shall be permanently attached to the suit;"

18 Paragraph 2.4.1.2 is deleted and paragraphs 2.4.1.3 and 2.4.1.4 are renumbered as paragraphs 2.4.1.2 and 2.4.1.3 respectively.

19 Insert the words "or its attachments," in between "the suit" and "or being injured" in subparagraph .2 of the new paragraph 2.4.1.2.

20 New paragraph 2.4.1.3 is replaced with the following:

"**2.4.1.3** An anti-exposure suit shall be fitted with a light complying with the requirements of paragraph 2.2.3 such that it shall be capable of complying with paragraphs 2.2.3.1.3 and 2.4.1.2.2, and the whistle prescribed by paragraph 2.2.1.14."

21 The subparagraph .2 of paragraph 2.4.2.1 is replaced with the following:

"**.2** be so constructed that, when worn as marked and following one jump into the water which totally submerges the wearer, the suit continues to provide sufficient thermal protection to ensure that when it is worn in calm circulating water at a temperature of 5°C, the wearer's body core temperature does not fall at a rate of more than 1.5°C per hour, after the first 0.5 h."

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ANNEX 6

DRAFT AMENDMENTS TO THE REVISED RECOMMENDATION ON TESTING OF LIFE-SAVING APPLIANCES (RESOLUTION MSC.81(70))

PART 1 – *Prototype tests for life-saving appliances*

1 Subparagraph .3 of paragraph 1.1 is replaced with the following:

"**.3** if it is intended to operate the quick-release arrangement provided for a self-activated smoke signal and self-igniting light, the lifebuoy has a mass of not less than 4 kg (see 1.8); and"

2 The words "8 h cycle at +65°C" in paragraph 1.2.1.1 are replaced with "8 h exposure at a minimum temperature of +65°C".

3 After the words "under ordinary room conditions" in paragraphs 1.2.1.2 and 1.2.1.4, the words "at a temperature of 20°C ± 3°C" are added.

4 The words "8 h cycle at -30°C" in paragraph 1.2.1.3 are replaced with "8 h exposure at a maximum temperature of -30°C".

5 Paragraph 1.9.3 is replaced with the following:

"**1.9.3** The last three smoke signals taken from ordinary room conditions and attached by a line to a lifebuoy having a mass of not more than 4 kg should undergo the drop test into water prescribed in 1.3. The lifebuoy should have both a smoke signal and a lifebuoy light attached in the manner recommended by the manufacturers and be dropped from a quick-release fitting. The smoke signals should not be damaged and should function for a period of at least 15 min."

6 Add the following new paragraph 1.9.6:

"**1.9.6** A force of 225 N should be applied to the fitting that attaches the self-activating smoke signal to the lifebuoy. Neither the fitting nor the signal should be damaged as a result of the test."

7 Section 2 is replaced with the following:

"**2 LIFEJACKETS**

2.1 Temperature cycling test

A lifejacket should be subjected to the temperature cycling as prescribed in 1.2.1 and should then be externally examined. The lifejacket materials should show no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical qualities.

2.2 Buoyancy test

The buoyancy of the lifejacket should be measured before and after 24 h complete submersion to just below the surface in fresh water. The difference between the initial buoyancy and the final buoyancy should not exceed 5% of the initial buoyancy.

2.3 Fire test

A lifejacket should be subjected to the fire test prescribed in 1.5. The lifejacket should not sustain burning for more than 6 s or continue melting after being removed from the flames.

2.4 Tests of components other than buoyancy materials

All the materials, other than buoyancy materials, used in the construction of the lifejacket, including the cover, tapes, seams and closures should be tested to an international standard acceptable to the Organization* to establish that they are rot-proof, colour-fast and resistant to deterioration from exposure to sunlight and that they are not unduly affected by seawater, oil or fungal attack.

2.5 Strength tests

Body or lifting loop strength tests

2.5.1 The lifejacket should be immersed in water for a period of 2 min. It should then be removed from the water and closed in the same manner as when it is worn by a person. A force of not less than 3,200 N (2,400 N in the case of a child or infant-size lifejacket) should be applied for 30 min to the part of the lifejacket that secures it to the body of the wearer (see figure 1) and separately to the lifting loop of the lifejacket. The lifejacket should not be damaged as a result of this test. The test should be repeated for each encircling closure.

Shoulder lift test

2.5.2 The lifejacket should be immersed in water for a period of 2 min. It should then be removed from the water and closed on a form as shown in figure 2, in the same manner as when it is worn by a person. A force of not less than 900 N (700 N in the case of a child- or infant-size lifejacket) should be applied for 30 min across the form and the shoulder section of the lifejacket (see figure 3). The lifejacket should not be damaged as a result of this test. The lifejacket should remain secured on the form during this test.

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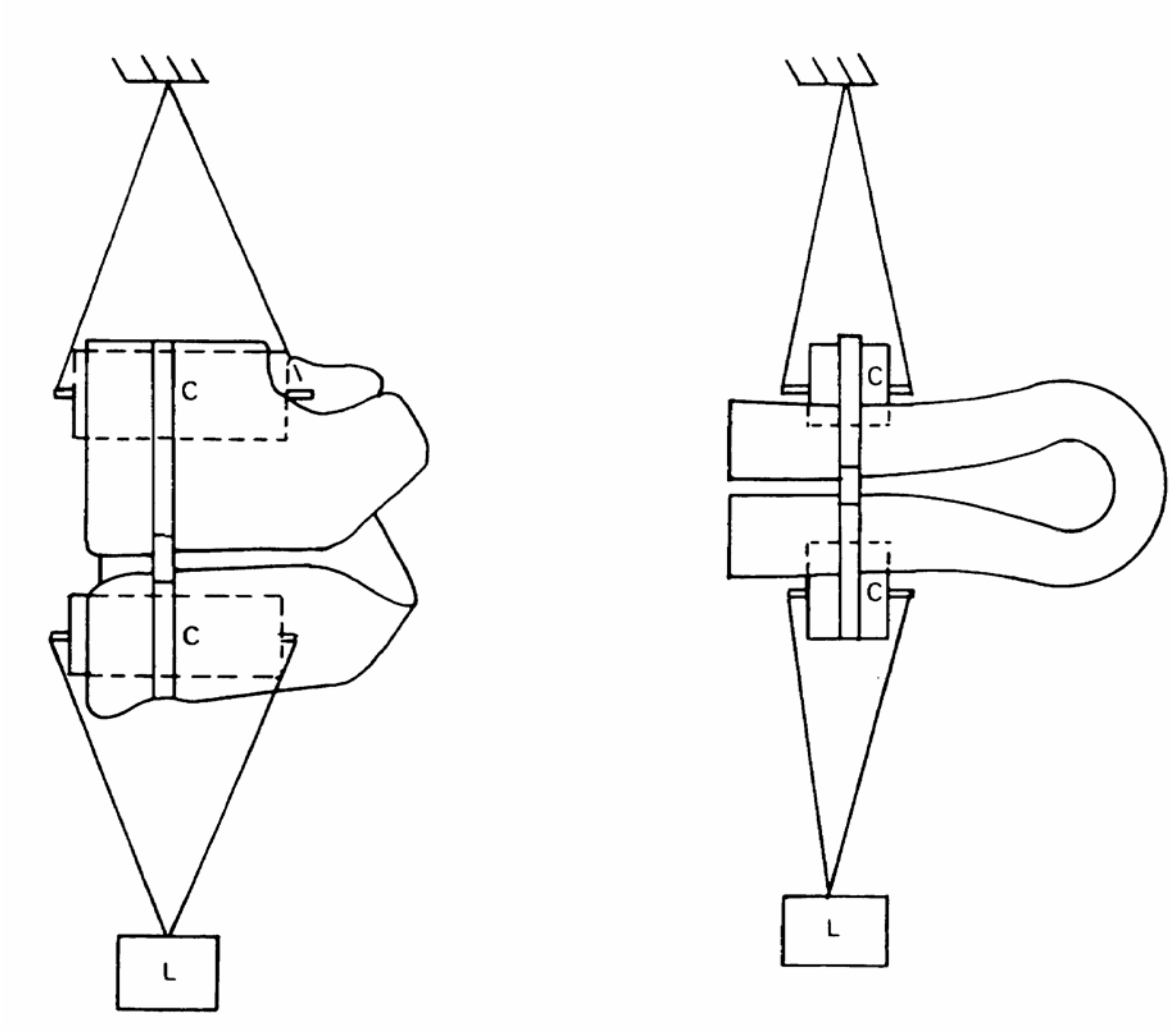
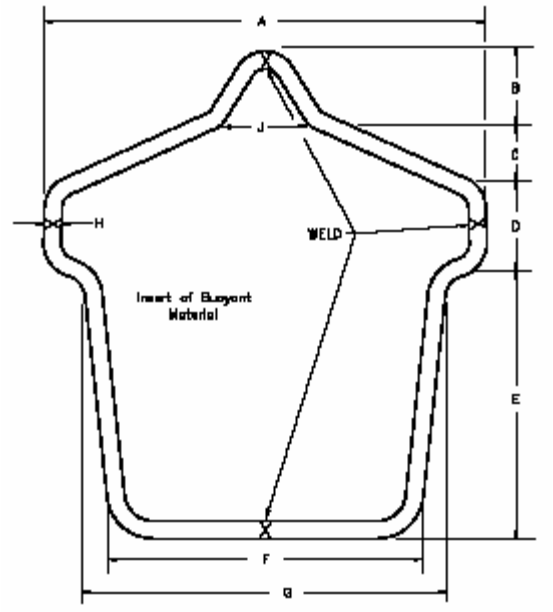
* Refer to the recommendations of the International Organization for Standardization, in particular publication ISO 12402-7 *Personal flotation devices – Part 7: Materials and components – Safety requirements and test methods* (to be published).



Vest-type lifejacket **Yoke or over-the-head-type lifejacket**

C - Cylinder
125 mm diameter for adult sizes
50 mm diameter for infant and child sizes
L - Test load

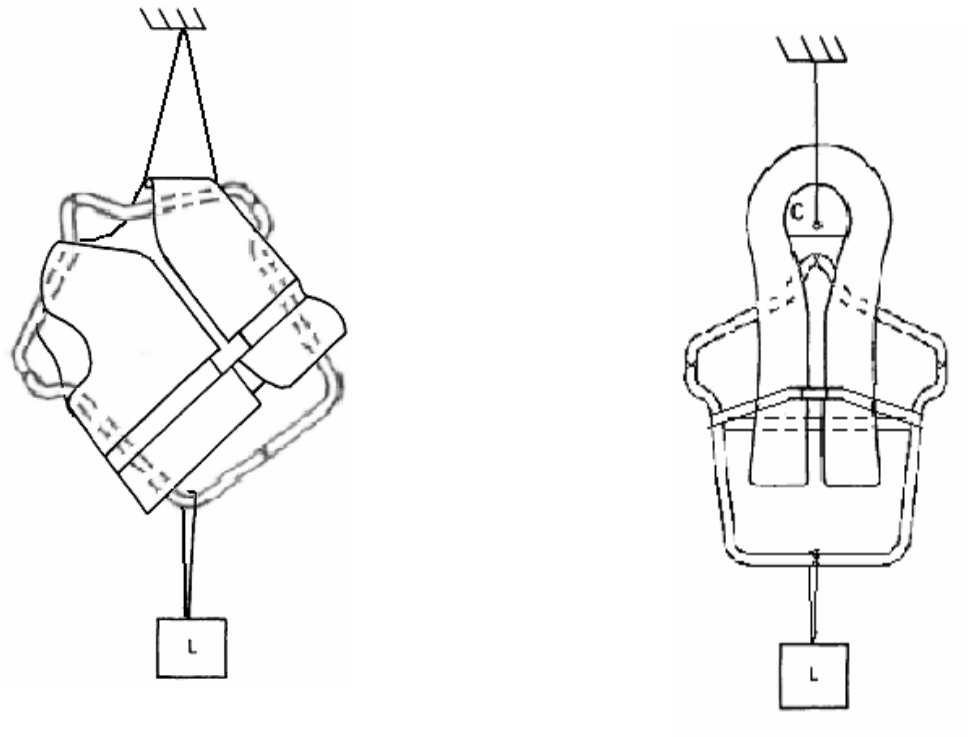
Figure 1 – Body strength test arrangement for lifejackets



Dimensions in mm

Size	A	B	C	D	E	F	G	H	J
Adult	610	114	76,2	127	381	432	508	25,4	178
Child	508	102	76,2	102	279	330	406	22,2	152
Infant	305	63,5	38,1	63,5	191	203	241	19,1	76,2

Figure 2 – Test form for shoulder lift test for lifejackets



Vest-type lifejacket **Yoke or over-the-head-type lifejacket**

C - Cylinder
125 mm diameter for adult sizes
50 mm diameter for infant and child sizes
L - Test load

Figure 3 – Shoulder lift test arrangement for lifejackets

2.6 Tests for lifejacket buoyancy material

The following tests should be carried out on eight specimens of each lifejacket buoyancy material. The specimens should be at least 300 mm square and be of the same thickness as used in the lifejacket. In the case of kapok, the entire lifejacket should be subjected to the test. The dimensions should be recorded at the beginning and end of these tests. Where multiple layers of materials are used to achieve the total thickness desired for the lifejacket, the specimens should be of the thinnest material used.

Test for stability under temperature cycling

2.6.1 Six specimens should be subjected to temperature cycling as prescribed in 1.2.1.

2.6.2 The dimensions of the specimens (except kapok) should be recorded at the end of the last cycle. The specimens should be carefully examined and should not show any sign of external change of structure or of mechanical qualities.

2.6.3 Two of the specimens should be cut open and should not show any sign of internal change of structure.

2.6.4 Four of the specimens should be used for compression and water absorption tests, two of which should be so tested after they have also been subjected to the diesel oil test as prescribed in 1.4.

Tests for compression and water absorption

2.6.5 The tests should be carried out in fresh water and the specimens should be immersed for a period of seven days under a 1.25 m head of water.

2.6.6 The tests should be carried out:

.1 on two specimens as supplied;

.2 on two specimens which have been subjected to the temperature cycling as prescribed in 2.6.1; and

.3 on two specimens which have been subjected to the temperature cycling as prescribed in 2.6.1 followed by the diesel oil test as prescribed in 1.4.

2.6.7 The results should state the buoyant force in N which each specimen exerts when submerged in water after one and seven days' immersion. The reduction of buoyancy should not exceed 10% for specimens which have been exposed to the diesel oil conditioning and must not exceed 5% for all other specimens. The specimens should show no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical qualities.

Tensile strength test

2.6.8 The tensile strength at break of the material should be measured before and after the combined exposure described in 2.6.6.3. When tested according to an international standard acceptable to the Organization*, the materials should have a minimum tensile strength of 140 kPa before exposure, which should not be reduced by more than 25% following the combined exposures. In the case of kapok, the protective cover should have a minimum breaking strength of 13 kPa before exposure, which should not be reduced by more than 25% following the combined exposures.

2.7 Donning test

2.7.1 To minimize the risk of incorrect donning by uninitiated persons, often in adverse conditions, lifejackets should be examined for the following features and tested as follows:

.1 fastenings necessary for proper performance should be few and simple, and provide quick and positive closure that does not require tying of knots;

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* Refer to the recommendations of the International Organization for Standardization, in particular publication ISO 12402-7, *Personal flotation devices – Part 7: Materials and components – Safety requirements and test methods* (to be published).

.2 adult lifejackets should readily fit various sizes of adults, both lightly and heavily clad; and

.3 all lifejackets should be capable of being worn inside-out, or clearly in only one way.

Test subjects

2.7.2 These tests should be carried out with at least 12 able-bodied persons who are completely unfamiliar with the lifejacket and selected according to the heights and weights in Table 2.1 and the following:

.1 small test subjects need not be adults;

.2 at least 1/3, but not more than 1/2 of test subjects should be females, including at least 1 per height category but excluding the tallest height;

.3 at least one male and one female should be from the lowest and highest weight group;

.4 at least one subject should be selected from each cell containing a "1"; and

.5 enough additional subjects should be selected from cells containing a "X" to total the required number of test subjects, with no more than one subject per cell. A uniform distribution across weight ranges should be maintained.

Table 2.1 - Test subject selection for adult lifejackets

	Weight Range – kg							
Height range -- m	40 - 43	43 - 60	60 - 70	70 - 80	80 - 100	100 - 110	110 - 120	>120
< 1.50	1	X	X	X				
1.50-1.60	X	1	1	X	X			
1.60-1.70		X	X	1	X	X		
1.70-1.80			X	X	1	X	X	X
1.80-1.90			X	X	X	1	1	X
> 1.90					X	X	X	1

Clothing

2.7.3 Each test subject should be tested wearing the clothing specified for the test and appropriate to their size as follows:

.**1** *Normal clothing* means normal indoor clothing, which would not normally interfere with the donning of a lifejacket; and

.2 *Heavy-weather clothing* means the attire appropriate for a hostile environment, including a hooded arctic parka and warm cotton gloves.

2.7.4 Each test shall be timed from when the order is given until the test subject declares that donning is complete. For assessment purposes donning is considered complete when the subject has donned and securely adjusted all methods of securing the lifejacket to the extent needed to meet the in-water performance requirements, including inflation, if needed.

Test without instruction

2.7.4.1 The test subjects may be tested individually or as a group. Wearing normal clothing, the first attempt should be with no assistance, guidance or prior demonstration. The lifejacket, with closures in the stored condition, should be placed on the floor, face up, in front of the test subject. The instruction provided should be identical for each subject and should be equivalent to the following: "PLEASE DON THIS LIFEJACKET AS QUICKLY AS POSSIBLE AND ADJUST IT TO A SNUG FIT SO YOU CAN ABANDON SHIP." The lifejacket should be capable of being donned by at least 75 % of the subjects, and within 1 minute. If a subject dons the lifejacket substantially correctly but fails to secure and/or adjust all closures, the jump test in 2.8.8 and in-water performance tests in 2.8.5 and 2.8.6 should be performed with the lifejacket as donned to establish whether the performance is acceptable and the donning is successful.

Test after instruction

2.7.4.2 For each subject whose first attempt exceeds 1 min or is incomplete, after demonstration or instruction to familiarize the subject with the donning procedure, the test subject should then don the lifejacket without assistance while wearing normal clothing, using the same instruction and timing method as in 2.7.4.1. Each subject should correctly don the lifejacket within a period of 1 minute.

Heavy-weather clothing test

2.7.4.3 Each subject should then don the lifejacket without assistance while wearing heavy-weather clothing, using the same instruction and timing method as in 2.7.4.1. Each subject should don the lifejacket correctly within a period of 1 minute.

2.8 Water performance tests

2.8.1 This portion of the test is intended to determine the ability of the lifejacket to assist a helpless person or one in an exhausted or unconscious state and to show that the lifejacket does not unduly restrict movement. The in-water performance of a lifejacket is evaluated by comparison to the performance of a suitable size standard reference lifejacket, i.e. Reference Test Device (RTD) as specified in appendices 1 to 3. All tests should be carried out in fresh water under still conditions.

Test subjects

2.8.2 These tests should be carried out with at least 12 persons as described in 2.7.2. Only good swimmers should be used, since the ability to relax in the water is rarely otherwise obtained.

Clothing

2.8.3 Subjects should wear only swimming costumes.

Preparation for water performance tests

2.8.4 The test subjects should be made familiar with each of the tests set out below, particularly the requirement regarding relaxing and exhaling in the face-down position. The test subject should don the lifejacket, unassisted, using only the instructions provided by the manufacturer. After entering the water, care should be taken to ensure that there is no significant amount of air unintentionally trapped in the lifejacket or swimming costume.

Righting tests

2.8.5 Each test subject should assume a prone, face down position in the water, but with the head lifted up so the mouth is out of the water. The subject's feet should be supported, shoulder width apart, with the heels just below the surface of the water. After assuming a starting position with the legs straight and arms along the sides, the subject should then be instructed in the following sequence to allow the body to gradually and completely relax into a natural floating posture: allow the arms and shoulders to relax; allow the legs to relax; and then the spine and neck, letting the head fall into the water while breathing out normally. During the relaxation phase the subject should be maintained in a stable face down position. Immediately after the subject has relaxed with the face in the water, simulating a state of utter exhaustion, the subject's feet should be released. The period of time until the mouth of the test subject comes clear of the water should be recorded to the nearest 1/10 of a second, starting from when the subject's feet are released. The above test should be conducted for a total of six times, and the highest and lowest times discarded. The test should then be conducted for a total of six times in the RTD and the highest and lowest times discarded.

Static balance measurements

2.8.6 At the conclusion of the righting tests without making any adjustments in body or lifejacket position, measurements should be made with the subject floating in the relaxed face-up position of static balance resulting from the preceding tests. The following measurements should be made (see figure 4):

.1 freeboard - the distance measured perpendicularly from the surface of the water to the lowest point of the subject's mouth where respiration may be impeded, if the mouth were not held shut. The lowest side of the mouth should be measured if the left and right sides are not level;

.2 faceplane angle - the angle, relative to the surface of the water, of the plane formed between the most forward part of the forehead and the chin;

.3 torso angle - the angle, relative to vertical, of the line formed by the forward points of the shoulder and hipbone (ilium portion of the pelvis); and

.4 list angle - the angle relative to the surface of the water and a line between the left and right shoulder or a line through the ears if only the head is tilted.

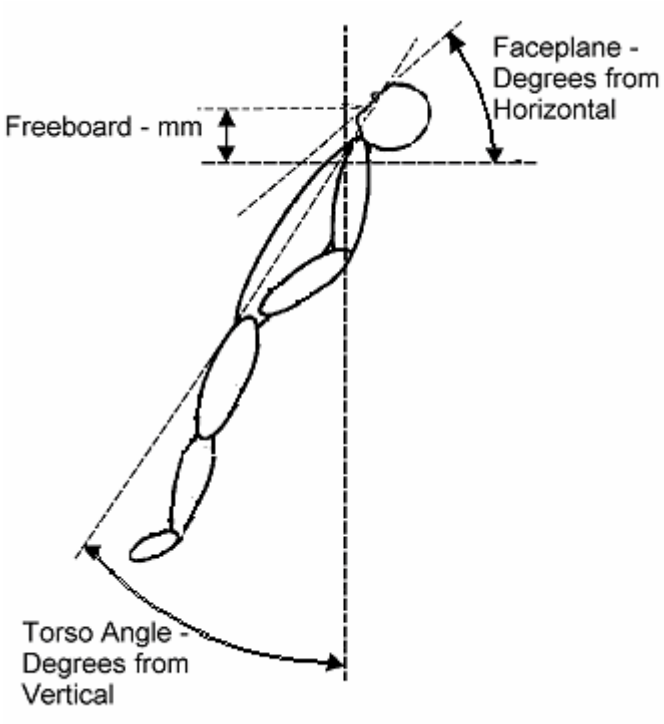


Figure 4 – Static balance measurements

Assessment

2.8.7 After the water tests described in 2.8.5 and .6 above:

.1 *Turning time:* The average turn time for all subjects in the candidate lifejacket should not exceed the average time in the RTD, and the number of "no-turns", if any, should not exceed the number in the RTD;

.2 *Freeboard:* The average freeboard of all the subjects should not be less than the average for the RTD;

.3 *Torso angles:* The average of all subjects' torso angles should be not less than the average for the RTD minus 5°;

.4 *Faceplane (head) angles:* The average of all subjects' faceplane angles should be not less than the average for the RTD minus 5°;

.5 *Lifejacket light location:* The position of the lifejacket light should permit it to be visible over as great a segment of the upper hemisphere as is practicable.

Jump and drop tests

2.8.8 Without readjusting the lifejacket, the test subject should jump vertically into the water, feet first, from a height of at least 1 m while holding the arms over the head. Upon entering the water, the test subject should relax to simulate a state of utter exhaustion. The freeboard to the mouth should be recorded after the test subject comes to rest. The test should be repeated from a height of at least 4.5 m but, when jumping into

the water, the test subject should hold on to the lifejacket during water entry to avoid possible injury. Upon entering the water, the test subject should relax to simulate a state of utter exhaustion. The freeboard to the mouth should be recorded after the test subject comes to rest. The lifejacket and its attachments should be examined for any damage. If injury is believed likely from any jump or drop test the lifejacket should be rejected or the test delayed until tests from a lower height or with additional precautions demonstrate that the risk from the required test is acceptable.

Assessment

2.8.9 Following the drop test the lifejacket should:

.1 surface the test subject in a face up position with an average freeboard for all the subjects of not less than the average for the RTD determined in accordance with 2.8.6;

.2 not be dislodged or cause harm to the test subject;

.3 have no damage that would affect its in-water performance or buoyancy; and

.4 have no damage to its attachments.

Stability test

2.8.10 The test subject should attain a relaxed face-up position of static balance in the water. The subject should be instructed to assume a foetal position as follows: "place your elbows against your sides, your hands on your stomach, under the lifejacket if possible, and bring your knees up as close to your chest as possible." The subject should be rotated clockwise around the longitudinal axis of the torso by grasping the subject's shoulders or upper areas of the lifejacket so that the subject attains a 55 ± 5 degree list. The subject should then be released. The subject should return to a stable face-up position. The test should then be conducted with the subject rotated counter-clockwise. The entire test should then be repeated with the test subject wearing the RTD. The candidate lifejacket should not roll any subject face down in the water. The number of subjects who are returned to the stable face-up foetal position in the candidate lifejacket should be at least equal to the number who are returned to the stable face-up foetal position in the RTD.

Swimming and water emergence test

2.8.11 All test subjects, without wearing the lifejacket, should attempt to swim 25 m and board a liferaft or a rigid platform with its surface 300 mm above the water surface. All test subjects who successfully complete this task should perform it again wearing the lifejacket. At least two thirds of the test subjects who can accomplish the task without the lifejacket should also be able to perform it with the lifejacket.

2.9 Infant and children's lifejacket tests

As far as possible, similar tests should be applied for approval of lifejackets suitable for infants and children.

Infant and child test subjects

2.9.1 For child-size lifejackets, tests should be carried out with at least 9 able-bodied persons, and for infant-size lifejackets, tests should be carried out with at least 5 able-bodied persons. All test subjects should be selected according to table 2.2 or table 2.3 as follows:

.1 One subject should be selected per each cell containing a "1".

.2 Remaining subjects should be selected from cells containing an "X", without repeating a cell.

.3 At least 40% of the subjects should be male and at least 40% female.

.4 Devices for infants should be tested on infants as small as 6 kg mass.

.5 A manikin or manikins may be substituted for infant lifejacket test subjects if the manikin or manikins have been demonstrated to provide representative results compared to human subjects.

Table 2.2 - Selection of Child Test Subjects

Height range (cm)	Weight Range (kg)										
	14-17	17-20	20-22	22-25	25-28	28-30	30-33	33-36	36-38	38-41	41-43
79-105	1	X									
90-118		X	1								
102-130				1	X						
112-135					X	1					
122-150							1	1	X		
145-165									X	1	1

Table 2.3 - Selection of Infant Test Subjects

Height range (cm)	Weight Range (kg)		
	Less than 11	11-14	14-17
Less than 83	1	X	
79-105	X	1	1
90-118			X

2.9.2 When conducting water performance tests under 2.8, infant and child-size lifejackets should meet the following requirements for their critical flotation stability characteristics:

.1 *Turning time:* The average turn time for all subjects in the candidate lifejacket should not exceed the average time in the appropriate size RTD;

.2 *Freeboard:* The average results for clearance of the mouth above the water for all subjects should not be less than the average for the appropriate size RTD;

.3 *Torso angle:* The average of all subjects' results should be not less than the average for the appropriate size RTD minus 10°;

.4 *Faceplane (head) angle:* The average of all subjects' results should be not less than the average for the appropriate size RTD minus 10°; and

.5 *Mobility:* Mobility of the subject both in and out of the water should be given consideration in determining the acceptability of a device for approval and should be compared to mobility when wearing the appropriate size RTD when climbing out of the water, going up and down stairs, picking up an article from the floor, and then drinking from a cup.

2.9.3 With the exception of reducing freeboard and self-righting performance, the requirements for infant lifejackets may be relaxed if necessary in order to:

.1 contribute to the rescue of the infant by a caretaker;

.2 allow the infant to be fastened to a caretaker and contribute to keeping the infant close to the caretaker;

.3 keep the infant dry, with free respiratory passages;

.4 protect the infant against bumps and jolts during the evacuation; and

.5 allow a caretaker to monitor and control heat loss by the infant.

2.10 Tests for inflatable lifejackets

2.10.1 Inflation tests

2.10.1.1 Two inflatable lifejackets should be subjected to the temperature cycling test prescribed in paragraph 1.2.1 in the uninflated condition and should then be externally examined. The inflatable lifejacket materials should show no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical qualities. The automatic and manual inflation systems should each be tested immediately after each temperature cycling test as follows:

.1 After a high temperature cycle, the two inflatable lifejackets should be taken from the stowage temperature of +65°C. One should be activated using the automatic inflation system by placing it in seawater at a temperature of +30°C and the other should be activated using the manual inflation system. Each should fully inflate.

.2 After a low temperature cycle, the two inflatable lifejackets should be taken from the stowage temperature of -30°C. One should be activated using the automatic inflation system by placing it in seawater at a

temperature of -1°C and the other should be activated using the manual inflation system. Each should fully inflate.

2.10.1.2 After exposure to a temperature of -15°C for a period of at least 8 h, two lifejackets should be activated using the manual inflation system and should fully inflate.

2.10.1.3 After exposure to a temperature of +40°C for a period of at least 8 h, two lifejackets should be activated using the manual inflation system and should fully inflate.

2.10.2 The test in 2.7 should be conducted using lifejackets both in the inflated and uninflated conditions.

2.10.3 The tests in 2.8 should be conducted using lifejackets that have been inflated both automatically and manually, and also with one of the compartments uninflated. The tests with one of the compartments uninflated should be repeated as many times as necessary to perform the test once with each compartment in the uninflated condition.

2.10.4 *Tests of materials for inflatable bladders, inflation systems and components*

The material used for the inflatable bladder, inflation system and components should be tested to establish that they are rot-proof, colour fast and resistant to deterioration from exposure to sunlight and that they are not duly affected by seawater, oil or fungal attack.

2.10.4.1 *Material tests*

Resistance to rot and illumination tested according to AATCC Method 30:1981 and ISO 105-B04:1988 Illumination should take place to class 4-5.

Following exposure to rot or illumination tests above the tensile strength should be measured using the grab method given in ISO 5082. Minimum tensile strength should be not less than 300 N per 25 mm in the warp and weft direction.

2.10.4.2 *Coated fabrics*

Coated fabrics used in the construction of inflatable buoyancy chambers should comply with the following requirements:

.1 coating adhesion should be tested in accordance with ISO 2411:1991 using the method described in paragraph 5.1 at 100 mm/min and should be not less than 50 N per 50 mm width.

.2 coating adhesion should be tested when wet following ageing according to ISO 188 with an exposure of 336 ± 0.5 h in fresh water at (70.0 ± 1.0)°C, following which the method at ISO 2411:1991, paragraph 5.1 should be applied at 100 mm/min and should not be less then 40 N per 50 mm width.

.3 tear strength should be tested in accordance with ISO 4674:1977 using method A1 and should not be less than 35 N.

.4 resistance to flex cracking should be tested in accordance with ISO 7854:1984 method A using 9000 flex cycles, there should be no visible cracking or deterioration.

.5 breaking strength should be tested in accordance with ISO 1421:1977 using the CRE or CRT method, following conditioning for 24 ± 0.5 h at room temperature and should not be less than 200 N per 50 mm width.

.6 breaking strength should be tested in accordance with ISO 1421:1977 using the CRE or CRT method, following conditioning immersed in fresh water for 24 ± 0.5 h at room temperature and should not be less than 200 N per 50 mm width.

.7 elongation to break should be tested in accordance with ISO 1421:1977 using the CRE or CRT method following conditioning at room temperature for 24 ± 0.5 h and should not be more than 60%.

.8 elongation to break should be tested in accordance with ISO 1421:1977 using the CRE or CRT method following conditioning immersed in fresh water at room temperature for 24 ± 0.5 h and should not be more than 60%.

.9 the resistance to exposure to light when tested in accordance with ISO 105-BO2:1988 and the contrast between the unexposed and exposed samples should not be less than class 5.

.10 the resistance to wet and dry rubbing when tested in accordance with ISO 105-X12:1995 and should not be less than class 3.

.11 the resistance to seawater should not be less than class 4 in accordance with ISO 105 EO2:1978 and the change in colour of the specimen should not be less than class 4.

2.10.4.3 *Operating head load test*

The operating head load test should be carried out using two lifejackets one lifejacket to be conditioned at -30°C for 8 h and the other at +65°C for 8 h. After mounting on the manikin or the test form the lifejackets should be inflated, and a steady force of 220 ± 10 N applied to the operating head as near as possible to the point where it enters the buoyancy chamber. This load should be maintained for 5 min during which the direction and angle in which it is applied should be continuously varied. On completion of the test the lifejacket should remain intact and should hold its pressure for 30 min.

2.10.4.4 *Pressure test*

.1 *Overpressure test:* The inflatable buoyancy chambers should be capable of withstanding an internal over pressure at ambient temperature. A lifejacket should be inflated using the manual method of inflation, after inflation the relief valves should be disabled and a fully charged gas cylinder according to the manufacturers recommendation should be fitted

to the same inflation device and fired. The lifejacket should remain intact and should hold its pressure for 30 min. The lifejackets should show no signs of damage such as cracking, swelling or changes of mechanical qualities and that there has been no significant damage to the lifejacket inflation component. All fully charged gas cylinders used in this test should be sized according to the markings on lifejacket.

.2 *Relief valve test:* With one buoyancy chamber inflated, the operating head on the opposite buoyancy chamber should be fired manually, using a fully charged gas cylinder according to the manufacturers recommendations. The operation of the relief valves should be noted to ensure that the excess pressure is relieved. The lifejacket should remain intact and should hold its pressure for 30 min. The lifejackets should no signs of damage such as cracking, swelling or changes of mechanical qualities and that there has been no significant damage to the lifejacket inflation component.

.3 *Air retention test:* One inflation chamber of a lifejacket is filled with air until air escapes from the over-pressure valve or, if the lifejacket does no have an over-pressure valve, until its design pressure, as stated in the plans and specifications, is reached. After 12 h the drop in pressure should not be greater than 10%. This test is then repeated as many times as necessary to test a different chamber until each chamber has been tested in this manner.

2.10.4.5 *Compression test*

The inflatable lifejacket, packed in the normal manner should be laid on a table. A bag containing 75 kg of sand and having a base of 320 mm diameter should be lowered onto the lifejacket from a height of 150 mm in a time of 1 second. This should be repeated ten times, after which the bag should remain on the jacket for not less than 3 h. The lifejacket should be inflated by immersion into water and should inflate fully, the jacket to be inspected to ensure that no swelling or change of mechanical properties has occurred, the jacket should be checked for leaks.

2.10.4.6 *Test of metallic components*

.1 Metal parts and components of a lifejacket should be corrosion-resistant to sea water and should be tested in accordance with ISO 9227:1990 for a period of 96 h. The metal components should be inspected and should not be significantly affected by corrosion, or affect any other part of the lifejacket and should not impair the performance of the lifejacket.

.2 Metal components should not affect a magnetic compass of a type used in small boats by more than 1 degree, when placed at a distance of 500 mm from it.

2.10.4.7 *Inadvertent inflation test*

The resistance of an automatic inflation device to inadvertent operation should be assessed by exposing the entire lifejacket to sprays of water for fixed period. The lifejacket should be fitted correctly to a free-standing manikin of adult size, with a

minimum shoulder height of 1,500 mm (see figure 5), or alternatively to an appropriately sized form as shown in figure 2. The lifejacket should be deployed in the mode in which it is worn ready for use but not deployed as used in the water (i.e. if it is equipped with a cover which is normally worn closed, then the cover should be closed for the test). Two sprays should be installed so as to spray fresh water onto the lifejacket, as shown in the diagram. One should be positioned 500 mm above the highest point of the lifejacket, and at an angle of 15° from the vertical centre line of the manikin and the bottom line of the lifejacket. The other nozzle should be installed horizontally at a distance of 500 mm from the bottom line of the lifejacket, and points directly at the lifejacket. These nozzles should have a spray cone of 30°, each orifice being 1.5 ± 0.1 mm in diameter, and the total area of the orifice should be 50 ± 5 mm², the orifice being evenly spread over the spray nozzle area.

The air temperature should be 20°C, and water should be supplied to the sprays at a pressure of 0.3 kPa - 0.4 kPa, a flow of 600 l/h, and a temperature of 18°C to 20°C.

