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SÉRIE

do *Boletim Oficial* da Região Administrativa Especial de Macau, constituído pelas séries I e II

Sexta-feira, 27 de Novembro de 2015

澳門特別行政區公報
BOLETIM OFICIAL DA REGIÃO ADMINISTRATIVA ESPECIAL DE MACAU

副 刊
SUPLEMENTO

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澳門特別行政區

行政長官辦公室

第 123/2015 號行政長官公告

中華人民共和國於二零零五年六月十七日以照會通知國際海事組織秘書長，一九七六年九月三日訂於倫敦的《國際海事衛星組織（INMARSAT）公約》（下稱“公約”）適用於澳門特別行政區；

國際海事組織秘書長於二零零五年六月三十日以照會確認公約自二零零五年六月二十四日起適用於澳門特別行政區；

基於此，行政長官根據第3/1999號法律《法規的公佈與格式》第六條第一款的規定，命令公佈上指公約的英文正式文本及其葡文譯本。

二零一五年十一月十日發佈。

行政長官　崔世安

REGIÃO ADMINISTRATIVA ESPECIAL DE MACAU

GABINETE DO CHEFE DO EXECUTIVO

Aviso do Chefe do Executivo n.º 123/2015

Considerando que a República Popular da China, por nota datada de 17 de Junho de 2005, notificou o Secretário-Geral da Organização Marítima Internacional sobre a aplicação na Região Administrativa Especial de Macau da Convenção relativa à Organização Internacional de Satélites Marítimos (INMARSAT), concluída em Londres em 3 de Setembro de 1976, adiante designada por Convenção;

Considerando igualmente que o Secretário-Geral da Organização Marítima Internacional, por nota datada de 30 de Junho de 2005, confirmou que a Convenção é aplicável na Região Administrativa Especial de Macau desde 24 de Junho de 2005;

O Chefe do Executivo manda publicar, nos termos do n.º 1 do artigo 6.º da Lei n.º 3/1999 (Publicação e formulário dos diplomas), a referida Convenção, no seu texto autêntico em língua inglesa, acompanhado da respectiva tradução para a língua portuguesa.

Promulgado em 10 de Novembro de 2015.

O Chefe do Executivo, *Chui Sai On*.

CONVENTION ON THE INTERNATIONAL MARITIME SATELLITE ORGANIZATION (INMARSAT)

THE STATES PARTIES TO THIS CONVENTION:

CONSIDERING the principle set forth in Resolution 1721 (XVI) of the General Assembly of the United Nations that communication by means of satellites should be available to the nations of the world as soon as practicable on a global and non-discriminatory basis,

CONSIDERING the relevant provisions of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, concluded on 27 January 1967, and in particular Article 1, which states that outer space shall be used for the benefit and in the interests of all countries,

TAKING INTO ACCOUNT that a very high proportion of world trade is dependent upon ships,

BEING AWARE that considerable improvements to the maritime distress and safety systems and to the communication link between ships and between ships and their management as well as between crew or passengers on board and persons on shore can be made by using satellites,

DETERMINED, to this end, to make provision for the benefit of ships of all nations through the most advanced suitable space technology available, for the most efficient and economic facilities possible consistent with the most efficient and equitable use of the radio frequency spectrum and of satellite orbits,

RECOGNIZING that a maritime satellite system comprises mobile earth stations and land earth stations, as well as the space segment,

AGREE AS FOLLOWS:

Artide 1

Definitions

For the purposes of this Convention:

(a) "Operating Agreement" means the Operating Agreement on the International Maritime Satellite Organization (INMARSAT), including its Annex.

(b) "Party" means a State for which this Convention has entered into force.

(c) "Signatory" means either a Party or an entity designated in accordance with Article 2(3), for which the Operating Agreement has entered into force.

(d) "Space segment" means the satellites, and the tracking, telemetry, command, control, monitoring and related facilities and equipment required to support the operation of these satellites.

(e) "INMARSAT space segment" means the space segment owned or leased by INMARSAT.

(f) "Ship" means a vessel of any type operating in the marine environment. It includes *inter alia* hydrofoil boats, air-cushion vehicles, submersibles, floating craft and platforms not permanently moored.

(g) "Property" means anything that can be the subject of a right of ownership, including contractual rights.

Article 2

Establishment of INMARSAT

(1) The International Maritime Satellite Organization (INMARSAT), herein referred to as "the Organization", is hereby established.

(2) The Operating Agreement shall be concluded in conformity with the provisions of this Convention and shall be opened for signature at the same time as this Convention.

(3) Each Party shall sign the Operating Agreement or shall designate a competent entity, public or private, subject to the jurisdiction of that Party, which shall sign the Operating Agreement.

(4) Telecommunications administrations and entities may, subject to applicable domestic law, negotiate and enter directly into appropriate traffic agreements with respect to their use of telecommunications facilities provided pursuant to this Convention and the Operating Agreement, as well as with respect to services to be furnished to the public, facilities, division of revenues and related business arrangements.

Article 3

Purpose

(1) The purpose of the Organization is to make provision for the space segment necessary for improving maritime communications, thereby assisting in improving distress and safety of life at sea communications, efficiency and management of ships, maritime public correspondence services and radiodetermination capabilities.

(2) The Organization shall seek to serve all areas where there is need for maritime communications.

(3) The Organization shall act exclusively for peaceful purposes.

Article 4

Relations between a Party and its Designated Entity

Where a Signatory is an entity designated by a Party:

(a) Relations between the Party and the Signatory shall be governed by applicable domestic law.

(b) The Party shall provide such guidance and instructions as are appropriate and consistent with its domestic law to ensure that the Signatory fulfils its responsibilities.

(c) The Party shall not be liable for obligations arising under the Operating Agreement. The Party shall, however, ensure that the Signatory, in carrying out its obligations within the Organization, will not act in a manner which violates obligations which the Party has accepted under this Convention or under related international agreements.

(d) If the Signatory withdraws or its membership is terminated the Party shall act in accordance with Article 29(3) or 30(6).

Article 5

Operational and Financial Principles of the Organization

(1) The Organization shall be financed by the contributions of Signatories. Each Signatory shall have a financial interest in the Organization in proportion to its investment share which shall be determined in accordance with the Operating Agreement.

(2) Each Signatory shall contribute to the capital requirements of the Organization and shall receive capital repayment and compensation for use of capital in accordance with the Operating Agreement.

(3) The Organization shall operate on a sound economic and financial basis having regard to accepted commercial principles.

Article 6

Provision of Space Segment

The Organization may own or lease the space segment.

Article 7

Access to Space Segment

(1) The INMARSAT space segment shall be open for use by ships of all nations on conditions to be determined by the Council. In determining such conditions, the Council shall not discriminate among ships on the basis of nationality.

(2) The Council may, on a case-by-case basis, permit access to the INMARSAT space segment by earth stations located on structures operating in the marine environment other than ships, if and as long as the operation of such earth stations will not significantly affect the provision of service to ships.

(3) Earth stations on land communicating via the INMARSAT space segment shall be located on land territory under the jurisdiction of a Party and shall be wholly owned by Parties or entities subject to their jurisdiction. The Council may authorize otherwise if it finds this to be in the interests of the Organization.

Article 8

Other Space Segments

(1) A Party shall notify the Organization in the event that it or any person within its jurisdiction intends to make provision for, or initiate the use of, individually or jointly, separate space segment facilities to meet any or all of the purposes of the INMARSAT space segment, to ensure technical compatibility and to avoid significant economic harm to the INMARSAT system.

(2) The Council shall express its views in the form of a recommendation of a non-binding nature with respect to technical compatibility and shall provide its views to the Assembly with respect to economic harm.

(3) The Assembly shall express its views in the form of recommendations of a non-binding nature within a period of nine months from the date of commencing the procedures provided for in this Article. An extraordinary meeting of the Assembly may be convened for this purpose.

(4) The notification pursuant to paragraph (1), including the provision of pertinent technical information, and subsequent consultations with the Organization, shall take into account the relevant provisions of the Radio Regulations of the International Telecommunication Union.

(5) This Article shall not apply to the establishment, acquisition, utilization or continuation of separate space segment facilities for national security purposes, or which were contracted for, established, acquired or utilized prior to the entry into force of this Convention.

Article 9

Structure

The organs of the Organization shall be:

(a) The Assembly.

(b) The Council.

(c) The Directorate headed by a Director General.

Article 10

Assembly – Composition and Meetings

(1) The Assembly shall be composed of all the Parties.

(2) Regular sessions of the Assembly shall be held once every two years. Extraordinary sessions shall be convened upon the request of one-third of the Parties or upon the request of the Council.

Article 11

Assembly — Procedure

(1) Each Party shall have one vote in the Assembly.

(2) Decisions on matters of substance shall be taken by a two-thirds majority, and on procedural matters by a simple majority, of the Parties present and voting. Parties which abstain from voting shall be considered as not voting.

(3) Decisions whether a question is procedural or substantive shall be taken by the Chairman. Such decisions may be overruled by a two-thirds majority of the Parties present and voting.

(4) A quorum for any meeting of the Assembly shall consist of a majority of the Parties.

Article 12

Assembly — Functions

(1) The functions of the Assembly shall be to:

(a) Consider and review the activities, purposes, general policy and long-term objectives of the Organization and express views and make recommendations thereon to the Council.

(b) Ensure that the activities of the Organization are consistent with this Convention and with the purposes and principles of the United Nations Charter, as well as with any other treaty by which the Organization becomes bound in accordance with its decision.

(c) Authorize, on the recommendation of the Council, the establishment of additional space segment facilities the special or primary purpose of which is to provide radiodetermination, distress or safety services. However, the space segment facilities established to provide maritime public correspondence services can be used for telecommunications for distress, safety and radiodetermination purposes without such authorization.

(d) Decide on other recommendations of the Council and express views on reports of the Council.

(e) Elect four representatives on the Council in accordance with Article 13(1)(b).

(f) Decide upon questions concerning formal relationships between the Organization and States, whether Parties or not, and international organizations.

(g) Decide upon any amendment to this Convention pursuant to Article 34 or to the Operating Agreement pursuant to Article XVIII thereof.

(h) Consider and decide whether membership be terminated in accordance with Article 30.

(i) Exercise any other functions conferred upon it in any other Article of this Convention or the Operating Agreement.

(2) In performing its functions the Assembly shall take into account any relevant recommendations of the Council.

Article 13

Council – Composition

(1) The Council shall consist of twenty-two representatives of Signatories as follows:

(a) Eighteen representatives of those Signatories, or groups of Signatories not otherwise represented, which have agreed to be represented as a group, which have the largest investment shares in the Organization. If a group of Signatories and a single Signatory have equal investment shares, the latter shall have the prior right. If by reason of two or more Signatories having equal investment shares the number of representatives on the Council would exceed twenty-two, all shall nevertheless, exceptionally, be represented.

(b) Four representatives of Signatories not otherwise represented on the Council, elected by the Assembly, irrespective of their investment shares, in order to ensure that the principle of just geographical representation is taken into account, with due regard to the interests of the developing countries. Any Signatory elected to represent a geographical area shall represent each Signatory in that geographical area which has agreed to be so represented and which is not otherwise represented on the Council. An election shall be effective as from the first meeting of the Council following that election, and shall remain effective until the next ordinary meeting of the Assembly.

(2) Deficiency in the number of representatives on the Council pending the filling of a vacancy shall not invalidate the composition of the Council.

Article 14

Council – Procedure

(1) The Council shall meet as often as may be necessary for the efficient discharge of its functions, but not less than three times a year.

(2) The Council shall endeavour to take decisions unanimously. If unanimous agreement cannot be reached, decisions shall be taken as follows: Decisions on substantive matters shall be taken by a majority of the representatives on the Council representing at least two-thirds of the total voting participation of all Signatories and groups of Signatories represented on the Council. Decisions on procedural matters shall be taken by a simple majority of the representatives present and voting, each having one vote. Disputes whether a specific matter is procedural or substantive shall be decided by the Chairman of the Council. The decision of the Chairman may be overruled by a two-thirds majority of the representatives present and voting, each having one vote. The Council may adopt a different voting procedure for the election of its officers.

(3) (a) Each representative shall have a voting participation equivalent to the investment share or shares he represents. However, no representative may cast on behalf of one Signatory more than 25 per cent of the total voting participation in the Organization except as provided in sub-paragraph (b)(iv).

(b) Notwithstanding Article V(9), (10) and (12) of the Operating Agreement:

(i) If a Signatory represented on the Council is entitled, based on its investment share, to a voting participation in excess of 25 per cent of the total voting participation in the Organization, it may offer to other Signatories any or all of its investment share in excess of 25 per cent.

(ii) Other Signatories may notify the Organization that they are prepared to accept any or all of such excess investment share. If the total of the amounts notified to the Organization does not exceed the amount available for distribution, the latter amount shall be distributed by the Council to the notifying Signatories in accordance with the amounts notified. If the total of the amounts notified does exceed the amount available for distribution, the latter amount shall be distributed by the Council as may be agreed among the notifying Signatories, or, failing agreement, in proportion to the amounts notified.

(iii) Any such distribution shall be made by the Council at the time of determinations of investment shares pursuant to Article V of the Operating Agreement. Any distribution shall not increase the investment share of any Signatory above 25 per cent.

(iv) To the extent that the investment share of the Signatory in excess of 25 per cent offered for distribution is not distributed in accordance with the procedure set forth in this paragraph, the voting participation of the representative of the Signatory may exceed 25 per cent.

(c) To the extent that a Signatory decides not to offer its excess investment share to other Signatories, the corresponding voting participation of that Signatory in excess of 25 per cent shall be distributed equally to all other representatives on the Council.

(4) A quorum for any meeting of the Council shall consist of a majority of the representatives on the Council, representing at least two-thirds of the total voting participation of all Signatories and groups of Signatories represented on the Council.

Article 15

Council — Functions

The Council shall have the responsibility, having due regard for the views and recommendations of the Assembly, to make provision for the space segment necessary for carrying out the purposes of the Organization in the most economic, effective and efficient manner consistent with this Convention and the Operating Agreement. To discharge this responsibility, the Council shall have the power to perform all appropriate functions, including:

(a) Determination of maritime satellite telecommunications requirements and adoption of policies, plans, programmes, procedures and measures for the design, development, construction, establishment, acquisition by purchase or lease, operation, maintenance and utilization of the INMARSAT space segment, including the procurement of any necessary launch services to meet such requirements.

(b) Adoption and implementation of management arrangements which shall require the Director General to contract for technical and operational functions whenever this is more advantageous to the Organization.

(c) Adoption of criteria and procedures for approval of earth stations on land, on ships and on structures in the marine environment for access to the INMARSAT space segment and for verification and monitoring of performance of earth stations having access to and utilization of the INMARSAT space segment. For earth stations on ships, the criteria should be in sufficient detail for use by national licensing authorities, at their discretion, for type-approval purposes.

(d) Submission of recommendations to the Assembly in accordance with Article 12(1)(c).

(e) Submission to the Assembly of periodic reports on the activities of the Organization, including financial matters.

(f) Adoption of procurement procedures, regulations and contract terms and approval of procurement contracts consistent with this Convention and the Operating Agreement.

(g) Adoption of financial policies, approval of the financial regulations, annual budget and annual financial statements, periodic determination of charges for use of the INMARSAT space segment, and decisions with respect to all other financial matters, including investment shares and capital ceiling consistent with this Convention and the Operating Agreement.

(h) Determination of arrangements for consultation on a continuing basis with bodies recognized by the Council as representing shipowners, maritime personnel and other users of maritime telecommunications.

(i) Designation of an arbitrator where the Organization is a party to an arbitration.

(j) Exercise of any other functions conferred upon it in any other Article of this Convention or the Operating Agreement or any other function appropriate for the achievement of the purposes of the Organization.

Article 16

Directorate

(1) The Director General shall be appointed, from among candidates proposed by Parties or Signatories through Parties, by the Council, subject to confirmation by the Parties. The Depositary shall immediately notify the Parties of the appointment. The appointment is confirmed unless within sixty days of the notification more than one-third of the Parties have informed the Depositary in writing of their objection to the appointment. The Director General may assume his functions after appointment and pending confirmation.

(2) The term of office of the Director General shall be six years. However, the Council may remove the Director General earlier on its own authority. The Council shall report the reasons for the removal to the Assembly.

(3) The Director General shall be the chief executive and legal representative of the Organization and shall be responsible to and under the direction of the Council.

(4) The structure, staff levels and standard terms of employment of officials and employees and of consultants and other advisers to the Directorate shall be approved by the Council.

(5) The Director General shall appoint the members of the Directorate. The appointment of senior officials reporting directly to the Director General shall be approved by the Council.

(6) The paramount consideration in the appointment of the Director General and other personnel of the Directorate shall be the necessity of ensuring the highest standards of integrity, competency and efficiency.

Article 17

Representation at Meetings

All Parties and Signatories which, under this Convention or the Operating Agreement, are entitled to attend and/or participate at meetings of the Organization shall be allowed to attend and/or participate at such meetings as well as any other meeting held under the auspices of the Organization, regardless of where the meeting may take place. The arrangements made with any host country shall be consistent with these obligations.

Article 18

Costs of Meetings

(1) Each Party and Signatory shall meet its own costs of representation at meetings of the Organization.

(2) Expenses of meetings of the Organization shall be regarded as an administrative cost of the Organization. However, no meeting of the Organization shall be held outside its headquarters, unless the prospective host agrees to defray the additional expenditure involved.

Article 19

Establishment of Utilization Charges

(1) The Council shall specify the units of measurement for the various types of utilization of the INMARSAT space segment and shall establish charges for such utilization. These charges shall have the objective of earning sufficient revenues for the Organization to cover its operating, maintenance, and administrative costs, the provision of such operating funds as the Council may determine to be necessary, the amortization of investment made by Signatories, and compensation for use of capital in accordance with the Operating Agreement.

(2) The rates of utilization charge for each type of utilization shall be the same for all Signatories for that type of utilization.

(3) For entities, other than Signatories, which are authorized in accordance with Article 7 to utilize the INMARSAT space segment, the Council may establish rates of utilization charge different from those established for Signatories. The rates for each type of utilization shall be the same for all such entities for that type of utilization.

Article 20

Procurement

(1) The procurement policy of the Council shall be such as to encourage, in the interests of the Organization, world-wide competition in the supply of goods and services. To this end:

(a) Procurement of goods and services required by the Organization, whether by purchase or lease, shall be effected by the award of contracts, based on responses to open international invitations to tender.

(b) Contracts shall be awarded to bidders offering the best combination of quality, price and the most favourable delivery time.

(c) If there are bids offering comparable combinations of quality, price and the most favourable delivery time, the Council shall award the contract so as to give effect to the procurement policy set out above.

(2) In the following cases the requirement of open international tender may be dispensed with under procedures adopted by the Council, provided that in so doing the Council shall encourage in the interests of the Organization world-wide competition in the supply of goods and services:

(a) The estimated value of the contract does not exceed 50,000 US dollars and the award of the contract would not by reason of the application of the dispensation place a contractor in such a position as to prejudice at some later date the effective exercise by the Council of the procurement policy set out above. To the extent justified by changes in world prices, as reflected by relevant price indices, the Council may revise the financial limit.

(b) Procurement is required urgently to meet an emergency situation.

(c) There is only one source of supply to a specification which is necessary to meet the requirements of the Organization or the sources of supply are so severely restricted in number that it would be neither feasible nor in the best interest of the Organization to incur the expenditure and time involved in open international tender, provided that where there is more than one source they will have an opportunity to bid on an equal basis.

(d) The requirement is of an administrative nature for which it would be neither practicable nor feasible to undertake open international tender.

(e) The procurement is for personal services.

Article 21

Inventions and Technical Information

(1) The Organization, in connexion with any work performed by it or on its behalf at its expense, shall acquire in inventions and technical information those rights, but no more than those rights, which are necessary in the common interests of the Organization and of the Signatories in their capacity as such. In the case of work done under contract, any such rights obtained shall be on a non-exclusive basis.

(2) For the purpose of paragraph (1) the Organization, taking into account its principles and objectives and generally accepted industrial practices, shall, in connexion with such work involving a significant element of study, research or development ensure for itself:

(a) The right to have disclosed to it without payment all inventions and technical information generated by such work.