The sprays should be turned on, and the lifejacket exposed to the following series of test to access the ability of the jacket to resist inadvertent inflation:

.1 5 min with the high spray on the front of the lifejacket;

.2 5 min with the high spray on the left side of the lifejacket;

.3 5 min with the high spray on the back of the lifejacket; and

.4 5 min with the high spray on the right side of the lifejacket.

During exposures .1, .2 and .4 the horizontal spray should be applied for 10 periods of 3 s each to the front, left or right sides (but not back) as with the high spray.

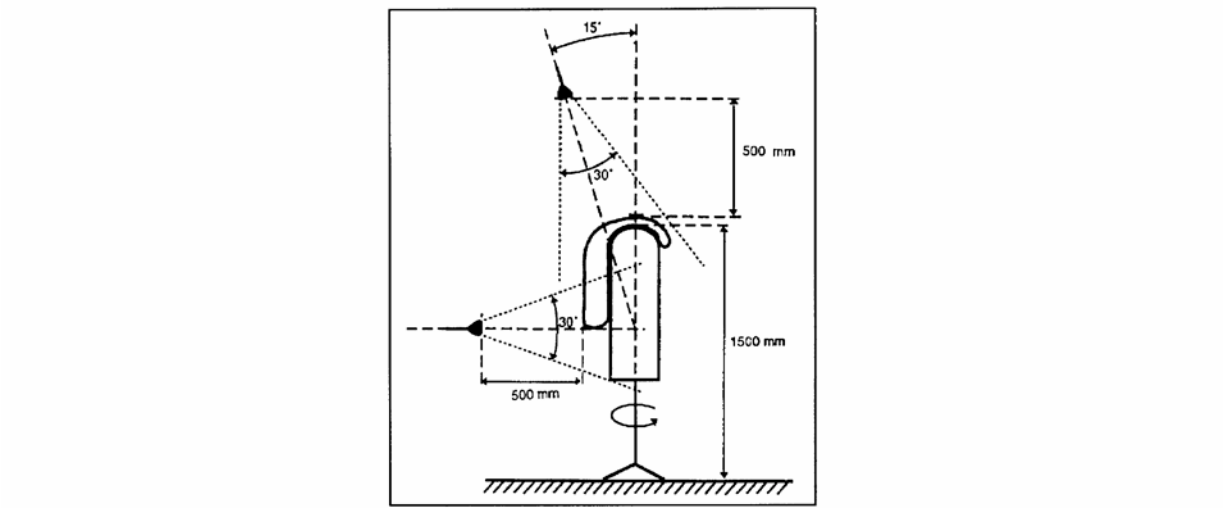


Figure 5 - Test set-up for test of automatic inflation system

After completing the above test the lifejacket should be removed from the manikin and immersed in water to verify that the auto-inflation system functions."

8 Paragraph 3.1.1 is replaced with the following:

"**3.1.1** These tests should be carried out with at least six able-bodied persons of the following heights and weights:

Height	Weight
1.40 m - 1.60 m	1 person under 60 kg
	1 person over 60 kg
1.60 m - 1.80 m	1 person under 70 kg
	1 person over 70 kg
over 1.80 m	1 person under 80 kg
	1 person over 80 kg

at least one and not more than two of the persons should be females with not more than one female in the same height range."

9 The word "shall" in paragraph 3.1.5 is replaced with "should".

10 The sentence "The position of the lifejacket light should permit it to be visible over as great a segment of the upper hemisphere as is practicable." is added at the end of paragraph 3.1.7.

11 The words "and its attachments" are inserted in between "anti-exposure suit" and "should not be damaged" in paragraph 3.1.10.

12 The words "for more than 6 s" are inserted in between "sustain burning" and "or continue melting" in paragraph 3.1.15.

13 The note at the end of paragraph 10.4.9 is deleted.

14 At the end of paragraph 10.4.9, the following new paragraph is added:

"Flashing lights with a flash duration of not less than 0.3 s may be considered as fixed/steady lights for the measurement of their luminous intensity. Such lights should provide the required luminous intensity in all directions of the upper hemisphere. The time interval between switching on and reaching the required luminous intensity (incandescence time) and all time spent below the required luminous intensity when the light switches off should be disregarded. (See Figure 10.4.1.)

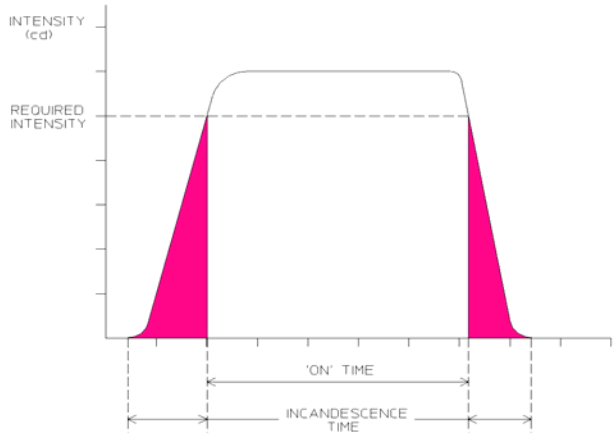


Figure 10.4.1 – "On-time" measurement diagram"

PART 2 – *Production and Installation Tests*

15 The word "shall" in paragraph 2.2 is replaced with "should".

16 The words ", using a dummy smoke signal, if necessary" are inserted in between "should be" and "to demonstrate" in paragraph 3.1; In the same paragraph, the word "will" is inserted in between "their attachments" and "drop clear".

17 The following new appendices 1 to 3 are added after part 2:

"APPENDIX 1

ADULT REFERENCE TEST DEVICE (RTD)
DESIGN AND CONSTRUCTION

1 **General.** The RTD is intended for use only as a test reference standard to represent the desired level of in-water performance of a lifejacket required by SOLAS Convention, and is not considered representative of any other required lifejacket performance. The adult RTD is designed to fit persons from a chest size of 700 mm to 1,350 mm and to be comfortable to wear as a non-reversible device such that it would be obvious to the wearer as to which is the inside and outside of the device, even under reduced lighting conditions. The Adult RTD is made with two types of buoyant foam in a vest style using a heavy nylon cover fabric shell secured to the body with 25 mm webbing, closures, and adjustments. The shell is made with slide fasteners (zippers) in place of closing seams to hold the foam within, in order that the foam inserts can be easily removed to check their buoyancy and renew or supplement them if they are out of tolerance. Hook and loop fasteners are used on the interior foam retainers to position and prevent shifting of the foam panels.

2 **Materials.** All materials used should comply with ISO 12402-7.

2.1 **Foam requirements.** The performance of the RTD is dependent on using plastic foam of the proper stiffness, shapes, and buoyancy.

2.1.1 **Stiffness.** Two different stiffness foams are used; one is a soft foam and the other is a stiff foam. A bridge deflection test is provided to determine acceptability for the intended application. Figure A.1 provides the setup details and Table A.1 provides the specific measured values. For selecting the type of foam for the specific insert, see Tables A.2 and A.3. To measure the centre deflection of a foam panel of the specified cross-section (a × b) and 110 mm wide, place the foam panel centred across the two equal height, parallel horizontal surfaces separated by the specified distance (c), and then load with a mass of the specified width. Note the length of the load must be at least 110 mm, such that when placed on the foam panel it will extend the full width of the foam panel. It is acceptable for the load to extend beyond the width of the foam panel provided that it is centred over the panel with equal amounts extending over the sides of the foam panel. Measure the deflection at the bottom centre location of the foam panel 30 s after placing the load on the panel.

2.1.2 **Shape.** The shape of each foam insert is specified in Figures A.8 to A.11. For dimensions see Tables A.2 and A.4.

2.1.3 **Buoyancy.** The total design buoyancy of the device is 155,6 N. Table A.3 specifies the foam characteristics, the buoyancy for each insert and its tolerances, and the overall buoyancy distribution to be verified when using the RTD for certification testing.

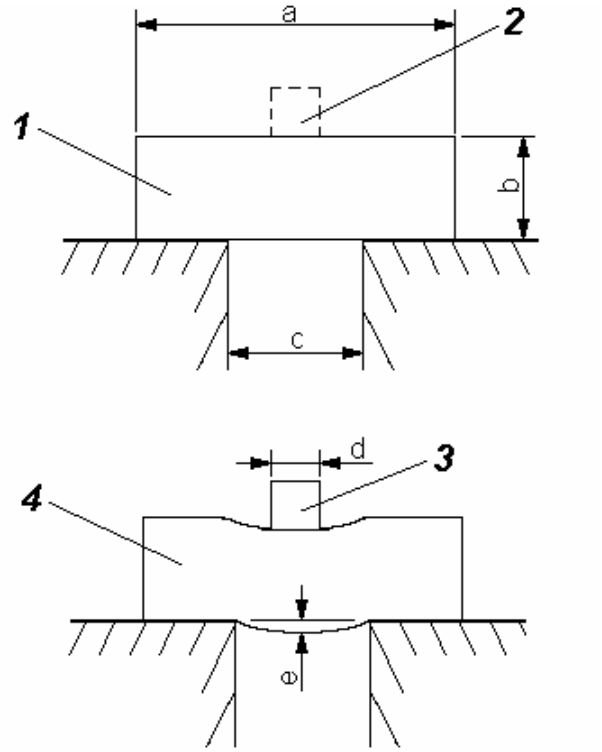
2.2 **Other component requirements.** See Table A.2.

3 **Construction.** The construction and assembly of the device should be in accordance with Tables A.2 to A.4 and Figures A.2 to A.14. A tolerance of ± 6 mm is used throughout for fabric cutting and stitching assembly. A tolerance of ± 6 mm is also used for foam cutting, however, the buoyancy requirements of Table A.3 should be met.

3.1 **Seams.** The seam allowances are 13 mm, unless otherwise specified. All structural seams use a lock type stitch so that the seam will not unravel when a force is applied in the direction of the seam on any of the threads forming the stitch. Stitching should have a density of 7 to 12 stitches per 25 mm of stitch length. The box-x stitching on the webbing is 15 mm × 18 mm, unless otherwise specified. The bar-tack stitching on the webbing is 15 mm × 2 mm.

3.1.1 On the closing seam of the back section of the outer and inside cover, the cut ends of the fabric are turned under and stitched so that the fabric will not ravel. The cut ends of webbing should be heat-sealed.

3.1.2 Tabs on the ends of the waist belt are formed by turning under 40 mm of material twice and stitching 19 mm from the end of the folds with box-x or bar tack stitching.



Key

1 Foam at initial setup
2 Centre load
3 Load
4 Foam bridge deflection after 30 seconds

Figure A.1 – Foam bridge deflection test

Table A.1 — Specifications for the foam bridge deflection test

	Dimension shown in Figure A.1						Load mass
Foam type	a (Length) mm	(Not shown) (Width) mm	b (Thickness) mm	c (Span) mm	d (Load width) mm	e (Deflection) mm	kg
Stiff	394	110	83	300	120	< 20	8,6
Soft	394	110	45	150	30	≥ 25	0,75

Table A.2 — Parts, quantity and assembly

Component	Description	Quantity	See Figure	Construction notes
1 Cover Fabric	420 denier nylon, with ravel resistant coating, orange			
1.1 Front Outer Cover		1	A.2	
1.2 Back Outer Cover		1	A.2	
1.3 Inside Cover		1	A.3	
1.4 Centre Gusset		2	A.4	

Component	Description	Quantity	See Figure	Construction notes
1.5 Collar, outer and inside cover		2	A.5	
1.6 Fabric reinforcement		4	A.6 A.14	Attach to inside of collar cover, as attachment 1, for reinforcement at webbing attachment (see Figure A.14).
1.7 Interior fabric retainers for foam inserts 1		2	A.7 A.13	Attach to inside of front cover, as attachment 3, stitch to cover at each side to form a foam retainer for inside front foam insert components 2.2.1 and 2.2.2 (see Figure A.13).
1.8 Interior fabric retainers for foam inserts 2		2	A.7 A.14	Attach hoop and loop fasteners to the ends and stitch at centre to the inside of front cover, as attachment 4, to form a foam retainer for front foam insert components 2.1.1 and 2.1.2 (see Figure A.13).
2 Foam				
2.1 Stiff	See Tables A.1 and A.3			
2.1.1 Front foam insert, right side	81 mm thick	1	A.8	
2.1.2 Front foam insert, left side	81 mm thick	1	A.8	
2.1.3 Collar foam insert	56 mm thick	1	A.10	
2.2 Soft	See Tables A.1 and A.3			
2.2.1 Inside front foam insert, right side	46 mm thick	1	A.9	
2.2.2 Inside front foam insert, left side	46 mm thick	1	A.9	
2.2.3 Back foam insert	32 mm thick	1	A.11	
3 Webbing	25 mm, polypropylene, with easy adjustment and no significant slippage when used with the specified hardware.			
3.1 Chest strap	127 mm, black	2	A.12	On left side of front cover, attach webbing with male buckle. On right side of front cover attach webbing with female buckle. The free ends of the chest strap are folded under the yellow

Component		Description	Quantity	See Figure	Construction notes
					webbing (collar attachment webbing), with reinforcing fabric (see Figure A.6) on inside of cover fabric. A box-x stitch is used to attached the chest strap to the front cover.
3.2	Waist belt	152 mm, black	2	A.12	On left side attach waist belt with slide and buckle clip waist belt. On right side attach bottom belt with D-ring and slide.
3.3	Waist belt	1 867 mm, black	1	A.12 A.13	Form 40 mm tab on each end. Attach to back cover using three box-x stitches (after front and back covers are assembled).
3.4	Belt-loop on front cover	76 mm, black	2	A.12	Attach webbing to front outer cover and form a belt-loop (one on each side) by two sets of double bar tack stitches
3.5	Belt-loop on inside cover	89 mm, black	2	A.13	Attach webbing to inside cover and form a belt-loop (one on each side) by two box-x stitches
3.6	Collar attachment	1 384 mm, yellow	1	A.14 A.6 A.12	Attach webbing to collar and reinforcing fabric, in two places using box-x stitch
4	**Hook and loop fastener**	50 mm × 70 mm, black generic	2	A.13 A.7	Hook and loop fasteners are attached to the ends of interior fabric retainer for foam insert
5	**Thread**	Generic synthetic	AR		
6	**Hardware**				
6.1	Buckle	Male and female 25 mm, plastic, 890 N single-end strength	1		Chest strap
6.2	Slide	Adjuster 25 mm, plastic, 1 600 N single-end strength	2		Waist belt
6.3	Snap hook	25 mm, SS, 1 600 N single-end strength	1		Waist belt
6.4	D-ring	25 mm, SS, 1 600 N single-end strength	2		Waist belt
6.5	Zipper	280 mm, plastic (zipper chain and pulls)	1	A.14	Foam access for collar cover

Component	Description	Quantity	See Figure	Construction notes
6.6 Zipper	370 mm, plastic (zipper chain and pulls)	1	A.12	Foam access for back cover
6.7 Zipper	440 mm, plastic (zipper chain and pulls)	2	A.12 A.13	Foam access for front cover

Table A.3 — Foam insert specifications

Values in Newtons (N)

	Front right	Front left	Inside front right	Inside front left	Back	Collar
Foam type[a]	Stiff	Stiff	Soft	Soft	Soft	Stiff
Buoyancy[b]	34 ± 1,2	34 ± 1,2	17,5 ± 0,65	17,5 ± 0,65	18 ± 0,8	28 ± 1

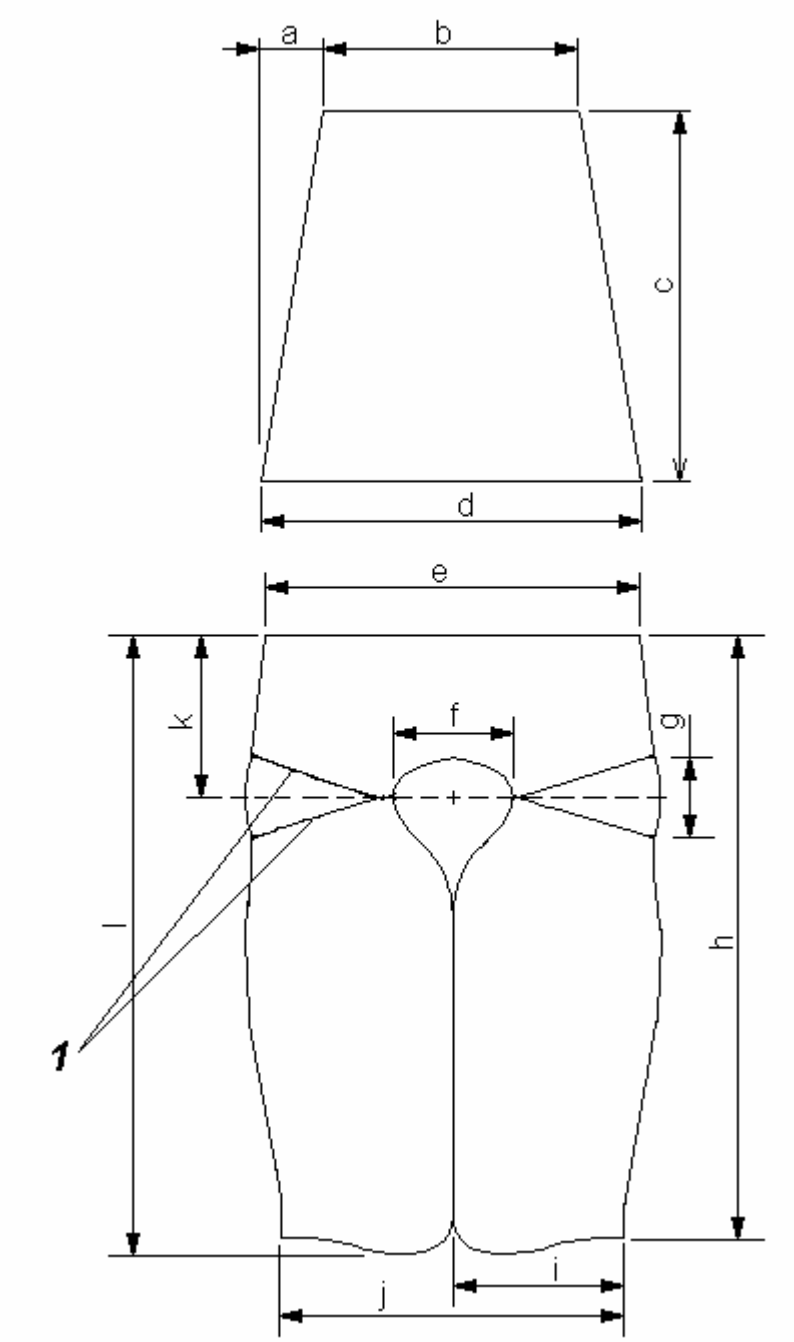
[a] The buoyancy of most foams will change over time with the greatest change occurring in the first several months after manufacture. The exact kind of foam selected with need to be evaluated to determine the amount of additional buoyancy needed at the time of manufacture to maintain the values specified.

[b] Buoyancy distribution: 69 % front ± 1,5 percentage points

Table A.4 – List of dimensions shown in Figures A.2 to A.14

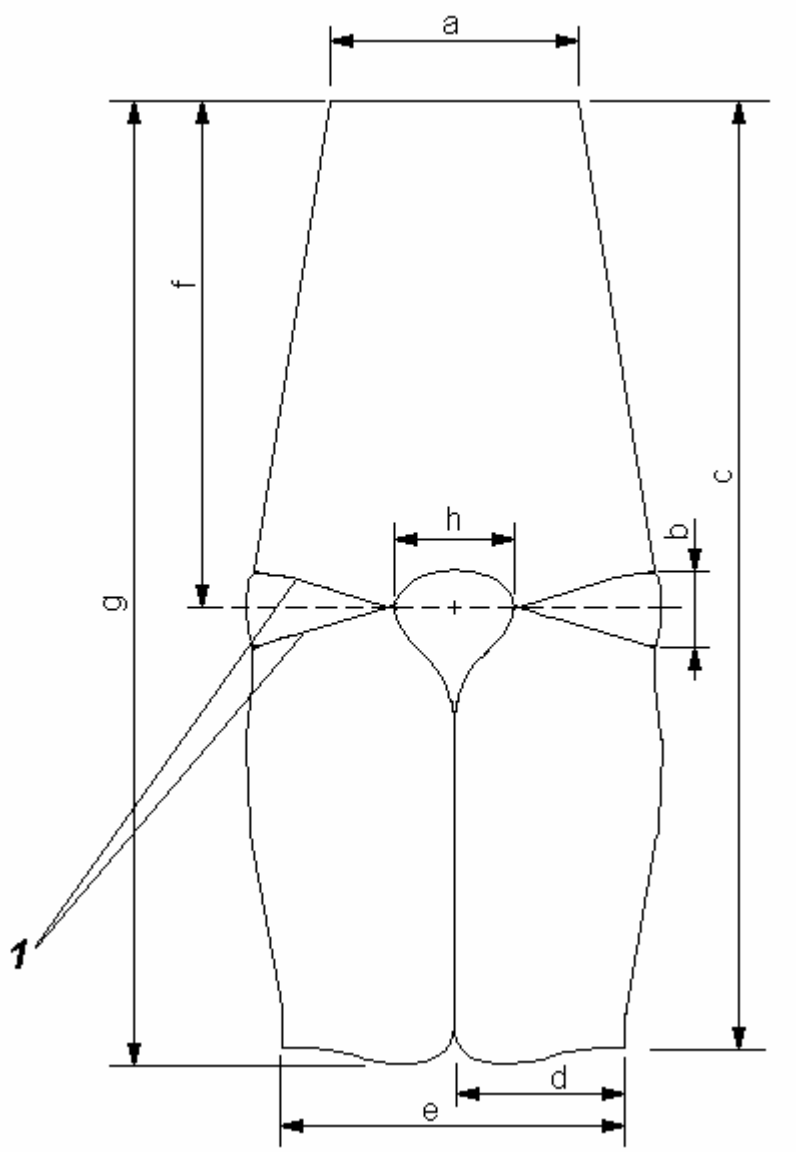
Dimensions in millimetres

Letter	Figure											
	A.2	A.3	A.4	A.5	A.6, A.7	A.8	A.9	A.10	A.11	A.12	A.13	A.14
a	72	294	23	308	73	198	76	20	188	100	100	25
b	298	100	516	142	73	46	46	56	274	35	35	160
c	438	1 106	618	10	130	76	394	51	414	20	20	53
d	442	199	102	288	205	81	38	216	343	35	300	25
e	432	398		342	72	76	51	229	147	120	30	45
f	141	597		476	470	157	165	259	223	260		
g	100	1 124		65		394		45		85		
R								70				
h	705	141				46				40		
i	199					8				55		
j	398					20				225		
k	188					20				75		
l	723					76						
m						46						
n						38						
o						165						
p						25						



Key
1 Dart

Figure A.2 – Outer cover, front and back sections



Key
1 Dart

Figure A.3 – Inside cover

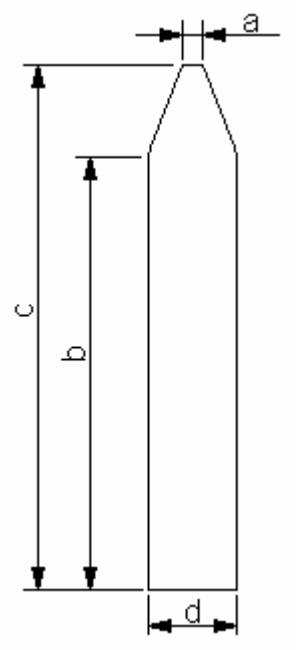


Figure A.4 – Centre gusset

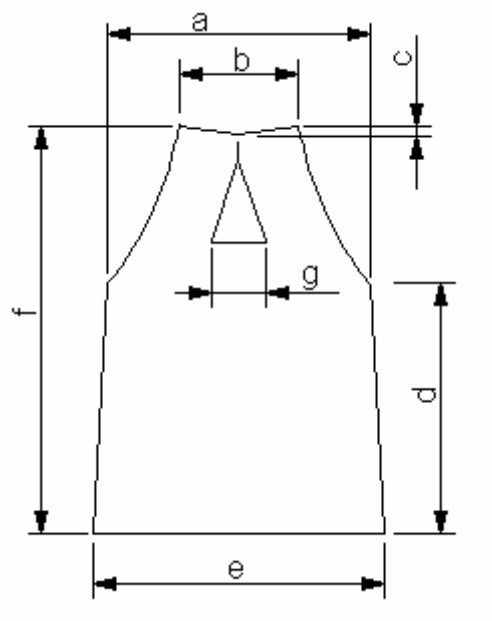


Figure A.5 – Outer and inside cover, collar

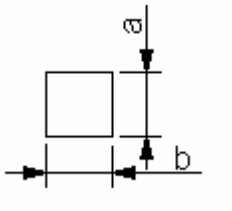


Figure A.6 – Fabric reinforcement

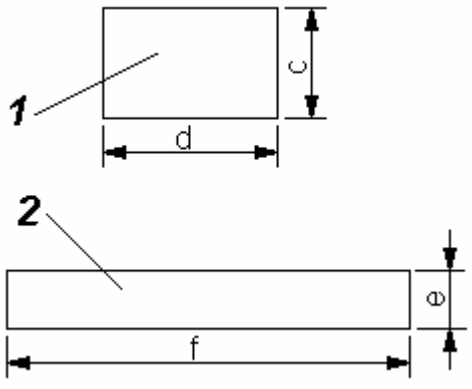
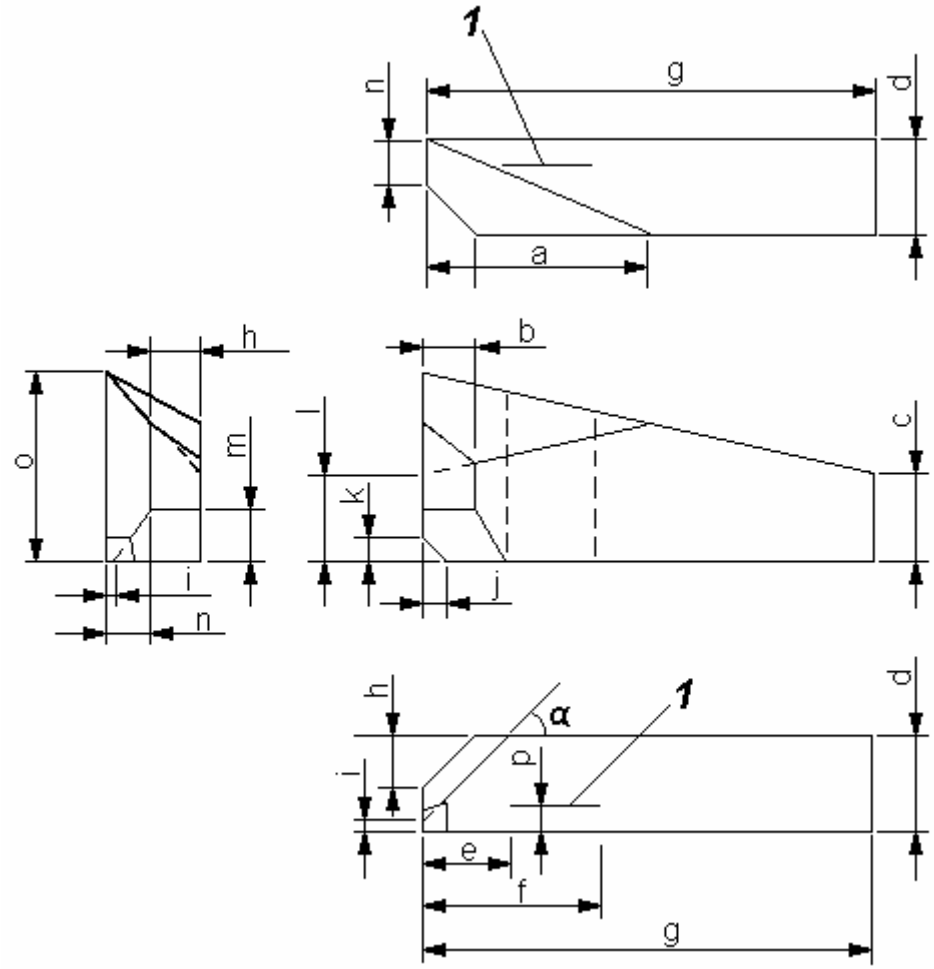


Figure A.7 – Interior foam retainer



Key

1	Slot
α	45°

Figure A.8 – Front foam insert

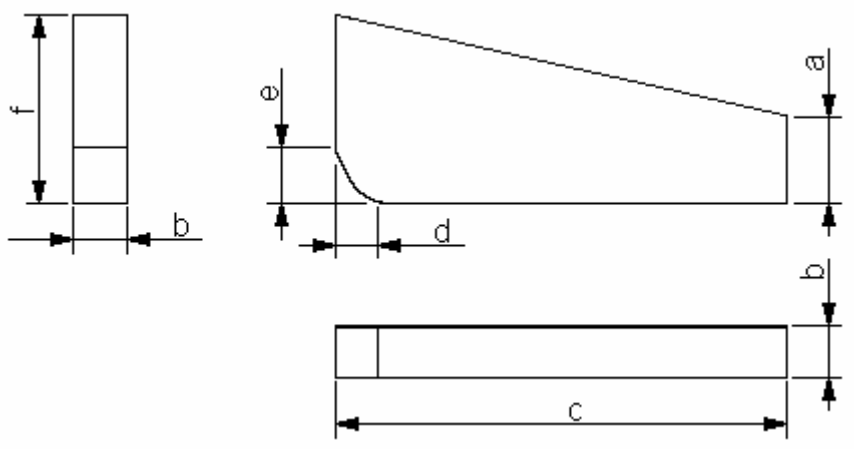
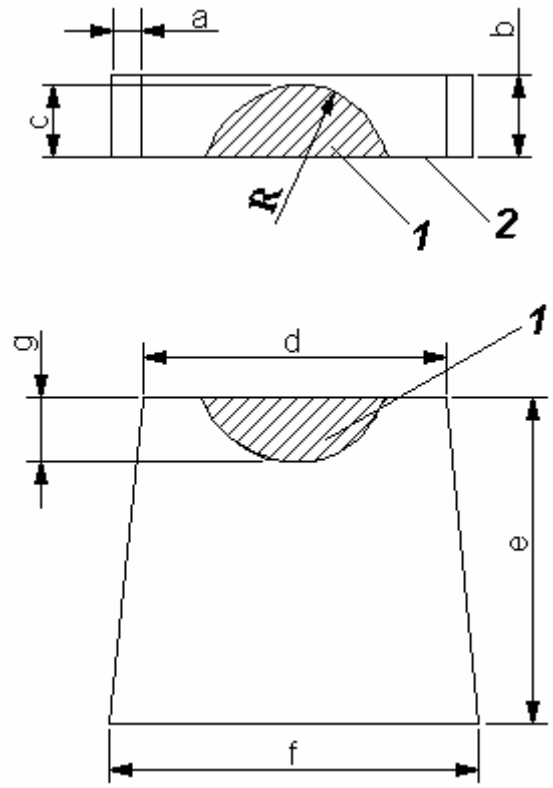
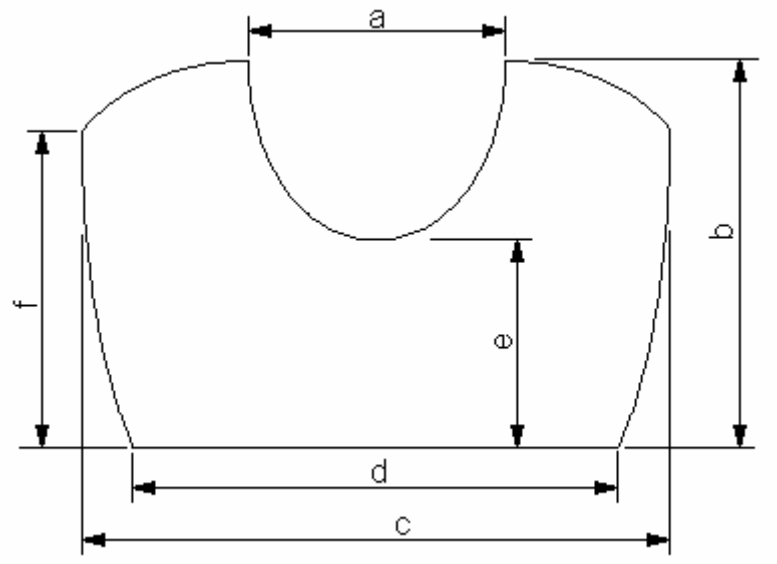


Figure A.9 – Inside front foam insert



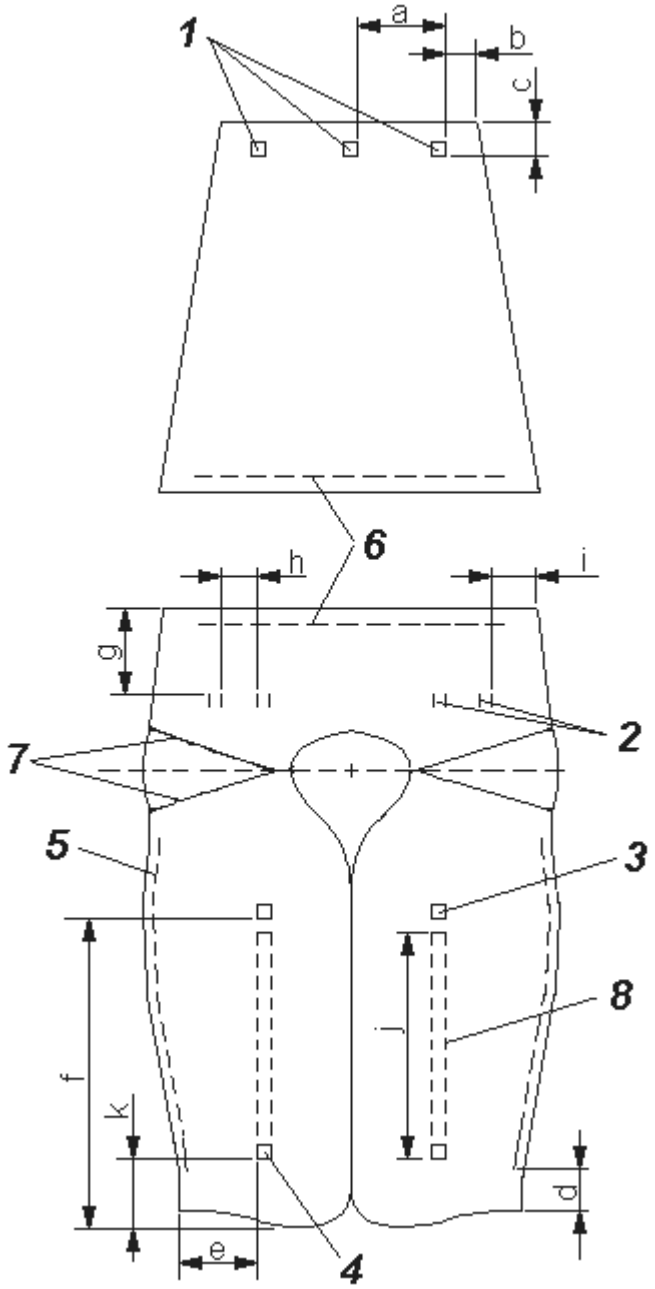
Key
1 Skive
2 Side towards body

Figure A.10 – Collar foam insert



Thickness = 25 mm

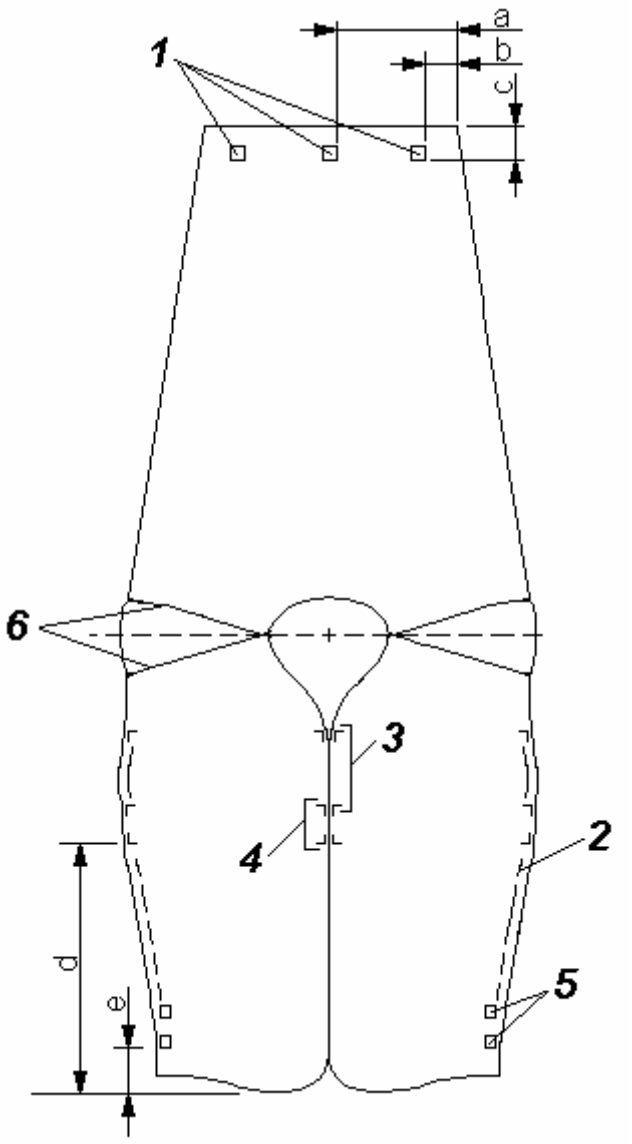
Figure A.11 – Back foam insert



Key

1	Waist belt (1,867 mm) attachment to outside of back cover
2	Zipper (440 mm) attachment to front
3	Chest strap (webbing (127 mm) attachment to outside of front cover
4	Waist belt (152 mm) attachment to outside of front cover
5	Belt loop webbing (76 mm) attachment to outside of front cover
6	Zipper (370 mm) attachment to the front and back covers
7	Dart
8	Collar webbing (1,384 mm) attachment to outside of front cover

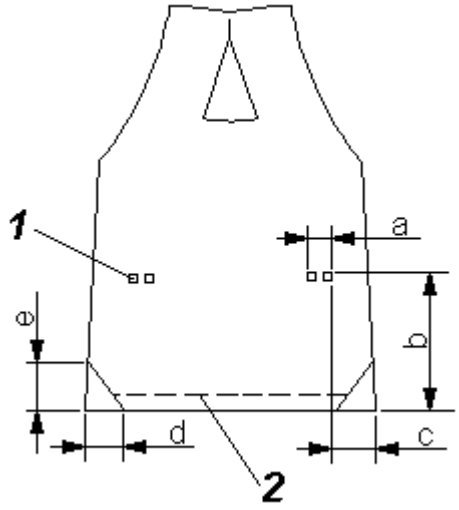
Figure A.12 – Attachments to front and back cover



Key

1 Waist belt (1,867 mm) attachment to outside of back cover and inside cover (see Figure A.12)
2 Zipper (440 mm) attachment
3 Interior fabric retainer attachment to inside front cover
4 Interior fabric retainer attachment to centre of inside front cover
5 Belt loop webbing (89 mm) attachment to outside of cover
6 Dart

Figure A.13 – Attachments to inside cover



Key

1 Collar webbing (1,384 mm) attachment on the outside of the inner cover with reinforcement fabric inside

2 Zipper (280 mm) attachment to the outer and inner covers

Figure A.14 – Attachments to outer and inside collar cover

APPENDIX

RTD Serial number: _____

ADULT REFERENCE TEST DEVICE – BUOYANCY TRACKING AND VERIFICATION

To achieve repeatability in human subject testing, the overall buoyancy and distribution of buoyancy between the front and back of the RTD must be maintained within a tight tolerance as specified in Table 1.

Table 1 – SOLAS Adult RTD Buoyancy and Tolerance

Limit / Units	Front Buoyancy[1]	Back Buoyancy	Total Buoyancy	Buoyancy Distribution[2]
Design / N	103.5	46.5	150	69% in front
Maximum / N	107	48	155	70.5% in front
Minimum / N	100	45	145	67.5% in front

[1] Values at or corrected to standard temperature and pressure.

[2] Buoyancy distribution is calculated by dividing the front buoyancy by the total buoyancy.

The buoyancy of a new RTD may exceed the allowable tolerance range until the normal shrinkage or compression of the foam inserts stabilizes. Until the buoyancies of the foam inserts have stabilized, buoyancy and distribution should be checked at regular intervals (perhaps weekly), and then at least monthly thereafter or whenever used for testing, whichever is longer. (Frequent use may require more frequent checks.) Only RTDs with buoyancies within tolerance should be used for certification testing. A data sheet to document the buoyancy and buoyancy distribution of the RTD is attached.

Adjustment of buoyancy: At the time of manufacture the left-to-right distribution of buoyancy in the front inserts was adjusted to be within 1.3 N of each other. To achieve this tolerance, thin layers of foam ("make-up" inserts) may have been inserted between the front and inside front foam inserts. The test house may need to increase the size of these make-up inserts from time to time to keep these parameters within tolerance, or may need to add buoyancy to the back or collar inserts (or trim buoyancy, if the back insert has not shrunk as anticipated). Figure 2 provides guidance for sizing of make-up inserts to adjust buoyancy. After a full sheet of 6.5 mm thick foam is required in any one of the four major areas, an inside front or back insert probably needs to be replaced. If the front buoyancy is under the minimum value, measure the buoyancy of the right and left sides so that the proper distribution of buoyancy (no more than a 1.3 N difference) between the right and left front panels can be maintained.

Table 2 – SOLAS Adult RTD Insert Design Buoyancies

	Combined Left Front & Inside Front [1]	Combined Right Front & Inside Front [1]	Back	Collar
Design (N)	34 + 17.75 = 51.75	34 + 17.75 = 51.75	18.5	28
S/N ____ Date:				

[1] Plus make-up inserts, if used.

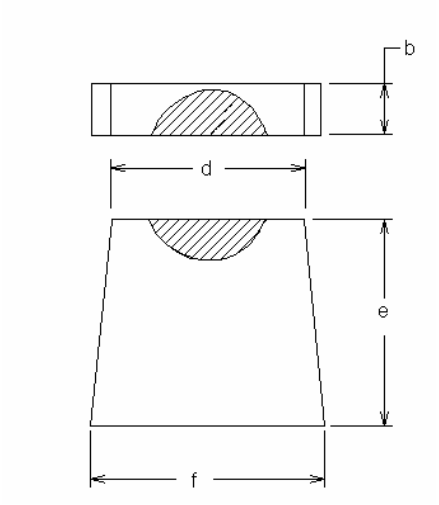
RTD BUOYANCY DATA SHEET

RTD Serial number/identification: _____

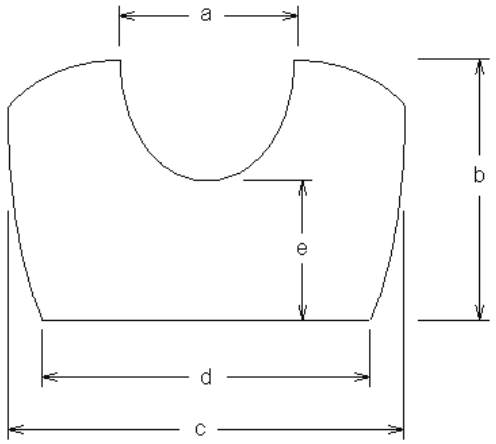
Date	Left Front Buoyancy (N)	Right Front Buoyancy (N)	Total Front Buoyancy (N)	Total Back Buoyancy (N)	Total Buoyancy (N)	Buoyancy Distribution (% in front)	Remarks
	(1)		(2)				

(1) Left and right front buoyancy need not be checked if distribution is within tolerance.

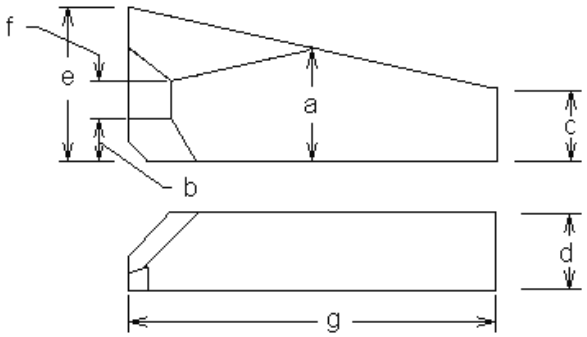
(2) If the temperature and pressure at the time of measurement is not at standard conditions, these values should be corrected to standard temperature and pressure.



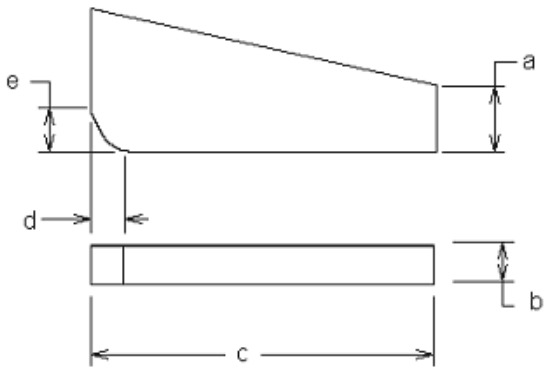
COLLAR INSERT



BACK INSERT



FRONT INSERT



INSIDE FRONT FOAM INSERT

Figure 1 – Adult RTD foam insert nomenclature

Buoyancy (N)	Length (mm)	Height (mm)
0.9	84	146
1.3	126	137
1.8	172	126
2.2	222	114
3.1	394	76

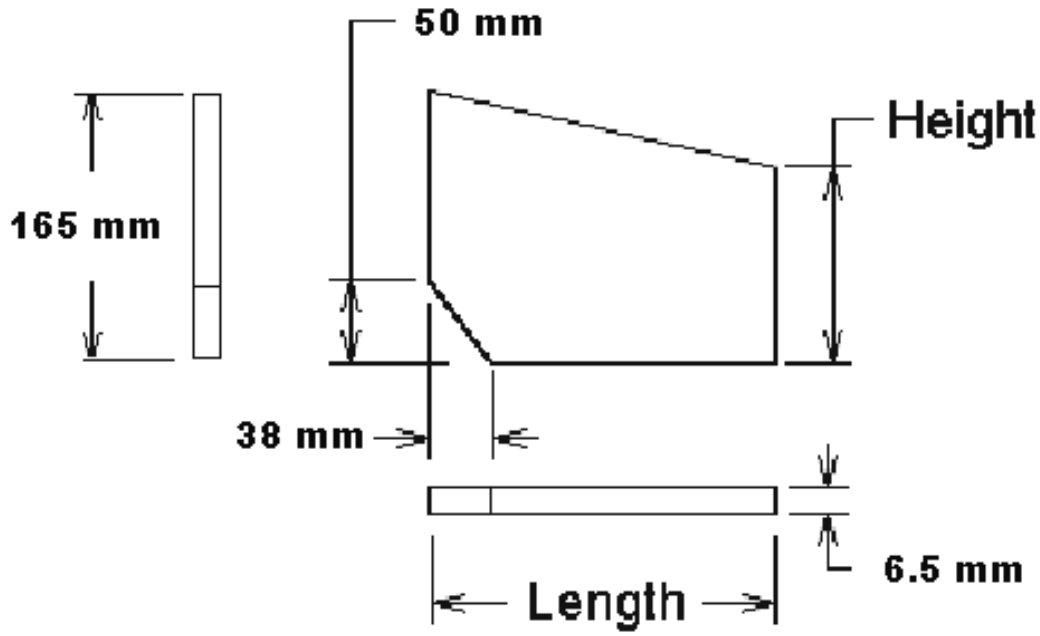


Figure 2 – Adult RTD "make-up" foam insert sizes

APPENDIX 2

CHILD REFERENCE TEST DEVICE (RTD)
DESIGN AND CONSTRUCTION

1 **General.** The RTD is intended for use only as a test reference standard to represent the desired level of in-water performance of a lifejacket required by SOLAS Convention, and is not considered representative of any other required lifejacket performance. The Child RTD is for persons weighing approximately 15 to 43 kg, or 100 to 155 cm in height. The device is designed to fit persons with chest sizes from 50 cm to 70 cm. This RTD is made with layers of buoyant foam in a bib-style design using a heavy nylon shell cover fabric secured to the body with a waist belt with quick and positive closure and adjustment, along with a chest strap at the neck for closure and adjustment. The shell is made with slide fasteners (zippers) in place of closing seams to hold the foam within, in order that the foam inserts can be easily removed to check their buoyancy and renew or supplement them if they are out of tolerance. The RTD is designed to be reasonably comfortable to wear as a non-reversible device.

2 **Materials.** All materials used should comply with ISO 12402-7.

2.1 **Foam requirements.** The performance of the RTD is dependent on using plastic foam of the proper stiffness, shapes and buoyancy.

2.1.1 **Stiffness.** The buoyant inserts are made of layers of medium stiffness foam to create a flexible but firm buoyancy element.

2.1.2 **Shape.** The shape of each foam layer is identified in Figures B.2 and B.3. Dimensions are in Tables B.1, B.2 and B.3.

2.1.3 **Buoyancy.** The total design buoyancy of the device is 88 N. Table B.4 specifies foam characteristics, the buoyancy for each insert and its tolerances, and the overall buoyancy distribution to be verified when using the RTD for certification testing.

2.2 **Other component requirements.** See Table B.1.

3 **Construction.** The construction and assembly of the device should be in accordance with Tables B.1 and B.5 and Figures B.1 through B.9. A tolerance of ± 6 mm is used throughout for fabric cutting and stitching assembly. A tolerance of ± 6 mm is also used for foam cutting, however, the buoyancy requirements of Table A.3 should be met.

3.1 **Seams.** Seam allowances are 13 mm, unless otherwise specified. All structural seams use a lock type stitch so that the seam will not unravel when a force is applied in the direction of the seam on any of the threads forming the stitch. Stitching should have a density of 7 to 12 stitches per 25 mm of stitch length. Box-x stitching on the webbing is 30 x 15 mm for the waist belt and 15 x 13 mm for the belt loop and chest strap, unless otherwise specified. The bar-tack stitching on webbing is 30 x 2 mm for the waist belt and 15 x 2 mm for the belt loop and chest strap.

3.1.1 The fabric reinforcements for the waist belt, belt loop, and chest strap should be attached to the inside surface of the outside cover before attaching any of these items. On the closing seam of the top and bottom sections of the outside and inside cover, the cut ends of the fabric is turned under and stitched when installing the zippers so that the fabric will not ravel and so that the folds are flush with the line where the zipper teeth mesh (zippers installed to be hidden by cover fabric when closed).

Table B.1 – Parts, quantity and assembly

Component	Description	Quantity	See Figure	Construction notes
1 Cover fabric	420 denier nylon, with ravel resistant coating, orange		B.1, B.4, & B.9	
1.1 Outside cover		1	B.1, B.4, & B.9	
1.2 Inside cover		1	B.1, B.4, & B.9	
1.3 Fabric reinforce-ment, chest strap)		2	B.5 & B.9	Attach one each to inside left and right outside covers for the chest strap. Use lock stitches on three sides each (see Figure B.9 for locations).
1.4 Fabric reinforce-ment, belt, and belt loop		2	B.5 & B.9	Attach to inside left and right outside covers for the waist belt and belt loop. Use lock stitches on three sides (see Figure B.9 for location).
2 Foam	7 mm thickness, polyethylene (PE) foam, except for one layer as needed to achieve required buoyancy		B.2 & B.3	Layers stacked per Figures B.2 and B.3.
2.1 Front foam insert, left		13 layers	B.2	Trim corner of layers A and B only per Figure B.2.
2.2 Front foam insert, right		13 layers	B.2	Trim corner of layers A and B only per Figures B.2.
2.3 Back foam insert		11 layers	B.3	
3 Webbing				All cut ends heat-sealed.
3.1 Waist belt webbing	38 mm, black, polypropylene, with easy adjustment and no significant slippage when used with the specified hardware.	1285 m m cut length	B.1, B.8 & B.9	On left side attach waist belt with fixed part of buckle. Tab on the end of belt formed by turning under 40 mm of material twice and stitching 19 mm from the end of the fold with a bar-tack stitch. For location see Figure B.9.
3.2 Belt loop webbing	19 mm, black, polypropylene.	80 mm cut length	B.1 & B.9	Attach webbing to front outside cover with two sets of double bar tack stitches to form a belt-loop. For location see Figure B.9.

Component	Description	Quantity	See Figure	Construction notes
3.3 Chest Strap webbing	19 mm, black, polypropylene.	235 mm & 80 mm cut length	B.1, B.7 & B.9	Attach webbing with female buckle to right outside cover. Attach webbing with male buckle to left outside cover. For location see Figure B.9. Tab formed 75 mm from the free end of the male section of chest strap by folding in "Z" pattern 30 mm apart and stitching 15 mm from the fold with a bar-tack stitch. See Figure B.7.
4 Thread	Generic synthetic	AR		
5 Hardware				
5.1 Buckle	38 mm, plastic (male & female sections)	1	B.1 & B.8	Used in waist belt assembly
5.2 Buckle	19 mm, plastic (male & female sections)	1	B.1 & B.7	Used in chest strap assembly
5.3 Zipper	380 mm, plastic (zipper chain length)	1	B.1 & B.9	
5.4 Zipper	150 mm, plastic separating (zipper chain and box/pin length)	2	B.1 & B.9	

Table B.2 – List of dimensions shown in Figure B.2

Dimension	Insert layer dimensions (mm)				
	A	*B*	*C*	*D*	*E*
a	145	140	125	115	95
b	305	300	285	275	255
c	30	30	0	0	0
d	30	30	0	0	0

Table B.3 – List of dimensions shown in Figure B.3

Dimension	Insert layer dimensions (mm)				
	A	*B*	*C*	*D*	*E*
a	343	335	325	315	305
b	140	133	120	108	95
c	9	5	3	0	– 5*
R	46	50	52	55	55

*measured in direction opposite to that shown in figure.

Table B.4 – Foam insert specifications

	Left front insert	Right front insert	Back insert
Density	29 ± 5 kg/m^3	29 ± 5 kg/m^3	29 ± 5 kg/m^3
Compressive strength @ 25% (ISO 3386-1)	35 ± 10 kPa	35 ± 10 kPa	35 ± 10 kPa
Buoyancy [a, b]	31,5 ± 1,2 N	31,5 ± 1,2 N	25 ± 1,2 N

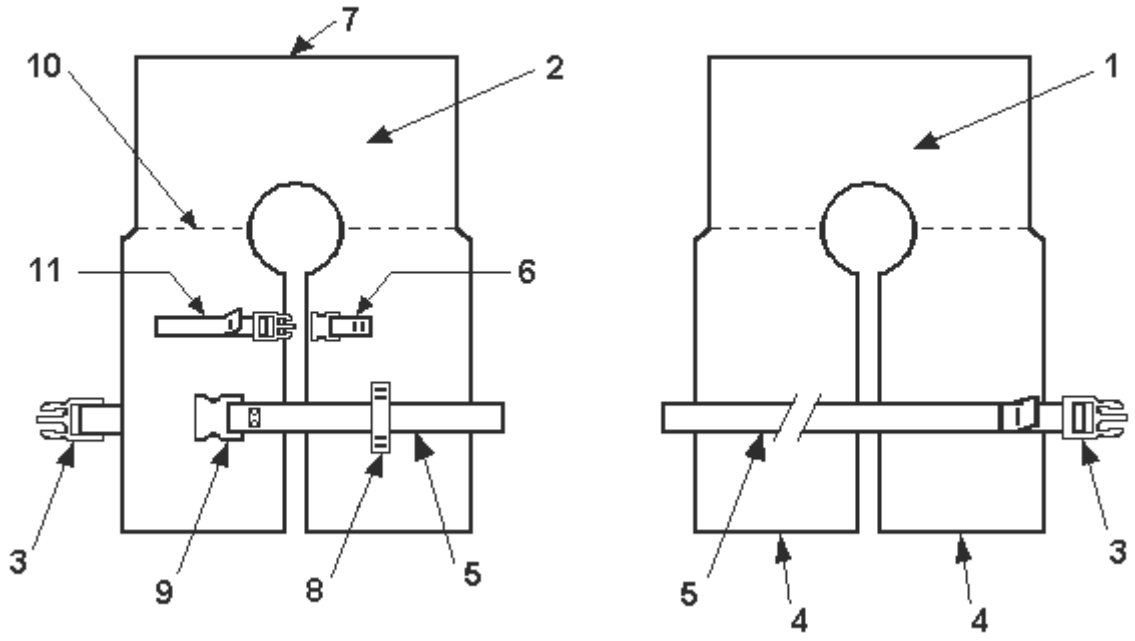
[a] The buoyancy of most foams will change over time with the greatest change occurring in the first several months after manufacture. The exact kind of foam selected with need to be evaluated to determine the amount of additional buoyancy needed at the time of manufacture to achieve the values specified.

[b] Buoyancy distribution: 71,5% front ± 1,5 percentage points

Table B.5 – List of dimensions shown in Figures B.4 - B.9

Dimension	Dimensions (mm)						
	Figure B.4	Figure B.5		Figure B.6	Figure B.7	Figure B.8	Figure B.9
		Key-1	Key-2				
a	420	75	80	75	90	1,150*	45
b	210	105	110		40		135
c	92						85
d	210						45
e	356						25
f	230						33
g	460						115
h	375						25
i	580						265

* With webbing assembly fully extended.



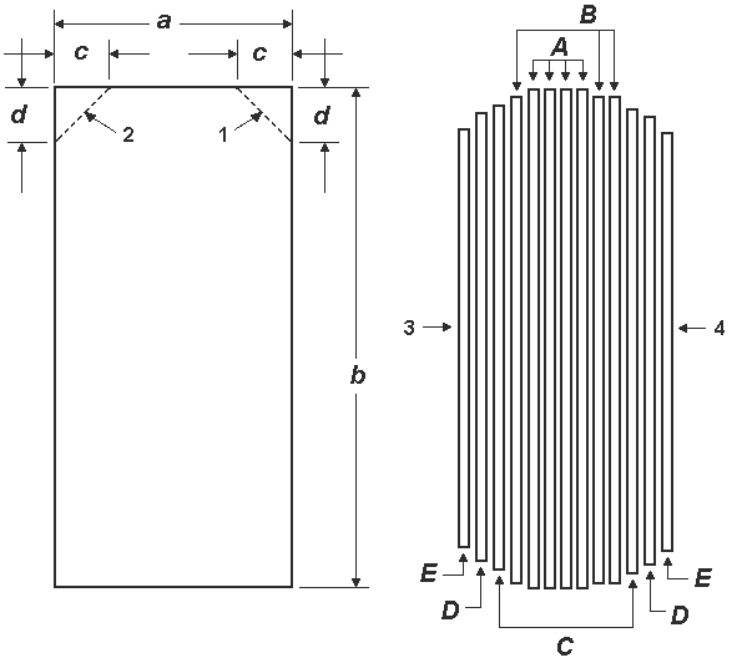
Left **Right**

Outside (front) **Inside**

Key

1 Inside cover fabric
2 Outside cover fabric
3 Adjustable part of waist belt closure
4 Zippers for access to front right and left foam compartment
5 Waist belt
6 Fixed part of chest strap
7 Zipper for access to back foam compartment
8 Belt loop
9 Fixed part of waist belt closure
10 Lockstitch to provide foam compartment separation
11 Adjustable part of chest strap

Figure B.1 – General arrangement, right side out (outside and inside)



Key

1 Trim upper right corner only for left insert layers per Table B.2
2 Trim upper left corner only for right insert layers per Table B.2
3 Outside
4 Inside

Figure B.2 – Front foam inserts (right and left sides)

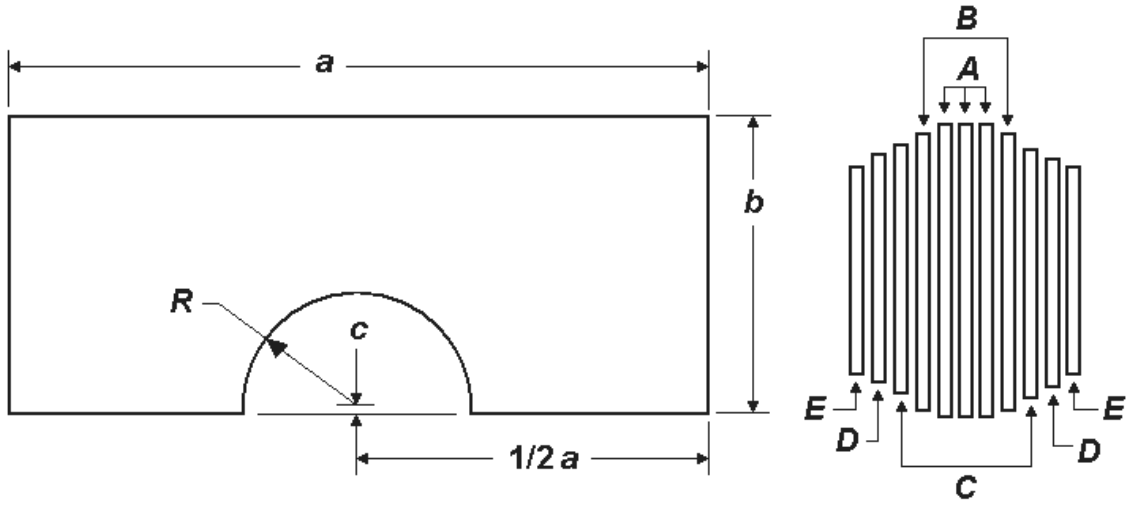


Figure B.3 – Back foam insert

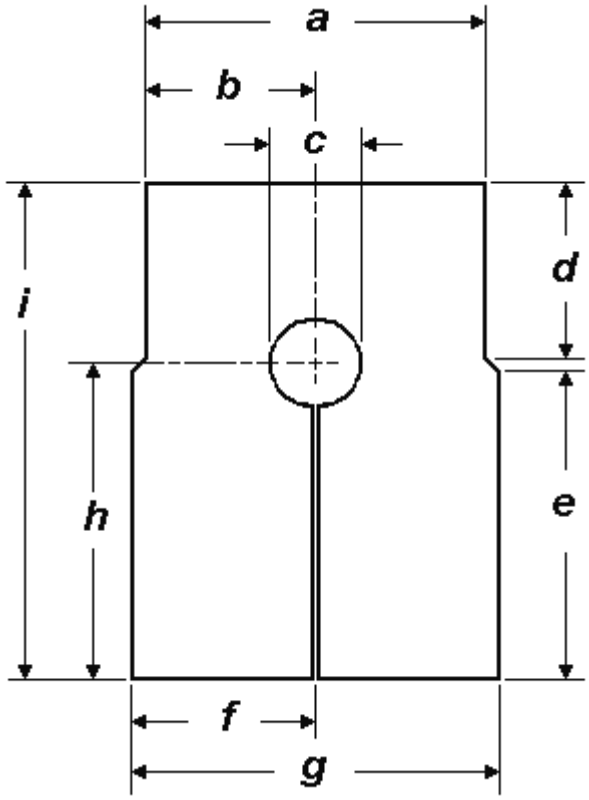
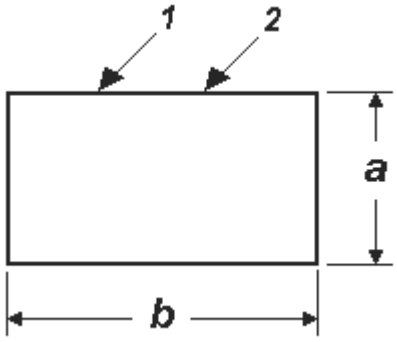
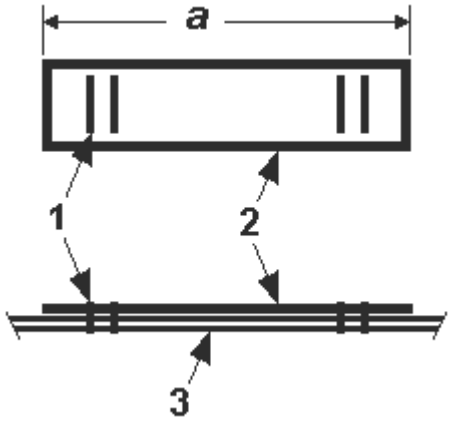


Figure B.4 – Cover cut pattern (outside and inside covers)



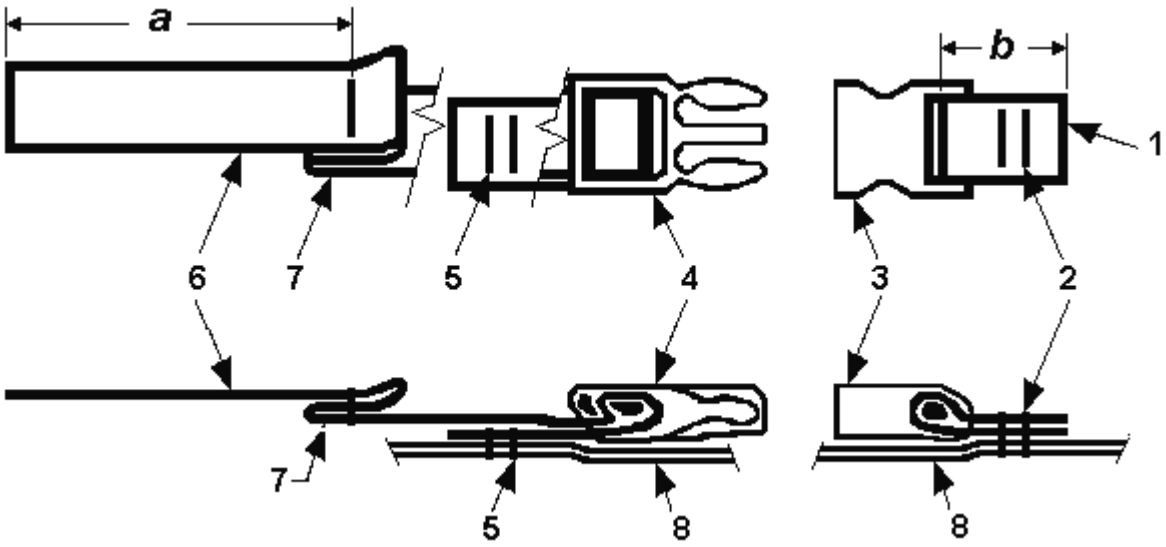
Key
1 Fabric reinforcements for chest strap attachments
2 Fabric reinforcement for waist belt and belt loop attachments

Figure B.5 – Fabric reinforcements



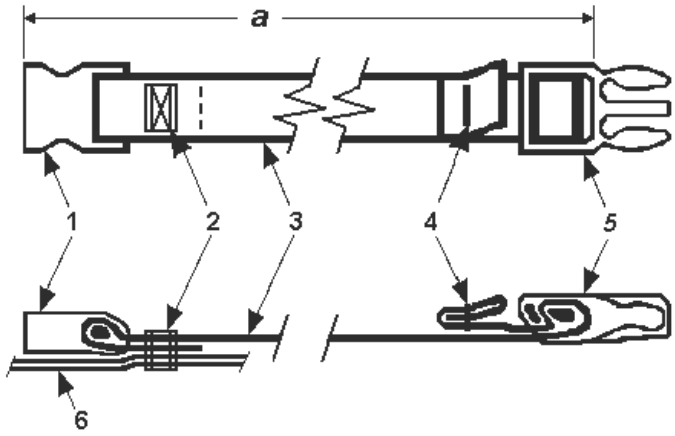
Key
1 Bar-tack
2 Webbing
3 Outer cover and reinforcement (shown on lower view only)

Figure B.6 – Belt loop



Key
1 Webbing
2 Double bar-tack (or Box-X) stitch
3 Fixed part of closure
4 Adjustable part of closure
5 Double bar-tack (or Box-x) stitch
6 Webbing
7 Tab
8 Outer cover and reinforcement (shown on lower view only)

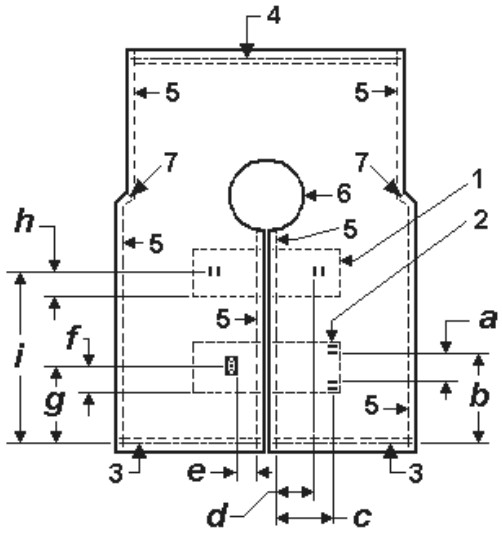
Figure B.7 – Chest strap assembly (adjustable part left and fixed part right)



Key

1 Fixed part of closure
2 Box-X (or double bar-tack) stitch
3 Webbing
4 Tab, double fold webbing and secure with a bar-tack stitch
5 Adjustable part of closure
6 Outer left cover and reinforcement (shown on lower view only)

Figure B.8 – Waist belt assembly



Key

1 Stitching on Interior fabric reinforcement for chest strap on right and left sides of the outside cover
2 Stitching on Interior fabric reinforcement for waist belt and belt loop on right and left sides of the outside cover
3 Fabric fold and zipper teeth line of engagement when zipper is attached to outside and inside covers
4 Fabric fold and zipper teeth line of engagement when zipper is attached to outside and inside covers
5 Lockstitch seams (with fabric face to face)
6 Lockstitch with 5 mm seam allowance and over-edge stitch (with fabric face to face)
7 After stitching cut relief

Figure B.9 – Initial assembly (shown right side out, except as noted)

APPENDIX

RTD Serial number: _____

CHILD REFERENCE TEST DEVICE – BUOYANCY TRACKING AND VERIFICATION

To achieve repeatability in human subject and manikin testing, the overall buoyancy and distribution of buoyancy between the front and back of the RTD must be maintained within a tight tolerance as specified in Table 1.

Table 1 – SOLAS Child RTD Buoyancy and Tolerance

Limit / Units	Front Buoyancy (1) (2)	Back Buoyancy (1)	Total Buoyancy (1)		Buoyancy Distribution (3)
Design / N	63	25	88		71,5% in front
Maximum / N	65,4	26,2	91,6		73% in front
Minimum / N	60,6	23,8	84,4		70% in front

(1) Values at or corrected to standard temperature and pressure.
(2) The left-to-right buoyancy distribution in the front inserts is to be within 1,3 N of each other.
(3) Buoyancy distribution is calculated by dividing the front buoyancy by the total buoyancy.

The buoyancy of a new RTD may exceed the allowable tolerance range until the normal shrinkage or compression of the foam inserts stabilizes. Until the buoyancies of the foam inserts have stabilized, buoyancy and distribution should be checked at regular intervals (perhaps weekly), and then at least monthly thereafter or whenever used for testing, whichever is longer. (Frequent use may require more frequent checks.) Only RTD's with buoyancies within tolerance should be used for certification testing. A data sheet to document the buoyancy and buoyancy distribution of the RTD is attached.

To check buoyancy tolerances, foam inserts need to be removed from the device. Take care that all trapped air is removed when checking buoyancy and that layers are maintained in their proper sequence when reinstalled. (Considerable effort would be needed to remove entrapped air if testing the intact device.)

Adjustment of buoyancy: At the time of manufacture the left-to-right distribution of buoyancy in the front inserts was adjusted to be within 1,3 N of each other. To achieve this tolerance, the layers were individually selected to achieve the cumulative insert buoyancy. If buoyancy of a new device exceeds the upper limits, one layer per compartment may be altered or replaced to bring the unit into compliance. The test house may need to add make-up layers (see fig. 3) from time to time to maintain the front-to-back and side-to-side insert tolerances. If the front buoyancy is under the minimum value, measure the buoyancy of the right and left sides so that the proper distribution of buoyancy (no more than a 1,3 N difference) between the right and left front panels can be maintained.

Table 2 – SOLAS Child RTD Insert Design Buoyancies

	Combined Left Front Insert (13 layers)	Combined Right Front Insert (13 layers)	Combined Back Insert (11 layers)
Design (N)	31,5	31,5	25
S/N ____ Date:			

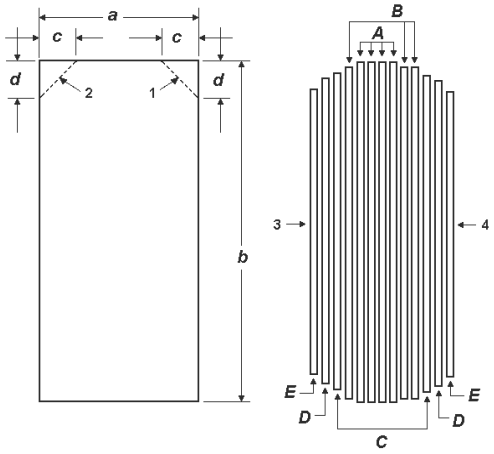
RTD BUOYANCY DATA SHEET

RTD Serial number/identification: _____

Date	Left Front Buoyancy (N)	Right Front Buoyancy (N)	Total Front Buoyancy (N)	Total Back Buoyancy (N)	Total Buoyancy (N)	Buoyancy Distribution (% in front)	Remarks
	(1)		(2)				

(1) Left and right front buoyancy need not be checked if distribution is within tolerance.