(b) The right to disclose and to have disclosed to Parties and Signatories and others within the jurisdiction of any Party such inventions and technical information, and to use and to authorize and to have authorized Parties and Signatories and such others to use such inventions and technical information without payment in connexion with the INMARSAT space segment and any earth station on land or ship station operating in conjunction therewith.

(3) In the case of work done under contract, ownership of the rights in inventions and technical information generated under the contract shall be retained by the contractor.

(4) The Organization shall also ensure for itself the right, on fair and reasonable terms and conditions, to use and to have used inventions and technical information directly utilized in the execution of work performed on its behalf but not included in paragraph (2), to the extent that such use is necessary for the reconstruction or modification of any product actually delivered under a contract financed by the Organization, and to the extent that the person who has performed such work is entitled to grant such right.

(5) The Council may in individual cases approve a deviation from the policies prescribed in paragraphs (2)(b) and (4), where in the course of negotiation it is demonstrated to the Council that failure to deviate would be detrimental to the interests of the Organization.

(6) The Council may also, in individual cases where exceptional circumstances warrant, approve a deviation from the policy prescribed in paragraph (3) where all the following conditions are met:

(a) It is demonstrated to the Council that failure to deviate would be detrimental to the interests of the Organization.

(b) The Council determines that the Organization should be able to ensure patent protection in any country.

(c) Where, and to the extent that, the contractor is unable or unwilling to ensure such patent protection within the time required.

(7) With respect to inventions and technical information in which rights are acquired by the Organization otherwise than pursuant to paragraph (2), the Organization, to the extent that it has the right to do so, shall upon request:

(a) Disclose or have disclosed such inventions and technical information to any Party or Signatory subject to reimbursement of any payment made by or required of the Organization in respect of the exercise of this right of disclosure.

(b) Make available to any Party or Signatory the right to disclose or have disclosed to others within the jurisdiction of any Party and to use and to authorize and to have authorized such others to use such inventions and technical information:

(i) Without payment in connexion with the INMARSAT space segment or any earth station on land or ship operating in conjunction therewith.

(ii) For any other purpose, on fair and reasonable terms and conditions to be settled between Signatories or others within the jurisdiction of any Party and the Organization or the owner of the inventions and technical information or any other authorized entity or person having a property interest therein, and subject to reimbursement of any payment made by or required of the Organization in respect of the exercise of these rights.

(8) The disclosure and use, and the terms and conditions of disclosure and use, of all inventions and technical information in which the Organization has acquired any rights shall be on a non-discriminatory basis with respect to all Signatories and others within the jurisdiction of Parties.

(9) Nothing in this Article shall preclude the Organization, if desirable, from entering into contracts with persons subject to domestic laws and regulations relating to the disclosure of technical information.

Artido 22

Liability

Parties are not, in their capacity as such, liable for the acts and obligations of the Organization, except in relation to non-Parties or natural or juridical persons they might represent in so far as such liability may follow from treaties in force between the Party and the non-Party concerned. However, the foregoing does not preclude a Party which has been required to pay compensation under such a treaty to a non-Party or to a natural or juridical person it might represent from invoking any rights it may have under that treaty against any other Party.

Artido 23

Excluded Costs

Taxes on income derived from the Organization by any of the Signatories shall not form part of the costs of the Organization.

Artido 24

Audit

The accounts of the Organization shall be audited annually by an independent Auditor appointed by the Council. Any Party or Signatory shall have the right to inspect the accounts of the Organization.

Artido 25

Legal Personality

The Organization shall have legal personality and shall be responsible for its acts and obligations. For the purpose of its proper functioning, it shall, in particular, have the capacity to contract, to acquire, lease, hold and dispose of movable and immovable property, to be a party to legal proceedings and to conclude agreements with States or international organizations.

Artido 26

Privileges and Immunities

(1) Within the scope of activities authorized by this Convention, the Organization and its property shall be exempt in all States Parties to this Convention from all national income and direct national property taxation and from customs duties on communication satellites and components and parts for such satellites to be launched for use in the INMARSAT space segment. Each Party undertakes to use its best endeavours to bring about, in accordance with the applicable domestic procedure, such further exemption from income and direct property taxation and customs duties as is desirable, bearing in mind the particular nature of the Organization.

(2) All Signatories acting in their capacity as such, except the Signatory designated by the Party in whose territory the headquarters is located, shall be exempt from national taxation on income earned from the Organization in the territory of that Party.

(3) (a) As soon as possible after the entry into force of this Convention, the Organization shall conclude, with any Party in whose territory the Organization establishes its headquarters, other offices or installations, an agreement to be negotiated by the Council and approved by the Assembly, relating to the privileges and immunities of the Organization, its Director General, its staff, of experts performing missions for the Organization and of representatives of Parties and Signatories whilst in the territory of the host Government for the purpose of exercising their functions.

(b) The agreement shall be independent of this Convention and shall terminate by agreement between the host Government and the Organization or if the headquarters of the Organization are moved from the territory of the host Government.

(4) All Parties other than a Party which has concluded an agreement referred to in paragraph (3) shall as soon as possible after the entry into force of this Convention conclude a Protocol on the privileges and immunities of the Organization, its Director General, its staff, of experts performing missions tor the Organization and of representatives of Parties and Signatories whilst in the territory of Parties for the purposes of exercising their functions. The Protocol shall be independent of this Convention and shall prescribe the conditions for its termination.

Article 27

Relationship with other International Organizations

The Organization shall co-operate with the United Nations and its bodies dealing with the Peaceful Uses of Outer Space and Ocean Area, its Specialized Agencies, as well as other international organizations, on matters of common interest. In particular the Organization shall take into account the relevant Resolutions and Recommendations of the Inter-Governmental Maritime Consultative Organization. The Organization shall observe the relevant provisions of the International Telecommunication Convention and regulations made thereunder, and shall in the design, development, construction and establishment of the INMARSAT space segment and in the procedures established for regulating the operation of the INMARSAT space segment and of earth stations give due consideration to the relevant Resolutions, Recommendations and procedures of the organs of the International Telecommunication Union.

Article 28

Notification to the International Telecommunication Union

Upon request from the Organization, the Party in whose territory the Headquarters of the Organization is located shall co-ordinate the frequencies to be used for the space segment and shall, on behalf of each Party that consents, notify the International Telecommunication Union of the frequencies to be so used and other information, as provided for in the Radio Regulations annexed to the International Telecommunication Convention.

Article 29

Withdrawal

(1) Any Party or Signatory may by written notification to the Depositary withdraw voluntarily from the Organization at any time. Once a decision has been made under applicable domestic law that a Signatory may withdraw, notice of the withdrawal shall be given in writing to the Depositary by the Party which has designated the Signatory, and the notification shall signify the acceptance by the Party of the withdrawal. Withdrawal of a Party, in its capacity as such, shall entail the simultaneous withdrawal of any Signatory designated by the Party or of the Party in its capacity as Signatory, as the case may be.

(2) Upon receipt by the Depositary of a notice to withdraw, the Party giving notice and any Signatory which it has designated, or the Signatory in respect of which notice has been given, as the case may be, shall cease to have any rights of representation and any voting rights in any organ of the Organization and shall incur no obligation after the date of such receipt. However, a withdrawing Signatory shall remain responsible, unless otherwise decided by the Council pursuant to Article XIII of the Operating Agreement, for contributing its share of the capital contributions necessary to meet contractual commitments specifically authorized by the Organization before the receipt and liabilities arising from acts or omissions before the receipt. Except with respect to such capital contributions and except with respect to Article 31 of this Convention and Article XVI of the Operating Agreement, withdrawal shall become effective and this Convention and/or the Operating Agreement shall cease to be in force for the Party and/or Signatory three months after the date of receipt by the Depositary of the written notification referred to in paragraph (1).

(3) If a Signatory withdraws, the Party which designated it shall, before the effective date of withdrawal and with effect from that date, designate a new Signatory, assume the capacity of a Signatory in accordance with paragraph (4), or withdraw. If the Party has not acted by the effective date, it shall be considered to have withdrawn as from that date. Any new Signatory shall be responsible for all the outstanding capital contributions of the previous Signatory and for the proportionate share of any capital contributions necessary to meet contractual commitments specifically authorized by the Organization, and liabilities arising from acts or omissions, after the date of receipt of the notice.

(4) If for any reason a Party desires to substitute itself for its designated Signatory or to designate a new Signatory, it shall give written notice to the Depositary. Upon assumption by the new Signatory of all the outstanding obligations, as specified in the last sentence of paragraph (3), of the previously designated Signatory and upon signature of the Operating Agreement, that Agreement shall enter into force for the new Signatory and shall cease to be in force for the previous Signatory.

Article 30

Suspension and Termination

(1) Not less than one year after the Directorate has received written notice that a Party appears to have failed to comply with any obligation under this Convention, the Assembly, after considering any representations made by the Party, may decide, if it finds that the failure to comply has in fact occurred and that such failure impairs the effective operation of the Organization, that the membership of the Party is terminated. This Convention shall cease to be in force for the Party as from the date of the decision or at such later date as the

Assembly may determine. An extraordinary session of the Assembly may be convened for this purpose. The termination shall entail the simultaneous withdrawal of any Signatory designated by the Party or of the Party in its capacity as Signatory, as the case may be. The Operating Agreement shall cease to be in force for the Signatory on the date on which this Convention ceases to be in force for the Party concerned, except with respect to capital contributions necessary to meet contractual commitments specifically authorized by the Organization before the termination and liabilities arising from acts or omissions before the termination, and except with respect to Article 31 of this Convention and Article XVI of the Operating Agreement.

(2) If any Signatory, in its capacity as such, fails to comply with any obligation under this Convention or the Operating Agreement, other than obligations under Article III(1) of the Operating Agreement and the failure has not been remedied within three months after the Signatory has been notified in writing of a resolution of the Council taking note of the failure to comply, the Council, after considering any representations made by the Signatory and, if applicable, the Party concerned may suspend the rights of the Signatory. If, after an additional three months and after consideration of any representations made by the Signatory and, if applicable, the Party, the Council finds that the failure to comply has not been remedied, the Assembly may decide on the recommendation of the Council that the membership of the Signatory is terminated. Upon the date of such decision, the termination shall become effective and the Operating Agreement shall cease to be in force for that Signatory.

(3) If any Signatory fails to pay any amount due from it pursuant to Article III(1) of the Operating Agreement within four months after the payment has become due, the rights of the Signatory under this Convention and the Operating Agreement shall be automatically suspended. If within three months after the suspension the Signatory has not paid all sums due or the Party which has designated it has not made a substitution pursuant to Article 29(4), the Council, after considering any representations made by the Signatory or by the Party which has designated it, may decide that the membership of the Signatory is terminated. From the date of such decision, the Operating Agreement shall cease to be in force for the Signatory.

(4) During the period of suspension of the rights of a Signatory pursuant to paragraphs (2) or (3), the Signatory shall continue to have all the obligations of a Signatory under this Convention and the Operating Agreement.

(5) A Signatory shall incur no obligation after termination, except that it shall be responsible for contributing its share of the capital contributions necessary to meet contractual commitments specifically authorized before the termination and liabilities arising from acts or omissions before the termination, and except with respect to Article 31 of this Convention and Article XVI of the Operating Agreement.

(6) If the membership of a Signatory is terminated, the Party which designated it shall, within three months from the date of the termination and with effect from that date, designate a new Signatory, assume the capacity of a Signatory in accordance with Article 29(4), or withdraw. If the Party has not acted by the end of that period, it shall be considered to have withdrawn as from the date of termination, and this Convention shall cease to be in force for the Party as from that date.

(7) Whenever this Convention has ceased to be in force for a Party, settlement between the Organization and any Signatory designated by that Party or that Party in its capacity as Signatory, shall be accomplished as provided in Article XIII of the Operating Agreement.

Article 31

Settlement of Disputes

(1) Disputes arising between Parties, or between Parties and the Organization, relating to rights and obligations under this Convention should be settled by negotiation between the parties concerned. If within one year of the time any party has requested settlement, a settlement has not been reached and if the parties to the dispute have not agreed to submit it to the International Court of Justice or to some other procedure for settling disputes, the dispute may, if the parties to the dispute consent, be submitted to arbitration in accordance with the Annex to this Convention. Any decision of an arbitral tribunal in a dispute between Parties, or between Parties and the Organization, shall not prevent or affect a decision of the Assembly pursuant to Article 30(1), that the Convention shall cease to be in force for a Party.

(2) Unless otherwise mutually agreed, disputes arising between the Organization and one or more Parties under agreements concluded between them, if not settled by negotiation within one year of the time any party has requested settlement, shall, at the request of any party to the dispute, be submitted to arbitration in accordance with the Annex to this Convention.

(3) Disputes arising between one or more Parties and one or more Signatories in their capacity as such, relating to rights and obligations under this Convention or the Operating Agreement may be submitted to arbitration in accordance with the Annex to this Convention if the Party or Parties and the Signatory or Signatories involved agree to such arbitration.

(4) This Article shall continue to apply to a Party or Signatory which ceases to be a Party or Signatory, in respect of disputes relating to rights and obligations arising from its having been a Party or Signatory.

Article 32

Signature and Ratification

(1) This Convention shall remain open for signature in London until entry into force and shall thereafter remain open for accession. All States may become Parties to the Convention by:

(a) Signature not subject to ratification, acceptance or approval, or

(b) Signature subject to ratification, acceptance or approval, followed by ratification, acceptance or approval, or

(c) Accession.

(2) Ratification, acceptance, approval or accession shall be effected by the deposit of the appropriate instrument with the Depositary.

(3) On becoming a Party to this Convention, or at any time thereafter, a State may declare, by written notification to the Depositary, to which Registers of ships operating under its authority, and to which land earth stations under its jurisdiction, the Convention shall apply.

(4) No State shall become a Party to this Convention until it has signed, or the entity it has designated, has signed the Operating Agreement.

(5) Reservations cannot be made to this Convention or the Operating Agreement.

Article 33

Entry into Force

(1) This Convention shall enter into force sixty days after the date on which States representing 95 per cent of the initial investment shares have become Parties to the Convention.

(2) Notwithstanding paragraph (1), if the Convention has not entered into force within thirty-six months after the date it was opened for signature, it shall not enter into force.

(3) For a State which deposits an instrument of ratification, acceptance, approval or accession after the date on which the Convention has entered into force, the ratification, acceptance, approval or accession shall take effect on the date of deposit.

Article 34

Amendments

(1) Amendments to this Convention may be proposed by any Party. Proposed amendments shall be submitted to the Directorate, which shall inform the other Parties and Signatories. Three months' notice is required before consideration of an amendment by the Council, which shall submit its views to the Assembly within a period of six months from the date of circulation of the amendment. The Assembly shall consider the amendment not earlier than six months thereafter, taking into account any views expressed by the Council. This period may, in any particular case, be reduced by the Assembly by a substantive decision.

(2) If adopted by the Assembly, the amendment shall enter into force one hundred and twenty days after the Depositary has received notices of acceptance from two-thirds of those States which at the time of adoption by the Assembly were Parties and represented at least two-thirds of the total investment shares. Upon entry into force, the amendment shall become binding upon all Parties and Signatories, including those which have not accepted it.

Article 35

Depositary

(1) The Depositary of this Convention shall be the Secretary-General of the Inter-Governmental Maritime Consultative Organization.

(2) The Depositary shall promptly inform all signatory and acceding States and all Signatories of:

(a) Any signature of the Convention.

(b) The deposit of any instrument of ratification, acceptance, approval or accession.

(c) The entry into force of the Convention.

(d) The adoption of any amendment to the Convention and its entry into force.

(e) Any notification of withdrawal.

(f) Any suspension or termination.

(g) Other notifications and communications relating to the Convention.

(3) Upon entry into force of the Convention the Depositary shall transmit a certified copy to the Secretariat of the United Nations for registration and publication in accordance with Article 102 of the Charter of the United Nations.

IN WITNESS WHEREOF the undersigned, duly authorized by their respective Governments, have signed this Convention.

DONE AT LONDON this third day of September one thousand nine hundred and seventy-six in the English, French, Russian and Spanish languages, all the texts being equally authentic, in a single original which shall be deposited with the Depositary, who shall send a certified copy to the Government of each of the States which were invited to attend the International Conference on the Establishment of an International Maritime Satellite System and to the Government of any other State which signs or accedes to this Convention.

ANNEX

PROCEDURES FOR THE SETTLEMENT OF DISPUTES REFERRED TO IN ARTICLE 31 OF THE CONVENTION AND ARTICLE XVI OF THE OPERATING AGREEMENT

Article 1

Disputes cognizable pursuant to Article 31 of the Convention or Article XVI of the Operating Agreement shall be dealt with by an arbitral tribunal of three members.

Article 2

Any petitioner or group of petitioners wishing to submit a dispute to arbitration shall provide each respondent and the Directorate with a document containing:

(a) A full description of the dispute, the reasons why each respondent is required to participate in the arbitration, and the measures being requested.

(b) The reasons why the subject matter of the dispute comes within the competence of a tribunal and why the measures requested can be granted if the tribunal finds in favour of the petitioner.

(c) An explanation why the petitioner has been unable to achieve a settlement of the dispute by negotiation or other means short of arbitration.

(d) Evidence of the agreement or consent of the disputants when this is a condition for arbitration.

(e) The name of the person designated by the petitioner to serve as a member of the tribunal.

The Directorate shall promptly distribute a copy of the document to each Party and Signatory.

Article 3

(1) Within sixty days from the date copies of the document described in Article 2 have been received by all the respondents, they shall collectively designate an individual to serve as a member of the tribunal. Within that period, the respondents may jointly or individually provide each disputant and the Directorate with a document stating their individual or collective responses to the document referred to in Article 2 and including any counter-claims arising out of the subject matter of the dispute.

(2) Within thirty days after the designation of the two members of the tribunal, they shall agree on a third arbitrator. He shall not be of the same nationality as, or resident in the territory of, any disputant, or in its service.

(3) If either side fails to nominate an arbitrator within the period specified or if the third arbitrator is not appointed within the period specified, the President of the International Court of Justice, or, if he is prevented from acting or is of the same nationality as a disputant, the Vice-President, or, if he is prevented from acting or is of the same nationality as a disputant, the senior judge who is not of the same nationality as any disputant, may at the request of either disputant, appoint an arbitrator or arbitrators as the case requires.

(4) The third arbitrator shall act as president of the tribunal.

(5) The tribunal is constituted as soon as the president is selected.

Article 4

(1) If a vacancy occurs in the tribunal for any reason which the president or the remaining members of the tribunal decide is beyond the control of the disputants, or is compatible with the proper conduct of the arbitration proceedings, the vacancy shall be filled in accordance with the following provisions:

(a) If the vacancy occurs as a result of the withdrawal of a member appointed by a side to the dispute, then that side shall select a replacement within ten days after the vacancy occurs.

(b) If the vacancy occurs as a result of the withdrawal of the president or of a member appointed pursuant to Article 3(3), a replacement shall be selected in the manner described in paragraph (2) or (3), respectively, of Article 3.

(2) If a vacancy occurs for any other reason, or if a vacancy occurring pursuant to paragraph (1) is not filled, the remainder of the tribunal shall have the power, notwithstanding Article 1, upon request of one side, to continue the proceedings and give the final decision of the tribunal.

Article 5

(1) The tribunal shall decide the date and place of its meetings.

(2) The proceedings shall be held in private and all material presented to the tribunal shall be confidential. However, the Organization and any Party which has designated a Signatory which is a disputant in the proceedings shall have the right to be present and shall have access to the material presented. When the Organization is a disputant in the proceedings, all Parties and all Signatories shall have the right to be present and shall have access to the material presented.

(3) In the event of a dispute over the competence of the tribunal, the tribunal shall deal with that question first.

(4) The proceedings shall be conducted in writing, and each side shall have the right to submit written evidence in support of its allegations of fact and law. However, oral arguments and testimony may be given if the tribunal considers it appropriate.

(5) The proceedings shall commence with the presentation of the case of the petitioner containing its arguments, related facts supported by evidence and the principles of law relied upon. The case of the petitioner shall be followed by the counter-case of the respondent. The petitioner may submit a reply to the counter-case of the respondent and the respondent may submit a rejoinder. Additional pleadings shall be submitted only if the tribunal determines they are necessary.