(2) If the temperature and pressure at the time of measurement is not at standard conditions, these values should be corrected to standard temperature and pressure.

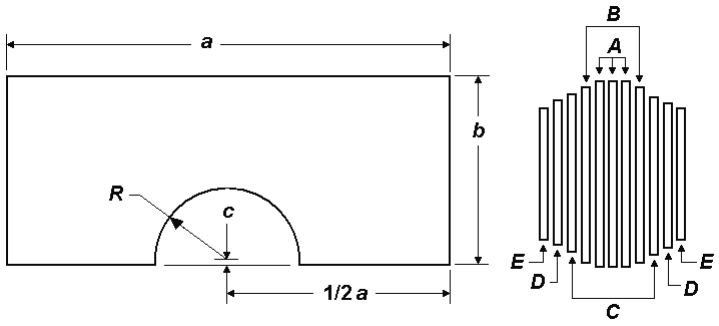


Key

1 Trim upper right corner only for left insert layers A and B.
2 Trim upper left corner only for right insert layers A and B.
3 Outside
4 Inside

Insert layer	Buoyancy (approx.) (N)	Insert layer dimensions (mm)			
		a	***b***	***c***	***d***
A	2,8	145	305	30	30
B	2,7	140	300	30	30
C	2,3	125	285	0	0
D	2,0	115	275	0	0
E	1,6	95	255	0	0

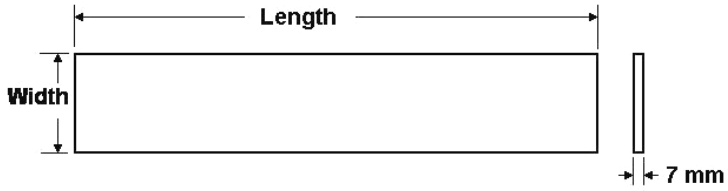
Figure 1 – Front foam insert specifications



Insert layer	Buoyancy (approx.) (N)	Insert layer dimensions (mm)			
		a	***b***	***c***	***R***
A	2,8	343	140	9	46
B	2,6	335	133	5	50
C	2,2	325	120	3	52
D	1,9	315	108	0	55
E	1,6	305	95	-5*	55

* measured in direction opposite to that shown in figure.

Figure 2 – Back foam insert specifications



1 Any thickness of foam up to 7 mm is acceptable for a make-up layer.

2 For 7 mm thick foam, 15,300 mm^2 surface area equals approximately 1 N of buoyancy.

Make-up layer (1)	Buoyancy (approx.) (N)	Make-up layer dimensions (mm)	
		Length (mm) (2)	Width (mm)
Front	1.0	300	51
	1.5		76
Back	1.0	340	45
	1.5		67

(1) For 7 mm thick foam.

(2) The length for make-up layer is fixed to maintain proper placement within the lifejacket, but the width may vary to obtain desired buoyancy.

Figure 3 – Child RTD "make-up" foam insert sizes

APPENDIX 3

INFANT REFERENCE TEST DEVICE (RTD)
DESIGN AND CONSTRUCTION

1 **General.** The RTD is intended for use only as a test reference standard to represent the desired level of in-water performance of a lifejacket required by SOLAS Convention, and is not considered representative of any other required lifejacket performance. The infant RTD is for persons weighing less than 15 kg, or less than 100 cm in height. The device is designed to fit persons with a chest size of less than 50 cm. This RTD is made with layers of buoyant foam in a bib-style design using a heavy nylon shell cover fabric secured to the body with a waist belt with quick and positive closure and adjustment, along with a chest strap at the neck for closure and adjustment. The shell is made with slide fasteners (zippers) in place of closing seams to hold the foam within, in order that the foam inserts can be easily removed to check their buoyancy and renew or supplement them if they are out of tolerance. The RTD is designed to be reasonably comfortable to wear as a non-reversible device.

2 **Materials.** All materials used should comply with ISO 12402-7.

2.1 **Foam requirements.** The performance of the RTD is dependent on using plastic foam of the proper stiffness, shapes, and buoyancy.

2.1.1 **Stiffness.** The buoyant inserts are made of layers of medium stiffness foam to create a flexible but firm buoyancy element.

2.1.2 **Shape.** The shape of each foam layer is identified in Figures C.2 and C.3. Dimensions are in Tables C.1, C.2 and C.3.

2.1.3 **Buoyancy.** The total design buoyancy of the device is 71 N. Table C.4 identifies foam characteristics, the buoyancy for each insert and its tolerances, and the overall buoyancy distribution to be verified when using the RTD for certification testing.

2.2 **Other component requirements.** See Table C.1.

3 **Construction.** The construction and assembly of the device should be in accordance with Tables C.1 and C.5 and Figures C.1 through C.9. A tolerance of ± 6 mm is used throughout for fabric cutting and stitching assembly. A tolerance of ± 6 mm is also used for foam cutting, however, the buoyancy requirements of Table C.4 should be met.

3.1 **Seams.** Seam allowances are 13 mm, unless otherwise specified. All structural seams use a lock type stitch so that the seam will not unravel when a force is applied in the direction of the seam on any of the threads forming the stitch. Stitching should have a density of 7 - 12 stitches per 25 mm of stitch length. Box-x stitching on the webbing is 30 x 15 mm for the waist belt and 15 x 13 mm for the belt loop and chest strap, unless otherwise specified. The bar-tack stitching on webbing is 30 x 2 mm for the waist belt and 15 x 2 mm for the belt loop and chest strap.

3.1.1 The fabric reinforcements for the waist belt, belt loop, and chest strap should be attached to the inside surface of the outside cover before attaching any of these items. On the closing seam of the top and bottom sections of the outside and inside cover, the cut ends of the fabric are turned under and stitched when installing the zippers so that the fabric will not ravel and so that the folds are flush with the line where the zipper teeth mesh (zippers installed to be hidden by cover fabric when closed).

Table C.1 – Parts, quantity and assembly

Component	Description	Quantity	See Figure	Construction notes
1 Cover fabric	420 denier nylon, with ravel resistant coating, orange		C.1, C.4, & C.9	
1.1 Outside cover		1	C.1, C.4, & C.9	
1.2 Inside cover		1	C.1, C.4, & C.9	
1.3 Fabric reinforce-ment, chest strap		2	C.5 & C.9	Attach one each to inside left and right outside covers for the chest strap. Use lock stitches on three sides each (see Figure C.9 for locations).
1.4 Fabric reinforce-ment, belt and belt loop		2	C.5 & C.9	Attach to inside left and right outside covers for the waist belt and belt loop. Use lock stitches on three sides (see Figure C.9 for location).
2 Foam	7 mm thickness, polyethylene (PE) foam, except for one layer as needed to achieve required buoyancy		C.2 & C.3	Layers stacked per Figures C.2 and C.3.
2.1 Front foam insert, left		15 layers	C.2	Trim corners per Figure C.2, except outside layers B thru G.
2.2 Front foam insert, right		15 layers	C.2	Trim corners per Figure C.2, except outside layers B thru G.
2.3 Back foam insert		12 layers	C.3	
3 Webbing				All cut ends heat-sealed.
3.1 Waist belt webbing	38 mm, black, polypropylene, with easy adjustment and no significant slippage when used with the specified hardware.	1085 mm cut length	C.1, C.8 & C.9	On left side attach waist belt with female buckle. Tab on the end of belt formed by turning under 40 mm of material twice and stitching 19 mm from the end of the fold with a bar-tack stitch. For location see Figure C.9.

3.2 Belt loop webbing	19 mm, black, polypropylene.	80 mm cut length	C.1, C.6, & C.9	Attach webbing to front outside cover with two sets of double bar tack stitches to form a belt-loop. For location see Figure C.9.
3.3 Chest Strap webbing	19 mm, black, polypropylene.	235 mm & 80 mm cut length	C.1, C.7 & C.9	Attach webbing with female buckle to right outside cover. Attach webbing with male buckle to left outside cover. For location see Figure C.9. Tab formed 75 mm from the free end of the male section of chest strap by folding in "Z" pattern 30 mm apart and stitching 15 mm from the fold with a bar-tack stitch. See Figure C.7.
4 Thread	Generic synthetic	AR		
5 Hard ware				
5.1 Buckle	38 mm, plastic (male and female sections)	1	C.1 & C.8	Used in waist belt assembly.
5.2 Buckle	19 mm, plastic (male and female sections)	1	C.1 & C.7	Used in chest strap assembly
5.3 Zipper	350 mm, plastic (zipper chain length)	1	C.1 & C.9	Installed to be hidden by cover fabric when closed.
5.4 Zipper	180 mm, plastic separating (zipper chain and box/pin length)	2	C.1 & C.9	Installed to be hidden by cover fabric when closed.

Table C.2 – List of dimensions shown in Figure C.2

Dimension	Insert layer dimensions (mm)						
	A	*B*	*C*	*D*	*E*	*F*	*G*
a	140	133	127	120	108	95	83
b	190	184	178	172	165	160	140
c	28	28	28	28	28		

Table C.3 – List of dimensions shown in Figure C.3

Dimension	Insert layer dimensions (mm)				
	A	*B*	*C*	*D*	*E*
a	310	303	290	275	255
b	165	160	140	120	95
c	3	3	3	3	-3*
R	44	44	44	44	44

* measured in direction opposite to that shown in figure.

Table C.4 – Foam insert specifications

	Left front insert	Right front insert	Back insert
Density	29 ± 5 kg/m^3	29 ± 5 kg/m^3	29 ± 5 kg/m^3
Compressive strength @ 25% (ISO 3386-1)	35 ± 10 kPa	35 ± 10 kPa	35 ± 10 kPa
Buoyancy [a, b]	21 ± 1,2 N	21 ± 1,2 N	29 ± 1,2 N

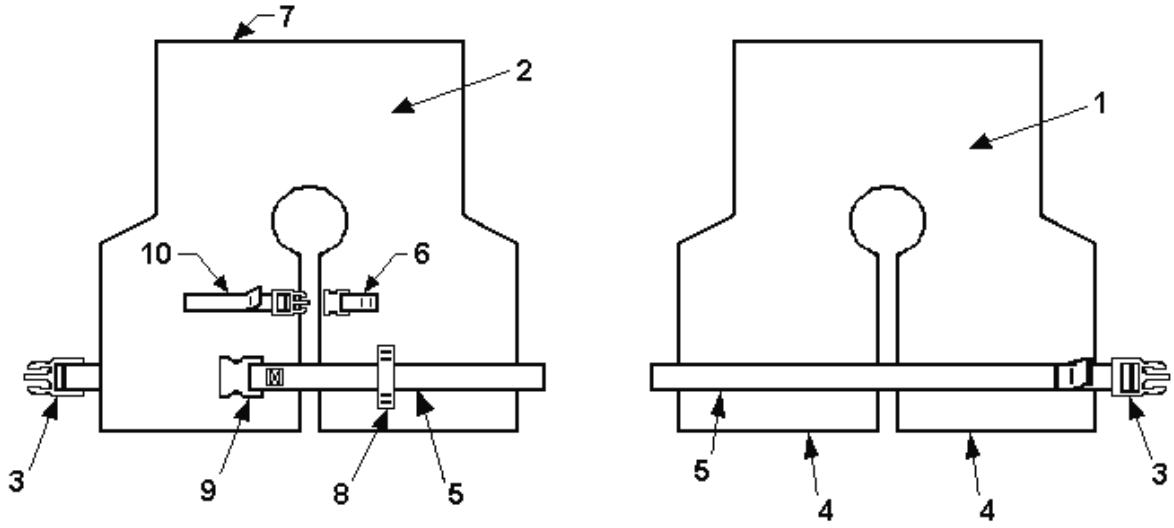
[a] The buoyancy of most foams will change over time with the greatest change occurring in the first several months after manufacture. The exact kind of foam selected will need to be evaluated to determine the amount of additional buoyancy needed at the time of manufacture to achieve the values specified.

[b] Buoyancy distribution: 59,2 % front ± 1,5 percentage points

Table C.5 – List of dimensions shown in Figures C.4-C.9

Dimension	Dimensions (mm)						
	Figure C.4	Figure C.5		Figure C.6	Figure C.7	Figure C.8	Figure C.9
		Key-1	Key-2				
a	390	75	80	75	90	950*	45
b	195	105	110		40		115
c	85						140
d	220						45
e	245						25
f	241						33
g	482						95
h	260						25
i	490						160

* With webbing assembly fully extended.



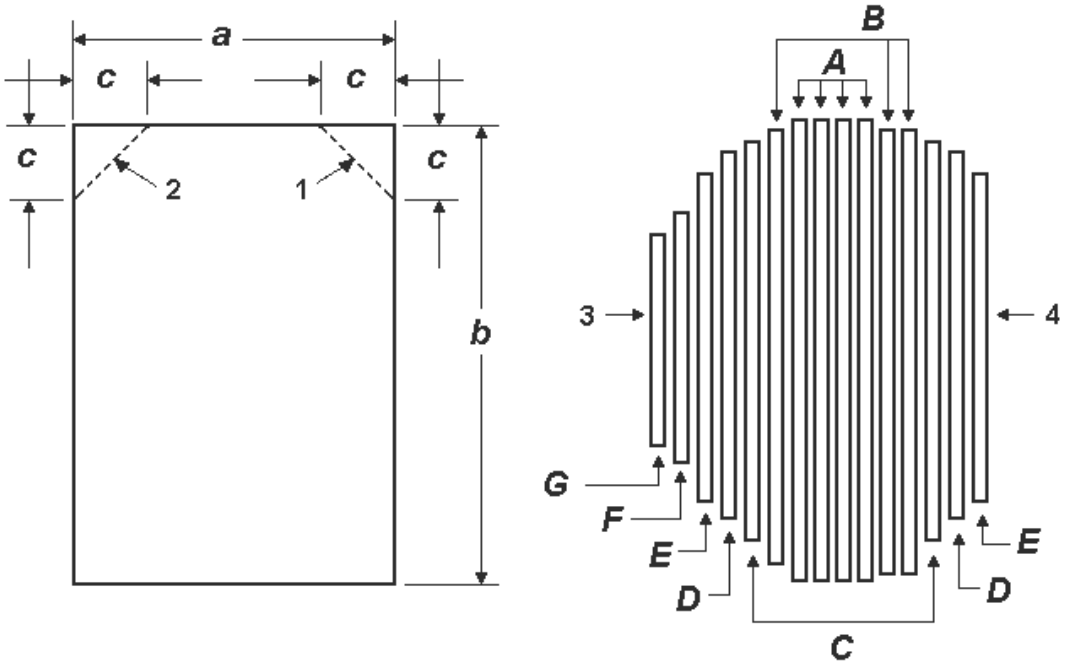
Left **Right**

Outside (front) **Inside**

Key

1 Inside cover fabric
2 Outside cover fabric
3 Adjustable part of closure
4 Zippers for access to front right and left foam compartment
5 Waist belt
6 Fixed part of chest strap
7 Zipper for access to back foam compartment
8 Belt loop
9 Fixed part of closure
10 Adjustable part of chest strap

Figure C.1 – General arrangement, right side out (outside and inside)



Key

1 Trim upper right corner only for left insert layers per Table C.2
2 Trim upper left corner only for right insert layers per Table C.2
3 Outside
4 Inside

Figure C.2 – Front foam inserts (right and left sides)

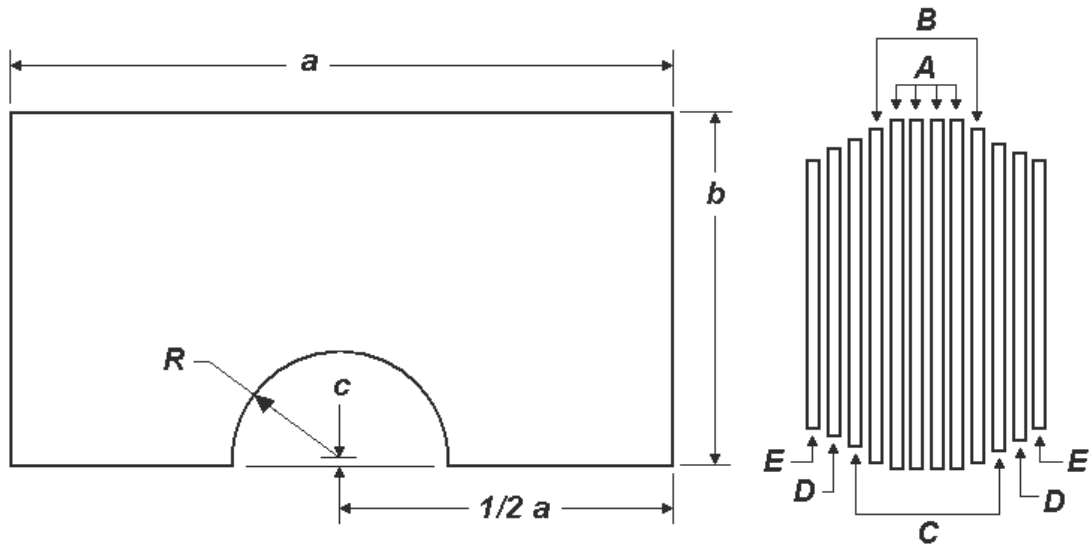


Figure C.3 – Back foam insert

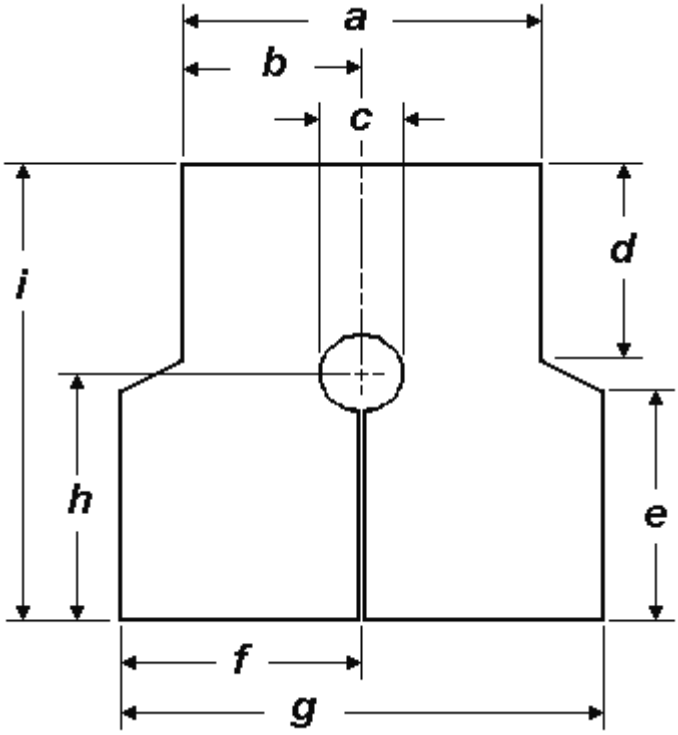
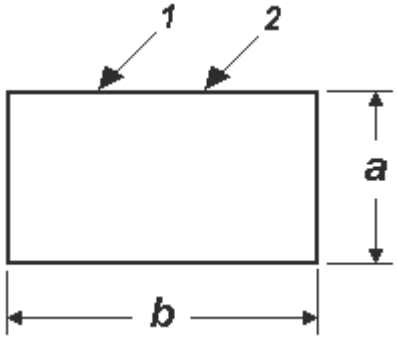
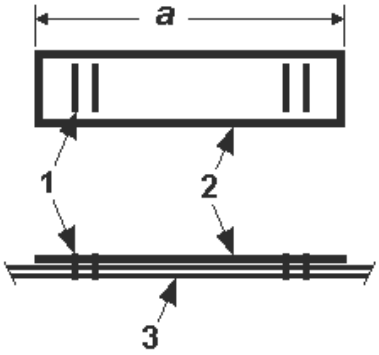


Figure C.4 – Cover cut pattern (outside and inside covers)



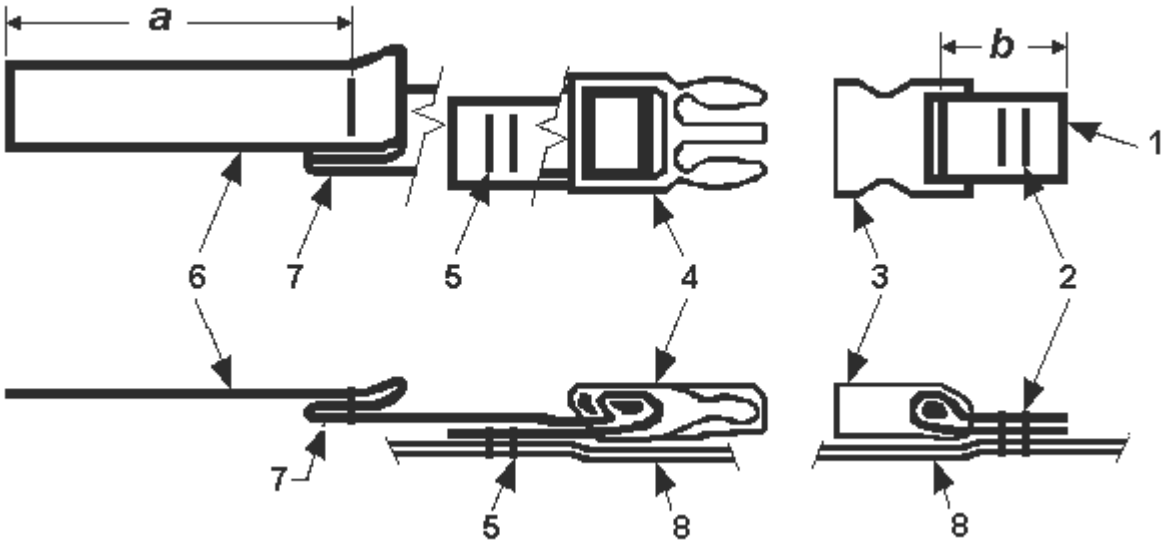
Key
1 Fabric reinforcements for chest strap attachments
2 Fabric reinforcement for waist belt and belt loop attachments

Figure C.5 – Fabric reinforcements



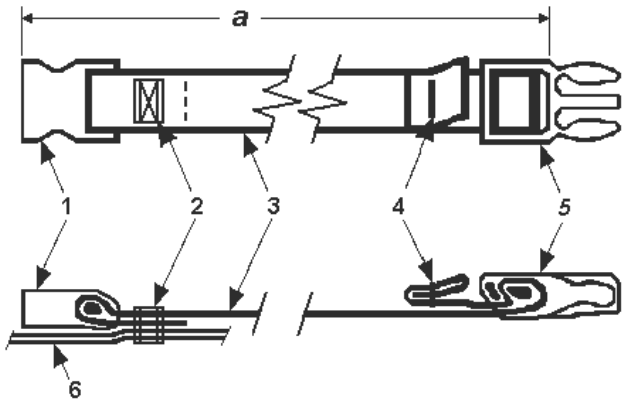
Key
1 Bar-tack
2 Webbing
3 Outer cover and reinforcement (shown on lower view only)

Figure C.6 – Belt loop



Key
1 Webbing
2 Double bar-tack (or box-X) stitch
3 Fixed part of closure
4 Adjustable part of closure
5 Double bar-tack (or box-X) stitch
6 Webbing
7 Tab
8 Outer cover and reinforcement (shown on lower view only)

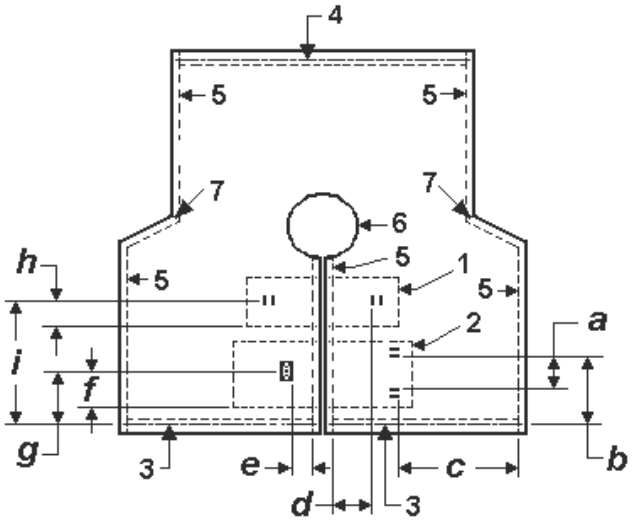
Figure C.7 – Chest strap assembly (adjustable part left and fixed part right)



Key

1 Fixed part of closure
2 Box-X (or double bar-tack) stitch
3 Webbing
4 Tab, double fold webbing and secure with a bar-tack stitch
5 Adjustable part of closure
6 Outer left cover and reinforcement (shown on lower view only)

Figure C.8 – Waist belt assembly



Key

1 Stitching on interior reinforcement for chest strap on right and left sides of outside cover only
2 Stitching on interior reinforcement for waist belt and belt loop on right and left sides of outside cover only
3 Fabric fold and zipper teeth line of engagement when attached to outside and inside covers
4 Fabric fold and zipper teeth line of engagement when attached to outside and inside covers
5 Lockstitch seams (with fabric face to face)
6 Lockstitch with 5 mm seam allowance and over-edge stitch (with fabric face to face)
7 After stitching seams cut relief

Figure C.9 – Initial assembly (shown right side out, except as noted)

APPENDIX

RTD Serial number: _____

INFANT REFERENCE TEST DEVICE – BUOYANCY TRACKING AND VERIFICATION

To achieve repeatability in human subject and manikin testing, the overall buoyancy and distribution of buoyancy between the front and back of the RTD must be maintained within a tight tolerance as specified in Table 1.

Table 1 – SOLAS Infant RTD Buoyancy and Tolerance

Limit / Units	Front Buoyancy (1) (2)	Back Buoyancy (1)	Total Buoyancy (1)		Buoyancy Distribution (3)
Design / N	42	29	71		59,2% in front
Maximum / N	44,4	30,2	74,6		60,7% in front
Minimum / N	39,6	27,8	67,4		57,7% in front

(1) Values at or corrected to standard temperature and pressure.

(2) The left-to-right buoyancy distribution in the front inserts is to be within 1,3 N of each other.

(3) Buoyancy distribution is calculated by dividing the front buoyancy by the total buoyancy.

The buoyancy of a new RTD may exceed the allowable tolerance range until the normal shrinkage or compression of the foam inserts stabilizes. Until the buoyancies of the foam inserts have stabilized, buoyancy and distribution should be checked at regular intervals (perhaps weekly), and then at least monthly thereafter or whenever used for testing, whichever is longer. (Frequent use may require more frequent checks.) Only RTD's with buoyancies within tolerance should be used for certification testing. A data sheet to document the buoyancy and buoyancy distribution of the RTD is attached.

To check buoyancy tolerances, foam inserts need to be removed from the device. Take care that all trapped air is removed when checking buoyancy and that layers are maintained in their proper sequence when reinstalled. (Considerable effort would be needed to remove entrapped air if testing the intact device.)

Adjustment of buoyancy: At the time of manufacture the left-to-right distribution of buoyancy in the front inserts was adjusted to be within 1,3 N of each other. To achieve this tolerance, the layers were individually selected to achieve the cumulative insert buoyancy. If buoyancy of a new device exceeds the upper limits, one layer per compartment may be altered or replaced to bring the unit into compliance. The test house may need to add make-up layers (see figure 3) from time to time to maintain the front-to-back and side-to-side insert tolerances. If the front buoyancy is under the minimum value, measure the buoyancy of the right and left sides so that the proper distribution of buoyancy (no more than a 1,3 N difference) between the right and left front panels can be maintained.

Table 2 – SOLAS Infant RTD Insert Design Buoyancies

	Combined Left Front Inserts (15 layers)	Combined Right Front Inserts (15 layers)	Combined Back Inserts (11 layers)
Design (N)	21	21	29
S/N _____ Date:			

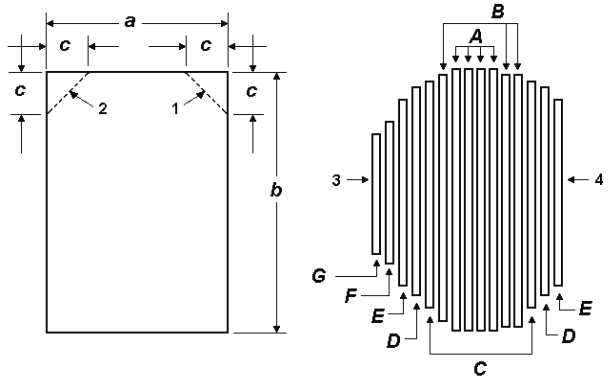
RTD BUOYANCY DATA SHEET

RTD Serial number/identification: _____

Date	Left Front Buoyancy (N)	Right Front Buoyancy (N)	Total Front Buoyancy (N)	Total Back Buoyancy (N)	Total Buoyancy (N)	Buoyancy Distribution (% in front)	Remarks
	(1)		(2)				

(1) Left and right front buoyancy need not be checked if distribution is within tolerance.

(2) If the temperature and pressure at the time of measurement is not at standard conditions, these values should be corrected to standard temperature and pressure.

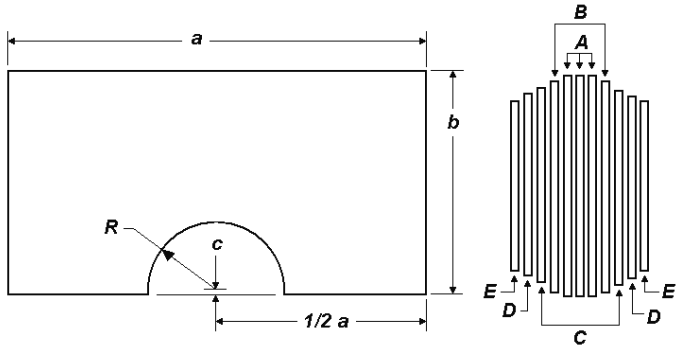


Key

1 Trim upper right corner only for left insert layers A through E
2 Trim upper left corner only for right insert layers A through E
3 Outside
4 Inside

Insert layer	Buoyancy (N)	Insert layer dimensions (mm)		
		a	*b*	*c*
A	1,7	140	190	28
B	1,6	133	184	28
C	1,4	127	178	28
D	1,3	120	172	28
E	1,1	108	165	28
F	1,0	95	160	0
G	0,8	83	140	0

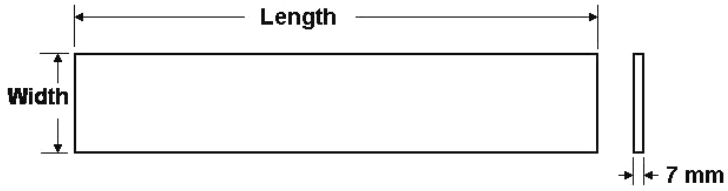
Figure 1 – Front foam insert specifications



Insert layer	Buoyancy (N)	Insert layer dimensions (mm)			
		a	*b*	*c*	*R*
A	3,1	310	165	3	44
B	2,9	303	160	3	46
C	2,4	290	140	3	48
D	1,8	275	120	3	50
E	1,3	255	95	-3*	52

* measured in direction opposite to that shown in figure.

Figure 2 – Back foam insert specifications



1 Any thickness of foam up to 7 mm is acceptable for a make-up layer.

2 For 7 mm thick foam, 15,300 mm^2 surface area equals approximately 1 N of buoyancy.

Make-up layer (1)	Buoyancy (approx.) (N)	Make-up layer dimensions (mm)	
		Length (mm) (2)	Width (mm)
Front	1.0	185	82
	1.5		123
Back	1.0	305	50
	1.5		75

(1) For 7 mm thick foam.

(2) The length for make-up layer is fixed to maintain proper placement within the lifejacket, but the width may vary to obtain desired buoyancy.

Figure 3 – Child RTD "make-up" foam insert sizes"

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ANNEX 7

SO_x OVER CO_2 MONITORING METHOD

1 Correspondence between 65 ([1]ppm/%) SO_2/CO_2 and 1.5% sulphur in fuel is demonstrated by first calculating the mass ratio of fuel sulphur to fuel carbon, which is tabulated in Table 1 for various fuels and fuel sulphur contents; including 1.5% sulphur for both distillate and residual fuels. These ratios were used to solve for the corresponding SO_2 and CO_2 concentrations in exhaust, which are tabulated in Table 2. Molecular weights (MW) were taken into account to convert mass fractions to mole fractions. For the 1.5% sulphur fuels in Table 2, the amount of CO_2 is set first at 8% and then changed to 0.5% to show that there is no effect due to changes in excess air. As expected, the absolute SO_2 concentration changes, but the SO_2/CO_2 ratio does not. This indicates that the SO_2/CO_2 ratio is independent of fuel-to-air ratios. Therefore, SO_2/CO_2 ratio can be used robustly at any point of operation, including operation where no brake power is produced.

Note that the SO_2/CO_2 ratio varies slightly from distillate to residual fuel. This occurs because of the very different atomic hydrogen-to-carbon ratios (H:C) of the two fuels. Figure 1 illustrates the extent of the SO_2/CO_2 ratios' sensitivity to H:C over a broad range of H:C and fuel sulphur concentrations. From Figure 1, it can be concluded that for fuel sulphur levels less than 3.00% S, the difference in S/C ratios for distillate and residual fuel is less than 5.0%.

Table 1: Fuel properties for marine distillate and residual fuel

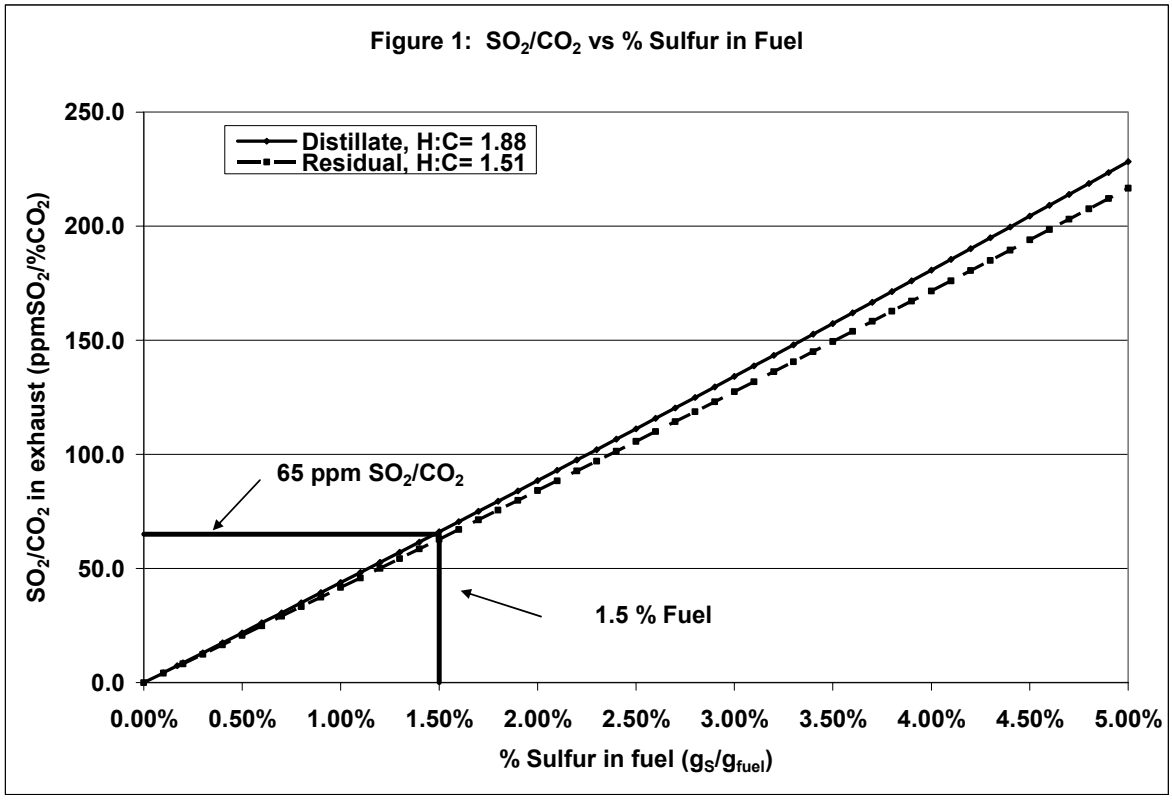
	Carbon	Hydrogen	Sulphur	Other	H:C	Fuel S/C
	g/g	g/g	g/g	g/g	mol/mol	g/g
Distillate*	86.20%	13.60%	0.17%	0.03%	1.880	0.00197
Residual*	86.10%	10.90%	2.70%	0.30%	1.509	0.03136
Distillate 1.5% S	85.05%	13.42%	1.50%	0.03%	1.880	**0.01764**
Residual 1.5% S	87.17%	11.03%	1.50%	0.30%	1.509	**0.01721**

* Based on properties in the IMO NO_x Monitoring Guidelines

Table 2: Emissions calculations corresponding to 1.5% fuel sulphur

	CO_2	SO_2	Exh SO_2/CO_2	Exh S/C
	%	[1]ppm	[1]ppm/%	g/g
Distillate 0.17% S	8	59.1	7.4	0.00197
Residual 2.70% S	8	939.7	117.5	0.03136
Distillate 1.5% S	8	528.5	**66.1**	**0.01764**
Residual 1.5% S	8	515.7	**64.5**	**0.01721**
Distillate 1.5% S	0.5	33.0	**66.1**	**0.01764**
Residual 1.5% S	0.5	32.2	**64.5**	**0.01721**

[1] ppm means "parts per million". It is assumed that ppm is measured by gas analysers on a molar basis, assuming ideal gas behaviour. The technically correct units are actually micro-moles of substance per mole of total amount (μmol/mol), but ppm is used in order to be consistent with units in the NO_x Technical Code.



2 Correspondence between 65 ([1]ppm/%) SO_2/CO_2 and 6.0 g/kWh is demonstrated by showing that their S/C ratios are similar. This requires the additional assumption of a brake-specific fuel consumption value of 200 g/kWh. This is an appropriate average for marine diesel engines. The calculation is as follows:

$$S/C_{fuel} = \frac{\text{brake-specific } SO_2 * \left(MW_S / MW_{SO2}\right)}{BSFC * \left(\%\text{ carbon in fuel} / 100\right)}$$

brake-specific $SO_2 = 6.0$ g/kW-hr

$MW_S = 32.065$ g/mol

$MW_{SO2} = 64.064$ g/mol

BSFC = 200 g/kW-hr

% carbon in 1.5% S fuel (from Table 1)= 85.05% (distillate) & 87.17% residual

$$S/C_{\text{residual fuel}} = \frac{6.0 * \left(32.065 / 64.064\right)}{200 * \left(87.17\% / 100\right)}$$

$S/C_{\text{residual fuel}} = 0.01723$

$$S/C_{\text{residual fuel}} = \frac{6.0 * \left(32.065 / 64.064\right)}{200 * \left(85.05\% / 100\right)}$$

$S/C_{\text{residual fuel}} = 0.01765$

Note that the S/C mass ratios calculated above, based on 6.0 g/kWh SO_2 and 200 g/kWh BSFC, are both within 0.10% of the S/C mass ratios in the emissions table (Table 2). Therefore, 65 [1]ppm SO_2/CO_2 corresponds well to 6.0 g/kWh in regulation 14(4)(b).

3 Thus, the working formulas are as follows:

For complete combustion = $$\frac{SO_2\ (ppm^*)}{CO_2\ (\%^*)} \leq 65$$

For incomplete combustion = $$\frac{SO_2\ (ppm^*)}{CO_2(\%^*) + (CO\ (ppm^*)/10000) + (THC\ (ppm^*)/10000)} \leq 65$$

* Note: Gas concentrations must be sampled or converted to the same residual water content (e.g., fully wet, fully dry).

4 The following is a list of advantages of using the 65 ([1]ppm/%) SO_2/CO_2 as the limit for determining compliance with regulation 14:

.1 This limit can be used to determine compliance from fuel oil burners that do not produce mechanical power.

.2 This limit can be used to determine compliance at any power output, including idle.

.3 This limit only requires two gas concentration measurements at one sampling location.

.4 There is no need to measure any engine parameters such as engine speed, engine torque, engine exhaust flow, or engine fuel flow.

.5 If both gas concentration measurements are made at the same residual water content in the sample (e.g. fully wet, fully dry), no dry-to-wet conversion factors are required in the calculation.

.6 This limit completely decouples the thermal efficiency of the fuel oil burner from the EGCS.

.7 No fuel properties need to be known.

.8 Because only two measurements are made at a single location, transient engine or EGCS effects can be minimized by aligning signals from just these two analysers. (Note that the most appropriate points to align are the points where each analyser responds to a step change in emissions at the sample probe by 50% of the steady-state value).

.9 This limit is independent of the amount of exhaust gas dilution. Dilution may occur due to evaporation of water in an EGCS, and as part of an exhaust sampler's preconditioning system.

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ANNEX 8

DRAFT MEPC RESOLUTION

GUIDELINES FOR ON-BOARD EXHAUST GAS-SO_x CLEANING SYSTEMS

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee (the Committee) conferred upon it by international conventions for the prevention and control of marine pollution,

RECALLING ALSO that the Conference of Parties to the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78), held in September 1997, adopted the Protocol of 1997 to amend MARPOL 73/78 with a new Annex VI on the Prevention of Air Pollution from Ships,

NOTING that the 1997 Conference by regulation 14(4)(b) of Annex VI, agreed that ships within a SO_x emission control area are permitted to operate with an exhaust gas cleaning system approved by the Administration and taking into account guidelines to be developed by the Organization,

BEING AWARE that the Protocol of 1997 entered into force on 19 May 2005 and that exemptions from the requirements for SO_x emission control areas will cease on 18 May 2006,

HAVING CONSIDERED the recommendation made by the Sub-Committee on Ship Design and Equipment at its forty-eighth session,

1. ADOPTS the Guidelines for exhaust gas – SO_x cleaning systems, as set out in the Annex to this resolution;

2. INVITES Governments to apply the Guidelines from the date of their adoption.

ANNEX

GUIDELINES FOR EXHAUST GAS-SO_x CLEANING SYSTEMS – MARPOL ANNEX VI, REGULATION 14(4)(B)

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11 WASH WATER MONITOR

12 DATA RECORDING AND PROCESSING DEVICE

13 ON-BOARD MONITORING MANUAL

SCP COMPLIANCE PLAN

14 SECA COMPLIANCE PLAN (SCP)

15 SHIP COMPLIANCE

1 Scheme A
2 Scheme B

16 DEMONSTRATION OF COMPLIANCE

GUIDELINES FOR EXHAUST GAS-SO_x CLEANING SYSTEMS – MARPOL ANNEX VI, REGULATION 14(4)(B)

INTRODUCTION

Regulation 14(4) of Annex VI to MARPOL 73/78 requires ships within SO_x emission control areas to either use fuel oil with a sulphur content not exceeding 1.5% or apply an exhaust gas (SO_x) cleaning system (EGCS-SO_x) to reduce the total emission of SO_x to 6.0g/kWh. The EGCS-SO_x is to be approved by the Administration taking into account guidelines to be developed by the Organization.

Similar to a NO_x emission reduction system, EGCS-SO_x could be type approved or its compliance could be verified in service by direct measurement and monitoring of SO_x emission. These guidelines have been developed with the intention of being objective and performance oriented. Introduction of the SO_2(ppm)/CO_2(%) ratio method would simplify the monitoring of SO_x emission and facilitate type approval of the EGCS-SO_x.

These guidelines are recommendatory in nature, however, Administrations are invited to base their implementation on these guidelines.

SAFETY NOTE

Due attention is to be given to the safety implications related to the handling and proximity of exhaust gases, the measurement equipment and the storage and use of cylindered pure and calibration gases. Sampling positions and access staging should be such that this monitoring may be performed safely. In locating discharge outlet of waste water used in EGCS-SO_x, due consideration should be given to the location of the ship's sea water inlet and other implications of the acidic nature of such water.

SCHEME A – EGCS-SO_x TYPE APPROVAL AND CERTIFICATION

Unit certification of Exhaust Gas-SO_x Cleaning Systems (EGCS-SO_x) by the Administration with subsequent in service verification at survey intervals by indirect means together with unit use monitoring.

1 GENERAL

1.1 Purpose

The purpose of these Guidelines is to specify the requirements for the design, testing, survey and certification of exhaust gas cleaning-SO_x systems (EGCS-SO_x) to ensure that they comply with the requirements of regulation 14(4)(b) of Annex VI of MARPOL 73/78.

1.2 Application

1.2.1 These Guidelines apply to EGCS-SO_x as fitted to fuel oil combustion machinery, excluding shipboard incinerators, installed onboard a ship which is to operate within a SO_x Emission Control Area (SECA).

1.2.2 These Guidelines cover only the certification and survey of EGCS-SO_x for compliance with regulation 14(4)(b) of Annex VI.

1.3 Definitions

"ppm" means "parts per million". It is assumed that ppm is measured by gas analysers on a molar basis, assuming ideal micro-moles of substance per mole of total amount (μmol/mol), but ppm is used in order to be consistent with units in the NO_x Technical Code.

2 SURVEY AND CERTIFICATION

2.1 General

2.1.1 Prior to use within a SECA each EGCS-SO_x should be issued by the Administration with a SECA Compliance Certificate (SCC).

2.1.2 EGCS-SO_x as fitted should be subject to survey on installation and at Initial, Annual/Intermediate and Renewals Surveys by the Administration, irrespective of whether or not the ship is in a SECA at the time of Survey.

2.1.3 The ship's SCC should be duly endorsed at each survey as required by 2.1.2.

2.1.4 In accordance with regulation 10, EGCS-SO_x may also be subject to survey by PSC when operating within a SECA.

2.2 Procedures for the certification of an EGCS-SO_x

2.2.1 In order to meet the requirements of 2.1.1 either prior to, or after installation onboard, each EGCS-SO_x should be certified as meeting the emission limit of 6.0 g SO_x/kWh under the operating conditions and restrictions as given by the EGCS-SO_x Technical Manual (ETM) as approved by the Administration.

2.2.2 Determination of the emission value should be in accordance with the provisions of these Guidelines.

2.2.3 EGCS-SO_x meeting the requirements of 2.2.1 should be issued, by the Administration, with a SCC.

2.2.4 Application for a SCC should be made by the EGCS-SO_x manufacturer, shipowner or other party.

2.2.5 Subsequent EGCS-SO_x of the same design and rating as that certified under 2.2.1 may be issued with SCC by the Administration without the need for testing in accordance with 2.2.1 subject to section 4.2 of these Guidelines.

2.2.6 EGCS-SO_x of the same design but with ratings different from that certified under 2.2.1 may be accepted by the Administration subject to section 4.3 these Guidelines.

2.2.7 EGCS-SO_x which treat only part of the exhaust gas flow of the uptake in which they are fitted should be subject to special consideration by the Administration to ensure that under all defined operating conditions that the overall emission value of the exhaust gas down stream of the system is no more than 6.0 g SO_x /kWh.

2.3 EGCS-SO_x Technical Manual

2.3.1 Each EGCS-SO_x is to be supplied with Technical Manual (ETM). This ETM should, as a minimum, contain the following information:

(a) the identification of the unit (manufacturer, model/type, serial number and other details as necessary) including a description of the unit and any required ancillary systems;

(b) the operating limits, or range of operating values, for which the unit is certified. These should, as a minimum include:

(i) maximum and, if applicable, minimum mass flow rate of exhaust gas;

(ii) the power, type and other relevant parameters of the fuel oil combustion unit for which the EGCS-SO_x is to be fitted (boiler or diesel engine). In the cases of boilers the maximum air/fuel ratio at 100% load should also be given. In the cases of diesel engines whether the engine is of 2 or 4 stroke cycle;

(iii) maximum and minimum wash water flow rate, inlet pressures and minimum inlet water alkalinity (pH);

(iv) exhaust gas inlet temperature ranges;

(v) exhaust gas inlet and outlet pressure ranges; and

(vi) other factors in respect of the design and operation of the EGCS-SO_x relevant to achieving a maximum emission value no higher than 6.0 g SO_x/kWh;

(c) any requirements or restrictions applicable to the EGCS-SO_x or associated equipment necessary in order that the unit can achieve a maximum emission value no higher than 6.0 g SO_x/kWh;

(d) maintenance, service or adjustment requirements in order that the EGCS-SO_x can continue to achieve a maximum emission value no higher than 6.0 g SO_x/kWh;

(e) the means by which the EGCS-SO_x is to be surveyed to ensure that its performance is maintained and that the unit is used as required (see section 6);

(f) the effect on wash water quality;

(g) design requirements of the wash water system; and

(h) the SCC as applicable.

2.3.2 The ETM should be approved by the Administration.

2.3.3 The ETM should be retained onboard the ship onto which the EGCS-SO_x is fitted. The ETM should be available for surveys as required.

2.3.4 Additions, deletions or amendments to the ETM should be approved by the Administration. Where these are separate to the ETM as initially approved, they should be retained with the ETM and should be considered as part of the ETM.

2.3.5 In lieu of the maximum emission rate stipulated in 2.3.1(b)(vi) of 6.0 g SO_x/kWh, SO_2 (ppm)/CO_2 (%) ratio of [65] measured at downstream of EGCS-SO_x may be used.

3 EMISSION LIMIT

3.1 Each EGCS-SO_x should be capable of reduction emissions to no more than 6.0 g SO_x/kWh at any load point when operated in accordance with the criteria as given within 2.3.1(b), except as provided for by the provisions of these Guidelines.

3.2 EGCS-SO_x fitted to main propulsion diesel engines should meet the requirements of 3.1 at all loads between 100-25% of the load range of the engines to which they are fitted.

3.3 EGCS-SO_x fitted to auxiliary diesel engines should meet the requirements of 3.1 at all loads between 100-10% of the load range of the engines to which they are fitted.

3.4 EGCS-SO_x fitted to diesel engines which supply power for both main propulsion and auxiliary purposes should meet the requirements of 3.3.

3.5 EGCS-SO_x fitted to boilers should meet the requirements of 3.1 at all loads between 100-10% of the load range (steaming rates) of the boilers to which they are fitted.

3.6 In order to demonstrate performance, emission measurements should be undertaken, with the agreement of the Administration, at a minimum of four load points. One load point is to be at 100%-95% of the maximum exhaust gas mass flow rate for which the unit is to be certified. One load point is to be within ± 5% of the minimum exhaust gas mass flow rate for which the unit is to be certified. The other two load points are to be equally spaced between the maximum and minimum exhaust gas mass flow rates. Where there are discontinuities in the operation of the system the number of load points should be increased, with the agreement of the Administration, so that it is demonstrated that the required performance over the stated exhaust gas mass flow rate range is retained. Additional intermediate load points should be tested if there is evidence of an emission peak below the maximum exhaust gas mass flow rate and above, if applicable, the minimum exhaust gas flow rate. These additional tests should be sufficient number as to establish the emission peak value.

3.7 For loads below those specified in 3.2 to 3.5, the EGCS-SO_x should continue in operation. In those cases where the fuel oil combustion equipment may be required to operate under idling conditions, the SO_2 emission concentration (ppm) at standardized O_2 concentration (15.0% diesel engines, 3.0% boilers) should not exceed [50 ppm].

3.8 Alternatively to the provisions of 3.2-3.5 and 3.7, each EGCS-SO_x should be capable of reduction emissions to no more than [65] in SO_2 (ppm)/CO_2 (%) ratio at any load point when operated in accordance with the criteria as given within 2.3.1(b) and 2.4.

4 APPROVAL OF EGCS-SO_x

4.1 Unit approval

4.1.1 EGCS-SO_x should be capable of meeting the limit value of 6.0 g SO_x/kWh (other than as given in section 3) with fuel oils of up to 4.5% m/m sulphur and for the range of operating parameters, as listed in 2.3.1(b), for which they are to be approved.

4.1.2 Where testing is not to be undertaken with fuel oils of 4.5% m/m sulphur content or above, testing should be undertaken to demonstrate the effect of fuel oil sulphur content on system performance. In such cases a minimum of two tests, in accordance with section 3 as appropriate, should be performed. These need not be sequential and could be undertaken on two different, but identical, EGCS-SO_x. The minimum sulphur content of the fuel oil used in one test should not be less than 2.0% m/m sulphur. The other fuel oil should have a sulphur content of at least 1.0% m/m sulphur above that of the lower sulphur content fuel oil. The EGCS-SO_x manufacturer should justify, on the basis of the above, and other testing as may be required, that the EGCS-SO_x would meet the required limit of 6.0 g SO_x/kWh when used with a fuel oil of 4.5% m/m sulphur.

4.1.3 The maximum and, if applicable, minimum exhaust gas mass flow rate of the unit should be stated. The effect of variation of the other parameters defined in 2.3.1(b) should be justified by the equipment manufacturer. The effect of variations in these factors is to be assessed by testing or otherwise as appropriate. No variation in these factors, or combination of variations in these factors, should be such that the emission value of the EGCS-SO_x would be in excess of 6.0 g SO_w/kWh.

4.1.4 Data obtained in accordance with this section should be submitted to the Administration for approval together with the ETM.

4.2 Serially manufactured units

In the case of nominally similar EGCS-SO_x of the same mass flow ratings as that certified under 4.1, and to avoid the testing in accordance with 2.2.1 each EGCS-SO_x, the equipment manufacturer may submit, for acceptance by the Administration, a conformity of production arrangement. The certification of each EGCS-SO_x unit under this arrangement should be subject to such surveys that the Administration may consider necessary as to assure that each EGCS-SO_x has an emission value of not more than 6.0 g SO_x/kWh when operated in accordance with the parameters defined in 2.3.1(b).

4.3 Product range approval

4.3.1 In the case of EGCS-SO_x of the same design, but of different maximum exhaust gas mass flow capacities, the Administration may accept, in lieu of tests on EGCS-SO_x of all capacities in accordance with section 4.1, tests of EGCS-SO_x systems of three different capacities provided that the three tests are performed in respect of units from the highest, lowest and one intermediate capacity rating within the range.

4.3.2 Where there are significant differences in the design of EGCS-SO_x of different capacities this procedure should not be applied unless it can be shown, to the satisfaction of the Administration, that in practice those differences do not materially alter the performance between the various EGCS-SO_x types.

4.3.3 For EGCS-SO_x of different capacities, the sensitivity to variations in the type of combustion machinery to which they are fitted should be detailed together with sensitivity to the variations in the parameters listed in 2.3.1(b). This should be on the basis of testing, or other data as appropriate.

4.3.4 The effect of changes of EGCS-SO_x capacity on wash water characterization should be detailed.

4.3.5 All supporting data obtained in accordance with this section, together with the ETM for each capacity unit, should be submitted to the Administration in accordance with 4.1.6.

4.3.6 An SO_2 (ppm)/CO_2 (%) ratio of [65] may be used for emission limit value specified in 4.1 to 4.3 above.

5 EMISSION TESTING

5.1 Emission testing should follow the requirements of the NO_x Technical Code, chapter 5, and associated Appendices, except as provided for in these Guidelines.

5.2 CO_2, O_2 and SO_2 should be measured. CO_2 and O_2 as % to a precision of two decimal places, SO_2 to a precision of 1 ppm.

5.3 SO_2 should be measured on a dry or wet basis using analysers operating on NDIR or NDUV principles and with additional equipment such as dryers as necessary. Other systems or analysers may be accepted, subject to the approval of the Administration, provided they yield equivalent results to those of the equipment referenced above.

5.4 Exhaust gas sample for SO_2 should be obtained from a representative sampling point downstream of the EGCS-SO_x.

5.5 SO_2 should be determined either in-situ or from an extracted sample.

5.6 Extractive exhaust gas sample for SO_2 determination should be maintained at a sufficient temperature to avoid condensed water in the sampling system and hence loss of SO_2.

5.7 If an extractive exhaust gas sample for SO_2 determination needs to be dried prior to analysis it should be done in a manner which does not result in loss of SO_2 in the sample as analysed.

5.8 Where SO_2 is measured in-situ, the water content in the exhaust gas stream at that point is also to be determined in order to correct the SO_2 reading to a dry basis value.

5.9 Where the exhaust gas mass flow is to be calculated in accordance with the NO_x Technical Code, Appendix 6, the complete combustion case calculations may be used. The exhaust gas mass flow (GEXHW) should be determined in respect of the mass flow into the EGCS-SO_x.

5.10 In applying the NO_x Technical Code, equation 15, the dry basis SO_2 concentration should be converted to a wet basis value using the dry/wet correction factor applicable to the exhaust gas at entry into the EGCS-SO_x (NO_x Technical Code, equation 11, CO = 0):

w = 0.002855, u = w/exhaust gas density in g/m^3 at 0ºC and 101.3 kPa

5.11 The fuel oil as used in the test should be a residual blend product. A representative sample of that fuel should be analysed in order to establish its chemical composition (carbon, hydrogen and sulphur) together with the other parameters as necessary to establish its grade in accordance with the ISO 8217 specification.

5.12 For diesel engines the power should be the uncorrected brake power.

5.13 For boilers the 'power' should be determined based on the fuel rate and assumed brake specific fuel consumption of 200 g/kWh.

5.14 The determined SO_2 emission value at each test point should be equal to, or less than, 6.0 g SO_x/kWh.

5.15 In lieu of the testing procedure laid down in 5.5 to 5.10 and 5.12 to 5.14, compliance may be demonstrated by continuous monitoring of SO_2 and CO_2 concentration in the exhaust gas down stream of EGCS-SO_x and demonstrating SO_2 (ppm)/CO_2 (%) ratio, at each test point is equal to or less than [65].

6 PROCEDURES FOR DEMONSTRATING COMPLIANCE WITH SO_2 EMISSION LIMIT ON BOARD

6.1 For each EGCS-SO_x, the ETM should contain a verification procedure for use at surveys as required. This procedure should not require specialist equipment or an in depth knowledge of the system. Where particular devices are required they should be provided and maintained as part of the system. EGCS-SO_x should be designed in such a way as to facilitate inspection as required. The basis of this verification procedure is that if all relevant components and operating values or settings are within those as approved, then the performance of the EGCS-SO_x system is within that required without the need for actual exhaust emission measurements. It is however necessary to also ensure that that the EGCS-SO_x is fitted to an item of fuel oil combustion equipment for which it is rated – this forms part of the SCP.

6.2 Included in the verification procedure should be all components and operating values or settings which may affect the operation of the EGCS-SO_x and its ability to meet the required emission limit.

6.3 The verification procedure should be submitted by the EGCS-SO_x manufacturer and approved by the Administration.

6.4 The verification procedure should cover both a documentation check and a physical check of the EGCS-SO_x.

6.5 The Surveyor should verify that each EGCS-SO_x is installed in accordance with the ETM and has a SCC as required.

6.6 At the discretion of the Administration, the Surveyor should have the option of checking one or all of the identified components, operating values or settings. Where there is more than one EGCS-SO_x the Administration may, at its discretion, abbreviate or reduce the extent of the survey on board however the entire survey should be completed for at least one of each type of EGCS-SO_x on board provide that it is expected that the other EGCS-SO_x perform in the same manner.

6.7 The EGCS-SO_x should include means to automatically record when the system is in use. This should monitor, as a minimum, wash water pressure and flow rate at the EGCS-SO_x inlet connection and exhaust gas temperature before and after the ECGS-SO_x. The data recording system should comply with the requirements of Scheme B, section 13.

6.8 If a direct monitoring system is fitted, its record would verify EGCS-SO_x compliance. If a direct monitoring system is not fitted, a spot check of the exhaust gas quality in terms of SO_2 (ppm)/CO_2 (%) ratio, may verify compliance.

6.9 An EGCS-SO_x Record Book should be maintained by the shipowner recording maintenance and service of the unit. The form of this record should be submitted by the EGCS-SO_x manufacturer and approved by the Administration. This record book should be available at surveys as required and may be read in conjunction with engine room log books and other data as necessary to confirm the correction operation of the EGCS-SO_x. Alternatively, this information is to be recorded in the vessel's planned maintenance record system as approved by the Administration.

7 WASH WATER MONITOR

The wash water being discharged should also be monitored, at a defined frequency appropriate to the sensors used, for alkalinity and oil content together with other parameters which may have an adverse impact on ecosystems in the area in which the ship operates. The data provided by this monitoring should be used by the ship in assessing the acceptability of water discharge against criteria which may be developed by individual port State authorities.

SCHEME B - CONTINUOUS MONITORING OF SO_x EMISSIONS

Compliance demonstrated in service by continuous exhaust gas monitoring. Monitoring system should be approved by the Administration and the results of that monitoring available to the Administration as necessary to demonstrate compliance as required.

Additionally for all ships which are to use an EGCS-SO_x, in part or in total, in order to comply with the requirements of regulation 14(4) there should be a SECA Compliance Plan (SCP) for the ship, approved by the Administration, detailing how:

(a) compliance is to be achieved;

(b) that compliance is to be demonstrated.

8 GENERAL

This Scheme should be used to demonstrate that the emissions from an item of fuel oil combustion equipment fitted with an EGCS will, with that system in operation, result in an emission value of SO_2 (ppm)/CO_2 ratio below [65].

9 EXHAUST GAS MEASUREMENT

Exhaust gas composition, (SO_2 plus CO_2) should be measured at an appropriate position after the EGCS-SO_x.

10 CALCULATION OF SO_2 EMISSION RATE

10.1 SO_2 ppm and CO_2 (%) to be continuously monitored and recorded onto a data recording and processing device at a rate which should not be less than 0.005 Hz.

10.2 Due to differing response times in the sensors used to feed signals to the processing device they may be periods of apparent non-compliance during transient performance, such as manoeuvring. The sensors should be tuned such that the aggregated period of any such apparent non-compliance is no more than 5 minutes in any one hour period. If this is not possible then, during transient operations, the fuel oil combustion equipment should be changed over to comply by regulation 14(4)(a).

11 WASH WATER MONITOR

The wash water being discharged should also be monitored, at a defined frequency appropriate to the sensors used, for alkalinity and oil content together with other parameters which may have an adverse impact on ecosystems in the area in which the ship operates. The data provided by this monitoring should be used by the ship in assessing the acceptability of water discharge against criteria which may be developed by individual port State authorities.

12 DATA RECORDING AND PROCESSING DEVICE

12.1 The recording and processing device should be of robust, tamper proof design with read only capability.

12.2 The recording and processing device should record the data required by section 10.1 against UTC.

12.3 The recording and processing device should be capable of preparing reports over specified time periods.

12.4 Data should be retained for a period of not less than 18 months from the date of recording. If the unit is changed over that period the shipowner should ensure that the required data is retained onboard and available as required.

12.5 The device should be capable of downloading a copy of the recorded data and reports in a readily useable format. Such copy of the data and reports should be available to the Administration or port State authority as requested.

13 ON-BOARD MONITORING MANUAL

13.1 An On-board Monitoring Manual (OMM) should be prepared to cover each item of fuel oil combustion equipment, which should be identified, for which compliance is to be demonstrated by this Scheme.

13.2 The OMM should, as a minimum, include:

(a) the sensors to be used in respect of EGCS performance and discharge water, their service, maintenance and calibration requirements;

(b) the positions from which exhaust emission measurements are to be taken together with details of any necessary ancillary services such as sample transfer lines and sample treatment units and any related service or maintenance requirements;

(c) the analysers to be used their service, maintenance and calibration requirements;

(d) analyser zero and span check procedures; and

(e) other information or data relevant to the correct functioning of the monitoring system or its use in demonstrating compliance.

13.3 The OMM should give how the monitoring system is to be surveyed.

13.4 The OMM should be approved by the Administration.

14 SECA COMPLIANCE PLAN (SCP)

For all ships which are to use an EGCS-SO_x, in part or in total, in order to comply with the requirements of regulation 14(4) there should be a SECA Compliance Plan (SCP) for the ship, approved by the Administration.

15 SHIP COMPLIANCE

15.1 Scheme A

The SCP should list each item of fuel oil combustion equipment which is to meet the requirements for operating in a SECA by means of an approved EGCS-SO_x.

15.2 Scheme B

15.2.1 The SCP should list each item of fuel oil combustion equipment which is to meet the requirements for operating in a SECA by means of an EGCS-SO_x with continuous monitoring showing that, as required, SO_2 (ppm) emissions no higher than SO_2 (ppm)/CO_2 (%) ratio of [65].

15.2.2 At the shipowner's discretion, the demonstration of compliance within a SECA may also be by application of Scheme B in respect of fuel oil combustion equipment fitted EGCS-SO_x certified in accordance with Scheme A. Where Scheme B is applied in each case it supersedes in total all aspects related to Scheme A such as the SCC, ETM and Record Book. At the ship owners discretion those items of fuel oil combustion equipment which normally demonstrate compliance by the Scheme B approach but which may be subject to significant transient effects, as encountered during manoeuvring, such equipment may, to avoid those effects, change over that equipment to comply by regulation 14(4)(a) during those periods. This, and the criteria for change over of compliance regime, should be documented in the SCP.

15.2.3 There may be some equipment such as small engines and boilers to which the fitting of EGCS-SO_x would not be practical, particularly where such equipment is sited remote from the main machinery spaces. All such fuel oil combustion units should be listed in the SCP. For these fuel oil combustion units which are not to be fitted with EGCS-SO_x, compliance is to be achieved by means of regulation 14(4)(a) while operating within a SECA.

15.2.4 Ship construction requirements generally require that each fuel oil combustion unit should have its own exhaust gas system venting to the atmosphere. Therefore compliance on the part of a ship may be demonstrated by each item of fuel oil combustion equipment meeting the requirements of either 15.1, 15.2.1, 15.2.2 or 15.2.3.

15.2.5 If each fuel oil combustion unit meets the requirements of either regulation 14(4)(a) or 14(4)(b) the ship is considered to be in compliance with the requirements.

15.2.6 Recognizing that the limit given in regulation 14(4)(b) is for the ship, not each individual item of combustion equipment, the shipowner should have the opportunity to balance performance which considerably exceeds the requirement of 6.0 g SO_2/kWh or SO_2 (ppm)/CO_2% ratio below [65] against that of equipment, potentially not fitted with EGCS-SO_x, which does not meet that requirement. These cases should be subject to special consideration by the Administration. In particular the SCP should detail how the actual SO_2 emissions from each fuel oil combustion unit are to be aggregated together to obtain an overall, real time, emission value for the ship which does not exceed 6.0 g SO_2/kWh or SO_2 (ppm)/CO_2 (%) ratio of [65]. Since the emission value in regulation 14(4)(b) is an alternative to that given in regulation 14(4)(a), not an equivalent, compliance in excess of that required by means of regulation 14(4)(a) in respect of fuel oil burning units, such as given in section 2.3, should only be set against the requirements of regulation 14(4)(b) where it can be clearly documented as to the actual sulphur content of the fuel oil being used at any time together with the requirement that the specific fuel consumption rate (g fuel/kWh) of that equipment is capable of determination on a real time basis (calibration requirements of such equipment to comply with those as given in the NO_x Technical Code).

16 DEMONSTRATION OF COMPLIANCE

16.1 For EGCS-SO_x certified in accordance with Scheme A the SCP should refer to, not reproduce, the ETM and Record Book as specified under that Scheme. Alternatively, this information is to be recorded in the ship's planned Maintenance Record System, as allowed by the Administration.

16.2 For all fuel oil combustion equipment listed under 15.1, details should be provided demonstrating that the rating and restrictions for the EGCS-SO_x as approved, Scheme A 2.3.1(b), are complied with.

16.3 For EGCS-SO_x approved under Scheme A the wash water flow rate and pressure, and other parameters as considered necessary, should be monitored and recorded continuously while within a SECA in order to demonstrate use as required.

16.4 For EGCS-SO_x where compliance is to be demonstrated by Scheme B, the SCP should refer to the On-board Monitoring Manual as approved by the Administration and the input data and resulting reports as produced by that Scheme.

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ANNEX 9

DRAFT AMENDMENTS TO THE OSV GUIDELINES

4 MACHINERY AND ELECTRICAL INSTALLATIONS

1 The text of section 4 is replaced with the following:

"The vessel should comply with the relevant provisions for cargo ships contained in Parts C, D and E of chapter II-1 of the 1974 SOLAS Convention, as amended, as determined by the Administration."

6 LIFE-SAVING APPLIANCES

2 The text of section 6 is replaced with the following:

"The vessel should comply with the relevant provisions for cargo ships of the revised chapter III of the 1974 SOLAS Convention, as amended, as determined by the Administration."

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ANNEX 10

DRAFT UNIFIED INTERPRETATIONS TO MARPOL ANNEX VI AND THE NO_x TECHNICAL CODE

ANNEX VI OF MARPOL 73/78

Regulation 1
Application

Regulation 1 reads as follows:

The provisions of this Annex shall apply to all ships, except where expressly provided otherwise in regulations 3, 5, 6, 13, 15, 18 and 19 of this annex.

Interpretation:

For application of this regulation the term "all ships" should be interpreted as applicable to all ships (as defined by MARPOL 73 Article 2(4)).

Regulation 2(4)
Ozone depleting substances

Regulation 2(4) reads as follows:

New installations, in relation to regulation 12 of this annex, means the installation of systems, equipment, including new portable fire-extinguishing units, insulation, or other material on a ship after the date on which this Annex enters into force, but excludes repair or recharge of previously installed systems, equipment, insulation, or other material, or recharge of portable fire-extinguishing units.

Interpretation:

For application of this regulation the term "new installations" should be interpreted as follows:

(a) For new ships, installations on board ships the keels of which are laid or which are at a similar stage of construction on or after 19 May 2005.

(b) For existing ships, new installations with a contractual delivery date to the ship on or after 19 May 2005 or, in the absence of a contractual delivery date, the actual delivery of the equipment to the ship on or after 19 May 2005.

The same interpretation should apply with regard to new HCFC installations but with the substitution of '1 January 2020' in place of 19 May 2005.

Regulation 13(1)(b)(i)
Nitrogen oxides (NO_x)

Regulation 13(1)(b)(i) reads as follows:

This regulation does not apply to emergency diesel engines, engines installed in lifeboats and any device or equipment intended to be used solely in case of emergency.

Interpretation:

Regulation 13 does not apply to an engine which is used solely in response to emergencies on the ship on which the engine is installed.

Regulation 13(1)(c)
Nitrogen oxides (NO_x)

Regulation 13(1)(c) reads as follows:

Notwithstanding the provisions of subparagraph (a) of this paragraph, the Administration may allow exclusion from the application of this regulation to any diesel engine which is installed on a ship constructed, or on a ship which undergoes a major conversion, before the entry into force of the present Protocol, provided that the ship is solely engaged in voyages to ports or offshore terminals within the State of the flag of which the ship is entitled to fly.

Interpretation:

For application of this regulation the term "on a ship which undergoes a major conversion," should be interpreted as an error inserting the concept of 'ship' in place of 'engine', ship conversion is not given elsewhere within the Annex. In order to be consistent with regulation 13(1)(a)(i) & (ii) this should be read as "or engine which undergoes a major conversion".

Regulation 13(2)(a)(iii)
Nitrogen oxides (NO_x)

Regulation 13(2)(a)(iii) reads as follows:

For the purpose of this regulation, *major conversion* means a modification of an engine where the maximum continuous rating of the engine is increased by more than 10%.

Interpretation:

For application of this regulation in the case of ships built before 1 January 2000 the term "by more than 10%" should be interpreted as applicable to the pre 1 January 2000 maximum continuous rating.

Regulation 16(2)(a)
Shipboard incineration

Regulation 16(2)(a) reads as follows:

Except as provided in subparagraph (b) of this paragraph, each incinerator installed on board a ship on or after 1 January 2000 shall meet the requirements contained in appendix IV to this annex. Each incinerator shall be approved by the Administration taking into account the standard specifications for shipboard incinerators developed by the Organization*.

* Refer to resolution MEPC.76(40), Standard specification for shipboard incinerators.

Interpretation:

For application of this regulation the term "installed on board a ship on or after 1 January 2000" should be interpreted as follows:

(a) For new ships, installations on board ships the keels of which are laid or which are at a similar stage of construction on or after 1 January 2000.

(b) For existing ships, new installations with a contractual delivery date to the ship on or after 1 January 2000 or, in the absence of a contractual delivery date, the actual delivery of the equipment to the ship on or after 1 January 2000.

Regulation 16(6)
Shipboard incineration

Regulation 16(6) reads as follows:

Shipboard incineration of polyvinyl chlorides (PVCs) shall be prohibited, except in shipboard incinerators for which IMO Type Approval Certificates have been issued.

Interpretation:

For application of this regulation it should be interpreted as applicable to incinerators meeting either resolution MEPC.59(33) or resolution MEPC.76(40) specifications.

Regulation 16(7)
Shipboard incineration

Regulation 16(7) reads as follows:

All ships with incinerators subject to this regulation shall possess a manufacturer's operating manual which shall specify how to operate the incinerator within the limits described in paragraph 2 of appendix IV to this annex.

Interpretation:

For application of this regulation it should be interpreted that possession of an operating manual is applicable only to resolution MEPC.76(40) incinerators installed on or after 1 January 2000.

Regulation 16(8)
Shipboard incineration

Regulation 16(8) reads as follows:

Personnel responsible for operation of any incinerator shall be trained and capable of implementing the guidance provided in the manufacturer's operating manual.