(6) The tribunal shall hear and determine counter-claims arising directly out of the subject matter of the dispute, if the counter-claims are within its competence as defined in Article 31 of the Convention and Article XVI of the Operating Agreement.

(7) If the disputants reach an agreement during the proceedings, the agreement shall be recorded in the form of a decision of the tribunal given by consent of the disputants.

(8) At any time during the proceedings, the tribunal may terminate the proceedings if it decides the dispute is beyond its competence as defined in Article 31 of the Convention or Article XVI of the Operating Agreement.

(9) The deliberations of the tribunal shall be secret.

(10) The decisions of the tribunal shall be presented in writing and shall be supported by a written opinion. Its rulings and decisions must be supported by at least two members. A member dissenting from the decision may submit a separate written opinion.

(11) The tribunal shall forward its decision to the Directorate, which shall distribute it to all Parties and Signatories.

(12) The tribunal may adopt additional rules of procedure, consistent with those established by this Annex, which are appropriate for the proceedings.

Article 6

If one side fails to present its case, the other side may call upon the tribunal to give a decision on the basis of its presentation. Before giving its decision, the tribunal shall satisfy itself that it has competence and that the case is well-founded in fact and in law.

Article 7

(1) Any Party whose Signatory is a disputant shall have the right to intervene and become an additional disputant. Intervention shall be made by written notification to the tribunal and to the other disputants.

(2) Any other Party, any Signatory or the Organization may apply to the tribunal for permission to intervene and become an additional disputant. The tribunal shall grant permission if it determines that the applicant has a substantial interest in the case.

Article 8

The tribunal may appoint experts to assist it at the request of a disputant or on its own initiative.

Article 9

Each Party, each Signatory and the Organization shall provide all information which the tribunal, at the request of a disputant or on its own initiative, determines to be required for the handling and determination of the dispute.

Article 10

Pending the final decision, the tribunal may indicate any provisional measures which it considers ought to be taken to preserve the respective rights of the disputants.

Article 11

(1) The decision of the tribunal shall be in accordance with international law and be based on:

(a) The Convention and the Operating Agreement.

(b) Generally accepted principles of law.

(2) The decision of the tribunal, including any reached by agreement of the disputant pursuant to Article 5(7), shall be binding on all the disputants, and shall be carried out by them in good faith. If the Organization is a disputant, and the tribunal decides that a decision of any organ of the Organization is null and void as not being authorized by or in compliance with the Convention and the Operating Agreement, the decision of the tribunal shall be binding on all Parties and Signatories.

(3) If a dispute arises as to the meaning or scope of its decision, the tribunal shall construe it at the request of any disputant.

Article 12

Unless the tribunal determines otherwise because of the particular circumstances of the case, the expenses of the tribunal, including the remuneration of the members of the tribunal, shall be borne in equal shares by each side. Where a side consists of more than one disputant, the tribunal shall apportion the share of that side among the disputants on that side. Where the Organization is a disputant, its expenses associated with the arbitration shall be regarded as an administrative cost of the Organization.

Convenção relativa à Organização Internacional de Satélites Marítimos (INMARSAT)

Os Estados Partes na presente Convenção,

Considerando o princípio enunciado na Resolução n.° 1721 (XVI) da Assembleia-geral das Nações Unidas, segundo o qual as comunicações por satélite devem ser postas à disposição de todas as nações do Mundo, tão cedo quanto possível, numa base mundial e não discriminatória;

Considerando as disposições pertinentes do Tratado sobre os Princípios que Regem as Actividades dos Estados na Exploração e Utilização do Espaço Exterior, incluindo a Lua e Outros Corpos Celestes, celebrado em 27 de Janeiro de 1967, e em particular o seu artigo 1.°, o qual estabelece que o espaço exterior deve ser utilizado em benefício e no interesse de todos os países;

Tendo em conta que uma grande parte do comércio mundial depende da utilização de navios;

Convictos de que o uso de satélites pode contribuir para uma melhoria considerável dos sistemas de socorro e de segurança marítimos, bem como das comunicações entre navios e entre estes e as respectivas companhias, e ainda entre as tripulações ou os passageiros a bordo e as pessoas em terra;

Decididos, para este efeito, a fornecer em benefício dos navios de todas as nações, através da mais avançada e adequada tecnologia espacial disponível, as instalações mais eficazes e económicas possíveis, compatíveis com a utilização mais eficaz e equitativa do espectro de frequências radioeléctricas e do espaço orbital;

Reconhecendo que um sistema de satélites marítimos inclui as estações terrenas móveis e as estações terrenas em terra, bem como o segmento espacial:

Acordam no seguinte:

Artigo 1.°

Definições

Para os fins da presente Convenção:

a) «Acordo de Exploração» significa o Acordo de Exploração relativo à Organização Internacional de Satélites Marítimos (INMARSAT), incluindo o seu anexo;

b) «Parte» significa um Estado em relação ao qual a presente Convenção tenha entrado em vigor;

c) «Signatário» significa uma Parte ou uma entidade designada em conformidade com o disposto no n.° 3 do artigo 2.°, em relação à qual o Acordo de Exploração tenha entrado em vigor;

d) «Segmento espacial» significa os satélites e as instalações e equipamento de monitorização, de telemetria, de telecomando, de controlo e de vigilância, bem como as instalações e equipamentos conexos, necessários ao funcionamento dos referidos satélites;

e) «Segmento espacial INMARSAT» significa o segmento espacial do qual a INMARSAT seja proprietária ou arrendatária;

f) «Navio» significa uma embarcação de qualquer tipo que opere no ambiente marítimo. Inclui inter alia embarcações de sustentação dinâmica, veículos de sustentação por ar, submersíveis, estruturas flutuantes e plataformas que não estejam permanentemente ancoradas;

g) «Bens» abrange tudo quanto possa ser objecto de um direito de propriedade, incluindo direitos contratuais.

Artigo 2.°
Estabelecimento da INMARSAT

1. A Organização Internacional de Satélites Marítimos (INMARSAT), daqui em diante denominada «a Organização», fica por este meio estabelecida.

2. O Acordo de Exploração é concluído em conformidade com as disposições da presente Convenção e fica aberto à assinatura ao mesmo tempo que a presente Convenção.

3. Cada Parte assina o Acordo de Exploração ou designa uma entidade competente, pública ou privada, sujeita à jurisdição dessa Parte, que assine o referido Acordo de Exploração.

4. As administrações e entidades de telecomunicações podem, em conformidade com o direito interno aplicável, negociar e concluir directamente os acordos de tráfego apropriados, relativamente à utilização de instalações de telecomunicações fornecidas nos termos da presente Convenção e do Acordo de

Exploração, bem como aos serviços abertos ao público, às instalações, à partilha de receitas e às correspondentes disposições comerciais.

Artigo 3.°
Objectivo

1. O objectivo da Organização é o fornecimento do segmento espacial necessário para o desenvolvimento das comunicações marítimas, que permita a melhoria das comunicações nos serviços de socorro e segurança de vidas no mar, da eficiência e gestão de navios, dos serviços públicos de correspondência marítima e das capacidades de radiolocalização.

2. A Organização deve procurar servir todas as regiões onde haja necessidade de comunicações marítimas.

3. A Organização deve actuar exclusivamente com fins pacíficos.

Artigo 4.°
Relações entre uma Parte e a sua entidade designada

No caso de um Signatário ser uma entidade designada por uma Parte:

a) As relações entre a Parte e o Signatário são regidas pelo direito interno aplicável;

b) A Parte estabelece as directivas e as instruções apropriadas e em conformidade com o seu direito interno, para assegurar que o Signatário cumpra as suas responsabilidades;

c) A Parte não é responsável pelas obrigações decorrentes do Acordo de Exploração. A Parte deve, contudo, assegurar que o Signatário, no exercício das suas obrigações enquanto Membro da Organização, não actue de modo a violar as obrigações que a Parte tenha aceite ao abrigo da presente Convenção ou ao abrigo de acordos internacionais com ela relacionados;

d) Se o Signatário se retirar ou se for excluído na sua qualidade de Membro, a Parte deve actuar em conformidade com o disposto no n.° 3 do artigo 29.° ou no n.° 6 do artigo 30.°.

Artigo 5.º

Princípios financeiros e de exploração da Organização

1. A Organização é financiada pelas contribuições dos Signatários. Cada Signatário tem uma participação financeira na Organização proporcional à sua quota-parte de investimento, a qual é determinada em conformidade com o disposto no Acordo de Exploração.

2. Cada Signatário contribui para as necessidades de capital da Organização e recebe o reembolso do capital e a remuneração pela utilização de capital em conformidade com o disposto no Acordo de Exploração.

3. A Organização é gerida com base numa situação económica e financeira sólida tendo em consideração os princípios comerciais normalmente aceites.

Artigo 6.º

Fornecimento do segmento espacial

A Organização pode ser proprietária ou arrendatária do segmento espacial.

Artigo 7.º

Acesso ao segmento espacial

1. O segmento espacial INMARSAT está aberto aos navios de todas as nações, nas condições que vierem a ser fixadas pelo Conselho. Na fixação destas condições, o Conselho não deve fazer discriminação entre navios com base na nacionalidade.

2. O Conselho pode, caso a caso, autorizar o acesso ao segmento espacial INMARSAT de estações terrenas situadas em estruturas que, não sendo consideradas navios, operem no meio marítimo, desde que a operação de tais estações terrenas não afecte significativamente o serviço fornecido aos navios.

3. As estações terrenas em terra que comuniquem através do segmento espacial INMARSAT devem estar situadas numa zona terrestre sob a jurisdição de uma Parte e devem ser inteiramente propriedade das Partes ou entidades sujeitas à sua jurisdição. O Conselho pode autorizar segundo critério diferente, se concluir que tal é do interesse da Organização.

Artigo 8.°

Outros segmentos espaciais

1. Qualquer Parte ou pessoa sob a sua jurisdição que pretenda, individual ou conjuntamente, estabelecer ou iniciar a utilização de instalações de segmento espacial separadas, para satisfazer parcial ou totalmente os objectivos do segmento espacial INMARSAT, deve notificar a Organização, a fim de assegurar a compatibilidade técnica e evitar prejuízo económico significativo ao sistema INMARSAT.

2. O Conselho exprime a sua opinião sob a forma de uma recomendação não vinculativa, no que se refere à compatibilidade técnica, e dá o seu parecer à Assembleia no que se refere ao prejuízo económico.

3. A Assembleia exprime a sua opinião sob a forma de uma recomendação não vinculativa, no prazo de nove meses a contar da data do início dos procedimentos previstos no presente artigo. Uma reunião extraordinária da Assembleia pode ser convocada para esse fim.

4. A notificação, prevista no n.° 1, incluindo a comunicação da pertinente informação técnica, e as consultas subsequentes com a Organização, devem ter em conta as disposições relevantes do Regulamento das Radiocomunicações da União Internacional das Telecomunicações.

5. O disposto no presente artigo não se aplica ao estabelecimento, à aquisição, à utilização ou à continuação da utilização de instalações de segmento espacial separadas para fins de segurança nacional, ou que tenham sido contratadas, estabelecidas, adquiridas ou utilizadas antes da entrada em vigor da presente Convenção.

Artigo 9.°

Estrutura

Os órgãos da Organização são:

a) A Assembleia;

b) O Conselho;

c) A Direcção, chefiada por um Director-geral.

Artigo 10.º
Assembleia – Composição e reuniões

1. A Assembleia é constituída por todas as Partes.

2. As sessões ordinárias da Assembleia têm lugar uma vez de dois em dois anos. As sessões extraordinárias são convocadas a pedido de um terço das Partes ou a pedido do Conselho.

Artigo 11.º
Assembleia – Funcionamento

1. Cada Parte tem direito a um voto na Assembleia.

2. As decisões em questões de fundo são tomadas por uma maioria de dois terços, e as questões processuais por maioria simples das Partes presentes e votantes. As Partes que se abstenham de votar são consideradas como não votantes.

3. As decisões sobre se uma questão é processual ou de fundo são tomadas pelo presidente. Tais decisões podem ser anuladas por uma maioria de dois terços das Partes presentes e votantes.

4. O quórum para qualquer reunião da Assembleia é constituído pela maioria das Partes.

Artigo 12.º
Assembleia – Funções

1. A Assembleia tem as funções seguintes:

   a) Estudar e examinar as actividades, as finalidades, a política geral e os objectivos a longo prazo da Organização, e exprimir opiniões e fazer recomendações ao Conselho sobre tais matérias;

   b) Assegurar que as actividades da Organização sejam compatíveis com a presente Convenção e com os objectivos e princípios da Carta das Nações Unidas, bem como com qualquer outro tratado pelo qual a Organização fique vinculada por decisão própria;

c) Autorizar, sob recomendação do Conselho, o estabelecimento de instalações de segmento espacial adicionais, cujo objectivo principal ou especial seja o de fornecer serviços de radiolocalização, de socorro e de segurança. Contudo, as instalações do segmento espacial estabelecidas para fornecer serviços públicos de correspondência marítima podem ser utilizadas para telecomunicações com objectivos de radiolocalização, socorro e segurança, sem tal autorização;

d) Decidir sobre outras recomendações do Conselho e exprimir opiniões sobre relatórios do Conselho;

e) Eleger quatro representantes no Conselho em conformidade com o disposto na alínea b) do n.° 1 do artigo 13.°;

f) Decidir sobre questões relativas às relações formais entre a Organização e os Estados, sejam ou não Partes, e as organizações internacionais;

g) Decidir sobre qualquer emenda à presente Convenção, em conformidade com o disposto no artigo 34.°, ou ao Acordo de Exploração, em conformidade com o disposto no respectivo artigo XVIII;

h) Considerar e decidir sobre a exclusão de um Membro, em conformidade com as disposições do artigo 30.°;

i) Exercer quaisquer outras funções que lhe sejam atribuídas em virtude de qualquer outro artigo da presente Convenção ou do Acordo de Exploração.

2. No exercício das suas funções, a Assembleia tem em conta as recomendações pertinentes do Conselho.

Artigo 13.°
Conselho – Composição

1. O Conselho é constituído por vinte e dois representantes dos Signatários, como se segue:

a) Dezoito representantes dos Signatários ou grupos de Signatários não representados de outro modo e que concordarem em ser representados enquanto grupo, que tenham as quotas-partes de investimento mais elevadas da Organização. Se um grupo de Signatários e um Signatário

individual tiverem quotas-partes de investimento iguais, este último tem o direito de prioridade. Se em virtude de dois ou mais Signatários com quotas-partes de investimento iguais o número de representantes no Conselho exceder vinte e dois, todos têm o direito, excepcionalmente, de ser representados;

b) Quatro representantes dos Signatários não representados de outro modo no Conselho, eleitos pela Assembleia, independentemente das suas quotas-partes de investimento, de modo a assegurar o princípio de uma representação geográfica equitativa, atendendo aos interesses dos países em vias de desenvolvimento. Qualquer Signatário eleito para representar uma área geográfica representa cada Signatário dessa área geográfica que tenha concordado em ser assim representado e que não esteja representado de outro modo no Conselho. A eleição torna-se efectiva a partir da primeira reunião do Conselho que se lhe siga e permanece efectiva até à próxima reunião ordinária da Assembleia.

2. A insuficiência do número de representantes no Conselho, cm virtude de uma vaga que ainda não pôde ser preenchida, não invalida a composição do Conselho.

Artigo 14.°
Conselho – Funcionamento

1. O Conselho reúne tantas vezes quantas as necessárias para o eficaz cumprimento das suas funções, mas, pelo menos, três vezes por ano.

2. O Conselho deve envidar esforços para que as suas decisões sejam tomadas por unanimidade. Se o acordo unânime não for conseguido, as decisões são tomadas como se segue: as decisões sobre questões de fundo são tomadas pela maioria dos representantes no Conselho, representando, pelo menos, dois terços do total de participações de voto de todos os Signatários e grupos de Signatários representados no Conselho. As decisões sobre questões processuais são tomadas pela maioria simples dos representantes presentes e votantes, dispondo cada um de um voto. Os diferendos sobre se uma questão específica é processual ou de fundo são decididos pelo Presidente do Conselho. A decisão do Presidente pode ser anulada por uma maioria de dois terços dos representantes presentes e votantes, cada um dispondo de um voto. O Conselho pode adoptar um processo de votação diferente para a eleição da mesa.

3. a) Cada representante tem uma participação de voto equivalente à quota-parte ou quotas-partes de investimento que ele represente. Contudo, nenhum representante pode dispor, em nome de um Signatário, de mais do que 25% do total de participações de voto na Organização, com ressalva do disposto na subalínea iv) da alínea b);

b) Sem prejuízo do disposto nos números 9, 10 e 12 do artigo V do Acordo de Exploração:

i) Se um Signatário representado no Conselho tiver direito, com base na sua quota-parte de investimento, a uma participação de voto superior a 25% do total de participações de voto na Organização, pode oferecer a outros Signatários uma parte ou o total da sua quota-parte de investimento que excede os 25%;

ii) Os outros Signatários podem notificar a Organização de que estão dispostos a aceitar uma parte ou a totalidade do referido excedente da quota-parte de investimento. Se o total dos montantes notificados à Organização não exceder o montante disponível para repartição, este último montante deve ser repartido pelo Conselho aos Signatários notificantes de acordo com os montantes notificados. Se o total de montantes notificados exceder o montante para repartição, este último montante deve ser repartido pelo Conselho conforme o acordado entre os Signatários notificantes, ou, na falta desse acordo, proporcionalmente aos montantes notificados;

iii) Qualquer repartição do tipo atrás referido deve ser feita pelo Conselho no momento de cada determinação das quotas-partes de investimento, em conformidade com o estabelecido no artigo V do Acordo de Exploração. Qualquer repartição não pode fazer aumentar a quota-parte de investimento de qualquer Signatário para além de 25%;

iv) Na medida em que um Signatário dispondo de uma quota-parte de investimento superior a 25% e o excesso desses 25% oferecido para repartição não tenha sido repartido em conformidade com o procedimento previsto no presente parágrafo, a participação de voto do representante do Signatário pode exceder 25%;

c) Na medida em que um Signatário decida não oferecer o seu excedente de quota-parte de investimento a outros Signatários, a correspondente participação de voto desse Signatário, na parte que excede 25%, deve ser repartida igualmente entre todos os outros representantes no Conselho.

4. O quórum para qualquer reunião do Conselho é constituído pela maioria dos representantes que integram o Conselho, representando pelo menos dois terços do total de participações de voto de todos os Signatários e grupos de Signatários representados no Conselho.

Artigo 15.°
Conselho – Funções

O Conselho tem a responsabilidade, tendo em devida conta as opiniões e recomendações da Assembleia, de fornecer o segmento espacial necessário para levar a cabo os objectivos da Organização da forma mais económica, efectiva e eficaz, em conformidade com o disposto na presente Convenção e no Acordo de Exploração. A fim de dar cumprimento a esta responsabilidade, o Conselho tem os poderes necessários para desempenhar todas as funções adequadas, incluindo:

a) A determinação das necessidades em matéria de telecomunicações marítimas por satélite e a adopção de políticas, planos, programas, normas e medidas relativas à concepção, ao desenvolvimento, à construção, ao estabelecimento, à aquisição ou aluguer, à operação, à manutenção e à utilização do segmento espacial INMARSAT, incluindo a aquisição dos serviços de lançamento necessários para responder a essas necessidades;

b) A adopção e aplicação de disposições de gestão que permitam ao Director-geral estabelecer contratos para a execução de funções técnicas e operacionais, sempre que tal resulte mais vantajoso para a Organização;

c) A adopção de critérios e procedimentos para a aprovação de estações terrenas em terra, em navios e em estruturas no meio marítimo para acesso ao segmento espacial INMARSAT e para a verificação e controlo das características de funcionamento das estações terrenas com acesso a e utilizando o segmento espacial INMARSAT. No caso das estações terrenas em navios os critérios devem ser suficientemente detalhados, de

modo a permitir às autoridades licenciadoras nacionais conceder, discricionariamente, aprovações por tipos;

d) A apresentação de recomendações à Assembleia em conformidade com o disposto na alínea c) do n.° 1 do artigo 12.°;

e) A apresentação à Assembleia de relatórios periódicos sobre as actividades da Organização, incluindo as questões financeiras;

f) A adopção de normas de aquisição, regulamentos e termos de contratos e aprovação de contratos de aquisição, em conformidade com o disposto na presente Convenção e no Acordo de Exploração;

g) A adopção de políticas financeiras, a aprovação dos regulamentos financeiros, do orçamento anual e dos relatórios financeiros anuais, a determinação periódica dos encargos de utilização do segmento espacial INMARSAT e decisões respeitantes a quaisquer outras questões financeiras, incluindo quotas-partes de investimento e limite de capital, em conformidade com o disposto na presente Convenção e no Acordo de Exploração;

h) A determinação das medidas pertinentes para dispor de um regime de consulta permanente com os organismos reconhecidos pelo Conselho como representando os armadores, o pessoal marítimo e outros utilizadores de telecomunicações marítimas;

i) A designação de um árbitro nos casos em que a Organização se constitua parte num processo de arbitragem;

j) O exercício de qualquer função que lhe seja atribuída em qualquer outro artigo da presente Convenção ou do Acordo de Exploração, ou qualquer outra função apropriada à prossecução dos objectivos da Organização.

Artigo 16.°
Direcção

1. O Director-geral é nomeado pelo Conselho de entre os candidatos propostos pelas Partes ou pelos Signatários através das Partes, sob reserva de confirmação pelas Partes. O Depositário notifica imediatamente as Partes da nomeação. A nomeação considera-se confirmada, a menos que no prazo de sessenta dias a contar da

notificação mais de um terço das Partes tenha informado o Depositário, por escrito, da sua objecção à nomeação. O Director-geral pode assumir as suas funções logo após a nomeação e enquanto aguarda a confirmação.

2. O mandato do Director-geral é de seis anos. Contudo, o Conselho pode exonerar o Director-geral mais cedo, sob a sua própria autoridade. O Conselho relata à Assembleia as razões da exoneração.

3. O Director-geral é o mais alto executivo e o representante legal da Organização e é responsável perante o Conselho e sob direcção do mesmo.

4. A estrutura, o quadro de pessoal e as condições gerais de emprego dos funcionários, empregados, consultores e de outros conselheiros da Direcção são aprovados pelo Conselho.

5. O Director-geral nomeia os membros da Direcção. A nomeação de funcionários superiores que reportem directamente ao Director-geral é aprovada pelo Conselho.

6. Para a nomeação do Director-geral e do restante pessoal da Direcção deve ser tida principalmente em consideração a necessidade de assegurar os mais elevados padrões de integridade, de competência e de eficiência.

Artigo 17.°
Representação em reuniões

Todas as Partes e todos os Signatários que, ao abrigo da presente Convenção ou do Acordo de Exploração, tenham direito a assistir e/ou participar em reuniões da Organização devem ser autorizados a assistir às referidas reuniões e/ou a participar nas mesmas, bem como a qualquer outra reunião que se realize sob os auspícios da Organização, independentemente do local onde a reunião tenha lugar. Os acordos feitos com qualquer país anfitrião devem ser compatíveis com estas obrigações.

Artigo 18.°
Custos de reuniões

1. Cada Parte, bem como cada Signatário, suporta os seus próprios encargos de representação nas reuniões da Organização.

2. As despesas relativas às reuniões da Organização são consideradas como custos administrativos da Organização. Contudo, nenhuma reunião da Organização deve realizar-se fora da sua sede, a menos que o presumível anfitrião aceite suportar os encargos adicionais daí resultantes.

Artigo 19.°
Estabelecimento dos encargos de utilização

1. O Conselho especifica as unidades de medida para os vários tipos de utilização do segmento espacial INMARSAT e estabelece os encargos da referida utilização. Estes encargos têm como objectivo obter receitas suficientes para que a Organização possa suportar os custos de exploração, de manutenção e administrativos, para o suprimento de fundos de exploração que o Conselho venha a considerar necessários, para a amortização do investimento feito pelos Signatários e para a compensação pela utilização de capital em conformidade com o disposto no Acordo de Exploração.

2. Os valores dos encargos de utilização são os mesmos para todos os Signatários, para cada tipo de utilização.

3. Para aquelas entidades que não sejam Signatários e que estejam autorizadas, em conformidade com o disposto no artigo 7.°, a utilizar o segmento espacial INMARSAT, o Conselho pode estabelecer encargos de utilização diferentes dos estabelecidos para os Signatários. Os encargos para cada tipo de utilização são os mesmos para todas essas entidades.

Artigo 20.°
Aquisições

1. A política de aquisições do Conselho é de molde a encorajar, no interesse da Organização, uma concorrência à escala mundial no fornecimento de bens e serviços. Neste sentido:

a) A aquisição de bens e serviços necessários à Organização, quer se trate de compra ou aluguer, é efectuada pela adjudicação de contratos, com base em respostas a convites públicos internacionais para apresentação de propostas;

b) Os contratos são adjudicados aos concorrentes que ofereçam a melhor combinação de qualidade, preço e prazo de entrega mais favorável;

c) Se houver propostas que ofereçam idênticas combinações de qualidade, preço e prazo de entrega mais favorável, o Conselho outorga o contrato por forma a cumprir a política de aquisições atrás estabelecida.

2. Nos casos a seguir indicados o requisito de concurso público internacional pode ser dispensado em conformidade com normas adoptadas pelo Conselho, desde que deste modo o Conselho encoraje, no interesse da Organização, a competição à escala mundial para o fornecimento de bens e serviços:

a) O valor estimado do contrato não exceder 50 000 dólares dos Estados Unidos da América e a outorga do contrato, em resultado da aplicação da dispensa, não colocar um contratante em posição tal que possa vir a prejudicar, em data posterior, o efectivo exercício pelo Conselho da política de aquisições atrás estabelecida. Na medida em que as variações nos preços à escala mundial reflectidas nos relevantes índices de preços o justifiquem, o Conselho pode rever o limite financeiro;

b) A aquisição tiver carácter de urgência para fazer face a uma situação de emergência;

c) Existir apenas uma única fonte de abastecimento que corresponda às especificações necessárias aos requisitos da Organização ou quando o número de fontes de abastecimento for de tal modo limitado que não seria possível, nem no interesse da Organização, incorrer em despesas e demoras resultantes de um concurso público internacional, desde que, havendo mais do que uma fonte, todas elas tenham a oportunidade de apresentar as suas propostas numa base de igualdade;

d) As necessidades forem de natureza administrativa, para as quais não seria prático nem viável abrir um concurso público internacional;

e) Tratar-se da aquisição de serviços pessoais.

Artigo 21.°

Invenções e informações técnicas

1. Em relação a qualquer trabalho realizado por si ou em seu nome e à sua custa, a Organização adquire, no respeitante às invenções e informações técnicas, os

direitos necessários aos interesses comuns da Organização e dos Signatários enquanto tais, mas não mais do que esses direitos. No caso de trabalhos efectuados sob contrato, esses direitos são obtidos a título não exclusivo.

2. Para efeitos do n.° 1, a Organização, tendo em conta os seus princípios e objectivos bem como as práticas industriais geralmente aceites, assegura para si própria, em relação a quaisquer trabalhos que impliquem um elemento significativo de estudo, de investigação ou de desenvolvimento:

a) O direito de lhe serem divulgadas, sem pagamento, todas as invenções e informações técnicas resultantes dos referidos trabalhos;

b) O direito de divulgar e de fazer divulgar às Partes e Signatários e a terceiros sob a jurisdição de qualquer Parte as referidas invenções e informações técnicas, bem como o direito de utilizar e de autorizar e de fazer autorizar às Partes e Signatários e aos referidos terceiros a utilização dessas invenções e informações técnicas, sem pagamento, relativamente ao segmento espacial INMARSAT e a qualquer estação terrena em terra ou num navio que operem conjuntamente com aquele.

3. No caso de trabalhos efectuados sob contrato, a propriedade dos direitos nas invenções e informações técnicas resultantes do contrato é retida pelo contratante.

4. A Organização assegura igualmente para si própria, nos termos e condições justas e razoáveis, o direito de utilizar e de fazer utilizar as invenções e informações técnicas directamente utilizadas na execução dos trabalhos efectuados em seu nome, mas não incluídas entre as previstas no n.° 2, na medida em que a referida utilização for necessária para a reconstrução ou modificação de qualquer produto que tenha sido fornecido ao abrigo de um contrato financiado pela Organização e na medida em que a pessoa que efectuou esses trabalhos esteja habilitada a conceder esse direito.

5. O Conselho pode, em casos particulares, aprovar um desvio das orientações prescritas na alínea b) do n.° 2 e no n.°4 quando, no decurso das negociações, for demonstrado ao Conselho que a falta desse desvio seria prejudicial aos interesses da Organização.

6. O Conselho pode também, em casos particulares, e quando circunstâncias excepcionais o justifiquem, aprovar um desvio das orientações prescritas no n.° 3, quando forem satisfeitas todas as condições seguintes:

a) Seja demonstrado ao Conselho que a falta desse desvio seria prejudicial aos interesses da Organização;

b) O Conselho determine que a Organização está em condições de assegurar que as patentes ficam protegidas em qualquer país;

c) Quando, e na medida em que, o contratante não esteja em condições ou não deseje assegurar a referida protecção no prazo exigido.

7. Relativamente às invenções e informações técnicas cujos direitos sejam adquiridos pela Organização em bases diferentes das previstas no n.° 2, a Organização, na medida em que tenha direito a fazê-lo, deve, mediante pedido:

a) Divulgar ou fazer divulgar as referidas invenções e informações técnicas a qualquer Parte ou Signatário, sob reserva de reembolso de qualquer pagamento feito por ou exigido à Organização, no respeitante ao exercício do referido direito de divulgação;

b) Pôr à disposição de qualquer Parte ou de qualquer Signatário o direito de divulgar ou de fazer divulgar a terceiros sob a jurisdição de qualquer Parte, e de utilizar e autorizar e fazer autorizar os referidos terceiros a utilizarem aquelas invenções e informações técnicas:

i) Sem pagamento relativamente ao segmento espacial INMARSAT ou a qualquer estação terrena em terra ou em navios e que operem conjuntamente com aquele;

ii) Para qualquer outra finalidade, em termos e condições justas e razoáveis, a estipular entre os Signatários ou outros sob a jurisdição de qualquer Parte e a Organização ou o proprietário das referidas invenções e informações técnicas, ou qualquer outra entidade ou pessoa devidamente autorizada que nelas tenha uma parte da propriedade, e sob reserva de reembolso de qualquer pagamento feito por ou exigido à Organização relativamente ao exercício de tais direitos.

8. A divulgação e utilização e os termos e condições de divulgação e utilização de todas as invenções e informações técnicas sobre as quais a Organização tenha adquirido quaisquer direitos são efectuados numa base não discriminatória para todos os Signatários e outras pessoas sob a jurisdição das Partes.

9. Nenhuma das disposições do presente artigo impede a Organização, se o julgar conveniente, de estabelecer contratos com pessoas submetidas às leis e regulamentos nacionais relacionados com a divulgação de informações técnicas.

Artigo 22.°
Responsabilidade

As Partes não são, nessa sua qualidade, responsáveis pelos actos e obrigações da Organização, excepto em relação a não Partes ou a pessoas singulares ou colectivas que aquelas representem, na medida em que tal responsabilidade resulte de tratados em vigor entre a Parte e a não Parte em questão. Contudo, o precedente não impede uma Parte a quem tenha sido reclamado o pagamento de uma indemnização ao abrigo de um tal tratado por uma não Parte ou pessoa singular ou colectiva que aquela represente de invocar quaisquer direitos que possam resultar do referido tratado contra qualquer outra Parte.

Artigo 23.°
Custos excluídos

Os impostos sobre rendimentos provenientes da Organização que couberem a qualquer dos Signatários não constituem despesas da Organização.

Artigo 24.°
Auditoria

As contas da Organização são verificadas anualmente por um auditor independente nomeado pelo Conselho. Qualquer Parte ou qualquer Signatário tem o direito de inspeccionar as contas da Organização.

Artigo 25.°
Personalidade jurídica

A Organização tem personalidade jurídica e é responsável pelos seus actos e obrigações. Para efeitos do seu adequado funcionamento, tem capacidade para, nomeadamente, celebrar contratos, adquirir, alugar, deter ou alienar bens móveis e imóveis, ser uma parte em litígio em acções legais e concluir acordos com Estados ou organizações internacionais.

Artigo 26.°
Privilégios e imunidades

1. No âmbito das actividades autorizadas pela presente Convenção, a Organização e os seus bens estão isentos, em todos os Estados Partes na presente Convenção, de todos os impostos nacionais sobre rendimentos e bens e de todos os direitos aduaneiros sobre os satélites de telecomunicações, assim como sobre os componentes e partes dos referidos satélites que se destinem a ser lançados com vista à sua utilização no segmento espacial INMARSAT. Cada Parte compromete-se a envidar os seus melhores esforços, em conformidade com os procedimentos internos aplicáveis, para que sejam concedidas todas as outras isenções de impostos sobre os rendimentos e de impostos directos sobre os bens, bem como de direitos alfandegários que se afigurem desejáveis, tendo em conta o carácter específico da Organização.

2. Todos os Signatários no exercício dessa sua capacidade, excepto o Signatário designado pela Parte em cujo território está localizada a sede, estão isentos dos impostos nacionais sobre rendimentos relativos às importâncias pagas pela Organização no território daquela Parte.

3. a) Tão cedo quanto possível após a entrada em vigor da presente Convenção, a Organização conclui, com qualquer Parte em cujo território a Organização estabeleça a sua sede, outros escritórios ou instalações, um acordo que será negociado pelo Conselho e aprovado pela Assembleia, relativo aos privilégios e imunidades da Organização, do seu Director-geral e do seu pessoal, dos especialistas no exercício de missões para a Organização e dos representantes das Partes e Signatários enquanto permanecerem no território do Governo anfitrião no exercício das suas funções.

b) O acordo é independente da presente Convenção e chega ao seu termo mediante acordo entre o Governo anfitrião e a Organização, ou se a sede da Organização for transferida do território do Governo anfitrião.

4. Todas as Partes, excepto uma Parte que tenha concluído um acordo como o referido no n.° 3, concluem logo que possível, após a entrada em vigor da presente Convenção, um Protocolo sobre os privilégios e imunidades da Organização, do seu Director-geral e do seu pessoal, dos especialistas no exercício de missões para a Organização e dos representantes das partes e Signatários enquanto permanecerem no território das Partes no exercício das suas funções. O Protocolo é independente da presente Convenção e estipula as condições para o seu termo.

Artigo 27.°
Relações com outras organizações internacionais

A Organização colabora com a Organização das Nações Unidas e seus órgãos relacionados com a Utilização Pacífica do Espaço Exterior e Zona Oceânica, com as suas agências especializadas, bem como com outras organizações internacionais, em matérias de interesse comum. Em particular a Organização deve ter em conta as relevantes resoluções e recomendações da Organização Marítima Consultiva Intergovernamental. A Organização respeita as disposições relevantes da Convenção Internacional das Telecomunicações e as regras dela decorrentes, e tem em devida consideração, na concepção, desenvolvimento, construção e estabelecimento do segmento espacial INMARSAT e das normas estabelecidas para regulamentar a operação do segmento espacial INMARSAT e das estações terrenas, as relevantes resoluções, recomendações e normas pertinentes adoptadas pelos órgãos da União Internacional das Telecomunicações.

Artigo 28.°
Notificação à União Internacional das Telecomunicações

A pedido da Organização, a Parte em cujo território está localizada a sede da Organização coordena as frequências a serem utilizadas no segmento espacial e notifica a União Internacional das Telecomunicações, em nome das Partes que para tal derem o seu consentimento, das frequências a serem utilizadas para este efeito e outras informações, tal como previsto no Regulamento das Radiocomunicações anexo à Convenção Internacional das Telecomunicações.

Artigo 29.°
Retirada

1. Qualquer Parte ou qualquer Signatário pode em qualquer momento, mediante notificação escrita dirigida ao Depositário, retirar-se voluntariamente da Organização. Logo que tenha sido tomada a decisão ao abrigo da legislação interna aplicável de que um Signatário se pode retirar, a retirada é notificada por escrito ao Depositário pela Parte que designou Signatário, e a notificação significa a aceitação pela Parte da retirada do Signatário. A retirada de uma Parte, nessa sua qualidade, implica a retirada simultânea de qualquer Signatário designado pela Parte ou da Parte na sua qualidade de Signatário, conforme for o caso.

2. Após a recepção pelo Depositário da notificação de uma decisão de retirada, a Parte notificante e qualquer Signatário por ela designado, ou o Signatário a respeito do qual foi feita a notificação, conforme for caso, deixam de ter quaisquer direitos de representação e quaisquer direitos de voto em qualquer órgão da Organização e não incorrem em quaisquer obrigações depois da data da referida recepção. Contudo, um Signatário retirado permanece responsável, salvo decisão em contrário do Conselho, em conformidade com o disposto no artigo XIII do Acordo de Exploração, pela participação da sua quota-parte de contribuições de capital necessárias para satisfazer compromissos contratuais expressamente autorizados pela Organização antes da recepção da notificação, e responsabilidades resultantes de actos e omissões que tenham precedido a referida recepção. Excepto no que diz respeito às referidas contribuições de capital e ao disposto no artigo 31.° da presente Convenção e no artigo XVI do Acordo de Exploração, a retirada produz efeitos e a presente Convenção e/ou o Acordo de Exploração deixam de estar em vigor em relação à Parte e/ou Signatário três meses após a data da recepção, pelo Depositário, da notificação escrita referida no n.° 1.

3. Se um Signatário se retirar, a Parte que o designou deve, antes da data na qual a retirada produz efeitos a contar dessa data, designar um novo Signatário, assumir a qualidade de Signatário em conformidade com o disposto no n.° 4, ou retirar-se. Se a Parte não tiver actuado à data efectiva da retirada, é considerada como se tendo retirado a contar dessa data. Qualquer novo Signatário assume todas as contribuições de capital em dívida do Signatário precedente e a parte que lhe corresponda de quaisquer contribuições de capital necessárias para fazer face às obrigações contratuais expressamente autorizadas pela Organização após a data da recepção de referida notificação, e as responsabilidades decorrentes de actos e omissões posteriores a essa data.

4. Se, por qualquer razão, uma Parte desejar substituir-se ao Signatário que designou, ou desejar designar um novo Signatário, ela deve notificar o Depositário por escrito. Logo que o novo Signatário assuma todas as obrigações pendentes do Signatário precedente, tal como especificado na última frase do n.° 3, e logo após a assinatura do Acordo de Exploração, este Acordo entra em vigor para o novo Signatário e deixa de estar em vigor para o Signatário precedente.

Artigo 30.°

Suspensão e exclusão

1. Em prazo não inferior a um ano após a Direcção ter recebido uma notificação escrita de que aparentemente uma Parte faltou ao cumprimento das obrigações que lhe incumbem nos termos da presente Convenção, a Assembleia, após considerar quaisquer alegações feitas pela Parte, pode decidir, se tiver verificado que a falta ocorreu de facto e que a referida falta prejudica a actividade efectiva da Organização, que a Parte seja excluída como Membro da Organização. A presente Convenção deixa de estar em vigor para a Parte a contar da data da decisão ou a contar de data posterior, conforme determinação da Assembleia. Uma reunião extraordinária da Assembleia pode ser convocada para este efeito. A exclusão implica a retirada simultânea de qualquer Signatário designado pela Parte ou da Parte na sua qualidade de Signatário, conforme for o caso. O Acordo de Exploração deixa de estar em vigor para o Signatário na data em que a presente Convenção deixa de estar em vigor para a Parte abrangida, excepto no que diz respeito às contribuições de capital necessárias para fazer face às obrigações contratuais expressamente autorizadas pela Organização antes da exclusão e às responsabilidades decorrentes de actos ou omissões antes da exclusão, excepto no que se refere ao disposto no artigo 31.° da presente Convenção e no artigo XVI do Acordo de Exploração.