Interpretation:

For application of this regulation it should be interpreted that any incinerator refers to those specified in regulation 16(2).

TECHNICAL CODE ON CONTROL OF EMISSION OF NITROGEN OXIDES FROM MARINE DIESEL ENGINES (NO_x TECHNICAL CODE)

Table 3 – Symbols and subscripts for terms and variables used in the formulae for the test-bed measurement methods

Table 3 gives:

Symbol	Term	Dimension
p_a	Saturation vapour pressure of the engine intake air (in ISO 3046-1, 1995: *psy* = PSY, test ambient vapour pressure)	kPa
p_B	Total barometric pressure (in ISO 3046-1, 1995: p_x = PX, site ambient total pressure; py = PY, test ambient total pressure)	kPa
p_s	Dry atmospheric pressure	kPa
R_a	Relative humidity of the intake air	%
T_a	Absolute temperature of the intake air	K

Interpretation:

For application of the term "p_s" it should be interpreted that the dry atmospheric pressure is determined in accordance with the following formula:

$$p_s = p_B - \frac{R_a \bullet p_a}{100}$$

It should also be interpreted that the p_a term be determined using a temperature value for the intake air determined at the same physical location as the measurements for p_B and R_a.

Interpretation:

For application of the term "T_a" it should be interpreted that the temperature of the intake air temperature is that determined at the engine/turbocharger intake suction filter.

Chapter 1.3 Definitions

Chapter 1.3.10

Chapter 1.3.10 reads as follows:

Marine diesel engine means any reciprocating internal-combustion engine operating on liquid or dual fuel, to which regulations 5, 6 and 13 of Annex VI apply, including booster/compound systems if applied.

Interpretation:

Regulation 13 does apply to dual-fuel engines. For the application of this section it should be interpreted that if the engine is intended to be operated normally in the gas mode i.e. with the main fuel gas and only a small amount of liquid pilot fuel, the requirements of regulation 13 have to be met only for this operation mode. Operation on pure liquid fuel resulting from restricted gas supply in cases of failures should be exempted for the voyage to the next appropriate port for the repair of the failure.

Chapter 2.2 Procedures for pre-certification of an Engine Group

Chapter 2.2.4

Chapter 2.2.4 reads as follows:

There are engines which, due to their size, construction and delivery schedule, cannot be pre-certified on a test-bed. In such cases, the engine manufacturer, shipowner or ship builder shall make application to the Administration requesting an on-board test (see 2.1.2.2). The applicant must demonstrate to the Administration that the on-board test fully meets all of the requirements of a test-bed procedure as specified in chapter 5 of this Code. Such a survey may be accepted for one engine or for an engine group represented by the parent engine only, but it shall not be accepted for an engine family certification. In no case shall an allowance be granted for possible deviations of measurements if an initial survey is carried on board a ship without any valid pre-certification test.

Interpretation:

For engines undergoing an on-board certification test, to be issued with an EIAPP Certificate, the same procedures apply as if the engine had been pre-certified on a test-bed:

(a) the survey on-board meets the pre-certification survey requirements; and

(b) the on-board test fully meets all of the requirements of a test-bed procedure as specified in chapter 5 of the NO_x Technical Code; and

(c) the application average weighted NO_x emission value meets the requirements of regulation 13 of Annex VI; and

(d) the engine has an approved Technical File.

Chapter 2.2.8

Chapter 2.2.8 reads as follows:

A flow chart providing guidance for compliance with the requirements of a pre-certification survey for marine diesel engines intended for installation on board of ships is provided in figure 1 of appendix 2 of this Code.

Interpretation:

The text in chapter 2 gives the certification procedures which should be followed. Where discrepancies exist with figure 1, the text of chapter 2 takes precedence.

Chapter 2.3 Procedures for certification of an engine

Chapter 2.3.4

Chapter 2.3.4 reads as follows:

The shipowner shall have the option of direct measurement of NO_x emissions during engine operation. Such data may take the form of spot checks logged with other engine operating data on a regular basis and over the full range of engine operation or may result from continuous monitoring and data storage. Data must be current (taken within the last 30 days) and must have been acquired using the test procedures cited in this NO_x Technical Code. These monitoring records shall be kept on board for three months for verification purposes by the Parties to the Protocol of 1997. Data shall also be corrected for ambient conditions and fuel specification, and measuring equipment must be checked for correct calibration and operation, in accordance with the procedures specified by the measurement equipment manufacturer in the engine's technical file. Where exhaust gas after-treatment devices are fitted which influence the NO_x emissions, the measuring point(s) must be located downstream of such devices.

Interpretation:

For application of this section it should be interpreted that any system or procedure utilized to monitor engine NO_x emissions by the direct measurement method shall meet the requirements of MEPC Resolution 103(49) 'Guidelines for On-board NO_x Verification Procedure – Direct Measurement and Monitoring Method'.

Chapter 2.3.5

Chapter 2.3.5 reads as follows:

To demonstrate compliance by the direct measurement method, sufficient data shall be collected to calculate the weighted average NO_x emissions in accordance with this Code.

Interpretation:

For application of this section it should be interpreted that sufficient data shall be collected by the direct measurement method to enable the weighted average NO_x emissions to be determined in accordance with MEPC Resolution 103(49) 'Guidelines for On-board NO_x Verification Procedure – Direct Measurement and Monitoring Method'.

Chapter 2.3.6

Chapter 2.3.6 reads as follows:

Every marine diesel engine installed on board a ship shall be provided with a technical file. The technical file shall be prepared by the engine manufacturer and approved by the Administration,

and required to accompany an engine throughout its life on board ships. The technical file shall contain information as specified in 2.4.1.

Interpretation:

For application of this section it should be interpreted that the term “engine manufacturer” is the entity which applied for the engine certification.

Chapter 2.3.13

Chapter 2.3.13 reads as follows:

Flow charts providing guidance for compliance with the requirements of an initial, periodical and intermediate surveys for certification of marine diesel engines installed on board ships are provided in figures 2 and 3 of appendix 2 of this Code.

Interpretation:

This section should be interpreted as follows:

The text in chapter 2 gives the certification procedures which should be followed. Where discrepancies exist with figures 2 and 3, the text of chapter 2 takes precedence.

Chapter 2.4 Technical file and on-board NO_x verification procedures

Chapter 2.4.1.1

Chapter 2.4.1.1 reads as follows:

To enable an Administration to perform the engine surveys described in 2.1, the technical file required by 2.3.6 shall, at a minimum, contain the identification of those components, settings and operating values of the engine which influences its NO_x emissions.

Interpretation:

This section should be interpreted as follows:

Where a NO_x reducing device or system is fitted in order to achieve compliance with regulation 13 (in accordance with paragraph 2.2.5), these should be identified in the Technical File.

Chapter 2.4.4.3

Chapter 2.4.4.3 reads as follows:

On-board NO_x verification procedures shall be determined by using the direct measurement and monitoring method in accordance with 2.3.4, 2.3.5, 2.3.7, 2.3.8, 2.3.11, and 5.5.

Interpretation:

For application of this section it should be interpreted that the on-board NO_x verification procedures have been approved by the Administration taking into account resolution MEPC.103(49) the 'Guidelines for On-board NO_x Verification Procedure – Direct Measurement and Monitoring Method'.

Chapter 2.4.5

Chapter 2.4.5 reads as follows:

When a NO_x monitoring and recording device is specified as on-board NO_x verification procedures, such device shall be approved by the Administration based on guidelines to be developed by the Organization. These guidelines shall include, but are not limited to, the following items:

.1 a definition of continuous NO_x monitoring, taking into account both steady-state and transitional operations of the engine;

.2 data recording, processing and retention;

.3 a specification for the equipment to ensure that its reliability is maintained during service;

.4 a specification for environmental testing of the device;

.5 a specification for the testing of the equipment to demonstrate that it has a suitable accuracy, repeatability and cross sensitivity compared with the applicable sections of this Code; and

.6 the form of the approval certificate to be issued by the Administration.

Interpretation:

For application of this section it should be interpreted that resolution MEPC.103(49) 'Guidelines for On-board NO_x Verification Procedure – Direct Measurement and Monitoring Method' defines the guidelines as developed by the Organization.

Chapter 4.4 Application of the engine group concept

Chapter 4.4.4

Chapter 4.4.4 reads as follows:

The application for the engine group concept, if requested by the engine manufacturer or another party, shall be considered for certification approval by the Administration. If the engine owner, with or without technical support from the engine manufacture, decides to perform modifications on a number of similar engines in the owner's fleet, the owner may apply for an engine group certification. The engine's group may include a test engine on the test bench. Typical applications are similar modifications of similar engines in service or similar engines in similar operational conditions.

Interpretation:

For application of this section it should be interpreted that the applicant for the engine certification takes on the responsibilities of the "engine manufacturer" as elsewhere given within the NO_x Technical Code.

Chapter 5.2 Test conditions

Chapter 5.2.2.2

Chapter 5.2.2.2 reads as follows:

All engines when equipped as intended for installation on board ships must be capable of operating within the allowable NO_x emission levels of regulation 13(3) of Annex VI at an ambient seawater temperature of 25ºC.*

* 25ºC seawater temperature is the reference ambient condition to comply with the NO_x limits. An additional temperature increase due to heat exchangers installed on board, e.g. for the low-temperature cooling water system, shall be taken into consideration.

Interpretation:

For application of this section it should be interpreted that the 25ºC seawater temperature defines an ambient reference value for which compliance with the NO_x emission limits as defined by regulation 13(3) must be demonstrated (tested or calculated with $T_{SC\ Ref}$ specified by the manufacturer).

The application of this reference primary coolant value should be considered in accordance with the charge air cooling arrangement applicable to the individual installation as follows:

(a) Direct seawater cooling to engine charge air coolers. Compliance with the NO_x limits should be demonstrated (or otherwise justified) with a charge air/scavenge air cooler coolant inlet temperature of 25ºC.

(b) Intermediate 'freshwater' cooling to engine charge air coolers. Compliance with the NO_x limits should be demonstrated (or otherwise justified) with the charge air/scavenge air cooling system operating with the highest allowable in service coolant inlet temperature regime comparable with an ambient seawater temperature of 25ºC.

Demonstration of compliance at a Parent Engine test for a direct seawater cooled system, as given by (a) above, does not demonstrate compliance in accordance with the higher charge air temperature regime inherent with an intermediate 'freshwater' cooling arrangement as given under (b).

(c) For those installations incorporating no seawater cooling, either direct or indirect, to the charge air coolers e.g. radiator cooled 'freshwater' systems, air/air charge air coolers, then it should be interpreted that compliance with the NO_x limits should be demonstrated with the engine and charge air cooling systems operating "as intended for installation on board".

Chapter 5.4 Measurement equipment

Chapter 5.4.2

Chapter 5.4.2 reads as follows:

Other systems or analysers may, subject to the approval of the Administration, be accepted if they yield equivalent results to that of the equipment referenced in 5.4.1.

Interpretation:

For application of the term "equivalent" it should be interpreted that alternative systems or analysers would, as quantified by using recognized national or international standards (such as ISO 8178, Part 1:1996, section 7), yield equivalent results when used to measure diesel engine exhaust emission concentrations in terms of the requirements referenced in 5.4.1 of Appendix 3.

Chapter 5.5 Determination of exhaust gas flow

Chapter 5.5.3 *Carbon-balance method*

Chapter 5.5.3 reads as follows:

This method involves exhaust gas mass flow calculation from fuel consumption and exhaust gas concentrations using the carbon and oxygen balance method as specified in appendix 6 of this Code.

Interpretation:

For calculation of the exhaust gas mass flow in accordance with "Method 2, universal, carbon/oxygen-balance" detailed under appendix 6 the "CW (soot)" term should be taken as zero.

Chapter 5.6 Permissible deviations of instruments for engine-related parameters and other essential parameters

Chapter 5.6 reads as follows:
The calibration of all measuring instruments shall be traceable to recognized international standards and shall comply with the requirements as set out in 1.3.1 of appendix 4 of this Code.

Interpretation:

For application of this section it should be interpreted that the measuring instruments as detailed under appendix 4 is not to be considered a definitive listing. Where additional measuring instruments are required in order to define an engine's NO_x emission performance, for example the measurement of peak cylinder or charge air pressures, then those measuring instruments should also be calibrated. As given by 1.3.1 of appendix 4 the recognized standards may be national or international.

Chapter 5.9 Test Run

Chapter 5.9.2 ***Main exhaust components to be analysed***

Chapter 5.9.2.1 reads as follows:

An analytical system for the determination of the gaseous emissions (CO, CO_2, HC, NO_x, O_2) in the raw exhaust gas shall be based on the use of the following analysers:

.1 HFID analyser for the measurement of hydrocarbons;

.2 NDIR analyser for the measurement of carbon monoxide and carbon dioxide;

.3 HCLD or equivalent analyser for the measurement of nitrogen oxides; and

.4 PMD, ECS or ZRDO for the measurement of oxygen.

Interpretation:

For application of 5.9.2.1.3 the term "equivalent" in this instance should be interpreted as referring to the use of CLD analysers for the dry basis measurement of nitrogen oxides.

Chapter 5.9.7 ***Analyser response***

Chapter 5.9.7 reads as follows:

The output of the analysers shall be recorded, both during the test and during all response checks (zero and span), on a strip chart recorder or measured with an equivalent data acquisition system with the exhaust gas flowing through the analysers at least during the last ten minutes of each mode.

Interpretation:

For application of this section it should be interpreted that the response must be of sufficient accuracy and resolution to enable verification of the zero and span response of the analysers in accordance with 5.9.9.

Chapter 5.12 Calculation of the gaseous emissions

Chapter 5.12.4 ***Calculation of the emission mass flow rates***

Chapter 5.12.4.1 reads as follows:

The emission mass flow rates for each mode shall be calculated as follows (for the raw exhaust gas):

$$\text{Gas mass} = u \bullet \text{conc} \bullet G_{EXHW} \quad (15)$$

or

$$\text{Gas mass} = v \bullet \text{conc} \bullet V_{EXHD} \quad (16)$$

or

$$\text{Gas mass} = w \bullet \text{conc} \bullet V_{EXHW} \quad (17)$$

Interpretation:

For application of this section it should be interpreted that for equations (15) and (17) the term "conc" applies to the averaged gas concentrations, as determined in accordance with 5.11, measured or corrected in accordance with 5.12.2 (conc, dry/$K_{w,r}$) to a wet basis and (in the case of NO_x) multiplied by the K_{HDIES} correction factor for humidity and temperature in accordance with 5.12.3.

For equation (16) the term "conc" applies to the averaged gas concentrations, as determined in accordance with 5.11, measured or corrected in accordance with 5.12.2 (conc, wet • $K_{w,r}$) to a dry basis and (in the case of NO_x) multiplied by the K_{HDIES} correction factor for humidity and temperature in accordance with 5.12.3.

Chapter 6.2 Engine parameter check method

Chapter 6.2.3 *Documentation for an engine parameter check method*

Chapter 6.2.3.4 List of NO_x –influencing parameters sometimes modified on board

Chapter 6.2.3.4.2 reads as follows:

The actual technical file of an engine may, based on the recommendations of the engine manufacturer and the approval of the Administration, include less components and/or parameters than discussed above depending on the particular engine and the specific design.

Interpretation:

For application of this section it should be interpreted that the term "engine manufacturer" is the entity which applied for the engine certification.

Chapter 6.2.3.5 *Checklist for the engine parameter check method*

Chapter 6.2.3.5 reads as follows:

For some parameters, different survey possibilities exist. Approved by the Administration, the ship operator, supported by the engine manufacturer, may choose what method is applicable. Any one of, or a combination of, the methods listed in appendix 7 of this Code may be sufficient to show compliance.

Interpretation:

For application of this section it should be interpreted that the term "engine manufacturer" is the entity which applied for the engine certification.

APPENDIX 4

CALIBRATION OF THE ANALYTICAL INSTRUMENTS (REFER TO CHAPTER 5 OF THE NO_x TECHNICAL CODE)

1 Introduction

Chapter 1.1 reads as follows:

Each analyser used for the measurement of an engine's parameters shall be calibrated as often as necessary in accordance with the requirements of this appendix.

Tables 1, 2, 3 and 4 right hand column headers read as follows:

Calibration intervals (month).

Interpretation:

For application of this section it should be interpreted that the calibration intervals as defined by Tables 1, 2, 3, and 4 of appendix 4 represent the duration of calibration validity applicable to the particular measurement instruments listed.

All instruments used for the measurement of an engine's parameters should be verified as being within the defined calibration validity period at the time of the measurement.

8 Interference effects with CO, CO_2, NO_x and O_2 analysers

8.1 *CO analyser interference check*

8.1 reads as follows:

Water and CO_2 may interfere with the CO analyser performance. Therefore, a CO_2 span gas having a concentration of 80 to 100% of full scale of the maximum operating range used during testing shall be bubbled through water at room temperature and the analyser response recorded. The analyser shall not be more than 1% of full scale for ranges greater than or equal to 300 ppm or more than 3 ppm for ranges below 300 ppm.

Interpretation:

For application of this section the term "The analyser shall not be more than …" should be interpreted as "The analyser response shall not be more than …" to correctly reflect the intent of this statement and ISO 8178-1, section 8.9.1.

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ANNEX 11

DRAFT MSC CIRCULAR

UNIFIED INTERPRETATIONS TO SOLAS CHAPTERS II-1 AND XII AND TO THE TECHNICAL PROVISIONS FOR MEANS OF ACCESS FOR INSPECTIONS

1 The Maritime Safety Committee, [at its eightieth session (11 to 20 May 2005)], approved the unified interpretations of the provisions of SOLAS chapters II-1 and XII and to the Technical provisions for means of access for inspections, as set out in the attached annex, following the recommendations made by the Sub-Committee on Ship Design and Equipment at its forty-eighth session, with a view to ensuring a uniform approach towards the application of the provisions of SOLAS chapters II-1 and XII.

2 Member Governments are invited to use the annexed interpretations when applying relevant provisions of SOLAS chapters II-1 and XII, and to bring them to the attention of all parties concerned.

ANNEX

INTERPRETATIONS TO CHAPTER II-1, INCLUDING THE TECHNICAL PROVISIONS FOR MEANS OF ACCESS FOR INSPECTIONS, AND CHAPTER XII OF THE 1974 SOLAS CONVENTION

1 SOLAS REGULATION II-1/3-6 – ACCESS TO AND WITHIN SPACES IN THE CARGO AREA OF OIL TANKERS AND BULK CARRIERS

SOLAS regulation II-1/3-6, section 1

"1 Application

1.1 Except as provided for in paragraph 1.2, this regulation applies to oil tankers of 500 gross tonnage and over and bulk carriers, as defined in regulation IX/1, of 20,000 gross tonnage and over, constructed on or after 1 January 2006.

1.2 Oil tankers of 500 gross tonnage and over constructed on or after 1 October 1994 but before 1 January 2005 shall comply with the provisions of regulation II-1/12-2 adopted by resolution MSC.27(61)."

Interpretation

Oil tankers:

This regulation is only applicable to oil tankers having integral tanks for carriage of oil in bulk, which is contained in the definition of oil in Annex I of MARPOL 73/78. Independent oil tanks can be excluded. Regulation II-1/3-6 should not normally be applied to FPSO or FSO unless the Administration decides otherwise.

Technical background

Means of Access (MA) specified in the Technical provisions contained in resolution MSC.158(78) are not specific with respect to the application to integral cargo oil tanks or also to independent cargo oil tanks. ESP requirements of oil tankers have been established assuming the target cargo oil tanks are integral tanks. The MA regulated under SOLAS regulation II-1/3-6 is for overall and close-up inspections as defined in regulation IX/1. Therefore it is assumed that the target cargo oil tanks are those of ESP, i.e. integral cargo tanks. Regulation II-1/3-6 is applicable to FPSO or FSO if they are subject to the scope of ESP as contained in resolution A.744(18) as amended.

Reference

SOLAS regulation IX/1 and resolution A.744(18) as amended.

SOLAS regulation II-1/3-6, paragraph 2.2

> "2.2 Where a permanent means of access may be susceptible to damage during normal cargo loading and unloading operations or where it is impracticable to fit permanent means of access, the Administration may allow, in lieu thereof, the provision of movable or portable means of access, as specified in the Technical provisions, provided that the means of attaching, rigging, suspending or supporting the portable means of access forms a permanent part of the ship's structure. All portable equipment shall be capable of being readily erected or deployed by ship's personnel."

Interpretation

Some possible alternative means of access are listed under paragraph 3.9 of the Technical provisions for means of access for inspections (TP). Always subject to acceptance as equivalent by the Administration, alternative means such as an unmanned robot arm, ROV's and dirigibles with necessary equipment of the permanent means of access for overall and close-up inspections and thickness measurements of the deck head structure such as deck transverses and deck longitudinals of cargo oil tanks and ballast tanks, should be capable of:

.1 safe operation in ullage space in gas-free environment; and

.2 introduction into the place directly from a deck access.

Technical background

Innovative approaches, in particular a development of robots in place of elevated passageways, are encouraged and it is considered worthwhile to provide the functional requirement for the innovative approach.

SOLAS regulation II-1/3-6, paragraph 2.3

> "2.3 The construction and materials of all means of access and their attachment to the ship's structure shall be to the satisfaction of the Administration. The means of access shall be subject to survey prior to, or in conjunction with, its use in carrying out surveys in accordance with regulation I/10."

Interpretation

Inspection

The MA arrangements, including portable equipment and attachments, should be periodically inspected by the crew or competent inspectors as and when it is going to be used to confirm that the MAs remain in serviceable condition.

Procedures

1 Any Company authorized person using the MA should assume the role of inspector and check for obvious damage prior to using the access arrangements. Whilst using the MA the inspector should verify the condition of the sections used by close up examination of those sections and note any deterioration in the provisions. Should any damage or deterioration be

found, the effect of such deterioration should be assessed as to whether the damage or deterioration affects the safety for continued use of the access. Deterioration found that is considered to affect safe use should be determined as "substantial damage" and measures should be put in place to ensure that the affected section(s) are not to be further used prior to effective repair.

2 Statutory survey of any space that contains MA should include verification of the continued effectiveness of the MA in that space. Survey of the MA should not be expected to exceed the scope and extent of the survey being undertaken. If the MA is found deficient the scope of survey should be extended if this is considered appropriate.

3 Records of all inspections should be established based on the requirements detailed in the ship's Safety Management System. The records should be readily available to persons using the MAs and a copy attached to the MA Manual. The latest record for the portion of the MA inspected should include as a minimum the date of the inspection, the name and title of the inspector, a confirmation signature, the sections of MA inspected, verification of continued serviceable condition or details of any deterioration or substantial damage found. A file of permits issued should be maintained for verification.

Technical background

It is recognized that MA may be subject to deterioration in the long term due to corrosive environment and external forces from ship motions and sloshing of liquid contained in the tank. MA therefore should be inspected at every opportunity of tank/space entry. The above interpretation is to be contained in a section of the MA Manual.

SOLAS regulation II-1/3-6, paragraph 3.1

> "3.1 Safe access* to cargo holds, cofferdams, ballast tanks, cargo tanks and other spaces in the cargo area shall be direct from the open deck and such as to ensure their complete inspection. Safe access to double bottom spaces or to forward ballast tanks may be from a pump-room, deep cofferdam, pipe tunnel, cargo hold, double hull space or similar compartment not intended for the carriage of oil or hazardous cargoes."

Interpretation

Access to a double side skin space of bulk carriers may be either from a topside tank or double bottom tank or from both.

Technical background

Unless used for other purposes, the double side skin space is to be designed as a part of a large U-shaped ballast tank and such space is to be accessed through the adjacent part of the tank, i.e. topside tank or double bottom/bilge hopper tank. Access to the double side skin space from the adjacent part rather than direct from the open deck is justified. Any such arrangement should provide a directly routed, logical and safe access that facilitates easy evacuation of the space.

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* Refer to the Recommendations for entering enclosed spaces aboard ships, adopted by the Organization by resolution A.864(20).

SOLAS regulation II-1/3-6, paragraph 3.2

"3.2 Tanks, and subdivisions of tanks, having a length of 35 m or more, shall be fitted with at least two access hatchways and ladders, as far apart as practicable. Tanks less than 35 m in length shall be served by at least one access hatchway and ladder. When a tank is subdivided by one or more swash bulkheads or similar obstructions which do not allow ready means of access to the other part of the tank, at least two hatchways and ladders shall be fitted."

Interpretation

A cargo oil tank of less than 35 m length without a swash bulkhead requires only one access hatch.

SOLAS regulation II-1/3-6, paragraph 4.1

"4.1 A ship's means of access to carry out overall and close-up inspections and thickness measurements shall be described in a Ship structure access manual approved by the Administration, an updated copy of which shall be kept on board. The Ship structure access manual shall include the following for each space:

.1 plans showing the means of access to the space, with appropriate technical specifications and dimensions;

.2 plans showing the means of access within each space to enable an overall inspection to be carried out, with appropriate technical specifications and dimensions. The plans shall indicate from where each area in the space can be inspected;

.3 plans showing the means of access within the space to enable close-up inspections to be carried out, with appropriate technical specifications and dimensions. The plans shall indicate the positions of critical structural areas, whether the means of access is permanent or portable and from where each area can be inspected;

.4 instructions for inspecting and maintaining the structural strength of all means of access and means of attachment, taking into account any corrosive atmosphere that may be within the space;

.5 instructions for safety guidance when rafting is used for close-up inspections and thickness measurements;

.6 instructions for the rigging and use of any portable means of access in a safe manner;

.7 an inventory of all portable means of access; and

.8 records of periodical inspections and maintenance of the ship's means of access."

Interpretation

The access manual should address spaces listed in paragraph 3 of regulation II-1/3-6. As a minimum the English version should be provided. The ship structure access manual should contain at least the following two parts:

Part 1: Plans, instructions and inventory required by paragraphs 4.1.1 to 4.1.7 of regulation II-1/3-6. This part should be approved by the Administration or the organization recognized by the Administration.

Part 2: Form of record of inspections and maintenance, and change of inventory of portable equipment due to additions or replacement after construction. This part should be approved for its form only at new building.

The following matters should be addressed in the ship structure access manual:

.1 The access manual should clearly cover scope as specified in the regulations for use by crews, surveyors and port State control officers.

.2 Approval/re-approval procedure for the manual, i.e. any changes of the permanent, portable, movable or alternative means of access within the scope of the regulation and the Technical provisions are subject to review and approval by the Administration or by the organization recognized by the Administration.

.3 Verification of MA should be part of the safety construction survey for continued effectiveness of the MA in that space which is subject to the statutory survey.

.4 Inspection of MA by the crew and/or a competent inspector of the company as a part of regular inspection and maintenance (see interpretation of paragraph 2.3 of SOLAS regulation II-1/3-6).

.5 Actions to be taken if MA is found unsafe to use.

.6 In case of use of portable equipment plans showing the means of access within each space indicating from where and how each area in the space can be inspected.

SOLAS regulation II-1/3-6, paragraph 4.2

"4.2 For the purpose of this regulation "critical structural areas" are locations which have been identified from calculations to require monitoring or from the service history of similar or sister ships to be sensitive to cracking, buckling, deformation or corrosion which would impair the structural integrity of the ship."

Interpretation

1 Critical structural areas should be identified by advanced calculation techniques for structural strength and fatigue performance, if available, and feed back from the service history and design development of similar or sister ships.

2 Reference should be made to the following publications for critical structural areas, where applicable:

- Oil tankers: Guidance Manual for Tanker Structures by TSCF;

- Bulk carriers: Bulk Carriers Guidelines for Surveys, Assessment and Repair of Hull Structure by IACS;

- Oil tankers and bulk carriers: resolution A.744(18), as amended.

Technical background

These documents contain the relevant information for the present ship types. However identification of critical areas for new double hull tankers and double side skin bulk carriers of improved structural design is to be made by structural analysis at the design stage, this information is to be taken into account to ensure appropriate access to all identified critical areas.

SOLAS regulation II-1/3-6, paragraph 5.1

> "5.1 For access through horizontal openings, hatches or manholes, the dimensions shall be sufficient to allow a person wearing a self-contained air-breathing apparatus and protective equipment to ascend or descend any ladder without obstruction and also provide a clear opening to facilitate the hoisting of an injured person from the bottom of the space. The minimum clear opening shall not be less than 600 mm x 600 mm. When access to a cargo hold is arranged through the cargo hatch, the top of the ladder shall be placed as close as possible to the hatch coaming. Access hatch coamings having a height greater than 900 mm shall also have steps on the outside in conjunction with the ladder."

Interpretation

The minimum clear opening of 600 mm x 600 mm may have corner radii up to 100 mm maximum. The clear opening is specified in MSC/Circ.686 to keep the opening fit for passage of personnel wearing a breathing apparatus. In such a case where as a consequence of structural analysis of a given design the stress is to be reduced around the opening, it is considered appropriate to take measures to reduce the stress such as making the opening larger with increased radii, e.g. 600 x 800 with 300 mm radii, in which a clear opening of 600 x 600 mm with corner radii up to 100 mm maximum fits.

Technical background

The interpretation is based upon the established Guidelines in MSC/Circ.686.

Reference

Paragraph 9 of the annex to MSC/Circ.686.

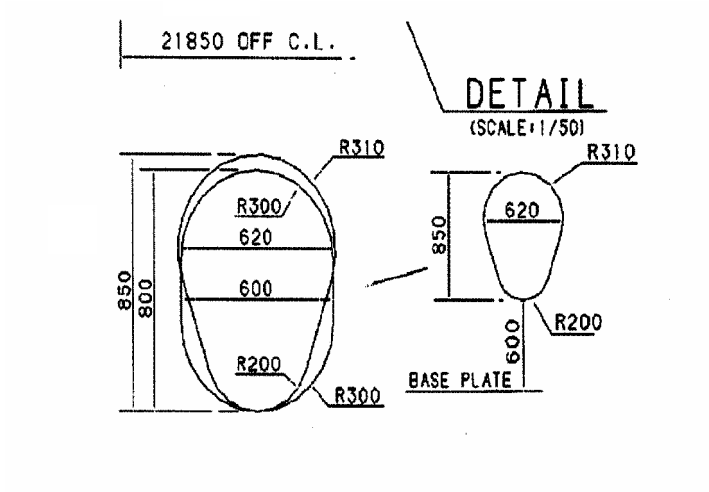
SOLAS regulation II-1/3-6, paragraph 5.2

> "5.2 For access through vertical openings, or manholes, in swash bulkheads, floors, girders and web frames providing passage through the length and breadth of the space, the minimum opening shall be not less than 600 mm x 800 mm at a height of not more than 600 mm from the bottom shell plating unless gratings or other foot holds are provided."

Interpretation

1 The minimum clear opening of not less than 600 mm x 800 mm may also include an opening with corner radii of 300 mm. An opening of 600 mm in height x 800 mm in width may be accepted as access openings in vertical structures where it is not desirable to make large openings in the structural strength aspects, i.e. girders and floors in double bottom tanks.

2 Subject to verification of easy evacuation of an injured person on a stretcher the vertical opening 850 mm x 620 mm with wider upper half than 600 mm, while the lower half may be less than 600 mm with the overall height not less than 850 mm is considered an acceptable alternative to the traditional opening of 600 mm x 800 mm with corner radii of 300 mm.



3 If a vertical opening is at a height of more than 600 mm steps and handgrips should be provided. In such arrangements it should be demonstrated that an injured person can be easily evacuated.

Technical background

The interpretation is based upon the established Guidelines in MSC/Circ.686 and an innovative design is considered for easy access by humans through the opening.

Reference

Paragraph 11 of the annex to MSC/Circ.686.

2 TECHNICAL PROVISIONS FOR MEANS OF ACCESS FOR INSPECTIONS (RESOLUTION MSC.158(78))

Paragraph 1.3

> "1.3 In order to address this issue, the Organization has developed these Technical provisions for means of access for inspections (hereinafter called the "Technical provisions"), intended to facilitate close-up inspections and thickness measurements of the ship's structure referred to in SOLAS regulation II-1/3-6 on Access to and within spaces in, and forward of, the cargo area of oil tankers and bulk carriers. The Technical provisions do not apply to the cargo tanks of combined chemical/oil tankers complying with the provisions of the IBC Code."

Interpretation

A "combined chemical/oil tankers complying with the provisions of the IBC Code" is a tanker that holds both a valid IOPP certificate as tanker and a valid certificate of fitness for the carriage of dangerous chemicals in bulk i.e. a tanker that is certified to carry both oil cargoes under MARPOL Annex I and Chemical cargoes in chapter 17 of the IBC Code either as full or part cargoes. The Technical provisions should be applied to ballast tanks of combined chemical/oil tankers complying with the provisions of the IBC Code.

Paragraph 1.4

> "1.4 Permanent means of access which are designed to be integral parts of the structure itself are preferred and Administration may allow reasonable deviations to facilitate such designs."

Interpretation

In the context of the above requirement, the deviation should be applied only to distances between integrated PMA that are the subject of paragraph 2.1.2 of Table 1.

Deviations should not be applied to the distances governing the installation of underdeck longitudinal walkways and dimensions that determine whether permanent access are required or not, such as height of the spaces and height to elements of the structure (e.g. cross-ties).

Paragraph 3.1

> "3.1 Structural members subject to the close-up inspections and thickness measurements of the ship's structure referred to in SOLAS regulation II-1/3-6, except those in double bottom spaces, shall be provided with a permanent means of access to the extent as specified in Table 1 and Table 2, as applicable. For oil tankers and wing ballast tanks of ore carriers, approved alternative methods may be used in combination with the fitted permanent means of access, provided that the structure allows for its safe and effective use."

Interpretation

The permanent means of access to a space can be credited for the permanent means of access for inspection.

Technical background

The Technical provisions specify means of access to a space and to hull structure for carrying out overall and close up surveys and inspections. Requirements of MA to hull structure may not always be suitable for access to a space. However if the MA for access to a space can also be used for the intended surveys and inspections such MA can be credited for the MA for use for surveys and inspections.

Paragraph 3.3

> "3.3 Elevated passageways forming sections of a permanent means of access, where fitted, shall have a minimum clear width of 600 mm, except for going around vertical webs where the minimum clear width may be reduced to 450 mm, and have guard rails over the open side of their entire length. Sloping structure providing part of the access shall be of a non-skid construction. Guard rails shall be 1,000 mm in height and consist of a rail and intermediate bar 500 mm in height and of substantial construction. Stanchions shall be not more than 3 m apart."

Interpretation

1 Sloping structures are structures that are sloped by 5 or more degrees from horizontal plane when a ship is in upright position at even-keel.

2 Guard rails should be fitted on the open side. For stand alone passageways guard rails should be fitted on both sides of these structures.

3 Discontinuous handrails are allowed, provided the gap does not exceed 50 mm. The maximum distance between the adjacent stanchions across the handrail gaps should be 350 mm.

4 Non-skid construction is such that the surface on which personnel walks provides sufficient friction to the sole of boots even if the surface is wet and covered with thin sediment.

5 "Substantial construction" is taken to refer to the as designed strength as well as the residual strength during the service life of the vessel. Durability of passageways together with guard rails should be ensured by the initial corrosion protection and inspection and maintenance during services.

6 For guard rails, use of alternative materials such as GRP should be subject to compatibility with the liquid carried in the tank. Non-fire resistant materials should not be used for means of access to a space with a view to securing an escape route at a high temperature.

7 Requirements for resting platforms placed between ladders should be equivalent to those applicable to elevated passageways.

Reference

Paragraph 10 of the annex to MSC/Circ.686.

Paragraph 3.4

"3.4 Access to permanent means of access and vertical openings from the ship's bottom shall be provided by means of easily accessible passageways, ladders or threads. Threads shall be provided with lateral support for the foot. Where the rungs of ladders are fitted against a vertical surface, the distance from the centre of the rungs to the surface shall be at least 150 mm. Where vertical manholes are fitted higher than 600 mm above the walking level, access shall be facilitated by means of treads and hand grips with platform landings on both sides."

Interpretation

Where the vertical manhole is at a height of more than 600 mm above the walking level, it should be demonstrated that an injured person can be easily evacuated.

Paragraph 3.5

"3.5 Permanent inclined ladders shall be inclined at an angle of less than 70º. There shall be no obstructions within 750 mm of the face of the inclined ladder, except that in way of an opening this clearance may be reduced to 600 mm. Resting platforms of adequate dimensions shall be provided normally at a maximum of 6 m vertical height. Ladders and handrails shall be constructed of steel or equivalent material of adequate strength and stiffness and securely attached to the structure by stays. The method of support and length of stay shall be such that vibration is reduced to a practical minimum. In cargo holds, ladders shall be designed and arranged so that the risk of damage from cargo handling gear is minimized."