2. Se qualquer Signatário, nessa sua qualidade, faltar ao cumprimento das obrigações que lhe incumbem nos termos da presente Convenção ou do Acordo de Exploração, excluindo as obrigações referidas no n.° 1 do artigo III do Acordo de Exploração, e se a falta não tiver sido reparada no prazo de três meses após o Signatário ter sido notificado por escrito de uma resolução do Conselho tomando nota da falta de cumprimento, o Conselho, depois de ter considerado quaisquer alegações feitas pelo Signatário e, se for caso disso, pela Parte abrangida pode suspender os direitos do Signatário. Se, decorrido um prazo adicional de três meses, e depois de ter considerado quaisquer alegações feitas pelo Signatário e, se for caso disso, pela Parte abrangida, o Conselho verificar que a falta de cumprimento não foi reparada, a Assembleia pode decidir, sob recomendação do Conselho, que o Signatário seja excluído. A exclusão produz efeitos na data desta decisão e o Acordo de Exploração deixa de estar em vigor para aquele Signatário a contar dessa data.

3. Se um Signatário faltar ao pagamento de qualquer quantia em dívida, nos termos do disposto no n.° 1 do artigo III do Acordo de Exploração, no prazo de quatro meses contados a partir da data do vencimento, os direitos do Signatário, ao abrigo da presente Convenção e do Acordo de Exploração, ficam automaticamente suspensos. Se, no prazo de três meses após a suspensão, o Signatário não tiver pago todas as importâncias em dívida, ou a Parte que o designou não tiver efectuado uma substituição, em conformidade com o disposto no n.° 4 do artigo 29.°, o Conselho, depois de ter considerado quaisquer alegações feitas pelo Signatário ou pela Parte que o designou, pode decidir a exclusão do Signatário. A partir da data dessa decisão, o Acordo de Exploração deixa de estar em vigor para o referido Signatário.

4. Durante o período de suspensão dos direitos de um Signatário nos termos dos números 2 ou 3, o Signatário continua a assumir todas as obrigações de um Signatário ao abrigo da presente Convenção e do Acordo de Exploração.

5. Um Signatário não incorre em qualquer obrigação após a exclusão, excepto no que respeita à participação com a respectiva quota-parte nas contribuições de capital necessárias para o cumprimento das obrigações contratuais expressamente autorizadas antes da exclusão e às responsabilidades decorrentes de actos e omissões antes da exclusão, excepto no que se refere ao artigo 31.° da presente Convenção e ao artigo XVI do Acordo de Exploração.

6. Se um Signatário for excluído, a Parte que o designou deve, no prazo de três meses a contar da data da exclusão e com efeitos a partir dessa data, designar um novo Signatário, assumir a qualidade de Signatário, de acordo com o disposto no n.° 4 do artigo 29.°, ou retirar-se. Se a Parte não tiver actuado até ao final daquele período, deve ser considerada como se tendo retirado a partir da data da exclusão, e a presente Convenção deixa de estar em vigor para a referida Parte a partir daquela data.

7. Sempre que a presente Convenção deixe de estar em vigor para uma Parte, a liquidação das contas entre a Organização e qualquer Signatário designado por essa Parte, ou a Parte na sua qualidade de Signatário, deve ser efectuada em conformidade com o disposto no artigo XIII do Acordo de Exploração.

Artigo 31.°

Resolução de litígios

1. Os litígios que surjam entre Partes, ou entre Partes e a Organização, em relação aos direitos e obrigações estabelecidos ao abrigo da presente Convenção

devem ser resolvidos por via de negociação entre as Partes em litígio. Se, num prazo de um ano a contar da data em que qualquer Parte tenha requerido a resolução e essa resolução não tenha sido conseguida, e se as Partes em litígio não tiverem concordado em submeter o mesmo ao Tribunal Internacional de Justiça ou a qualquer outro processo para resolução de litígios, o litígio pode, se as Partes em litígio consentirem, ser submetido a arbitragem em conformidade com o Anexo à presente Convenção. Qualquer decisão de um tribunal arbitral num litígio entre Partes, ou entre Partes e a Organização, não impedirá nem afectará as decisões da Assembleia nos termos do n.° 1 do artigo 30.°, no sentido de que a Convenção deixe de estar em vigor para uma Parte.

2. Salvo se for mutuamente acordado de outro modo, os litígios que surjam entre a Organização e uma ou mais Partes relativos a acordos concluídos entre elas, se não forem resolvidos por negociação no prazo de um ano a contar da data em que qualquer Parte em litígio tenha requerido a resolução, deverão, a pedido de qualquer Parte em litígio, ser submetidos a arbitragem, de acordo com o Anexo à presente Convenção.

3. Os litígios que surjam entre uma ou mais Partes e um ou mais Signatários nessa sua qualidade, relativos aos direitos e obrigações estabelecidos na presente Convenção ou no Acordo de Exploração podem ser submetidos a arbitragem de acordo com o Anexo à presente Convenção se a Parte ou Partes e o Signatário ou Signatários envolvidos concordarem com essa arbitragem.

4. Este artigo continua a aplicar-se a uma Parte ou Signatário que deixe de ser Parte ou Signatário, no que diz respeito a litígios referentes aos direitos e obrigações resultantes de terem sido uma Parte ou Signatário.

Artigo 32.°
Assinatura e ratificação

1. A presente Convenção fica aberta à assinatura em Londres até à sua entrada em vigor e a partir dessa data permanece aberta para adesão. Todos os Estados podem tornar-se Partes na Convenção por:

a) Assinatura sem reserva quanto à ratificação, à aceitação ou à aprovação; ou

b) Assinatura com reserva de ratificação, de aceitação ou de aprovação, seguida de ratificação, de aceitação ou de aprovação; ou

c) Adesão.

2. A ratificação, a aceitação, a aprovação ou a adesão são efectuadas através do depósito do instrumento apropriado junto do Depositário.

3. Ao tornar-se uma Parte na presente Convenção ou em qualquer momento posterior, um Estado pode declarar, através de notificação escrita dirigida ao Depositário, a que registos de navios operando sob a sua autoridade e a que estações terrenas em terra sob sua jurisdição a Convenção se aplica.

4. Nenhum Estado se pode tornar Parte na presente Convenção até que tenha assinado, ou a entidade que ele designou tenha assinado, o Acordo de Exploração.

5. Não podem ser formuladas reservas à presente Convenção nem ao Acordo de Exploração.

Artigo 33.°
Entrada em vigor

1. A presente Convenção entra em vigor sessenta dias após a data na qual os Estados representando 95% das quotas-partes iniciais de investimento se tornaram Partes na Convenção.

2. Não obstante as disposições do n.° 1, se a Convenção não tiver entrado em vigor num prazo de trinta e seis meses após a data na qual foi aberta à assinatura, não entrará em vigor.

3. Para um Estado que deposite um instrumento de ratificação, de aceitação, de aprovação ou de adesão depois da data em que a Convenção entrou em vigor, a ratificação, a aceitação, a aprovação ou a adesão produzem efeitos na data do depósito.

Artigo 34.°
Emendas

1. As emendas à presente Convenção podem ser propostas por qualquer Parte. As propostas de emenda são submetidas à Direcção, a qual informa as outras Partes e os outros Signatários. Só passados três meses após a apresentação de uma proposta de

emenda esta pode ser apreciada pelo Conselho, o qual deve submeter as suas opiniões à Assembleia, num período de seis meses a partir da data da divulgação da proposta. A Assembleia não pode apreciar a proposta de emenda antes de decorridos seis meses a partir daquela data, tendo em consideração quaisquer opiniões expressas pelo Conselho. Este prazo pode ser reduzido pela Assembleia, em casos especiais, mediante uma decisão tomada em conformidade com o procedimento previsto para as questões de fundo.

2. Se for adoptada pela Assembleia, a emenda entra em vigor cento e vinte dias depois de o Depositário ter recebido as notificações de aceitação por parte de dois terços dos Estados que, à data da adopção pela Assembleia, eram Partes e representavam pelo menos dois terços do total das quotas-partes de investimento. Após a entrada em vigor, a emenda torna-se vinculativa para todas as Partes e todos os Signatários, incluindo aqueles que não a aceitaram.

Artigo 35.°
Depositário

1. O Depositário da presente Convenção é o Secretário-geral da Organização Consultiva Marítima Intergovernamental.

2. O Depositário deve informar prontamente todos os Estados que tiverem assinado a Convenção ou que a ela tiverem aderido e todos os Signatários de:

a) Qualquer assinatura da Convenção;

b) O depósito de qualquer instrumento de ratificação, aceitação, aprovação ou adesão;

c) A entrada em vigor da Convenção;

d) A adopção de qualquer emenda à Convenção e a sua entrada em vigor;

e) Qualquer notificação de retirada;

f) Qualquer suspensão ou exclusão;

g) Outras notificações e comunicações relacionadas com a Convenção.

3. Após a entrada em vigor da Convenção, o Depositário envia uma cópia certificada da mesma ao Secretariado das Nações Unidas para registo e publicação, de acordo com o disposto no artigo 102.° da Carta das Nações Unidas.

EM TESTEMUNHO DO QUE os abaixo assinados, devidamente autorizados pelos respectivos Governos, assinaram a presente Convenção.

FEITO em Londres, a 3 de Setembro de 1976, nas línguas inglesa, francesa, russa e espanhola, sendo todos os textos igualmente autênticos, num único original, que fica depositado junto do Depositário, o qual envia uma cópia certificada do mesmo ao Governo de cada um dos Estados convidados a participar na Conferência Internacional para o Estabelecimento de um Sistema Internacional de Satélites Marítimos e ao Governo de qualquer outro Estado que assine ou adira à presente Convenção.

ANEXO

Normas para a resolução dos litígios referidos no artigo 31.° da Convenção e no artigo XVI do Acordo de Exploração

Artigo 1.°

Os litígios previstos no artigo 31.° da Convenção ou no artigo XVI do Acordo de Exploração são submetidos a um tribunal arbitral constituído por três membros.

Artigo 2.°

Qualquer requerente ou grupo de requerentes que pretendam submeter um litígio a arbitragem devem fornecer a cada requerido e à Direcção documentação contendo:

a) Uma descrição completa do litígio, as razões pelas quais se requer que cada requerido participe na arbitragem e as medidas que se solicitam;

b) As razões pelas quais o objecto do litígio é da competência do tribunal e as razões pelas quais as medidas solicitadas podem ser atendidas por aquele tribunal, se este se pronunciar a favor do requerente;

c) Uma exposição explicando as razões pelas quais o requerente não pôde solucionar o litígio por negociação ou outros meios alheios à arbitragem;

d) Prova do acordo ou consentimento dos litigantes quando isso constitua condição prévia de recurso à arbitragem;

e) O nome da pessoa designada pelo requerente para fazer parte do tribunal.

A Direcção deve distribuir prontamente uma cópia da documentação a cada Parte e a cada Signatário.

Artigo 3.°

1. Dentro de sessenta dias a contar da data da recepção, por todos os requeridos, das cópias da documentação descrita no artigo 2.°, estes devem designar colectivamente uma pessoa para fazer parte do tribunal. Dentro desse período os requeridos podem, em conjunto ou separadamente, fornecer a cada litigante e à Direcção um documento contendo as suas respostas individuais ou colectivas à

documentação referida no artigo 2.° e incluindo quaisquer contestações decorrentes da matéria sujeita a litígio.

2. Dentro de trinta dias após a designação dos dois membros do tribunal, estes devem escolher um terceiro árbitro. Este não pode ser da mesma nacionalidade, nem residente no mesmo território de qualquer litigante, nem estar ao seu serviço.

3. Se uma das Partes não nomear um árbitro no período estabelecido ou se o terceiro árbitro não for nomeado no período estabelecido, o Presidente do Tribunal Internacional de Justiça, ou, se este estiver impedido de actuar ou for da mesma nacionalidade de um dos litigantes, o Vice-Presidente, ou, se este estiver impedido de actuar ou for da mesma nacionalidade de um dos litigantes, o juiz mais antigo que tenha nacionalidade diferente dos litigantes, pode, a pedido de qualquer dos litigantes, nomear um árbitro ou árbitros, consoante o caso.

4. O terceiro árbitro assume as funções de presidente do tribunal.

5. O tribunal fica constituído a partir da nomeação do seu presidente.

Artigo 4.°

1. Se ocorrer uma vaga no tribunal por qualquer razão que o presidente ou os restantes membros do tribunal decidam ser alheia à vontade dos litigantes, ou que seja compatível com a adequada prossecução da arbitragem, a vaga deve ser preenchida de acordo com as disposições seguintes:

a) Se a vaga ocorrer como resultado da retirada de um membro nomeado por uma das partes no litígio, essa parte deve escolher um substituto no prazo de dez dias após a ocorrência da vaga;

b) Se a vaga ocorrer como resultado da retirada do presidente ou de um membro nomeado nos termos do disposto no n.° 3 do artigo 3.°, deve ser escolhido um substituto pela forma indicada nos números 2 ou 3, respectivamente, do artigo 3.°.

2. Se ocorrer uma vaga por qualquer outra razão, ou se não for preenchida uma vaga ocorrida nos termos do disposto no n.° 1, os restantes membros do tribunal, a pedido de uma das Partes, têm poder para, não obstante o disposto no artigo 1.°, continuar o processo e proferir a decisão final.

Artigo 5.°

1. O tribunal decide a data e o local das suas sessões.

2. Os debates decorrem em sessões à porta fechada e todos os documentos e peças apresentados ao tribunal são confidenciais. Contudo, a Organização e qualquer Parte que tenha designado um Signatário que seja parte no litígio têm o direito de estar presente e têm acesso a todos os documentos e peças apresentados. Quando a Organização for um litigante, todas as Partes e todos os Signatários têm o direito de estar presentes e têm acesso a todos os documentos e peças apresentados.

3. Em caso de litígio sobre a competência do tribunal, o tribunal aprecia esta questão em primeiro lugar.

4. O processo é conduzido por escrito e cada parte tem o direito de produzir provas escritas em abono das suas alegações de facto e de direito. Contudo, se o tribunal o considerar apropriado, podem ser feitas alegações verbais e ouvidas testemunhas.

5. O processo começa com a apresentação das alegações do requerente, contendo os seus argumentos, os factos com eles relacionados apoiados em provas e os princípios jurídicos invocados. As alegações do requerente são seguidas pela contestação do requerido. O requerente pode replicar à contestação do requerido e o requerido pode apresentar uma tréplica. Só podem ser apresentadas alegações adicionais se o tribunal as considerar necessárias.

6. O tribunal conhece das reconvenções que resultem directamente da matéria objecto do litígio, desde que as reconvenções sejam da sua competência, conforme o definido no artigo 31.° da Convenção e no artigo XVI do Acordo de Exploração.

7. Se as Partes chegarem a acordo no decurso do processo, o acordo fica registado sob a forma de uma sentença do tribunal dada com o consentimento das partes litigantes.

8. Em qualquer altura do processo, o tribunal pode pôr termo ao processo se concluir que o litígio excede a sua competência, conforme o definido no artigo 31.° da Convenção ou no artigo XVI do Acordo de Exploração.

9. As deliberações do tribunal são secretas.

10. As decisões do tribunal são apresentadas e fundamentadas por escrito. Os seus despachos e decisões devem ser aprovados, pelo menos, por dois membros do tribunal. Um membro que esteja em desacordo com a decisão pode apresentar a sua opinião separadamente por escrito.

11. O tribunal comunica a sua decisão à Direcção, a qual a dá a conhecer a todas as Partes e a todos os Signatários.

12. O tribunal pode adoptar regras processuais adicionais, compatíveis com as estabelecidas no presente Anexo, que sejam apropriadas ao processo.

Artigo 6.°

Se uma das partes não apresentar o seu caso, a outra parte pode pedir ao tribunal que profira uma sentença com base nas suas alegações. Antes de proferir a sentença, o tribunal deve certificar-se de que é competente e de que a acção está fundamentada de facto e de direito.

Artigo 7.°

1. Qualquer Parte cujo Signatário seja parte num litígio tem o direito de intervir e de se tornar parte no litígio. A intervenção deve ser notificada por escrito ao tribunal e aos outros litigantes.

2. Qualquer outra Parte, qualquer Signatário ou a Organização pode solicitar ao tribunal autorização para intervir e tornar-se parte no litígio. O tribunal deve conceder a autorização se concluir que o peticionário tem um interesse fundamental no litígio.

Artigo 8.°

O tribunal pode nomear peritos para o coadjuvar, a pedido de um litigante ou por sua própria iniciativa.

Artigo 9.°

Cada Parte, cada Signatário e a Organização fornecem todas as informações que o tribunal, a pedido de uma parte no litígio ou por sua própria iniciativa, considere necessárias para a instrução e resolução do litígio.

Artigo 10.°

Enquanto estiver pendente a decisão final, o tribunal pode indicar quaisquer medidas cautelares que considere necessárias para salvaguardar os direitos das partes.

Artigo 11.°

1. A sentença do tribunal deve respeitar o direito internacional e basear-se:

a) Na Convenção e no Acordo de Exploração;

b) Nos princípios de direito geralmente aceites.

2. A decisão do tribunal, incluindo qualquer acordo entre as partes no litígio nos termos do disposto no n.° 7 do artigo 5.° do presente Anexo, tem força obrigatória para todas as partes no litígio e deve por elas ser executada de boa fé. Se a Organização for parte e o tribunal decidir que uma decisão de qualquer dos órgãos da Organização é nula e de nenhum efeito, por não estar autorizada por, ou não respeitar a Convenção ou o Acordo de Exploração, a decisão do tribunal tem força obrigatória para todas as Partes e todos os Signatários.

3. Se houver desacordo quanto ao significado ou ao alcance da sentença, o tribunal que a tiver proferido deve interpretá-la a pedido de qualquer parte no litígio.

Artigo 12.°

Salvo se o tribunal decidir de outro modo devido a circunstâncias especiais do processo, as despesas do tribunal, incluindo a remuneração dos membros do tribunal, são repartidas igualmente pelas partes. Se a uma parte no litígio corresponder mais do que um litigante, o tribunal deve repartir os encargos dessa parte entre os respectivos litigantes. Quando a Organização for parte num litígio, as despesas relacionadas com a arbitragem que lhe corresponderem são consideradas como despesas administrativas da Organização.

第 124/2015 號行政長官公告

中華人民共和國於一九九九年十二月十三日以照會通知聯合國秘書長，經修訂的《1974年國際海上人命安全公約》自一九九九年十二月二十日起適用於澳門特別行政區；

國際海事組織海上安全委員會於二零零零年十二月五日透過第MSC.97（73）號決議通過了《2000年國際高速船安全規則》（2000年HSC規則），該規則自二零零二年七月一日起適用於澳門特別行政區；

基於此，行政長官根據第3/1999號法律《法規的公佈與格式》第六條第一款的規定，命令公佈包含上指規則的第MSC.97（73）號決議的中文及英文文本。

二零一五年十一月十日發佈。

行政長官　崔世安

Aviso do Chefe do Executivo n.º 124/2015

Considerando que a República Popular da China, por nota datada de 13 de Dezembro de 1999, notificou o Secretário-Geral das Nações Unidas sobre a aplicação da Convenção Internacional para a Salvaguarda da Vida Humana no Mar de 1974, tal como emendada, na Região Administrativa Especial de Macau a partir de 20 de Dezembro de 1999;

Considerando igualmente que, em 5 de Dezembro de 2000, o Comité de Segurança Marítima da Organização Marítima Internacional, através da resolução MSC.97(73), adoptou o Código Internacional de Segurança para as Embarcações de Alta Velocidade, 2000 (Código HSC 2000), e que tal Código é aplicável na Região Administrativa Especial de Macau desde 1 de Julho de 2002;

O Chefe do Executivo manda publicar, nos termos do n.º 1 do artigo 6.º da Lei n.º 3/1999 (Publicação e formulário dos diplomas), a resolução MSC.97(73), que contém o referido Código, nos seus textos em línguas chinesa e inglesa.

Promulgado em 10 de Novembro de 2015.

O Chefe do Executivo, *Chui Sai On*.

第 MSC.97（73）號決議

（2000 年 12 月 5 日通過）

通過《2000 年國際高速船安全規則》

（2000 年 HSC 規則）

海上安全委員會，

憶及國際海事組織公約第 28（b）條關於本委員會職能的規定，

注意到《國際高速船安全規則》（1994 年 HSC 規則）和《（1974 年國際海上人命安全公約》（SOLAS）（下文簡稱“本公約”）第 X 章使 1994 年 HSC 規則成為本公約規定的強制性要求，

認識到自 1994 年 HSC 規則通過以來，由於高速船的新類型和尺度的發展以及海上安全標準的提高，有必要對有關高速船的設計、結構、設備和操作的規定進行修訂，以便保持最高可行的安全水準，

並注意到本委員會以 MSC.99（73）號決議通過了公約第 X 章的修正案，使《2000 年國際高速船安全規則》（2000 年 HSC 規則）的規定成為本公約對 2002 年 7 月 1 日或其後建造的高速船的強制性要求，

在其第 73 屆會議上，**審議了**經過對 1994 年 HSC 規則徹底修訂而制定的 2000 年 HSC 規則草案的文本，

1. **通過**《2000 年國際高速船安全規則》（2000 年 HSC 規則），其文本見本決議的附件；

2. **提請**本公約的締約國政府注意 2000 年 HSC 規則將在 2002 年 7 月 1 日和本公約第 X 章的修正案同時生效；

3. **要求**秘書長將本決議及其所附 2000 年 HSC 規則文本的經核准的副本分發給公約的所有締約國政府；

4. **進一步要求**秘書長將本決議及其附件分發給本公約非締約政府的本組織成員。

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2000 年國際高速船安全規則

序言

1 以常規船舶為基礎批准的國際公約以及其後應用的規則都已經有了很大的發展，其中所考慮的是常規船舶的建造和營運方式。歷來，船舶是採用鋼材建造的，並在營運方面所受控制很少。因此，從事遠程國際航行的船舶只要申請檢驗並取得《船舶安全證書》，就可以在世界任何區域航行，而不受任何營運限制。只要船舶沒有發生嚴重事故，所有要做的就是在船舶安全證書期滿前，申請主管機關檢驗合格，重新取得證書。

2 控制船舶的傳統方法不應被認為是保證船舶適當的安全水準唯一可行的方法。採用不同衡準的其他方法不一定就是不能採用。長期以來，已經開發了大量新設計的海船，並在營運。雖然它們不盡滿足適用於常規鋼船的國際公約的規定，但它們已經證明，如限制營運的氣象條件，並按經認可的維護和監督程序從事有限航行，它們具有以等效安全水準營運的能力。

3 《1994 年高速船規則》（1994 年 HSC 規則）係國際海事組織 1977 年通過的《動力支承船安全規則》（DSC 規則）演變而成，當時認識到依靠與特定航線、定期航行相關的基本設施能夠使高速船的安全性顯著提高，而常規船舶的安全原理是建立在船舶自身承受能力和船載的所有必需應急設備的基礎上。

4 本規則的安全原理是基於控制和減少風險，以及一旦發生事故時被動保護的傳統原理。在評估安全性等效於現行公約時，應考慮艙室佈置、主動式安全系統、營運限制、質量管理、人為因素工程等方面的風險控制。應鼓勵採用數學分析法評估風險和確定安全措施的效能。

5 本規則考慮到高速船的排水量較常規船小，這是為了取得高航速和參與海上運輸的競爭而必須達到的參數。因而，本規則允許使用非常規的造船材料，但必須保證其達到至少不低於常規船要求的安全標準。

6 本規則採用基於航速和體積的傅汝德數衡準來定義高速船，以區別於其他常規船舶。

7 本規則的規定還考慮了因高速而可能引起的不同於常規船舶運輸的其他危險。因此，除了發生事故時的常規要求（包括救生設備、撤離用設施等）之外，還進一步強調如何將出現危險狀況的風險減小。高速船自身的某些優點，例如相對排水量而言的儲備浮力較大，也減少了《1966 年國際載重線公約》提到的某些危險。此外，本規則中較嚴格的航行和營運規定，以及有關艙室設施的特殊規定，對於諸如高速航行發生碰撞之類其他危險的後果起到抵消作用。

8 上述安全概念最初反映在 DSC 規則和 1994 年 HSC 規則中。然而，高速船類型的新穎化和尺度的發展，致使海事界越來越要求對於非動力支承的高速貨船、載運大量乘客的高速客船或者航行範圍超出原規則的許可範圍的高速船，應按上述概念發證。另外，還需將自 1994 年以來海上安全標準的改進，反映在 1994 年 HSC 規則的修訂中，以保持與常規船舶的安全性等效。

9 為此，1994 年 HSC 規則體現了兩個不同的防護和救援概念。

10 概念之一認識到當初制訂 DSC 規則時已預見到的高速船。如能方便迅速地取得救援且限制載客總數，則可以允許減少被動防護和主動防護。這類船被稱為“受援船”，並且是本規則中“A 類客船”的基礎。

11 概念之二認識到高速船進一步發展到較大的船舶。如不能迅速而方便地取得救援或者乘客總數不受限制，對於這類船則必須提出附加的被動和主動防護設施要求。這些附加要求是：船上提供安全避難處所，足夠的主要系統，增強水密和結構完整性，以及充足的滅火能力。這類船舶屬“非受援船”，是本規則中“貨船”和“B 類客船”的基礎。

12 基於達到符合《1974 年國際海上人命安全公約》的船舶所能達到的等效安全水準的原則，已將上述兩個概念形成一個統一文件。如果新技術或新設計的採用，確能證明其安全水準與嚴格使用本規則所達到的安全水準等效，則允許主管機關正式承認此等效性。

13 主管機關在按本規則的要求考慮高速船的適航性時，應採用本規則的全部章節，這是很重要的，因為不符合本規則的任何部分均可能引起對船舶、乘客和船員的安全產生不利影響的不平衡性。基於同樣理由，現有船舶進行可能影響安全的改裝，應經主管機關批准。

14 制定本規則時，又考慮到要確保高速船不對現有用戶提出有關環境條件方面的不合理要求，或者反過來不會因現有用戶缺少適當艙室設施而遭受不必要的損失。不管對要求的承受能力如何，不必將這些要求完全套用到高速船上。

15 《1994 年國際高速船安全規則》第 1.15.1 段規定：該規則應由本組織定期複審，間隔期不宜超過四年，以根據設計和技術方面的新發展，考慮對現有要求進行修訂。1994 年 HSC 規則於 1996 年生效以來，在其實際應用中所獲得的經驗已導致一種共識，即該規則需要修訂和更新。本組織隨後開展的工作導致制定了目前這份規則，以確保更大和更快的新型高速船不會因不斷採用最新技術和創新成果而影響其安全。

第 1 章 一般評述和要求

1.1 一般評述

本規則應作為一整套綜合性的要求來使用。本規則對從事國際航行的高速船的設計和建造、應配設備以及營運和維修條件作出規定。本規則的基本目標是借助於結構和設備標準以及嚴格的操作控制規定高速船的安全水準，使之與經修正的《1974 年國際海上人命安全公約》（SOLAS 公約）和《1966 年國際載重線公約》（載重線公約）對於常規船舶所要求的安全水準等效。

1.2 一般要求

使用本規則應滿足下列一般要求：

.1 應完整地使用本規則；

.2 高速船公司的經營者通過質量管理體系對高速船的營運和維修實行嚴格的控制；

.3 經營者保證只僱用有資格在指定航線上操縱特定類型高速船的人員；

.4 通過實行營運限制使航行距離及允許高速船營運的最壞預計工況得到限制；

.5 高速船在任何時候都應處於避難處合理的附近範圍之內，並充分考慮到第 1.3.4 段的規定；

.6 高速船在其營運區域內具有足夠的通信、氣象預報和維修設備；

.7 在高速船擬營運的區域內有隨時可提供的合適的救助設備；

.8 失火危險較大的區域，如機器處所和特種處所，應採用耐火材料和滅火系統加以保護，以保證儘實際可能遏制火焰蔓延並迅速撲滅；

.9 提供將所有人員迅速並安全撤至救生艇筏內的設施；

.10 所有乘客和船員都應有座位；和

.11 不設置乘客用的封閉式臥鋪。

1.3 適用範圍

1.3.1 如 1.3.4 所述，本規則適用於 2002 年 7 月 1 日或其後安放龍骨或處於類似建造階段的從事國際航行的高速船。

1.3.2 就本規則而言，術語“類似建造階段”係指在以下階段：

.1 可辨認出某一具體船舶建造開始；和

.2 該船業已開始的裝配量至少為 50t，或為包括上層建築和甲板室在內的全部結構所用材料估算重量的 3%，取其小者。

1.3.3 就本規則而言：

.1 “建造的高速船”指安放龍骨或處於類似建造階段的高速船；和

.2 無論何時建造的高速貨船改裝成高速客船，從開始改裝之日起應視作建造的高速客船。

1.3.4 本規則適用於：

.1 在其航行過程中，以營運航速航行至避難處不超過 4h 的高速客船；和

.2 在其航行過程中，滿載以營運航速航行至避難處不超過 8h 的 500 總噸及以上的高速貨船。

1.3.5 除另有明文規定外，本規則不適用於下列船舶：

.1 軍用艦艇和運兵船；

.2 非機動船；

.3 構造簡陋的木船；

.4 非營業性的游艇；和

.5 漁船。

1.3.6 本規則不適用於僅航行於北美洲五大湖和聖勞倫斯河東至羅歇爾角與安提科斯提島西點之間的直線以及在安提科斯提島北面水域東至西經 63°線的高速船。

1.3.7 本規則的適用範圍應經主管機關驗證，並能為高速船所到國家的政府接受。

1.4 定義

除另有明文規定外，就本規則而言所用術語定義如下，附加的定義補充在各章的通則中。

1.4.1 “主管機關”係指船旗國政府。

1.4.2 “氣墊船”（ACV）係指船舶不論在靜止或運動時，其重量的全部或絕大部分能被連續產生的氣墊所支承的船舶，這種船氣墊的有效程度取決於該船航行時船底離水面的高度。

1.4.3 “周年日”係指相應於有關證書有效期屆滿的每年的月份和日期。

1.4.4 “集合站”係指船舶在緊急情況下，能夠使乘客集中並給與指令以及必要時準備棄船的地方。乘客處所可以用作集合站，只要這些處所能容納所有乘客接受指令，並準備好棄船。

1.4.5 “輔機處所”係指設有驅動發電機的輸出功率為 110kW 及以下的內燃機、水噴淋器、消防泵、艙底泵等、加油站、總功率超過 800kW 的配電板的諸處所，類似處所，以及通往這些處所的圍壁通道。

1.4.6 “無火災危險或火災危險極小的輔機處所”係指設置冷藏、穩定、通風和空調機械、總功率 800kW 及以下的配電板的諸處所，類似處所，以及通往這些處所的圍壁通道。

1.4.7 “基地港”係指在營運手冊中規定的專門港口，並備有：

.1 任何時候都能與在港口或海上的高速船保持連續的無線電通信的適當設施；

.2 能取得相應地區的可靠天氣預報，並及時發送到所有營運中船舶的手段；

.3 能為“A 類船”提供適當的救助設備和救生設備的渠道；以及

.4 有適當設備，能為該船維修服務。

1.4.8 “基地港國”係指基地港所在的國家。

1.4.9 “船寬（*B*）”係指剛性船體水密外殼的最大型寬，不包括在排水狀態下提升或推進機械不工作時設計水線處或以下的附體。

1.4.10 “貨船”係指客船外的其他高速船。這類船任意一艙破損後，其他未損處所的主要功能和安全系統仍能維持正常狀態。

1.4.11 “裝貨處所”係指除特種處所和滾裝處所以外所有裝貨處所和通往這些處所的圍壁通道。就第 7 章 D 部分而言，“裝貨處所”包括滾裝處所、特種處所和開敞甲板處所。

1.4.12 “A 類船”係指符合下列條件的任一高速客船：

.1 船旗國和港口國對營運的航線已經了解並確信：一旦船舶在該航線任何地點出事而需撤船，有很大把握能在下列三項中最短時間內將所有乘客和船員安全救出：

—— 在最壞預計工況下為保護救生艇筏內的人員免予因暴露而造成體溫過低的時間；

—— 與該航線所處的環境條件和地理特點相適應的時間；

—— 4h；和

.2 載客不超過 450 人。

1.4.13 “B 類船”係指除 A 類船以外的任何其他高速客船。這類船的機器和安全系統的佈置應在一旦任何艙內的任何重要機械和安全系統失效時，該船仍能保持安全航行的能力。在這方面，不應推斷出第 2 章所考慮的破損情況。

1.4.14 “船公司”係指公約第 IX 章所定義的公司。

1.4.15 “持續有人操作的控制站”係指船舶正常營運期間，總有一名負責的船員持續操作的控制站。

1.4.16 “控制站”係指設有無線電設備或航行設備，或應急電源和應急配電板的處所，或防火記錄或防火控制設備集中的處所，或設置對船舶安全營運非常重要的其他功能諸如推進控制、有線廣播和穩定系統的處所。

1.4.17 “公約”係指經修正的《1974 年國際海上人命安全公約》。

1.4.18 “船員起居艙室”係指用於船員的處所，包括船員艙室、醫療室、辦公室、盥洗室、休息室及類似的處所。

1.4.19 “臨界設計工況”係指為設計目的而選取的限制性特定條件，高速船在排水狀態下應維持這些條件。該條件應比“最壞預計工況”更惡劣，是通過合適的界限為船舶在殘存情況下提供足夠的安全性。

1.4.20 “基準面”係指水密甲板或由風雨密結構覆蓋的非水密甲板等效結構，該風雨密結構具有足夠強度保持風雨密完整性並設有風雨密關閉裝置。

1.4.21 “設計水線”係指船舶的提升和推進機械不工作時，船舶最大營運重量所對應且由第 2 章和第 3 章的規定予以限制的水線。

1.4.22 “排水狀態”係指船舶不論在靜止或運動時，其全部或大部分重量由靜水力支承的一種狀態。

1.4.23 “故障模式和影響分析”（FMEA）係指按附錄 4 核查船舶的系統和設備以確定任何在合理的範圍內可能發生的故障或不適當的操作是否會導致危險的或災難性的後果。

1.4.24 “耐火試驗程序規則”（FTP 規則）係指公約第 II-2 章所定義的《國際耐火試驗程序應用規則》。

1.4.25 “襟翼”係指組成水翼或氣翼的完整部分或延伸部分的一個部件，用以調整該翼的水動或氣動升力。

1.4.26 “閃點”係指使用《國際海上危險貨物運輸規則》（IMDG 規則）所述的封閉杯式儀器測得的閃點。

1.4.27 “翼”係指高速船航行時產生流體動升力的一塊翼狀板或三維結構物。

1.4.28 “全浸式水翼”係指在翼航狀態下無割劃水面產生升舉力構件的水翼。

1.4.29 “廚房”係指設有暴露加熱面的烹飪設備的封閉處所，或配有任何功率大於 5kW 的烹飪或加熱裝置的封閉處所。

1.4.30 “高速船”係指以每秒米數（m/s）為單位的最大航速等於或大於下述數值的船舶：

$$3.7\nabla^{0.1667}$$

式中：∇=對應設計水線的排水量（m^3）

不包括在非排水狀態下船體由地效應產生的氣動升力完全支承在水面以上的船舶。

1.4.31 “水翼船”係指非排水狀態時由水翼產生的水動升力支承在水面以上的船。

1.4.32 “船長”（*L*）係指船在排水狀態（即提升和推進機械不工作）時設計水線處及以下的剛性船體水下水密外殼的總長，不包括附體。

1.4.33 “空船重量”係指無貨物，液艙（櫃）無燃油、滑油、壓載水、淡水、給養水，以及無消耗備品，無乘客、船員和他們所攜物品時的船舶排水量，以 t 計。

1.4.34 “救生設備規則（LSA 規則）”係指公約第 III 章所定義的《國際救生設備規則》。

1.4.35 “機器處所”係指設有總輸出功率 110kW 以上的內燃機、發電機、燃油裝置、推進機械、主要電機的諸處所和類似的處所，以及通往這些處所的圍壁通道。

1.4.36 “最大營運重量”係指經主管機關允許的按預定狀態營運時達到的總重量。

1.4.37 “最大航速”係指船舶處在最大營運重量狀態，以最大持續推進功率在靜水中航行能達到的航速。

1.4.38 “非排水狀態”係指船舶在其重量主要由非靜水力支承時的正常營運狀態。

1.4.39 “燃油裝置”係指以大於 $0.18N/mm^2$ 的壓力給鍋爐和輪機（包括燃氣輪機）準備並輸送經加熱未加熱燃料的設備。

1.4.40 “開敞滾裝處所”係指：

.1 任何車輛所載乘客都能抵達的滾裝處所；和

.2 下列兩者之一：

.2.1 兩端都敞開的滾裝處所；或

.2.2 一端敞開的滾裝處所，但在其側壁或天花板或上方設置永久性開口，這些開口的總面積至少為該處所各側壁總面積的 10%。

1.4.41 “操縱限制”係指高速船在控制、操縱和性能及其所須遵守的營運程序方面所受的限制。

1.4.42 “操縱室”係指執行船舶航行和控制的封閉區域。

1.4.43 “操縱站”係指操縱室內設有必需的航行、操縱和通信設施的限制區域。在此區域執行航行、操縱、通信指揮、下達舵令和瞭望觀察等業務。

1.4.44 “營運航速”係指最大航速的 90%。

1.4.45 “組織”係指國際海事組織。

1.4.46 “乘客”係指除下列人員之外的人員：

.1 船長和船員或在船上以任何職務從事或參加該船業務的其他人員；及

.2 1 周歲以下的兒童。

1.4.47 “客船”係指載客超過 12 人的船舶。

1.4.48 “避難處所”係指在船舶處於可能對其安全構成危險的情況下可提供庇護的任何天然或人工的遮蔽區域。

1.4.49 “公共處所”係指供乘客使用的處所，包括酒吧、小賣部、吸煙室、主要座位區、娛樂室、餐廳、休息室、走廊、盥洗室和其他類似的處所，並可包括賣品店。

1.4.50 “小賣部”係指供應點心飲料並設有總功率為 5kW 或 5kW 以下和暴露加熱表面溫度不超過 150℃ 的食品加熱設備的非封閉處所。

1.4.51 “滾裝高速船”係指設有一個或多個滾裝處所的高速船。

1.4.52 “滾裝處所”係指通常不作任何分隔並通常延伸至船舶的大部分長度或整個長度的處所，該處所通常能以水平方向裝載或卸下油箱內裝有自用燃油並/或載有貨物（以包裝或散裝形式載於鐵路或公路車輛（包括公路或鐵路油罐車）、拖車、集裝箱、貨盤、可拆箱櫃內或可拆箱櫃上，或類似裝載裝置或其他容器內或容器上）的機動車輛。

1.4.53 “服務處所”係指設有加熱食品的設備，但不帶有暴露加熱表面的烹調設備的配膳室、儲存艙櫃、賣品部、儲藏室和封閉的行李間等封閉處所。

1.4.54 “有義波高”係指在給定時間內觀察到的三分之一最大波高的平均值。

1.4.55 “特種處所”係指可供乘客出入的封閉滾裝處所。如果車輛的總淨高度合計不超過 10m，特種處所可設在一個以上甲板上。

1.4.56 “表面效應船”（SES）係指一種藉助永久浸在水中的硬結構可全部或部分保持氣墊的氣墊船。

1.4.57 “過渡狀態”係指介於排水狀態和非排水狀態之間的狀態。

1.4.58 “與某一結構有關的水密”係指在完整或破損情況中可能產生的水壓下能夠防止水從任何方向穿過該結構。

1.4.59 “露天甲板”係指上方並至少有兩側完全暴露在露天的甲板。

1.4.60 “風雨密”係指在臨界設計工況規定範圍內的任何風力和波浪狀況下，水不會滲入船內。

1.4.61 “最壞預計工況”係指船舶證書中規定的該船從事預定營運的環境條件。應考慮諸如允許的最大風力、有義波高（包括波長和浪向的不利組合）、最低氣溫、能見度、安全操作水深等最差條件參數，以及主管機關認為在該區域營運的這種類型的高速船所需要的其他參數。