Interpretation

MA for access to ballast tanks, cargo tanks and spaces other than fore peak tanks:

For oil tankers:

1 Tanks and subdivisions of tanks having a length of 35 m or more with two access hatchways:

First access hatchway: Inclined ladder or ladders should be used.

Second access hatchway:

.1 A vertical ladder may be used. In such a case where the vertical distance is more than 6 m, vertical ladders should comprise one or more ladder linking platforms spaced not more than 6 m apart vertically and displaced to one side of the ladder.

The uppermost section of the vertical ladder, measured clear of the overhead obstructions in way of the tank entrance, should not be less than 2.5 m but not exceed 3.0 m and should comprise a ladder linking platform which should be displaced to one side of a vertical ladder. However, the vertical distance of the upper most section of the vertical ladder may be reduced to 1.6 m, measured clear of the overhead obstructions in way of the tank entrance, if the ladder lands on a longitudinal or athwartship permanent means of access fitted within that range; or

.2 Where an inclined ladder or combination of ladders is used for access to the space, the uppermost section of the ladder, measured clear of the overhead obstructions in way of the tank entrance, should be vertical for not less than 2.5 m but not exceed 3.0 m and should comprise a landing platform continuing with an inclined ladder. However, the vertical distance of the upper most section of the vertical ladder may be reduced to 1.6 m, measured clear of the overhead obstructions in way of the tank entrance, if the ladder lands on a longitudinal or athwartship permanent means of access fitted within that range. The flights of the inclined ladders are normally to be not more than 6 m in vertical height. The lowermost section of the ladders may be vertical for the vertical distance not exceeding 2.5 m.

2 Tanks less than 35 m in length and served by one access hatchway an inclined ladder or combination of ladders should be used to the space as specified in 1.2 above.

3 In double hull spaces of less than 2.5 m width the access to the space may be by means of vertical ladders that comprises one or more ladder linking platforms spaced not more than 6 m apart vertically and displaced to one side of the ladder. The uppermost section of the vertical ladder, measured clear of the overhead obstructions in way of the tank entrance, should not be less than 2.5 m but not exceed 3.0 m and should comprise a ladder linking platform which should be displaced to one side of a vertical ladder. However, the vertical distance of the upper most section of the vertical ladder may be reduced to 1.6 m, measured clear of the overhead obstructions in way of the tank entrance, if the ladder lands on a longitudinal or athwartship permanent means of access fitted within that range. Adjacent sections of the ladder should be laterally offset from each other by at least the width of the ladder (see paragraph 20 of MSC/Circ.686).

4 Access from deck to a double bottom space may be by means of vertical ladders through a trunk. The vertical distance from deck to a resting platform, between resting platforms or a resting platform and the tank bottom should not be more than 6 m unless otherwise approved by the Administration.

MA for inspection of the vertical structure of oil tankers:

Vertical ladders provided for means of access to the space may be used for access for inspection of the vertical structure.

Unless stated otherwise in Table 1 of TP, vertical ladders that are fitted on vertical structures for inspection should comprise one or more ladder linking platforms spaced not more than 6 m apart vertically and displaced to one side of the ladder. Adjacent sections of ladder should be laterally offset from each other by at least the width of the ladder (see paragraph 20 of MSC/Circ.686).

Obstruction distances

The minimum distance between the inclined ladder face and obstructions, i.e. 750 mm and, in way of openings, 600 mm specified in TP 3.5 should be measured perpendicular to the face of the ladder.

Technical background

It is a common practice to use a vertical ladder from deck to the first landing to clear overhead obstructions before continuing to an inclined ladder or a vertical ladder displaced to one side of the first vertical ladder.

Reference

For vertical ladders: Paragraph 20 of the annex to MSC/Circ.686.

Paragraph 3.6

> "3.6 The width of inclined ladders between stringers shall not be less than 400 mm. The treads shall be equally spaced at a distance apart, measured vertically, of between 200 mm and 300 mm. When steel is used, the treads shall be formed of two square bars of not less than 22 mm by 22 mm in section, fitted to form a horizontal step with the edges pointing upward. The treads shall be carried through the side stringers and attached thereto by double continuous welding. All inclined ladders shall be provided with handrails of substantial construction on both sides fitted at a convenient distance above the treads."

Interpretation

1 The vertical height of handrails should not be less than 890 mm from the centre of the step and two course handrails should be provided.

2 The requirement of two square bars for treads specified in TP, paragraph 3.6, is based upon the specification of construction of ladders in paragraph 3(e) of Annex 1 to resolution A.272(VIII), which addresses inclined ladders. TP, paragraph 3.4, allows for single rungs fitted to vertical surfaces, which is considered for a safe grip. For vertical ladders, when steel is used, the rungs should be formed of single square bars of not less than 22 mm by 22 mm for the sake of safe grip.

3 The width of inclined ladders for access to a cargo hold should be at least 450 mm to comply with the Australian AMSA Marine Orders Part 32, Appendix 17.

4 The width of inclined ladders other than an access to a cargo hold should be not less than 400 mm.

5 The minimum width of vertical ladders should be 350 mm and the vertical distance between the rungs should be equal and should be between 250 mm and 350 mm.

6 A minimum climbing clearance in width should be 600 mm other than the ladders placed between the hold frames.

7 The vertical ladders should be secured at intervals not exceeding 2.5 m apart to prevent vibration.

Technical background

1 TP, paragraph 3.6, is continuation of TP, paragraph 3.5, which addresses inclined ladders. Interpretations for vertical ladders are needed based upon the current standards of IMO, AMSA or the industry.

2 Interpretations 2 and 5 address vertical ladders based upon the current standards.

3 Double square bars for treads become too large for a grip for vertical ladders and single rungs facilitate a safe grip.

4 Interpretation 7 is introduced consistently with the requirement and the interpretation of TP, paragraph 3.4.

Reference

1 Annex 1 to resolution A.272(VIII).

2 Australian AMSA Marine Orders Part 32, Appendix 17.

3 ILO Code of Practice "Safety and Health in Dockwork" – Section 3.6 Access to Ship's Holds.

Paragraph 3.9.6

> "3.9.6 Portable ladders more than 5 m long may only be utilized if fitted with a mechanical device to secure the upper end of the ladder."

Interpretation

A mechanical device such as hooks for securing at the upper end of a ladder should be considered as an appropriate securing device if a movement fore/aft and sideways can be prevented at the upper end of the ladder.

Technical background

Innovative design is to be accepted if it fits for the functional requirement with due consideration for safe use.

Paragraphs 3.10 and 3.11

> "3.10 For access through horizontal openings, hatches or manholes, the minimum clear opening shall not be less than 600 mm x 600 mm. When access to a cargo hold is arranged through the cargo hatch, the top of the ladder shall be placed as close as possible to the hatch coaming. Access hatch coamings having a height greater than 900 mm shall also have steps on the outside in conjunction with the ladder.
>
> 3.11 For access through vertical openings, or manholes, in swash bulkheads, floors, girders and web frames providing passage through the length and breadth of the space, the minimum opening shall be not less than 600 mm x 800 mm at a height of not more than 600 mm from the passage unless gratings or other foot holds are provided."

Interpretation

See interpretation for paragraphs 5.1 and 5.2 of SOLAS regulation II-1/3-6.

Paragraph 3.13.1

"3.13 For bulk carriers, access ladders to a cargo hold shall be:

.1 Where the vertical distance between the upper surface of adjacent decks or between deck and the bottom of the cargo space is not more than 6 m, either a vertical ladder or an inclined ladder; and"

Interpretation

Either a vertical or an inclined ladder or a combination of them may be used for access to a cargo hold where the vertical distance is 6 m or less from the deck to the bottom of the cargo hold.

Table 1 – Means of access for ballast and cargo tanks of oil tankers, paragraph 1.1

"1.1 For tanks of which the height is 6 m and over containing internal structures, permanent means of access shall be provided in accordance with .1 to .6:"

Interpretation

1 Subparagraphs .1, .2 and .3 define access to underdeck structure, access to the uppermost sections of transverse webs and connection between these structures.

2 Subparagraphs .4, .5 and .6 define access to vertical structures only and are linked to the presence of transverse webs on longitudinal bulkheads.

3 If there are no underdeck structures (deck longitudinals and deck transverses) but there are vertical structures in the cargo tank supporting transverse and longitudinal bulkheads, access in accordance with subparagraphs from .1 through to .6 should be provided for inspection of the upper parts of vertical structure on transverse and longitudinal bulkheads.

4 If there is no structure in the cargo tank, section 1.1 of Table 1 should not be applied.

5 Section 1 of Table 1 should also be applied to void spaces in cargo area, comparable in volume to spaces covered by the regulation II-1/3-6, except those spaces covered by Section 2.

6 The vertical distance below the overhead structure should be measured from the underside of the main deck plating to the top of the platform of the means of access at a given location.

7 The height of the tank should be measured at each tank. For a tank the height of which varies at different bays, item 1.1 should be applied to such bays of a tank that have a height of 6 m and over.

Technical background

Interpretation 7, if the height of the tank is increasing along the length of a ship the permanent means of access is to be provided locally where the height is above 6 m.

Reference

Paragraph 10 of the annex to MSC/Circ.686.

Table 1 – Means of access for ballast and cargo tanks of oil tankers, paragraph 1.1.2

> "1.1.2 at least one continuous longitudinal permanent means of access at each side of the tank. One of these accesses shall be at a minimum of 1.6 m to a maximum of 6 m below the deck head and the other shall be at a minimum of 1.6 m to a maximum of 3 m below the deck head;"

Interpretation

There is need to provide continuous longitudinal permanent means of access when the deck longitudinals and deck transverses are fitted on deck but supporting brackets are fitted under the deck.

Table 1 – Means of access for ballast and cargo tanks of oil tankers, paragraph 1.1.3

> "1.1.3 access between the arrangements specified in .1 and .2 and from the main deck to either .1 or .2;"

Interpretation

Means of access to tanks may be used for access to the permanent means of access for inspection.

Technical background

As a matter of principle, in such a case where the means of access can be utilized for the purpose of accessing structural members for inspection there is no need of duplicated installation of the MA.

Table 1 – Means of access for ballast and cargo tanks of oil tankers, paragraph 1.1.4

> "1.1.4 continuous longitudinal permanent means of access which are integrated in the structural member on the stiffened surface of a longitudinal bulkhead, in alignment, where possible, with horizontal girders of transverse bulkheads are to be provided for access to the transverse webs unless permanent fittings are installed at the uppermost platform for use of alternative means as defined in paragraph 3.9 of the Technical provisions for inspection at intermediate heights;"

Interpretation

The permanent fittings required to serve alternative means of access such as wire lift platform, that should be used by crew and surveyors for inspection should provide at least an equal level of safety as the permanent means of access stated by the same paragraph. These means of access

should be carried on board the ship and be readily available for use without filling of water in the tank. Therefore, rafting should not be acceptable under this provision. Alternative means of access should be part of Access Manual which should be approved on behalf of the flag State.

Table 1 – Means of access for ballast and cargo tanks of oil tankers, paragraph 2.1

> "2.1 For double side spaces above the upper knuckle point of the bilge hopper sections, permanent means of access are to be provided in accordance with .1 and .2:"

Interpretation

Section 2 of Table 1 should also be applied to wing tanks designed as void spaces. Paragraph 2.1.1 represents requirements for access to underdeck structures, while paragraph 2.1.2 is a requirement for access for survey and inspection of vertical structures on longitudinal bulkheads (transverse webs).

Technical background

Regulation II-1/3-6.2.1 requires each space to be provided with means of access. Though void spaces are not addressed in the technical provisions contained in resolution MSC.158(78) it is arguable whether MA is not required in void spaces. MA or portable means of access are necessary arrangement to facilitate inspection of the structural condition of the space and the boundary structure. Therefore the requirements of Section 2 of Table 1 is to be applied to double hull spaces even designed as void spaces.

Table 1 – Means of access for ballast and cargo tanks of oil tankers, paragraph 2.1.1

> "2.1.1 where the vertical distance between horizontal uppermost stringer and deck head is 6 m or more, one continuous permanent means of access shall be provided for the full length of the tank with a means to allow passing through transverse webs installed a minimum of 1.6 m to a maximum of 3 m below the deck head with a vertical access ladder at each end of the tank;"

Interpretation

1 For a tank, the vertical distance between horizontal upper stringer and deck head of which varies at different sections, item 2.1.1 should be applied to such sections that fall under the criteria.

2 The continuous permanent means of access may be a wide longitudinal, which provides access to critical details on the opposite side by means of platforms as necessary on web frames. In case the vertical opening of the web frame is located in way of the open part between the wide longitudinal and the longitudinal on the opposite side, platforms should be provided on both sides of the web frames to allow safe passage through the web frame.

3 Where two access hatches are required by SOLAS regulation II-1/3-6.3.2, access ladders at each end of the tank should lead to the deck.

Technical background

Interpretation 1: The interpretation of varied tank height in item 1 of Table 1 is applied to the vertical distance between horizontal upper stringer and deck head for consistency.

Table 1 – Means of access for ballast and cargo tanks of oil tankers, paragraph 2.1.2

> "2.1.2 continuous longitudinal permanent means of access, which are integrated in the structure, at a vertical distance not exceeding 6 m apart; and"

Interpretation

The continuous permanent means of access may be a wide longitudinal, which provides access to critical details on the opposite side by means of platforms as necessary on web frames. In case the vertical opening of the web is located in way of the open part between the wide longitudinal and the longitudinal on the opposite side, platforms should be provided on both sides of the web to allow safe passage through the web. A "reasonable deviation", as noted in TP, paragraph 1.4, of not more than 10% may be applied where the permanent means of access is integral with the structure itself.

Table 1 – Means of access for ballast and cargo tanks of oil tankers, paragraph 2.2

> "2.2 For bilge hopper sections of which the vertical distance from the tank bottom to the upper knuckle point is 6 m and over, one longitudinal permanent means of access shall be provided for the full length of the tank. It shall be accessible by vertical permanent means of access at both ends of the tank."

Interpretation

1 Permanent means of access between the longitudinal continuous permanent means of access and the bottom of the space should be provided.

2 The height of a bilge hopper tank located outside of the parallel part of vessel should be taken as the maximum of the clear vertical distance measured from the bottom plating to the hopper plating of the tank.

3 The foremost and aftmost bilge hopper ballast tanks with raised bottom, of which the height is 6 m and over, a combination of transverse and vertical MA for access to the upper knuckle point for each transverse web should be accepted in place of the longitudinal permanent means of access.

Technical background

Interpretation 2: The bilge hopper tanks at fore and aft of cargo area narrow due to raised bottom plating and the actual vertical distance from the bottom of the tank to hopper plating of the tank is more appropriate to judge if a portable means of access could be utilized for the purpose.

Interpretation 3: In the foremost or aftmost bilge hopper tanks where the vertical distance is 6 m or over but installation of longitudinal permanent means of access is not practicable permanent means of access of combination of transverse and vertical ladders provides an alternative means of access to the upper knuckle point.

Table 2 - Means of access for bulk carriers, paragraph 1.1

> "1.1 Permanent means of access shall be fitted to provide access to the overhead structure at both sides of the cross deck and in the vicinity of the centreline. Each means of access shall be accessible from the cargo hold access or directly from the main deck and installed at a minimum of 1.6 m to a maximum of 3 m below the deck."

Interpretation

1 Means of access should be provided to the crossdeck structures of the foremost and aftermost part of each cargo hold.

2 Interconnected means of access under the cross deck for access to three locations at both sides and in the vicinity of the centreline should be acceptable as the three means of access.

3 Permanent means of access fitted at three separate locations accessible independently, one at each side and one in the vicinity of the centreline, should be acceptable.

4 Special attention should be paid to the structural strength where any access opening is provided in the main deck or cross deck.

5 The requirements for bulk carrier cross deck structure should also be considered applicable to ore carriers.

Technical background

Pragmatic arrangements of the MA are provided.

Table 2 - Means of access for bulk carriers, paragraph 1.3

> "1.3 Access to the permanent means of access to overhead structure of the cross deck may also be via the upper stool."

Interpretation

Particular attention should be paid to preserve the structural strength in way of access opening provided in the main deck or cross deck.

Table 2 - Means of access for bulk carriers, paragraph 1.4

> "1.4 Ships having transverse bulkheads with full upper stools with access from the main deck which allows monitoring of all framing and plates from inside, do not require permanent means of access of the cross deck."

Interpretation

"Full upper stools" are understood to be stools with a full extension between top side tanks and between hatch end beams.

Table 2 - Means of access for bulk carriers, paragraph 1.5

> "1.5 Alternatively, movable means of access may be utilized for access to the overhead structure of cross deck if its vertical distance is 17 m or less above the tank top."

Interpretation

1 The movable means of access to the underdeck structure of cross deck need not necessarily be carried on board the vessel. It should be sufficient if it is made available when needed.

2 The requirements for bulk carrier cross deck structure should also be considered applicable to ore carriers.

Table 2 - Means of access for bulk carriers, paragraph 1.6

> "1.6 Permanent means of vertical access shall be provided in all cargo holds and built into the structure to allow for an inspection of a minimum of 25% of the total number of hold frames port and starboard equally distributed throughout the hold including at each end in way of transverse bulkheads. But in no circumstance shall this arrangement be less than 3 permanent means of vertical access fitted to each side (fore and aft ends of hold and mid-span). Permanent means of vertical access fitted between two adjacent hold frames is counted for an access for the inspection of both hold frames. A means of portable access may be used to gain access over the sloping plating of lower hopper ballast tanks."

Interpretation

The maximum vertical distance of the rungs of vertical ladders for access to hold frames should be 350 mm. If safety harness is to be used, means should be provided for connecting the safety harness in suitable places in a practical way.

Technical background

The maximum vertical distance of the rungs of 350 mm is applied with a view to reducing trapping cargoes.

Table 2 - Means of access for bulk carriers, paragraph 1.7

> "1.7 In addition, portable or movable means of access shall be utilized for access to the remaining hold frames up to their upper brackets and transverse bulkheads."

Interpretation

Portable, movable or alternative means of access should also be applied to corrugated bulkheads.

Table 2 - Means of access for bulk carriers, paragraph 2.3

> "2.3 Three permanent means of access, fitted at the end bay and middle bay of each tank, shall be provided spanning from tank base up to the intersection of the sloping plate with the hatch side girder. The existing longitudinal structure may be used as part of this means of access."

Interpretation

If the longitudinal structures on the sloping plate are fitted outside of the tank, a means of access should be provided.

Table 2 - Means of access for bulk carriers, paragraph 2.5

> "2.5 For each bilge hopper tank of which the height is 6 m and over, one longitudinal continuous permanent means of access shall be provided along the side shell webs and installed at a minimum of 1.2 m below the top of the clear opening of the web ring with a vertical access ladder in the vicinity of each access to the tank."

Interpretation

1 The height of a bilge hopper tank located outside of the parallel part of vessel should be taken as the maximum of the clear vertical height measured from the bottom plating to the hopper plating of the tank.

2 It should be demonstrated that portable means for inspection can be deployed and made readily available in the areas where needed.

Table 2 - Means of access for bulk carriers, paragraph 2.5.2

> "2.5.2 Alternatively, the longitudinal continuous permanent means of access can be located through the upper web plating above the clear opening of the web ring, at a minimum of 1.6 m below the deck head, when this arrangement facilitates more suitable inspection of identified structurally critical areas. An enlarged longitudinal frame can be used for the purpose of the walkway."

Interpretation

A wide longitudinal frame of at least 600 mm clear width may be used for the purpose of the longitudinal continuous permanent means of access.

Table 2 - Means of access for bulk carriers, paragraph 2.6

> "2.6 If no access holes are provided through the transverse ring webs within 600 mm of the tank base and the web frame rings have a web height greater than 1 m in way of side shell and sloping plating, then step rungs/grab rails shall be provided to allow safe access over each transverse web frame ring."

Interpretation

The height of web frame rings should be measured in way of side shell and tank base.

Technical background

In the bilge hopper tank the sloping plating is above the opening, while the movement of the surveyor is along the bottom of the tank. Therefore the measurement of 1 m should be taken from the bottom of the tank.

3 SOLAS REGULATION II-1/26.4 -GENERAL

Dead ship condition

> "Means shall be provided to ensure that machinery can be brought into operation from the dead ship condition without external aid."

Interpretation

1 Dead ship condition for the purpose of regulation II-1/26.4 should be understood to mean a condition under which the main propulsion plant, boilers and auxiliaries are not in operation and in restoring the propulsion, no stored energy for starting and operating the propulsion plant, the main source of electrical power and other essential auxiliaries is assumed to be available.

2 Where the emergency source of power is an emergency generator which complies with regulation II-1/44, IACS SC185 and IACS SC124, this generator may be used for restoring operation of the main propulsion plant, boilers and auxiliaries where any power supplies necessary for engine operation are also protected to a similar level as the starting arrangements.

3 Where there is no emergency generator installed or an emergency generator does not comply with regulation II-1/44, the arrangements for bringing main and auxiliary machinery into operation should be such that the initial charge of starting air or initial electrical power and any power supplies for engine operation can be developed on board ship without external aid. If for this purpose an emergency air compressor or an electric generator is required, these units should be powered by a hand-starting oil engine or a hand-operated compressor. The arrangements for bringing main and auxiliary machinery into operation should have capacity such that the starting energy and any power supplies for engine operation are available within 30 minutes of a dead ship condition.

4 SOLAS REGULATION II-1/41.4 - MAIN SOURCE OF ELECTRICAL POWER AND LIGHTING SYSTEMS

Connecting means by which the main bus bars of the main source of electrical power are normally connected

> "4 Where the total installed electrical power of the main generating sets is in excess of 3 MW, the main bus bars shall be subdivided into at least two parts which shall normally be connected by removable links or other approved means; so far as is practicable, the connection of generating sets and any other duplicated equipment shall be equally divided between the parts. Equivalent arrangements may be permitted to the satisfaction of the Administration."

Interpretation

Other approved means can be achieved by:

.1 circuit breaker without tripping mechanism; and

.2 disconnecting link or switch by which bus bars can be split easily and safely.

Bolted links, for example bolted bus bar sections, should not be accepted.

5 SOLAS REGULATION II-1/44 - STARTING ARRANGEMENTS FOR EMERGENCY GENERATING SETS

SOLAS regulation II-1/44, paragraph 1

> "1 Emergency generating sets shall be capable of being readily started in their cold condition at a temperature of 0°C. If this is impracticable, or if lower temperatures are likely to be encountered, provision acceptable to the Administration shall be made for the maintenance of heating arrangements, to ensure ready starting of the generating sets."

Interpretation (from MSC/Circ.736)

Emergency generating sets should be capable of being readily started in their cold condition at a temperature of 0°C. If this is impracticable, or if lower temperatures are likely to be encountered, heating should be provided to ensure ready starting of the generating sets.

SOLAS regulation II-1/44, paragraph 2

> "2 Each emergency generating set arranged to be automatically started shall be equipped with starting devices approved by the Administration with a stored energy capability of at least three consecutive starts. A second source of energy shall be provided for an additional three starts within 30 minutes unless manual starting can be demonstrated to be effective."

Interpretation (from MSC/Circ.736)

Each emergency generating set arranged to be automatically started should be equipped with starting devices with a stored energy capability of at least three consecutive starts. A second source of energy should be provided for an additional three starts within 30 minutes unless manual starting can be demonstrated to be effective.

6 SOLAS REGULATION XII/9 – REQUIREMENTS FOR BULK CARRIERS NOT BEING CAPABLE OF COMPLYING WITH REGULATION 4.2 DUE TO THE DESIGN CONFIGURATION OF THEIR CARGO HOLDS

Bulk carriers not complying with SOLAS XII/9 as of 1 January 2004

> "For bulk carriers being within the application limits of regulation 4.2, which have been constructed with an insufficient number of transverse watertight bulkheads to satisfy that regulation, the Administration may allow relaxation from the application of regulations 4.2 and 6 on condition that they shall comply with the following requirements:
>
> .1 for the foremost cargo hold, the inspections prescribed for the annual survey in the enhanced programme of inspections required by regulation XI/2 shall be replaced by the inspections prescribed therein for the intermediate survey of cargo holds;
>
> .2 are provided with bilge well high water level alarms in all cargo holds, or in cargo conveyor tunnels, as appropriate, giving an audible and visual alarm on the navigation bridge, as approved by the Administration or an organization recognized by it in accordance with the provisions of regulation XI/1; and

.3 are provided with detailed information on specific cargo hold flooding scenarios. This information shall be accompanied by detailed instructions on evacuation preparedness under the provisions of Section 8 of the International Safety Management (ISM) Code and be used as the basis for crew training and drills."

Interpretation

Bulk carriers subject to SOLAS regulation XII/9 but which have not been brought into compliance with the regulation as of 1 January 2004 should comply with SOLAS regulation XII/12 in accordance with the compliance schedule of that regulation (i.e. not later than the date of the annual, intermediate or renewal survey of the ship to be carried out after 1 July 2004, whichever comes first).

7 SOLAS REGULATION XII/12 – HOLD BALLAST AND DRY SPACE WATER LEVEL DETECTORS

When water level detectors are installed on bulk carriers in compliance with SOLAS regulation XII/12, the Performance standards for water level detectors on bulk carriers, annexed to resolution MSC.145(77) adopted on 5 June 2003 should be applied, taking into account the following interpretations to the paragraphs of the Performance standards:

Paragraph 3.2.3

"3.2.3 Detection equipment should be suitably corrosion resistant for all intended cargoes."

Interpretation

Detection equipment includes the sensor and any filter and protection arrangements for the detector installed in cargo holds and other spaces as required by SOLAS regulation XII/12.1.

Paragraph 3.2.5

"3.2.5 The part of the system which has circuitry in the cargo area, should be intrinsically safe."

Interpretation

1 In general, the construction and type testing should be in accordance with IEC Publication 60079: Electrical Equipment for Explosive Gas Atmospheres to a minimum requirement of EX(ia). Where a ship is designed only for the carriage of cargoes that cannot create a combustible or explosive atmosphere then the requirement for intrinsically safe circuitry should not be insisted upon, provided the operational instructions included in the Manual required by 4.1 of the Appendix to the Annex specifically exclude the carriage of cargoes that could produce a potential explosive atmosphere. Any exclusion of cargoes identified in the Annex should be consistent with the ship's Cargo Book and any Certification relating to the carriage of specifically identified cargoes.

2 The maximum surface temperature of equipment installed within cargo spaces should be appropriate for the combustible dusts and/or explosive gases likely to be encountered. Where the

characteristics of the dust and gases are unknown, the maximum surface temperature of equipment should not exceed 85°C.

3 Where intrinsically safe equipment is installed, it should be of a certified safe type.

4 Where detector systems include intrinsically safe circuits, plans of the arrangements should be appraised/approved by individual classification societies.

Paragraph 3.3.2

> "3.3.2 Visual and audible alarms should conform to the Code on Alarms and Indicators, 1995, as applicable to a primary alarm for the preservation or safety of the ship."

Interpretation

The pre-alarm, as a primary alarm, should indicate a condition that requires prompt attention to prevent an emergency condition and the main-alarm, as an emergency alarm should indicate that immediate actions must be taken to prevent danger to human life or to the ship.

Paragraph 3.3.7

> "3.3.7 Requirements for malfunctions, alarms and indications should be capable of the following:
>
> A facility for continuous monitoring of the system which, on detecting a fault activates a visual and audible alarm. The audible alarm should be capable of being muted but the visual indication should remain active until the malfunction is cleared."

Interpretation

Fault monitoring should address all foreseeable faults associated with the system that include open circuit, short circuit and earth fault as well as arrangement details that would include loss of power supplies, excessive runtime, CPU failure, I/O unit failure for computer based alarm/monitoring system, etc.

Paragraph 3.3.8

> "3.3.8 The water level indicator should be capable of being supplied with electrical power from two independent electrical supplies. Failure of the primary electrical power supply should be indicated by an alarm."

Interpretation

1 The electrical power supply should be from two separate sources, one should be the main source of electrical power and the other should be the emergency source, unless a continuously charged dedicated accumulator battery is fitted, having arrangement, location and endurance equivalent to that of the emergency source (18 h). The battery supply may be an internal battery in the water level detector system.

2 The changeover arrangement of supply from one electrical source to another need not be integrated into the water level detector system.

3 Where batteries are used for the secondary power supply, failure alarms for both power supplies should be provided.

Footnote to paragraph 3.4.1

"[2] With regard to testing, reference is made to IEC 60092-504 and IEC 60529. Electrical components installed in the cargo holds, ballast tanks and dry spaces should satisfy the requirements of IP68 in accordance with IEC 60529."

Interpretation

1 IACS UR E10 may be used as an equivalent test standard to IEC 60092-504.

2 The range of tests is to include the following:

For alarm/monitoring panel:

.1 functional tests in accordance with resolution MSC.145(77) – Performance Standards for Water Level Detectors on Bulk Carriers;

.2 electrical power supply failure test;

.3 power supply variation test;

.4 dry heat tests;

.5 damp heat tests;

.6 vibration test;

.7 EMC tests;

.8 insulation resistance test;

.9 high voltage test; and

.10 static and dynamic inclinations tests, if moving parts are contained.

For IS barrier unit, if located in the wheelhouse: in addition to the certificate issued by a competent independent testing laboratory, EMC tests should also be carried out.

For water ingress detectors:

.1 functional tests in accordance with resolution MSC.145(77) – Performance Standards for Water Level Detectors on Bulk Carriers;

.2 electrical power supply failure test;

.3 power supply variation test;

.4 dry heat test;

.5 damp heat test;

.6 vibration test;

.7 enclosure class in accordance with resolution MSC.145(77) – Performance Standards for Water Level Detectors on Bulk Carriers;

.8 insulation resistance test;

.9 high voltage test; and

.10 static and dynamic inclinations tests (if the detectors contain moving parts).

Appendix, paragraph 2.1.1

"2.1.1 Detector equipment should provide a reliable indication of water reaching a preset level and should be type tested to demonstrate their robustness and suitability under the appropriate conditions of IEC 60092-504 and the following:"

Interpretation

The test procedure should satisfy the following criteria:

.1 the type tests should be witnessed by a classification society surveyor if the tests are not carried out by a competent independent test facility;

.2 type tests should be carried out on a prototype or randomly selected item(s) which are representative of the manufactured item that is being type tested;

.3 type tests should be documented (type test reports) by the manufacturer and submitted for review by classification societies.

Appendix, paragraph 2.1.1.1

"2.1.1.1 Protection of the enclosures of electrical components installed in the cargo holds, ballast tanks and dry spaces should satisfy the requirements of IP68 in accordance with IEC 60529. The water pressure testing of the enclosure should be based on a pressure head held for a period depending on the application. For detectors to be fitted in holds intended for the carriage of water ballast or ballast tanks the application head should be the hold or tank depth and the hold period should be 20 days. For detectors to be fitted in spaces intended to be dry the application should be the depth of the space and the hold period should be 24 h."

Interpretation

1 The submerged test period for electrical components intended to be installed in ballast tanks and cargo tanks used as ballast tanks should be not less than 20 days.

2 The submerged test period for electrical components intended to be installed in dry spaces and cargo holds not intended to be used as ballast tanks should be not less than 24 hours.

3 Where a detector and/or cable connecting device (e.g. junction box, etc.) is installed in a space adjacent to a cargo hold (e.g. lower stool, etc.) and the space is considered to be flooded under damage stability calculations, the detectors and equipment should satisfy the requirements of IP68 for a water head equal to the hold depth for a period of 20 days or 24 hours on the basis of whether or not the cargo hold is intended to be used as a ballast tank as described in the previous paragraphs.

Appendix, paragraph 2.1.1.2

> "2.1.1.2 Operation in cargo/water mixture for the selected range of cargoes such as iron ore dust, coal dust, grains and oils using seawater in suspension of representative fine material for each cargo. For type test purposes an agitated suspension of representative fine materials in seawater, with a concentration of 50% by weight, should be used with the complete detector assembly including any filtration fitted. The functioning of the detection assembly with any filtration arrangements should be verified in the cargo/water mixture with immersion repeated ten times without cleaning any filtration arrangements."

Interpretation

1 The type test required for the sensor should be in accordance with the following:

.1 the test container for the cargo/water mixture should be dimensioned so that its height and volume are such that the sensor and any filtration fitted can be totally submerged for the repeated functionality tests required by 2.1.1.2 and the static and dynamic inclination tests identified in the previous interpretation.

.2 the sensor and any filtration fitted that are to be submerged and are to be arranged in the container as they would be installed in accordance with the installation instructions required by 4.4.

.3 the pressure in the container for testing the complete detector should be not more than 0.2 bar at the sensor and any filter arrangement. The pressure may be realized by pressurization or by using a container of sufficient height.

.4 the cargo/water mixture should be pumped into the test container and suitable agitation of the mixture provided to keep the solids in suspension. The effect of pumping the cargo/water mixture into the container should not affect the operation of the sensor and filter arrangements.

.5 the cargo/water mixture should be pumped into the test container to a predetermined level that submerges the detector and the operation of the alarm observed.

.6 the test container should then be drained and the de-activation of the alarm condition observed.

.7 the test container and sensor with any filter arrangement should be allowed to dry without physical intervention.

.8 the test procedure should be repeated consecutively ten times without cleaning any filter arrangement that may be fitted in accordance with the manufacturer's installation instructions (see also 2.1.1.2).

.9 satisfactory alarm activation and de-activation at each of the ten consecutive tests will demonstrate satisfactory type testing.

2 The cargo/water mixture used for type testing should be representative of the range of cargoes within the following groups and should include the cargo with the smallest particles expected to be found from a typical representative sample:

.1 iron ore particles and seawater;

.2 coal particles and seawater;

.3 grain particles and seawater; and

.4 aggregate (sand) particles and seawater.

The smallest and largest particle size together with the density of the dry mixture should be ascertained and recorded. The particles should be evenly distributed throughout the mixture. Type testing with representative particles will in general qualify all types of cargoes within the four groupings shown above.

The following provides guidance on the selection of particles for testing purposes:

.1 Iron ore particles should mainly consist of small loose screenings of iron ore and not lumps of ore (dust with particle size <0.1 mm).

.2 Coal particles should mainly consist of small loose screenings of coal and not lumps of coal (dust with particle size <0.1 mm).

.3 Grain particles should mainly consist of small loose grains of free flowing grain (grain having a size >3 mm, such as wheat).

.4 Aggregate particles should mainly consist of small loose grains of free flowing sand and without lumps (dust with particle size <0.1 mm).

Appendix, paragraph 3.1.1

"3.1.1 Alarm systems should be type tested in accordance with IEC 60092-504, as appropriate."

Interpretation

The test procedure should satisfy the following criteria:

.1 The type tests should be witnessed by a classification society surveyor if the tests are not carried out by a competent independent test facility.

.2 Type tests should be carried out on a prototype or randomly selected item(s) which are representative of the manufactured item that is being type tested.

.3 Type tests should be documented (type test reports) by the manufacturer and submitted for review by classification societies.

Appendix, section 4 - Manuals

"Manuals should be provided on board and should contain the following information and operational instructions:"

Interpretation

For each ship, a copy of the manual is to be made available to the surveyor at least 24 hours prior to survey of the water level detection installation. Each classification society is to ensure that any plans required for classification purposes have been appraised/approved as appropriate.

8 SOLAS REGULATION XII/13 - AVAILABILITY OF PUMPING SYSTEMS

Dewatering of forward spaces of bulk carriers

SOLAS regulation XII/13.1

"1 On bulk carriers, the means for draining and pumping ballast tanks forward of the collision bulkhead and bilges of dry spaces any part of which extends forward of the foremost cargo hold, shall be capable of being brought into operation from a readily accessible enclosed space, the location of which is accessible from the navigation bridge or propulsion machinery control position without traversing exposed freeboard or superstructure decks. Where pipes serving such tanks or bilges pierce the collision bulkhead, valve operation by means of remotely operated actuators may be accepted, as an alternative to the valve control specified in regulation II-1/11.4, provided that the location of such valve controls complies with this regulation."

MSC/Circ.1069

"1 The spaces where availability of pumping systems is required in accordance with paragraph 1 of SOLAS regulation XII/13 should be the same watertight spaces where water level detectors are required in accordance with paragraph 1.3 of SOLAS regulation XII/12.

2 This means that paragraph 1 of regulation XII/13 does not apply to the enclosed spaces the volume of which does not exceed 0.1% of the ship's maximum displacement volume and to the chain locker."

Interpretation

1 Where the piping arrangements for dewatering closed dry spaces are connected to the piping arrangements for the drainage of water ballast tanks, two non-return valves should be provided to prevent the ingress of water into dry spaces from those intended for the carriage of water ballast. One of these non-return valves should be fitted with shut-off isolation arrangement. The non-return valves should be located in readily accessible positions.