1.5 檢驗

1.5.1 每艘高速船都應作如下檢驗：

.1 初次檢驗，每艘船投入營運之前或首次取得證書之前應進行該項檢驗。

.2 換新檢驗，按主管機關規定的間隔期，但不超過 5 年，船舶應進行該項檢驗，適用 1.8.5 或 1.8.10 規定者除外。

.3 定期檢驗，船舶證書簽發周年日前後 3 個月內應進行該項檢驗；和

.4 附加檢驗，如有特別情況發生時的檢驗。

1.5.2 上述 1.5.1 中涉及的檢驗應按下列規定執行：

.1 初次檢驗包括：

.1.1 對有關裝載、環境條件、航速和操縱性所作的假定和限制作出評估；

.1.2 對根據計算、試驗、試航獲得的用以證明該設計的安全性的各種數據作出評價；

.1.3 進行本規則所要求的“故障模式和影響分析”；

.1.4 檢查提供給船舶的各種手冊是否齊全；和

.1.5 對船舶的結構、安全設備、無線電設備和其他裝置、屬具、佈置和材料作全面檢查，以保證其符合本規則的要求，並確信其處於滿意的狀態和適合該船預定的服務；

.2 換新檢驗和定期檢驗應對船體結構（包括船底外部和有關項目）、安全設備、無線電設備和 1.5.2.1 中所述的其他裝置作全面檢驗，以保證其合本規則的要求，並確信其處於滿意的狀態和適合該船預定的服務。應在船舶處於脫離水面的合適狀態下對船底進行近觀檢驗，仔細檢查任何損壞或有問題的部位；和

.3 按 1.7.3 規定進行調查並按要求修理之後，或作了重大修理或更新之後，應根據實際情況進行普遍或部分的附加檢驗。該檢驗應保證：所作的必要修理和更新是有效的，此修理和更新所採用的材料和工藝各方面均為滿意，且該船在各方面均能符合本規則的要求。

1.5.3 以上 1.5.1.3 所述的定期檢驗應簽署在高速船安全證書上。

1.5.4 為了執行本規則規定的要求，應由主管機關的官員承擔船舶檢查和檢驗。當然，主管機關也可授權由其為此目的而指定的驗船師或其認可的組織執行檢驗和檢查。

1.5.5 主管機關至少應授予執行 1.5.4 檢驗和檢查的指定驗船師或認可的組織以下權限：

.1 要求修理船舶；和

.2 若港口國有關當局請求時，進行檢查和檢驗。

主管機關應將其指定的驗船師或認可的組織的具體職責和授權條件通知本組織。

1.5.6 當指定的驗船師或認可的組織確定船舶的狀況或其裝備情況實際上與其證書不符時，或該船營運會危及船舶或船上人員的安全時，該驗船師或組織應確保其立即採取糾正措施，並及時通知主管機關。如果該糾正措施未予執行，則應撤消其證書並立即通知主管機關；若船舶在其他締約國政府的管轄區域內，則應立即通知該港口國的有關當局。港口國有關當局接到船舶主管機關的官員、指定的驗船師或認可的組織的通知後，有關港口國的政府應為這些官員、指定的驗船師和認可的組織提供必需的幫助，使其能按本節規定實施其職責。如可行，有關港口國政府還應確保：除非該船投入營運後不會給船舶或船上人員帶來危險，否則該船不應繼續投入營運。

1.5.7 主管機關在任何情況下都應充分保證檢查和檢驗的完整性和有效性，並應確保為履行此職責而作出必要的安排。

1.6 批准

船東有責任向主管機關提供充分的資料，使其能對船舶的設計特徵作出充分的評估。特別要建議，船公司、主管機關和港口國（如可能）在儘可能早的階段就開始進行討論，以便主管機關充分評估該船的設計，從而確定要使該船達到規定的安全水準應適用的附加要求或變通要求。

1.7 檢驗後狀況的維持

1.7.1 船舶及其設備的狀況應始終保持符合本規則規定的狀況，以確保該船在各方面均適合營運，不會給船舶或船上人員帶來危險。

1.7.2 船舶在完成第 1.5 節規定的任何檢驗後，未經主管機關批准，已檢驗的結構、設備、屬具、佈置和材料均不得變更。

1.7.3 當船舶發生事故或發現缺陷，不論其是影響船舶的安全，還是影響到結構、設備、屬具、佈置和材料的有效性和完整性，該船的船長或船東應儘早報告負責的主管機關、指定的驗船師或認可的組織，主管機關、指定的驗船師或認可的組織應促使進行調查，決定是否有必要進行 1.5 規定的檢驗。如果該船在另一國家政府管轄的地區，船長或船東還應立即向港口國有關當局報告。指定的驗船師或認可的組織應查明上述報告是否已經作出。

1.8 高速船安全證書

1.8.1 完成船舶的初次檢驗或換新檢驗並確認該船符合本規則規定後，應頒發“高速船安全證書”。該證書應由主管機關或主管機關認可的任何個人或組織簽發或簽署。在任何情況下，主管機關都應對證書完全負責。

1.8.2 公約締約國政府可應其他國家主管機關的要求使船舶接受檢驗，如認為該船符合本規則要求，應按照本規則規定發給或授權發給證書，並且（如適用）簽署或授權簽署證書。如此簽發的證書務必載明是受船旗國政府的委託而簽發的，此項證書與按 1.8.1 所發證書具有同等效力，並受同樣的承認。

1.8.3 證書的格式見本規則附錄 1。若所用文字不是英文、法文或西班牙文，則文本中應包括這三種文字之一的譯文。

1.8.4 應按主管機關規定的期限簽發高速船安全證書，此期限應不超過 5 年。

1.8.5 雖然 1.8.4 對簽發證書的間隔期作了規定，若在原證書到期之日前 3 個月以內完成換新檢驗，則新證書應從該換新檢驗完成之日起生效，有效期自原證書到期之日起不超過 5 年。

1.8.6 若在原證書到期之日後完成換新檢驗，則新證書應在換新檢驗完成之日起生效，有效期自原證書到期之日起不超過 5 年。

1.8.7 若在原證書到期之日前 3 個月以上完成換新檢驗，則新證書應在換新檢驗完成之日起生效，有效期自換新檢驗完成之日起不超過 5 年。

1.8.8 若簽發證書的間隔期限不滿 5 年，只要所作的檢驗係按簽發 5 年期證書的要求進行，則主管機關可以將該證書的有效期從到期之日展期至 1.8.4 規定的最大期限。

1.8.9 若換新檢驗已完成，但新證書尚不能在原證書到期之日前換發或交到船上，則主管機關授權的個人或組織可以對原證書簽署展期。此證書被視作繼續有效，其有效期自原證書到期之日起不應超過 5 個月。

1.8.10 若證書到期時船舶不在預定檢驗的港口，則主管機關可將該證書展期，但此展期僅以能使該船駛抵預定檢驗地點為限，而且僅在如此辦理時看來是適當和合理的情況下才行。此類證書展期不得超過 1 個月，而且獲得這樣展期的船舶，在抵達預定檢驗地點後不得因獲上述展期而在未領到新證書之前駛離該地。新證書應在完成換新檢驗後發給並生效，有效期自獲得展期之前的原證書到期之日起不超過 5 年。

1.8.11 在特殊情況下，根據主管機關的決定，新證書不必按 1.8.6 或 1.8.10 所規定的原證書到期之日起不超過 5 年計算有效期。在這種狀況下，新證書的有效期應為自完成換新檢驗之日起不超過 5 年。

1.8.12 若定期檢驗在 1.5 規定的期限之前完成，則

.1 應修改證書上的周年日，以不超過此項檢驗完成之日以後 3 個月的某一日期為簽署日期；

.2 1.5 規定的下次定期檢驗應以新的周年日計算，在 1.5 闡明的間隔期內完成；和

.3 到期之日可以保持不變，只要進行了一次或多次定期檢驗，使 1.5.1.3 闡明的檢驗之間最大間隔期未被超過。

1.8.13 在下列任一情況下按 1.8.1 或 1.8.2 簽發的證書應為失效：

.1 在 1.5.1 規定的期限內未完成相應的檢驗；

.2 未按 1.5.3 規定簽署證書；

.3 船舶變更船旗國時。只有當換發新證書的國家政府確認該船已滿足 1.7.1 和 1.7.2 的要求時，才換發新證書。在原船旗國政府和新船旗國政府均為公約締約國政府的情況下，如原船旗國政府在變更船旗後的 3 個月內接到要求，應儘速將變更船旗前該船所攜證書的副本及有關檢驗報告的副本（如備有），送交該船的新的主管機關。

1.8.14 任何船舶除持有有效證書外，不得要求本規則賦予各項特權。

1.9 高速船營運許可證書

1.9.1 高速船除具有高速船安全證書外，還應取得有效的高速船營運許可證書，才能從事商業性運輸。無高速船營運許可證書的高速船，可以從事不運載乘客或貨物的過渡航行。

1.9.2 高速船營運許可證書應由主管機關頒發，以證明該高速船符合 1.2.2 至 1.2.7 的要求，並規定該高速船的營運條件，其擬定應以本規則第 18 章規定的航線操縱手冊中的內容為基礎。

1.9.3 主管機關在頒發高速船營運許可證書之前應諮詢各個港口國政府，以便獲得該船營運所涉及國家的各種營運條件的細節。主管機關應將那些強制性條件記入營運許可證書，並且納入該船航線操縱手冊。

1.9.4 港口國政府為了查明該船的狀況與條件是否與其營運許可證書相符，可以對該船進行檢查並審核其文件資料。如在審核中發現缺陷，則該營運許可證書將停止有效，直到此類缺陷被糾正或採取其他解決方法。

1.9.5 1.8 的規定同樣適用於高速船營運許可證書的頒發和有效期限。

1.9.6 高速船營運許可證書的樣本見本規則附錄 2。若所用文字不是英文、法文或西班牙文，則文本中應包括這三種文字之一的譯文。

I.10 控制

公約第 I/19 條的規定除適用於按 1.8 要求頒發的高速船安全證書外，還應適用於高速船營運許可證書。

I.11 等效

1.11.1 凡本規則要求船舶應裝設或配備的專門裝置、材料、設備或器具，或其型式，或本規則要求應制訂的任何專門規定，主管機關可准許該船裝設或配備任何其他的裝置、材料、設備或器具，或其型式，或採取任何其他措施，但須通過試驗或其他方法，經主管機關認定這些替代的裝置、材料、設備或器具或其型式，或其他措施至少與本規則所要求者具有同等效能。

1.11.2 對於特殊設計的高速船，如滿足本規則任一規定為不切實際時，主管機關可允許採用變通要求，只要這種變通能達到等效的安全水準。該主管機關應將此替代的情況和理由通知本組織，然後由本組織通告各成員國。

1.12 應配備的資料

1.12.1 主管機關應確保經營高速船的船公司經營部門已經為高速船提供了手冊形式的充足資料和指導性文件，以使高速船能進行安全營運和維護。這些手冊應包括航線操縱手冊、船舶操作手冊、維修手冊和航班表。應對上述資料作必要的更新，使其切合最新情況。

1.12.2 上述手冊的內容至少應包括第 18 章所規定的資料，且應使用船員能看懂的文字。如果所用文字不是英文，則至少應該提供航線操縱手冊和船舶操作手冊的英文譯本。

1.13 今後的發展

1.13.1 應承認當今高速船設計方面的研究和發展日新月異，不斷湧現的新型高速船的形狀可能與制訂本規則時所設想的不同。本規則不限制這種新型設計的進展和開發，這一點十分重要。

1.13.2 某一設計或許不能符合本規則的規定，在這種情況下，主管機關應該確定本規則的規定對該設計的應用範圍，並在必要時制訂某些附加要求或變通要求，為高速船提供一個等效安全標準。

1.13.3 主管機關在按本規則要求評估和批准等效時，應考慮上述兩點。

1.14 安全信息的傳遞

1.14.1 當主管機關對涉及適用本規則的船舶海損事故作調查時，主管機關應將其官方報告的副本提交本組織。本組織將提請各成員國注意此報告以便取得副本。

1.14.2 如在船舶營運實踐中暴露出結構或設備方面的缺陷影響到船舶設計的安全性時，船東應通知主管機關。

1.15 本規則的複審

1.15.1 本規則將由本組織按不宜超過 4 年的間隔期予以複審，以便根據設計和技術的新發展而考慮對現有要求進行修改。

1.15.2 當主管機關認定新設計和新技術的成果可被採納時，該主管機關可將該成果的細節提交本組織，以便本組織在定期複審時考慮將其納入本規則中。

第 2 章 浮力、穩性與分艙

A 部分－一般規定

2.1 通則

2.1.1 船舶應具備：

.1 在非排水狀態和過渡狀態營運時，足以保證安全的穩性和穩定系統；

.2 在排水狀態營運時，並在完整和破損情況下，足以保證安全的浮力和穩性；和

.3 一旦發生任何系統故障足以保證船舶由非排水和過渡狀態安全轉至排水狀態的穩性。

2.1.2 計算穩性時應考慮結冰的影響。附錄 5 中給出了結冰允許量實際經驗的例子，供主管機關作指南用。

2.1.3 除另有明文規定者外，下列定義適用於本章和其他各章：

.1 “向下進水點”係指當船處於完整或破損狀態下，橫傾至越過平衡角一個角度時，使構成儲備浮力的處所可能發生浸水的任一開口。

.2 “全浸式水翼”係指在翼航狀態下無割劃水面產生升舉力構件的水翼。

.3 “單體船”係指非多體船的高速船。

.4 “多體船”係指以正常可以達到的縱傾或橫傾角營運時，以一個以上分離部位貫入海面的剛性船體結構的高速船。

.5 “處所的滲透率”係指該處所可能被水所佔部分容積的百分數。

.6 “圍裙”係指用於抑制或劃分氣墊的向下延伸的柔性結構。

2.1.4 只要能證明所選用的方法提供了同等水準的安全，也可接受用其他方法表明符合本章任何部分提出的要求。這些方法包括：

.1 動態數學模擬；

.2 比例模型試驗；和

.3 實船試驗。

2.1.5 模型試驗或實船試驗和/或計算（如適用）還應考慮高速船按船型會有下列已知的各種穩性危險：

.1 經常隨橫搖失穩和縱搖失穩一起出現的方向失穩；

.2 以接近波浪速度的航速隨波航行時突然橫轉或船艏浸入水中，大部分高速船都有這種情況；

.3 在相對平靜的海面滑行的單體船和雙體船因喪失動態縱穩性，其船艏浸入水中；

.4 單體船橫穩性隨航速增大而減少；

.5 在水面滑行的單體船船頭不斷升出水面和沉入水中，並且船體也有縱搖和升沉運動，這種起伏運動會變得很劇烈；

.6 在水面滑行的單體船舭緣縱材傾側失穩，此現象出現在舭緣縱材浸入水中產生強大的傾覆力矩時；

.7 由於船頭或船側的圍裙縮進或由於圍裙突然嚴重變形，氣墊船沿縱向或橫向猛然浸入水中，這在極端情況下會導致翻船；

.8 小水線面雙體船（SWATH）由於浸入水中的下部船體之上的水流所形成的水動力力矩而縱搖失穩；

.9 表面效應船（SES）在高速回旋時的有效穩心高度低於直線行駛時的有效穩心高度，即橫搖過穩，這可能導致橫傾角突然增大和/或橫搖或縱搖；和

.10 SES 在橫浪中產生共振橫搖，這在極端情況下會導致翻船。

2.1.6 應進行適當的計算並/或進行試驗，以證明船舶在批准的限制條件下營運時，在經過因回旋而造成橫搖、縱搖、升沉或橫傾的干擾或這些現象的任何複合干擾之後，會恢復其原來狀況。

2.2 完整浮力和水密及風雨密完整性

2.2.1 完整浮力

2.2.1.1 所有高速船均應在設計水線狀態下具有足夠的儲備浮力，以滿足本章的完整穩性和破損穩性要求。為允許高速船在任何預期的狀態下運行，主管機關可以要求有更大的儲備浮力。只有滿足以下條件的艙室才能包括在儲備浮力的計算中：

.1 水密並位於基準面以下，或

.2 水密或風雨密並位於基準面以上。

在考慮破損穩性時，應假定進水在平衡情況下達到水密界限，在進水的中間階段達到風雨密界限，並在滿足剩餘穩性要求所需的正復原力臂範圍之內。

根據公約第 XI/1 條，凡是按主管機關認可的組織的要求建造的高速船，均可認為具有足夠的強度和完整性。

2.2.1.2 應安排核查 2.2.1.1 所考慮的各個艙室的水密完整性或風雨密完整性，以及 18.2.1 所要求的《高速船操作手冊》所包含的各種細節。

2.2.2 水密分隔的開口

2.2.2.1 水密艙壁的開口數量應減至與船舶的設計和正確運行相容的最低限度，這種門在船舶駛離泊位前均應關閉。

2.2.2.2 水密艙壁的門可以是絞接式或滑動式，並應通過適當的試驗證明其能保持艙壁的水密完整性。應在門的兩面均進行這種試驗，所用壓頭應比由向下進水開口的最小允許高度而定的壓頭大 10%。試驗可在門裝到船上之前或之後進行，但如在岸上試驗，即應通過檢查和沖水試驗確認門在船上的安裝情況令人滿意。

2.2.2.3 只要型式認可過程所包括的壓力試驗的壓頭相當於或大於所要求的壓頭（參見 2.2.2.2），可以接受型式認可，而不必對各扇門單獨進行試驗。

2.2.2.4 所有水密門應能在船舶傾斜至 15°的情況下啟閉，並應在操縱室內設有表明水密門是開啟或關閉的顯示裝置。這種門應能在艙壁的每一側就地啟閉。

2.2.2.5 當船舶在海上時，水密門除了在用作通道的情況下可以開啟外，應保持關閉。應在每扇門旁貼一告示，說明不得讓門敞開。

2.2.2.6 水密門應能從操縱室在不少於 20 秒和不多於 40 秒的時間內遙控關閉，並應配有不同於該區域內其他報警裝置的聲響報警裝置。每當用電力遙控關閉時，聲響報警在門啟動之前至少響 5 秒，但不多於 10 秒，並持續至門完全關閉。按公約第 II-1/15.7.3 條的規定，電源、控制裝置和顯示器在主電源失效的情況下應仍能操作。在乘客區域和環境噪聲大於 85dB（A）的區域，應在門口設一間歇視覺信號作為對聲響警報的補充。如主管機關確認這樣的水密門對於船舶的操作安全非常重要，在設有 2.2.2.4 所要求的遙示器的情況下，可允許在僅供船員進出的區域裝有只能就地控制的絞接式水密門。

2.2.2.7 如管道、排水孔、電纜等穿過水密分隔，水密貫穿裝置應是以等於或大於其在船上實際安裝位置所須承受的浸水壓力經過原型試驗的裝置。試驗壓力應至少保持 30 分鐘，貫穿裝置在此期間不得有任何滲漏。試驗壓頭應比根據一個向下浸水開口的最小允許高度設定的壓頭大 10%。連續焊接而成的水密艙壁貫穿件不須進行原型試驗。從穩性計算範圍內的風雨密艙室通出的排水孔的閥，應在操縱站設有遙控關閉裝置。

2.2.2.8 如通風管道是水密界限的一部分，該管道應能承受可能出現的水壓，這要考慮到在浸水的所有階段的最大允許傾角。

2.2.3 船艏內門

2.2.3.1 如滾裝船設有船艏裝貨開口，在這些開口的後面應設有一扇船艏內門，以在外部關閉裝置失效的情況下限制浸水程度。如設有這種船艏內門，該門應：

.1 對於上面一層甲板保持風雨密，該層甲板本身應對其前面的船艏裝貨開口保持風雨密；

.2 其佈置在船艏裝貨門損壞或拆下的情況下，防止因船艏裝貨門而導致其受損的可能性；

.3 位於車輛甲板上所有用於載運車輛的車位之前；和

.4 是為防止船舶其餘部分浸水而設計的界限的一部分。

2.2.3.2 船舶如適用下列各項中的一項，可免除關於這種船艏內門的要求：

.1 船艏內門處的車輛裝運甲板在設計水線以上的高度大於相應於最壞預計工況的有義波高；

.2 可用船模試驗或數學模擬法來證明，當船舶在與最壞預計工況相應的最大有義波高的長峰浪海況下朝各種航向航行，其航速範圍達到載荷狀況下所能達到的最大航速時：

.1 船艏內門不會被海浪觸及；或

.2 在打開船艏裝貨門進行試驗以確定積聚的最大穩態水量之後，可通過靜力分析證明在車輛甲板上積聚同樣水量的情況下滿足 2.6.11 和 2.13 或 2.15 的剩餘穩性要求。如船模試驗或數學模擬法不能證明積聚的水量達到穩定狀態，即應認為船舶沒有滿足這種免除的條件。