The shut-off isolation arrangement should be capable of being controlled from the navigation bridge, the propulsion machinery control position or enclosed space which is readily accessible from the navigation bridge or the propulsion machinery control position without travelling exposed freeboard or superstructure decks. In this context, a position which is accessible via an under deck passage, a pipe trunk or other similar means of access should not be taken as being in the "readily accessible enclosed space".

2 Under SOLAS regulation XII/13.1:

.1 the valve specified under SOLAS regulation II-1/11.4 should be capable of being controlled from the navigation bridge, the propulsion machinery control position or enclosed space which is readily accessible from the navigation bridge or the propulsion machinery control position without travelling exposed freeboard or superstructure decks. In this context, a position which is accessible via an under deck passage, a pipe trunk or other similar means of access should not be taken as being in the "readily accessible enclosed space";

.2 the valve should not move from the demanded position in the case of failure of the control system power or actuator power;

.3 positive indication should be provided at the remote control station to show that the valve is fully open or closed;

.4 local hand powered valve operation from above the freeboard deck, as permitted under SOLAS regulation II-1/11.4, is requested, but is not an acceptable alternative to SOLAS regulation XII/13.1, unless all of the provisions of SOLAS regulation XII/13.1 are met.

3 The dewatering arrangements should be such that any accumulated water can be drained directly by a pump or eductor.

4 The dewatering arrangements should be such that when they are in operation, other systems essential for the safety of the ship including fire-fighting and bilge systems remain available and ready for immediate use. The systems for normal operation of electric power supplies, propulsion and steering should not be affected by the operation of the dewatering systems. It should also be possible to immediately start fire pumps and have a ready available supply of fire-fighting water and to be able to configure and use bilge system for any compartment when the dewatering system is in operation.

5 Bilge wells should be provided with gratings or strainers that will prevent blockage of the dewatering system with debris.

6 The enclosures of electrical equipment for the dewatering system installed in any of the forward dry spaces should provide protection to IPX8 standard as defined in IEC Publication 60529 for a water head equal to the height of the space in which the electrical equipment is installed for a time duration of at least 24 hours.

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ANNEX 12

DRAFT MSC CIRCULAR

INTERPRETATION TO THE 2000 HSC CODE

1 The Maritime Safety Committee, [at its eighty-first session (…….)], approved the interpretation of the provisions of the 2000 HSC Code, as set out in the attached annex, following the recommendations made by the Sub-Committee on Ship Design and Equipment at its forty-eighth session, with a view to ensuring a uniform approach towards the application of the provisions of the 2000 HSC Code.

2 Member Governments are invited to use the annexed interpretation when applying relevant provisions of the 2000 HSC Code and to bring it to the attention of all parties concerned.

ANNEX

INTERPRETATION TO THE 2000 HSC CODE

CHAPTER 9 – Machinery
Part A – General
Paragraph 9.1.5

Machinery installations – dead craft condition

"Means shall be provided to ensure that machinery can be brought into operation from the dead craft condition without external aid."

Interpretation

Dead craft condition for the purpose of paragraph 9.1.5 should be understood to mean a condition under which the main propulsion plant and auxiliaries are not in operation and, in restoring the propulsion, no stored energy is assumed to be available for starting and operating the propulsion plant, the main source of electrical power and other essential auxiliaries. It is assumed that means are available at all times to start the emergency generator or one of the main generators when the main source is arranged according to paragraph 12.7.2.

Where the emergency source of power is an emergency generator which complies with section 12.4, or a main generator meeting the requirements of paragraph 12.7.2, it is assumed that means are available to start this generator and consequently this generator may be used for restoring operation of the main propulsion plant and auxiliaries where any power supplies necessary for engine operation are also protected to a similar level as the starting arrangements.

Where there is no emergency generator installed or an emergency generator does not comply with section 12.4, the arrangements for bringing main and auxiliary machinery into operation should be such that initial charge of starting air or initial electrical power and any power supplies for engine operation can be developed on board the craft without external aid. If for this purpose an emergency air compressor or electric generator is required, these units should be powered by a hand-starting oil engine or a hand-operated compressor. The arrangements for bringing main and auxiliary machinery into operation should have a capacity such that the starting energy and any power supplies for engine operation are available within 30 minutes of a dead craft condition.

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ANNEX 13

DRAFT MSC CIRCULAR

UNIFIED INTERPRETATIONS TO SOLAS CHAPTER II-1

1 The Maritime Safety Committee, [at its eightieth session (11 to 20 May 2005)], approved the unified interpretations of the provisions of SOLAS chapter II-1 as set out in the attached annex, following the recommendations made by the Sub-Committee on Ship Design and Equipment at its forty-seventh session, with a view to ensuring a uniform approach towards the application of the provisions of SOLAS chapter II-1.

2 Member Governments are invited to use the annexed interpretations when applying relevant provisions of SOLAS chapter II-1, and to bring them to the attention of all parties concerned.

ANNEX

UNIFIED INTERPRETATIONS TO CHAPTER II-1 OF THE 1974 SOLAS CONVENTION

1 SOLAS regulation II-1/26.11 Machinery installations – service tank arrangements

Arrangements complying with this regulation and acceptable "equivalent arrangements", for the most commonly utilized fuel systems, are shown below.

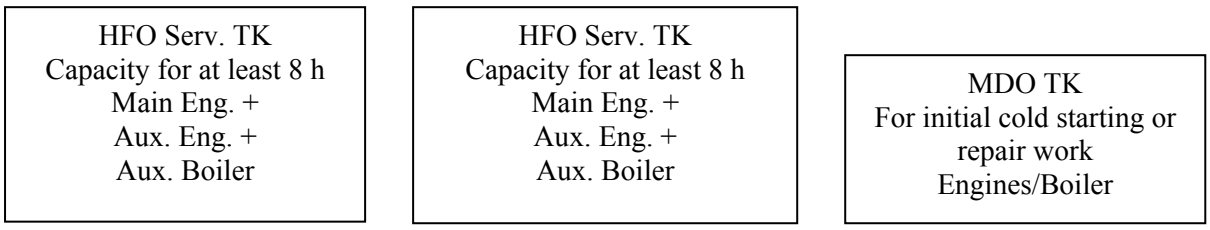
A service tank is a fuel oil tank which contains only fuel of a quality ready for use i.e. fuel of a grade and quality that meet the specification required by the equipment manufacturer. A service tank is to be declared as such and not to be used for any other purpose.

Use of a setting tank with or without purifiers, or purifiers alone, and one service tank is not acceptable as an "equivalent arrangement" to two service tanks.

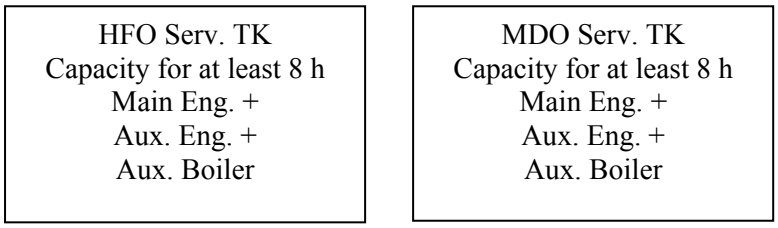
Examples of application for the most common systems

1 Main, auxiliary engines, and boilers operating with heavy fuel oil (HFO) (one fuel ship)

1.1 Requirement according to SOLAS



1.2 Equivalent arrangement



This interpretation only applies where main and auxiliary engines can operate with heavy fuel oil under all load conditions and, in the case of main engines, during manoeuvring.

For pilot burners of auxiliary boilers if provided, an additional MDO tank for 8 hours may be necessary.

2 SOLAS regulations II-1/40 and II-1/41
Essential services and arrangements of sources of power, supply, control and monitoring to the different categories of essential services

1 Classification of electrical services

1.1 Essential services are those services essential for propulsion and steering, and safety of the ship, which are made up of "Primary Essential Services" and "Secondary Essential Services". Definitions and examples of such services are given in 2 and 3 below.

1.2 Services to ensure minimum comfortable conditions of habitability are those services defined in 4 below.

2 Primary Essential Services

Primary Essential Services are those services which need to be in continuous operation to maintain propulsion and steering. Examples of equipment for primary essential services are as follows:

- steering gears;
- pumps for controllable pitch propellers;
- scavenging air blower, fuel oil supply pumps, fuel valve cooling pumps, lubricating oil pumps and cooling water pumps for main and auxiliary engines and turbines necessary for propulsion;
- forced draught fans, feed water pumps, water circulating pumps, vacuum pumps and condensate pumps for steam plants on steam turbine ships, and also for auxiliary boilers on ships where steam is used for equipment supplying primary essential services;
- oil burning installations for steam plants on steam turbine ships and for auxiliary boilers where steam is used for equipment supplying primary essential services;
- azimuth thrusters, which are the sole means for propulsion/steering with lubricating oil pumps, cooling water pumps;
- electrical equipment for electric propulsion plant with lubricating oil pumps and cooling water pumps;
- electric generators and associated power sources supplying the above equipment;
- hydraulic pumps supplying the above equipment;
- viscosity control equipment for heavy fuel oil;
- control, monitoring, and safety devices/systems for equipment to primary essential services;
- fire pumps and other fire extinguishing medium pumps;
- navigation lights, aids and signals;
- internal safety communication equipment;
- lighting system.

3 Secondary Essential Services

Secondary Essential Services are those services which need not necessarily be in continuous operation to maintain propulsion and steering but which are necessary for maintaining the vessel's safety. Examples of equipment for secondary essential services are as follows:

- windlass;
- fuel oil transfer pumps and fuel oil treatment equipment;
- lubrication oil transfer pumps and lubrication oil treatment equipment;
- pre-heaters for heavy fuel oil;
- starting air and control air compressors;
- bilge, ballast and heeling pumps;
- ventilating fans for engine and boiler rooms;
- services considered necessary to maintain dangerous spaces in a safe condition;
- fire detection and alarm system;
- electrical equipment for watertight closing appliances;
- electric generators and associated power sources supplying the above equipment;
- hydraulic pumps supplying the above equipment;
- control, monitoring, and safety systems for cargo containment systems;
- control, monitoring, and safety devices/systems for equipment to secondary essential services.

4 Services for habitability

Services for habitability are those services which need to be in operation for maintaining the ship's minimum comfort conditions for the crew and passengers. Examples of equipment for maintaining conditions of habitability are as follows:

- cooking;
- heating;
- domestic refrigeration;
- mechanical ventilation;
- sanitary and fresh water;
- electrical generators and associated power sources supplying the above equipment.

5 Regulation II-1/40.1.1 and regulation II-1/41.1.1 – For the purposes of these regulations, the services as included in paragraphs 2 to 4 are to be considered.

6 Regulation II-1/40.1.2 – For the purposes of this regulation, the services as included in paragraphs 2 and 3 and the services in regulation II-1/42 or II-1/43, as applicable, are to be considered.

7 Regulation II-1/41.1.2 – For the purposes of this regulation, the services as included in paragraphs 2 to 4, except for those also listed in Interpretation 3 (SOLAS chapter II-1, regulation 41.1.2), are to be considered.

8 Regulation II-1/41.1.5 – For the purposes of this regulation, the services as included in paragraphs 2, 3 and 4 are to be considered*.

9 Regulation II-1/41.5.1.2 – For the purposes of this regulation, the following interpretations are applicable:

9.1 Services in paragraph 2 should not be included in any automatic load shedding or other equivalent arrangements.

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* See also IACS UI SC83.

9.2 Services in paragraph 3 may be included in the automatic load shedding or other equivalent arrangement provided disconnection will not prevent services required for safety being immediately available when the power supply is restored to normal operating conditions.

9.3 Services for habitability in paragraph 4 may be included in the load shedding or other equivalent arrangement.

3 SOLAS regulation II-1/41.1.2
Main source of electrical power

Those services necessary to provide normal operational conditions of propulsion and safety do not include services such as:

.1 thrusters not forming part of the main propulsion;

.2 moorings;

.3 cargo handling gear;

.4 cargo pumps; and

.5 refrigerators for air conditioning (those which are not necessary to establish a minimum condition of habitability).

4 SOLAS regulation II-1/41.1.3
Main source of electrical power – Shaft-driven generator systems

Generators and generator systems, having the ship's main propulsion machinery as their prime mover, may be accepted as part of the ship's main source of electrical power, provided:

1 They are to be capable of operating under all weather conditions during sailing and during manoeuvring, also when the vessel is stopped, within the specified limits for the voltage variation in IEC 60092 – 301 and the frequency variation in IACS UR E5.

2 Their rated capacity is safeguarded during all operations given under 1, and is such that in the event of any other one of the generators failing, the services given under regulation II-1/41.1.2 (Interpretation 3) can be maintained.

3 The short circuit current of the generator/generator system is sufficient to trip the generator/generator system circuit-breaker taking into account the selectivity of the protective devices for the distribution system.

Protection is to be arranged in order to safeguard the generator/generator system in case of a short circuit in the main bus bar. The generator/generator system is to be suitable for further use after fault clearance.

4 Standby sets are started in compliance with paragraph 2.2 of SOLAS chapter II-1, regulation II-1/41.5 (Interpretation 5).

5 SOLAS regulation II-1/41.5 Main source of electrical power

Interpretation of 41.5.1.1

1 Where the electrical power is normally supplied by more than one generator set simultaneously in parallel operation, provision of protection, including automatic disconnection of sufficient non-essential services and if necessary secondary essential services as defined in the unified interpretation of SOLAS II-1/40 and 41 above (Interpretation 2) and those provided for habitability, should be made to ensure that, in case of loss of any of these generating sets, the remaining ones are kept in operation to permit propulsion and steering and to ensure safety.

2 Where Administrations permit electrical power to be normally supplied by one generator provision shall be made, upon loss of power, for automatic starting and connecting to the main switchboard of stand-by generator(s) of sufficient capacity with automatic restarting of the essential auxiliaries, in sequential operation if required. Starting and connection to the main switchboard of one generator should be as rapid as possible, preferably within 30 seconds after loss of power. Where prime movers with longer starting time are used, this starting and connection time may be exceeded upon approval from the Administration.

Interpretation of 41.5.1.2

3 The load shedding should be automatic.

4 The non-essential services, service for habitable conditions, may be shed and, where necessary, additionally the secondary essential services, sufficient to ensure the connected generator set(s) is/are not overloaded.

6 SOLAS regulations II-1/42 and II-1/43 Emergency source of power in passenger and cargo ships

1 "Blackout" as used in regulations II-1/42.3.4 and II-1/43.3.4 is to be understood to mean a "deadship" condition initiating event.

2 "Deadship" condition, for the purpose of regulations II-1/42.3.4 and II-1/43.3.4, is to be understood to mean a condition under which the main propulsion plant, boilers and auxiliaries are not in operation and in restoring the propulsion, no stored energy for starting the propulsion plant, the main source of electrical power and other essential auxiliaries is to be assumed available. It is assumed that means are available to start the emergency generator at all times.

3 Emergency generator stored starting energy is not to be directly used for starting the propulsion plant, the main source of electrical power and/or other essential auxiliaries (emergency generator excluded).

4 For steam ships, the 30 minute time limit given in SOLAS can be interpreted as time from blackout defined above to light-off of the first boiler.

5 Exceptionally is understood to mean conditions such as:

.1 black-out situation;

.2 dead-ship situation;

.3 routine use for testing;

.4 short-term parallel operation with the main source of electrical power for the purpose of load transfer; and

.5 use of the emergency generator during lay time in port for the supply of the ship main switchboard, provided the requirements of 6 (Suitable measures for the exceptional use of the emergency generator for power-supply of non-emergency circuits in port) are achieved and unless instructed otherwise by the Administration.

6 Suitable measures for the exceptional use of the emergency generator for power-supply of non-emergency circuits in port:

.1 To prevent the generator or its prime mover from becoming overloaded when used in port, arrangements are to be provided to shed sufficient non-emergency loads to ensure its continued safe operation.

.2 The prime mover is to be arranged with fuel oil filters and lubrication oil filters, monitoring equipment and protection devices as required for the prime mover for main power generation and for unattended operation.

.3 The fuel oil supply tank to the prime mover is to be provided with a low level alarm, arranged at a level ensuring sufficient fuel oil capacity for the emergency services for the period of time as required by SOLAS.

.4 The prime mover is to be designed and built for continuous operation and should be subjected to a planned maintenance scheme ensuring that it is always available and capable of fulfilling its role in the event of an emergency at sea.

.5 Fire detectors are to be installed in the location where the emergency generator set and emergency switchboard are installed.

.6 Means are to be provided to readily change over to emergency operation.

.7 Control, monitoring and supply circuits, for the purpose of the use of emergency generator in port are to be so arranged and protected that any electrical fault will not influence the operation of the main and emergency services.

.8 When necessary for safe operation, the emergency switchboard is to be fitted with switches to isolate the circuits.

.9 Instructions are to be provided on board to ensure that when the vessel is under way all control devices (e.g. valves, switches) are in a correct position for the independent emergency operation of the emergency generator set and emergency switchboard.

7 SOLAS chapter II-1, parts B and B-1
Doors in watertight bulkheads of passenger ships and cargo ships

This interpretation pertains to doors[1] located in way of the internal watertight subdivision boundaries and the external watertight boundaries necessary to ensure compliance with the relevant subdivision and damage stability regulations.

This interpretation does not apply to doors located in external boundaries above equilibrium or intermediate waterplanes.

The design and testing requirements for watertight doors vary according to their location relative to the equilibrium waterplane or intermediate waterplane at any stage of assumed flooding.

1 DEFINITIONS

For the purpose of this interpretation the following definitions apply:

1.1 **Watertight:** Capable of preventing the passage of water in any direction under a design head. The design head for any part of a structure shall be determined by reference to its location relative to the bulkhead deck or freeboard deck, as applicable, or to the most unfavourable equilibrium/intermediate waterplane, in accordance with the applicable subdivision and damage stability regulations, whichever is the greater. A watertight door is thus one that will maintain the watertight integrity of the subdivision bulkhead in which it is located.

1.2 **Equilibrium waterplane:** The waterplane in still water when, taking account of flooding due to an assumed damage, the weight and buoyancy forces acting on a vessel are in balance. This relates to the final condition when no further flooding takes place or after cross flooding is completed.

1.3 **Intermediate waterplane:** The waterplane in still water, which represents the instantaneous floating position of a vessel at some intermediate stage between commencement and completion of flooding when, taking account of the assumed instantaneous state of flooding, the weight and buoyancy forces acting on a vessel are in balance.

1.4 **Sliding door or rolling door:** A door having a horizontal or vertical motion generally parallel to the plane of the door.

1.5 **Hinged door:** A door having a pivoting motion about one vertical or horizontal edge.

2 STRUCTURAL DESIGN

Doors and their frames shall be of approved design and substantial construction in accordance with the requirements of the Administration and shall preserve the strength of the subdivision bulkheads in which they are fitted.

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[1] Doors in watertight bulkheads of small cargo ships, not subject to any statutory subdivision and damage stability requirements, may be hinged quick acting doors arranged to open out of the major space protected. They shall be constructed in accordance with the requirements of the Administration and have notices affixed to each side stating, “To be kept closed at sea”.

3 OPERATION MODE, LOCATION AND OUTFITTING

Doors shall be fitted in accordance with all requirements regarding their operation mode, location and outfitting, i.e. provision of controls, means of indication, etc., as shown in Table 1 below. This table is to be read in conjunction with paragraphs 3.1 to 5.4 below.

3.1 Frequency of use whilst at sea

3.1.1 **Normally closed**
Kept closed at sea but may be used if authorized. To be closed again after use.

3.1.2 **Permanently closed**
The time of opening such doors in port and of closing them before the ship leaves port shall be entered in the log-book. Should such doors be accessible during the voyage, they shall be fitted with a device to prevent unauthorized opening.

3.1.3 **Normally open**
May be left open provided it is always ready to be immediately closed.

3.1.4 **Used**
In regular use, may be left open provided it is ready to be immediately closed.

3.2 Type

Power operated, sliding or rolling[2]	POS
Power operated, hinged	POH
Sliding or rolling	S
Hinged	H

3.3 Control

3.3.1 Local

3.3.1.1 All doors, except those which are to be permanently closed at sea, are to be capable of being opened and closed by hand locally[3], from both sides of the doors, with the ship listed to either side.

3.3.1.2 For passenger ships, the angle of list at which operation by hand is to be possible is 15 degrees or 20 degrees if the ship is allowed to heel up to 20 degrees during intermediate stages of flooding.

3.3.1.3 For cargo ships, the angle of list at which operation by hand is to be possible is 30 degrees.

[2] Rolling doors are technically identical to sliding doors.
[3] Arrangements for passenger ships shall be in accordance with SOLAS regulation II-1/15.7.1.4.

3.3.2 Remote

Where indicated in Table 1, doors are to be capable of being remotely closed by power from the bridge[4]. Where it is necessary to start the power unit for operation of the watertight door, means to start the power unit is also to be provided at remote control stations. The operation of such remote control is to be in accordance with SOLAS regulations II-1/15.8.1 to 15.8.3.

3.4 Indication

3.4.1 Where shown in table 1, position indicators are to be provided at all remote operating positions[5] as well as locally, on both sides of the doors[6], to show whether the doors are open or closed and, if applicable, with all dogs/cleats fully and properly engaged.

3.4.2 The door position indicating system is to be of self-monitoring type and the means for testing of the indicating system are to be provided at the position where the indicators are fitted.

3.4.3 An indication (i.e. red light) should be placed locally showing that the door is in remote control mode ("doors closed mode"). Refer also to SOLAS regulation II-1/15-8.1. Special care should be taken in order to avoid potential danger when passing through the door. Signboard/instructions should be placed in way of the door advising how to act when the door is in "doors closed" mode.

3.5 Alarms

3.5.1 Doors which are to be capable of being remotely closed are to be provided with an audible alarm, distinct from any other alarm in the area, which will sound whenever such a door is remotely closed. For passenger ships the alarm shall sound for at least 5 s but not more than 10 s before the door begins to move and shall continue sounding until the door is completely closed. In the case of remote closure by hand operation, an alarm is required to sound only while the door is actually moving.

3.5.2 In passenger areas and areas of high ambient noise, the audible alarms are to be supplemented by visual signals at both sides of the doors.

3.6 Notices

As shown in table 1, doors which are normally closed at sea, but are not provided with means of remote closure, are to have notices fixed to both sides of the doors stating: "To be kept closed at sea". Doors which are to be permanently closed at sea are to have notices fixed to both sides stating: "Not to be opened at sea".

3.7 Location

For passenger ships the watertight doors and their controls are to be located in compliance with SOLAS regulations II-1/15.6.3 and II-1/15.7.1.2.2.

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4 Arrangements for passenger ships shall be in accordance with SOLAS regulation II-1/15.7.1.5.

5 Indication at all remote control positions (SOLAS regulation II-1/15.6.4).

6 Refer to SOLAS regulation II-1/25-9.3.

4 FIRE DOORS

4.1 Watertight doors may also serve as fire doors but need not be fire-tested when intended for use below the bulkhead deck. Where such doors are used at locations above the bulkhead deck they shall, in addition to complying with the provisions applicable to fire doors at the same locations, also comply with means of escape provisions of SOLAS regulation II-2/13 (2000 SOLAS amendments, resolution MSC.99(73)).

4.2 Where a watertight door is located adjacent to a fire door, both doors shall be capable of independent operation, remotely if required by SOLAS regulations II-1/15.8.1 to 15.8.3 and from both sides of each door.

5 TESTING

5.1 Doors which become immersed by an equilibrium or intermediate waterplane or are below the freeboard or bulkhead deck are to be subjected to a hydrostatic pressure test.

5.1.1 For large doors intended for use in the watertight subdivision boundaries of cargo spaces, structural analysis may be accepted in lieu of pressure testing. Where such doors utilize gasket seals, a prototype pressure test to confirm that the compression of the gasket material is capable of accommodating any deflection, revealed by the structural analysis, is to be carried out.

5.2 Doors above freeboard or bulkhead deck, which are not immersed by an equilibrium or intermediate waterplane but become intermittently immersed at angles of heel in the required range of positive stability beyond the equilibrium position are to be hose tested.

5.3 Pressure testing

5.3.1 The head of water used for the pressure test shall correspond at least to the head measured from the lower edge of the door opening, at the location in which the door is to be fitted in the vessel, to the bulkhead deck or freeboard deck, as applicable, or to the most unfavourable damage waterplane, if that be greater. Testing may be carried out at the factory or other shore based testing facility prior to installation in the ship.

5.3.2 Leakage criteria

5.3.2.1 The following acceptable leakage criteria should apply:

Doors with gaskets	No leakage
Doors with metallic sealing	Maximum leakage 1 litre/min

5.3.2.2 Limited leakage may be accepted for pressure tests on large doors located in cargo spaces employing gasket seals or guillotine doors located in conveyor tunnels, in accordance with the following[7]:

$$\text{Leakage rate (litre/min)} = \frac{(P+4.572)\, h^3}{6568}$$

where: P = perimeter of door opening (metres)
h = test head of water (metres)

5.3.2.3 However, in the case of doors where the water head taken for the determination of the scantling does not exceed 6.10 m, the leakage rate may be taken equal to 0.375 litre/min if this value is greater than that calculated by the above-mentioned formula.

5.3.3 For doors of passenger ships which are normally open and used at sea and which become submerged by the equilibrium or intermediate waterplane, a prototype test shall be conducted, on each side of the door, to check the satisfactory closing of the door against a force equivalent to a water height of at least 1m above the sill on the centre line of the door[8].

5.4 Hose testing after installation

All watertight doors shall be subject to a hose test[9] after installation in a ship. Hose testing is to be carried out from each side of a door unless, for a specific application, exposure to floodwater is anticipated only from one side. Where a hose test is not practicable because of possible damage to machinery, electrical equipment insulation, or outfitting items, it may be replaced by means such as an ultrasonic leak test or an equivalent test.

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7 Published in the ATM F 1196, Standard Specification for Sliding Watertight Door Assemblies and referenced in the Title 46 US Code of Federal Regulations 170.270 Door design, operation installation and testing.

8 Arrangements for passenger ships shall be in accordance with SOLAS regulation II-1/15.6.2.

9 Refer to IACS URS 14.2.3 IACS Reg. 1996/Rev.2, 2001.

Table 1 – Internal doors in watertight bulkheads in cargo ships and passenger ships

Position relative to equilibrium or intermediate waterplane	1. Frequency of use whilst at sea	2. Type	3. Remote control[6]	4. Indication locally and on bridge[6]	5. Audible alarm[6]	6. Notice	7. Comments	8. Regulation
I. Passenger ships								
A. At or below	Normally closed	POS	Yes	Yes	Yes	No	Certain doors may be left open, see SOLAS II-1/15.9.3	SOLAS II-1/15.9.1, 15.9.2 and 15.9.3
	Permanently closed	S, H	No	No	No	Yes	See Notes 1 + 4	SOLAS II-1/15.10.1 and 15.10.2
B. Above	Normally open	POS, POH	Yes	Yes	Yes	No		SOLAS II-1/15.9.3 SOLAS II-1/20.1 MSC/Circ.541
	Normally closed	S, H	No	Yes	No	Yes	See Note 2	
		S, H	No	Yes	No	Yes	Doors giving access to ro-ro deck	SOLAS II-1/20-2
II. Cargo ships								
A. At or below	Used	POS	Yes	Yes	Yes	No		SOLAS II-1/25-9.2
	Normally closed	S, H	No	Yes	No	Yes	see Notes 2 + 3 + 5	SOLAS II-1/25-9.3
	Permanently closed	S, H	No	No	No	Yes	see Notes 1 + 4	SOLAS II-1/25-9.4 SOLAS II-1/25-10
B. Above	Used	POS	Yes	Yes	Yes	No		SOLAS II-1/25-9.2
	Normally closed	S, H	No	Yes	No	Yes	See Notes 2 + 5	SOLAS II-1/25-9.3 SOLAS II-1/25-10

Notes:

1. Doors in watertight bulkheads subdividing cargo spaces.
2. If hinged, this door shall be of quick acting or single action type.
3. SOLAS requires remotely operated watertight doors to be sliding doors.
4. The time of opening such doors in port and closing them before the ship leaves port shall be entered in the logbook.
5. The use of such doors shall be authorized by the officer of the watch.
6. Cables for control and power systems to power operated watertight doors and their status indication should comply with the requirements of IACS UR E15.

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ANNEX 14

DRAFT REVISED WORK PROGRAMME OF THE SUB-COMMITTEE AND PROVISIONAL AGENDA FOR DE 49

DRAFT REVISED WORK PROGRAMME OF THE SUB-COMMITTEE

		Target completion date/number of sessions needed for completion	Reference
1	Casualty analysis (co-ordinated by FSI)	Continuous	MSC 70/23, paragraphs 9.17 and 20.4
2	**Consideration of IACS unified interpretations** *	Continuous	MSC 78/26, paragraph 22.12
H.1	**Amendments to resolution A.744(18)**	2006	DE 45/27, paragraphs 7.18 and 7.19; DE 47/25, section 3; DE 48/25, section 3
H.2	**Safety aspects of ballast water management****	2006	MSC 71/23, paragraph 9.11; DE 47/25, paragraphs 22.4 and 22.5; DE 48/25, section 17
H.3	**Passenger ship safety**	2006	MSC 74/24, paragraph 21.4; DE 47/25, section 4; MSC 79/23, paragraph 4.12; DE 48/25, section 4
H.4	**Measures to prevent accidents with lifeboats** (in co-operation with FSI, NAV and STW)	2006	MSC 74/24, paragraph 21.34; DE 47/25, section 5; DE 48/25, section 5

Notes: 1 "H" means a high priority item and "L" means a low priority item. However, within the high and low priority groups, items have not been listed in any order of priority.
2 Struck-out text indicates proposed deletion and the shaded text shows proposed additions or changes.
3 Items printed in bold letters have been selected for the provisional agenda for DE 49.

* Subject to relevant decision by the MSC.
** Subject to relevant decision by the MEPC.

		Target completion date/number of sessions needed for completion	Reference
~~H.5~~	~~**Protection of fuel tanks** (in co-operation with BLG and SLF, as necessary)~~	~~2005~~	~~DE 44/19, paragraph 2.7.2; MEPC 46/23, paragraph 20.18; MSC 74/24, paragraph 21.36; DE 47/25, section 6~~
~~H.6~~	~~**Anchoring, mooring and towing equipment** (in co-operation with NAV)~~	~~2005~~	~~MSC 74/24, paragraph 21.42; DE 47/25, section 8~~
~~H.7~~	~~**Performance testing and approval standards for SOLAS personal life-saving appliances**~~	~~2005~~	~~MSC 74/24, paragraph 21.46; DE 47/25, section 9~~
~~H.8~~ H.5	**Review of the OSV Guidelines*** (co-ordinated by SLF)	2007	MSC 75/24, paragraph 22.4; DE 47/25, paragraph 22.6; DE 48/25, section 15
~~H.9~~ H.6	**Review of the 2000 HSC Code and amendments to the DSC Code and the 1994 HSC Code** (in co-operation with FP, COMSAR, NAV and SLF)	~~2005~~ 2006	MSC 75/24, paragraph 12.22; MSC 76/23, paragraphs 8.19 and 20.4; DE 47/25, section 10; DE 48/25, section 11
~~H.10~~ H.7	**Performance standards for protective coatings**	2006	MSC 76/23, paragraphs 20.41.2 and 20.48; DE 47/25, section 18; DE 48/25, section 12
~~H.11~~ H.8	**Inspection and survey requirements for accommodation ladders**	2006	MSC 77/26, paragraph 23.32; DE 47/25, paragraph 2.6; DE 48/25, section 16

* Subject to relevant decision by the MSC.

		Target completion date/number of sessions needed for completion	Reference
~~H.12~~ H.9	**Mandatory emergency towing systems in ships other than tankers ~~greater~~ of not less than 20,000 dwt**	2006	MSC 77/26, paragraph 23.33; DE 47/25, paragraph 24.9; DE 48/25, section 14
~~H.13~~ H.10	**Compatibility of life-saving appliances**	2006	DE 47/15, paragraph 5.3; MSC 78/26, paragraph 24.37.1; DE 48/25, section 8
~~H.14~~ H.11	**Inconsistencies in IMO instruments regarding requirements for life-saving appliances**	2006	DE 42/15, paragraph 9.7; MSC 78/26, paragraph 24.37.2; DE 48/25, section 10
~~H.15~~ H.12	Guidelines under MARPOL Annex VI on prevention of air pollution from ships		MEPC 41/20, paragraph 8.22.1; DE 42/15, paragraphs 10.2 to 10.4
	.1 **Guidelines on equivalent methods to reduce on-board NO_x emission**	~~2 sessions~~ 2007	DE 48/25, paragraphs 13.5, 22.1.4.1 and 22.3
	~~.2~~ ~~**Guidelines on on-board exhaust gas cleaning systems**~~	~~2005~~	~~DE 46/32, paragraphs 3.10 and 29.9.6.1; DE 47/25, section 20~~
	~~.3~~ .2 Guidelines on other technological methods verifiable or enforceable to limit SO_x emission	2 sessions	
H.16 H.13	**Revision of the Guidelines for systems for handling oily wastes in machinery spaces of ships (MEPC/Circ.235)**	2006	MEPC 51/22, paragraph 20.5
~~H.17~~ H.14	**Review of the SPS Code** (in co-operation with DSC, FP, NAV, COMSAR and SLF)	~~2 sessions~~ 2007	MSC 78/26, paragraph 24.9; DE 48/25, paragraph 22.1.4.2
~~H.18~~ H.15	**Amendments to resolution A.761(18)**	~~2 sessions~~ 2007	MSC 78/26, paragraph 24.38; DE 48/25, paragraph 22.1.4.3

		Target completion date/number of sessions needed for completion	Reference
~~H.19~~ H.16	**Development of provisions for gas-fuelled ships** (in co-operation with BLG and FP)	2007	MSC 78/26, paragraph 24.39; DE 48/25, section 19
~~H.20~~ H.17	**Test standards for extended service intervals of inflatable liferafts**	~~2006~~ 2007	MSC 78/26, paragraph 24.41; DE 48/25, section 20
~~H.21~~ H.18	Amendments to the Guidelines for ships operating in Arctic ice-covered waters (in co-operation with SLF, as necessary)	2 sessions	MSC 79/23, paragraph 8.25
~~H.22~~ H.19	**Revision of the Code on alarms and indicators** (in co-operation with appropriate sub-committees, as necessary)	~~2 sessions~~ 2007	MSC 79/23, paragraph 20.28; DE 48/25, paragraph 22.1.4.4
~~H.23~~ H.20	**Amendments to the MODU Code**	~~2 sessions~~ 2007	MSC 79/23, paragraph 22.51; DE 48/25, paragraph 22.1.4.5
L.1	Revision of resolution A.760(18)	2 sessions	DE 46/32, paragraph 31.23; DE 47/25, paragraph 22.6
L.2	Free-fall lifeboats with float-free capabilities	1 session	MSC 76/23, paragraphs 20.41.3 and 20.48; DE 47/25, paragraph 22.6

DRAFT PROVISIONAL AGENDA FOR DE 49*

Opening of the session

1 Adoption of the agenda

2 Decisions of other IMO bodies

3 Amendments to resolution A.744(18)

4 Passenger ship safety

5 Measures to prevent accidents with lifeboats

6 Compatibility of life-saving appliances

7 Inconsistencies in IMO instruments regarding requirements for life-saving appliances

8 Review of the 2000 HSC Code and amendments to the DSC Code and the 1994 HSC Code

9 Performance standards for protective coatings

10 Mandatory emergency towing systems in ships other than tankers of not less than 20,000 dwt

11 Inspection and survey requirements for accommodation ladders

[12 Safety aspects of ballast water management]**

13 Revision of the Guidelines for systems for handling oily wastes in machinery spaces of ships (MEPC/Circ.235)

14 Development of provisions for gas-fuelled ships

15 Test standards for extended service intervals of inflatable liferafts

16 Amendments to resolution A.761(18)

17 Guidelines on equivalent methods to reduce on-board NO_x emission

[18 Consideration of IACS unified interpretations]***

19 Review of the SPS Code

20 Revision of the Code on alarms and indicators

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* Agenda item numbers do not necessarily indicate priority.

** Inclusion subject to relevant decisions by the MEPC.

*** Inclusion subject to relevant decisions by the MSC.

[21 Review of the OSV Guidelines][***]

22 Amendments to the MODU Code

23 Work programme and agenda for DE 49

24 Election of the Chairman and Vice-Chairman for 2006

25 Any other business

26 Report to the Maritime Safety Committee

[***] Inclusion subject to relevant decisions by the MSC.