如採用數學模擬法，應先按實船試驗或用船模試驗予以驗證；

.3 船艏裝貨開口通向設有護欄或符合 2.2.3.2.4 要求的排水口的開敞滾裝處所；

.4 設計水線以上最低一層滾裝處所甲板的每側設有排水口，沿該艙室的舷側均勻分佈。這些排水口應按 2.2.3.2.2 的要求進行試驗以證明其是可以接受的，或符合下列各項：

.1 $A \geq 0.3l$

式中：

A=甲板每側排水口的總面積，m^2；和

l=該艙室長度，m；

.2 在最壞情況下，船舶在滾裝處所甲板處應至少保持 1m 剩餘乾舷；

.3 這些排水口的位置應在滾裝處所甲板以上 0.6m 高度範圍以內，排水口的下緣應在滾裝處所甲板以上 0.2m 範圍以內；和

.4 這些排水口應設有關閉裝置或擋板，用於在排放滾裝處所甲板上可能積聚的水時，防止水進入該甲板。

2.2.4 關於滾裝高速船的其他規定

2.2.4.1 在滾裝處所內通向甲板下面各個處所的所有出入通道，其最低點應不低於按 2.2.3.2.2 進行試驗所要求的高度或設計水線以上 3m。

2.2.4.2 如設有車輛跳板通向滾裝處所甲板下面的各個處所，這些跳板的開口應能在關閉後保持風雨密，以防止向下進水。

2.2.4.3 可允許在滾裝處所內設有通向滾裝甲板下面各個處所，並且最低點低於按 2.2.3.2.2 進行試驗所要求的高度或設計水線以上 3m 的出入通道，但這些通道必須是水密的，在船舶離開錨地開始任何航次之前關閉並在到達下一錨地之前保持關閉狀態。

2.2.4.4 以上 2.2.4.2 和 2.2.4.3 所述通道應在操縱室設有報警指示器。

2.2.4.5 特種處所和滾裝處所應以有效手段，例如電視監控進行巡查和監視，以在船舶航行途中能探察到車輛在惡劣氣候條件下的任何移動和乘客擅自進入該處所（參見 7.8.3.1）。

2.2.5 指示器和監控

2.2.5.1 指示器

所有邊門、裝貨門和其他關閉裝置均應在操縱室設有指示器。這些門和關閉裝置如果未關上或未關妥，在完好和破損情況下均可能導致大量進水。指示器系統應按故障安全原則設計，應在門未完全關閉或任何鎖閉裝置不到位和未完全鎖住時，發出視覺報警信號，並在這類門或關閉裝置打開或鎖閉裝置鬆開時發出聲響警報。操縱室的指示器的顯示板應有“港口/海上航行”模式選擇功能，如船舶離港而未關閉首門、內門、船艉跳板或其他任何邊門或任何關閉裝置未到位，會在操縱室發出聲響警報。指示器系統的供電應獨立於用以操縱和鎖閉各扇門的供電。

2.2.5.2 電視監控

應設有電視監控和漏水監測系統，向操縱室和發動機控制台顯示船艏內門和外門、尾門或任何其他邊門可能導致大量浸水的任何漏水。

2.2.6 上層建築的完整性

2.2.6.1 如基準面以上的各個建築的進水對船舶穩性和浮力會有重大影響，則這些建築應：

.1 有足夠強度保持水密完整性，並設有風雨密關閉裝置；或

.2 設有足夠的排水裝置；或

.3 是上述兩種手段的等效組合。

2.2.6.2 基準面以上的上層建築和甲板室應在外部限界上設有關閉開口的裝置，其強度足以使所涉及的未受損處所在所有破損情況下保持風雨密完整性。此外，關閉裝置應在所有營運情況下保持風雨密完整性。

2.2.7 在風雨密處所限界內的門、窗等

2.2.7.1 風雨密上層建築和甲板室內的門、窗等以及任何相關的框和欖應是風雨密的，並應在均勻承受的壓力小於會使相鄰建築產生永久變形或失效的壓力時不致漏水或失效。符合主管機關按公約第 XI/l 條的規定認可的組織的要求，即可認為具備足夠強度。

2.2.7.2 對於風雨密上層建築內的門，應從外部進行沖水試驗，試驗規格至少要與本組織可接受的規格等效。

2.2.7.3 通向露天甲板的門道的門檻，尤其是在露天部位的門檻在甲板以上的高度應以合理和可行為限。在基準面以上各層甲板上的風雨密處所的門的門檻的這種高度一般應不少於 100mm，在別處不少於 250mm。對於船長在 30m 及以下的高速船，門檻高度可減至與高速船的工作安全相符的最低值。

2.2.7.4 在特種處所或滾裝處所的限界內或基準面以下不應允許設置窗戶。如營運許可證內的限制性規定有要求，方向朝前的窗戶或在浸水的任何階段均可能被淹沒的窗戶應設有可立即使用的鉸接或滑動風暴蓋。

2.2.7.5 基準面以下各處所的舷窗應在內側設有有效的鉸接窗蓋，使之可有效關閉和水密固緊。

2.2.7.6 舷窗的安裝位置不應使其窗檻低於與設計水線平行並在其上方一米的直線。

2.2.8 艙口和其他開口

2.2.8.1 由風雨密艙蓋關閉的艙口

確保貨物和其他艙口的風雨密性的構造和裝置應符合以下各點：

.1 在基準面以上各層甲板上各層風雨密處所的艙口圍板的高度一般應不少於 100mm，在別處不少於 250mm。對於船長 30m 及以下的高速船，圍板高度可減至與高速船的工作安全相符的最低值；

.2 如主管機關確信船舶安全在直至最壞預計工況的任何海況下不會受到影響，這些圍板的高度可以減少或完全不設圍板。如設有圍板，圍板應結構牢固；和

.3 固緊和保持風雨密的裝置應確保能在直至最壞預計工況的任何海況下保持密封性。

2.2.8.2 機器處所開口

2.2.8.2.1 機器處所開口應有合適的框架並用強度足夠的艙棚有效地圍閉，如係無其他結構防護的艙棚，則其強度應作專門考慮。上述艙棚的出入口應設有風雨密門。

2.2.8.2.2 對於基準面以上各層甲板上的風雨密處所開口，門檻和圍板的高度一般應不小於 100mm，在別處不小於 380mm。對於船長 30m 及以下的高速船，這些高度可減至與高速船的工作安全相符的最低值。

2.2.8.2.3 機器處所通風筒開口應符合 2.2.8.4.2 的要求。

2.2.8.3 露天甲板的各種開口

2.2.8.3.1 在基準面上的或封閉式上層建築以外的上層建築內的人孔和平的小艙口應以能保持水密的堅固罩蓋關閉。除用間隔緊密的螺栓固定者以外，罩蓋應以永久性方式安裝。

2.2.8.3.2 如罩蓋由間隔緊密的螺栓固定，在海上保持關閉狀態並配有移動護欄裝置，則通向機器等處的維修用艙口可佈置成齊平艙口。

2.2.8.3.3 除艙口、機器處所開口、人孔和甲板窗以外，在露天甲板上通向基準面以下的處所或封閉式上層建築的開口，應由一個封閉式上層建築或一個具有等效強度和風雨密性的甲板室或升降口罩予以保護。

2.2.8.3.4 對於在基準面以上各層甲板上的風雨密處所的門，升降罩門道的門檻在甲板以上的高度一般應不小於 100mm，在別處不小於250mm。對於船長 30m 及以下的高速船，門檻高度可減至與高速船的工作安全相符的最低值。

2.2.8.4 通風筒

2.2.8.4.1 在基準面或封閉式上層建築甲板以下處所的通風筒應有結構牢固的圍板，該圍板應與甲板有效相連。對於在基準面以上各層甲板上的風雨密處所的通風筒，圍板高度一般應不小於 100mm，在別處應不小於 380mm。對於船長 30m 及以下的高速船，門檻高度可減至與高速船的工作安全相符的最低值。

2.2.8.4.2 如通風筒的圍板伸出甲板一米以上或設在基準面以上的甲板上，則通風筒不需設有關閉裝置，除非通風筒方向朝前或主管機關有特殊要求。

2.2.8.4.3 除 2.2.8.4.2 的規定外，通風筒開口應裝設有效的風雨密關閉裝置。

2.2.8.4.4 只要可行，通風筒的開口應朝向船艉或船側。

2.2.9 泄水孔、進水孔和排水孔

2.2.9.1 從基準面以下處所或從設在基準面以上的上層建築和甲板室內通過船殼的排水孔，均應裝設有效和便於檢視的防止水進入船內的裝置。通常每一獨立的排水孔應有一個從基準面以上的位置可靠關閉的自動止回閥。但是，如果從設計水線至排水管船內一端的垂直距離超過 0.01L，只要船內的閥在營運條件下始終便於檢查，則排水孔可有兩個無關閉裝置的自動止回閥。如上述垂直距離超過 0.02L，可以

接受無可靠關閉裝置的單一自動止回閥。可靠作用閥的操縱裝置應便於檢視，並設有一個顯示該閥開或閉的指示器。

2.2.9.2 從穩性計算範圍內的風雨密艙室通出的泄水孔上的閥應可從操縱室進行操縱。

2.2.9.3 在有人操縱的機器處所，與機器運轉有關的主、副海水進水孔和排水孔可以就地控制。這些控制裝置應便於使用，並應設有表示閥是開或閉的指示器。在無人操縱的機器處所，與機器運轉有關的主、副海水進水孔和排水孔應可從操縱室進行操縱。

2.2.9.4 由未裝設風雨密門的上層建築或甲板室引出的泄水孔應通到舷外。

2.2.9.5 本規則要求的所有外板上的附件和閥應由合適的韌性材料製成。不應接受由普通生鐵或類似材料製成的閥。

2.2.10 空氣管

2.2.10.1 存放可燃液體的主貯存液艙或能泵出或灌注海水的液艙，應設有終端不在封閉處所的空氣管。

2.2.10.2 所有延伸到露天甲板的空氣管從甲板至可能向下進水點的高度，如該甲板在設計水線以上不足 0.05L，應至少為 300mm，在所有其他甲板上應至少為 150mm。

2.2.10.3 如上層建築的高度在未受損船舶橫傾 15°時至少在任何水線以上 0.02L，或至少在破艙穩性計算確定的所有進水階段的最高水線以上 0.02L（取其大者），空氣管可通過上層建築的側面排水。

2.2.10.4 所有空氣管均應配有自動關閉的風雨密關閉裝置。

2.2.11 排水口

2.2.11.1 如舷牆在露天甲板上形成阱，應有充分準備以迅速排除甲板積水和放盡積水。主船體露天甲板上每個阱在船舶舷側的最小排水口面積（A）應是：

.1 如在阱內的舷牆長度（l）為 20m 或小於 20m：

$A=0.7+0.035l$（m^2）；和

.2 如 l 大於 20m：

$A=0.07l$（m^2）；

而且在任何情況下，所取的 l 值不必大於 0.7L。

如舷牆平均高度大於 1.2m，所需面積對於每 0.1m 高度差應按每米阱長增加 $0.004m^2$。如舷牆平均高度小於 0.9m，所需面積對於每 0.1m 高度差應按每米阱長減少 $0.004m^2$。

2.2.11.2 上述排水口的位置應在甲板以上 0.6m 高度範圍內，其下緣應在甲板以上 0.02m 範圍內。

2.2.11.3 舷牆中所有上述開口應用間距約為 230mm 的欄桿或鐵條保護。如排水口設有蓋板，則應有足夠空隙以防卡住。鉸鏈的銷子或軸承應採用耐腐蝕材料。如蓋板裝有扣緊裝置，該裝置應為認可的結構。

2.2.11.4 上層建築在船艏或在船艏和船艉均敞開的高速船應符合 2.2.11.1 的規定。

2.2.11.5 對於上層建築在船艉敞開的高速船，最小排水口面積應為：

$A=0.3b$（m^2）

式中：b=露天甲板處的船寬（m）

2.2.11.6 船艏裝貨開口通向開敞車輛處所的滾裝船應符合 2.2.3 的規定。

2.3 排水狀態下的完整穩性

2.3.1 割劃式水翼船和/或全浸式水翼船在所有允許的裝載工況下，應具有足夠的穩性以符合附錄 6 的有關規定，尤其是當其承受該附錄 1.1.2 和 1.1.4 之中較大的傾側力矩時，應保持其橫傾角小於 10°。

2.3.2 根據 2.3.4 的要求，除水翼船以外的單體船在所有允許的裝載工況下，應符合附錄 7 的有關要求。

2.3.3 根據 2.3.4 的要求，除水翼船以外的單體船在所有允許的裝載工況下，應符合附錄 8 的有關要求。

2.3.4 如果多體船的特性不適合於應用附錄 7 的規定，或單體船的特性不適合於應用附錄 8 的規定，主管機關可以根據船舶類型和營運區域接受等效於規定衡準的其他衡準。可按下表所示採用附錄 7 和附錄 8 的要求。

附錄 7 和附錄 8 應用於單體船和多體船一覽表

GM_T	$\frac{B_{WL} \cdot A_{WP}}{\nabla}$	
	≤7	>7
≤3.0	附錄 8	附錄 8 或附錄 7
>3.0	附錄 8 或附錄 7	附錄 7

表中：

B_{WL}=設計水線處的最大水線面寬（m）；對於多體船，此寬度應計至船體外側

A_{WP}=設計水線處的水線面面積（m^2）

▽=設計水線處的排水量（m^3）

GM_T=相應於設計水線的裝載工況下的橫穩性高度，已對自由液面影響進行修正（m）

2.4 非排水狀態下的完整穩性

2.4.1 本節和2.12的要求適用的假定條件是任何設置的穩定系統完全有效運行。

2.4.2 對於系列船的首艘船和/或其他船的橫搖穩性和縱搖穩性，應在第 18 章和附錄 9 要求的營運安全性試航中作質量評定。此類試航的結果可以指明是否有必要實施營運限制。

2.4.3 如果船舶設置割劃水面的結構或附體，則應採取預防措施，防止在與浸沒水中或漂浮水面的物體碰撞後船舶出現危險的姿態或傾側和失去穩性。

2.4.4 在設計中，如果把定期利用氣墊變形作為控制船的一種輔助手段，或把定期利用氣墊向大氣排氣以操縱船舶，則應確定對墊升穩性的影響，並應根據船的速度或姿態制定這種利用限度。

2.4.5 對設置柔性圍裙的氣墊船，應證明圍裙在營運條件下保持穩固。

2.5 過渡狀態下的完整穩性

2.5.1 在一般氣象情況直至最壞預計工況下，從排水狀態轉為非排水狀態以及相反過程所用的時間應儘可能短，除非證明穩性在此過渡期間無實質性的減小。

2.5.2 水翼船應符合附錄 6 的有關規定。

2.6 破損後排水狀態下的浮力與穩性

2.6.1 本節的要求適用於所有允許的裝載工況。

2.6.2 為進破損穩性計算，體積和表面滲透率一般應按下述各項計取：

處所	滲透率（%）
貨物或儲物處所	60
起居處所	95
機器處所	85
液體艙櫃	0 或 95①
貨物車輛處所	90
空艙	95

① 取導致更苛刻要求者。

2.6.3 儘管有 2.6.2 的規定，但如果 2.6.2 規定的滲透率導致更不利的狀態，則滲透率應採用直接計算確定，而且如該規定導致較小不利的狀況，則也可採用直接計算。

2.6.4 主管機關可以允許在空艙利用低密度泡沫材料或其他介質提供浮力，條件是應提供足夠的證據表明任何此類推薦的介質是最合適的替代物，以及

.1 如果是泡沫材料，應呈封閉網眼形，否則，應為不透水；

.2 在營運條件下結構穩固；

.3 相對於與之接觸的結構材料，或相對於可能與該介質接觸的其他物質應是化學惰性的（參閱 7.4.3.7）；和

.4 應就地適當固定，並應易於搬移，以便檢查該空艙。

2.6.5 主管機關可以允許在無艙底水系統或空氣管的情況下，在船體的水密外殼範圍內設置空的底艙，條件是：

.1 該結構能承受本節所要求的任何破損之後的壓頭；

.2 在按本節要求計算破損穩性時，與破損區域相鄰的任何空艙均應包括在計算之內，並應符合 2.6、2.13 和 2.15 的衡準；

.3 滲進空艙的水的排除方式應包括在第 18 章所要求的高速船操縱手冊中；和

.4 為按 2.2.1.2 的要求對所述處所進行的檢驗提供充足的通風。

2.6.6 任何較 2.6.7 至 2.6.10 規定範圍小的破損，按適用情況對會導致更嚴重的情況者，也應予以檢查。破損的形狀應假定為一個平行六面體。

2.6.7 船側破損範圍

下列船側破損應假定發生在船舶周邊的任何位置：

.1 破損的縱向範圍應為 $0.75\nabla^{1/3}$，或（$3m+0.225\nabla^{1/3}$）或 11m，取最小者；

.2 船的橫向穿破範圍應為 $0.2\nabla^{1/3}$。然而，如果船舶設置充氣圍裙或無浮力船側結構，則橫向穿破範圍應至少伸入主浮力船體或艙室結構 $0.12\nabla^{1/3}$；和

.3 破損的垂向範圍應取船的全部垂直範圍。

式中：∇=相應於設計水線的排水量（m^3）。

2.6.8 在容易碰擦破損部位的船底破損範圍

2.6.8.1 適用範圍

.1 船體表面任何部分均被認為容易碰擦破損，如果：

.1 在靜水中以營運航速與水接觸，和

.2 位於在圖 2.6.8.1 所示高度垂直於船中縱剖面的兩個平面以下。

對於多個船體，各個船體應單獨考慮。

.2 應假定在龍骨和下圖所示的上限之間的船體表面沿首尾線發生碰擦破損；

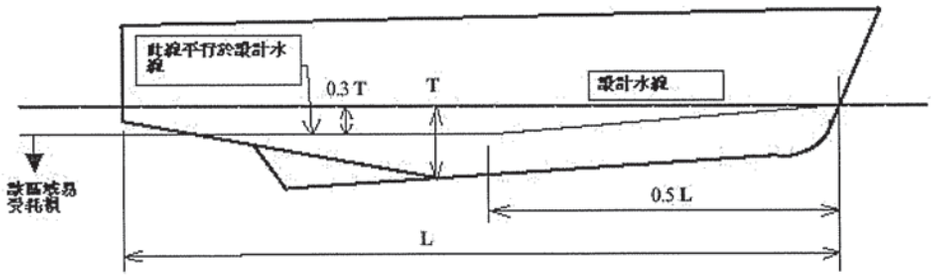


圖 2.6.8.1

其中：T=船體（對於多個船體，其中的每個船體應單獨考慮）至設計水線的最大吃水，不包括無浮力結構

.3 破損不應與 2.6.7 或 2.6.9 所定義的破損同時適用。

2.6.8.2 破損範圍

2.6.8.2.1 應單獨考慮下述兩種不同的縱向破損範圍：

.1 從每個船體水下浮力體積最前端量起的長度 L 的 55%；和

.2 船長 L 的百分比，對於 L=50m 及以上的船等於 35%，對於 L 小於 50m 的船等於（L/2+10）%，適用於船長的任何部分。

2.6.8.2.2 除了下文的規定之外，船殼的垂直穿破範圍應為 $0.04\nabla^{1/3}$ 或 0.5m，取其小者，並且沿船殼圍長等於 $0.1\nabla^{1/3}$，其中▽是相應於設計水線的排水量（m^3）。但是，此垂直穿破範圍或其圍長在任何情況下都不應延伸到 2.6.8.1.1 所規定的容易損壞部位的垂直範圍以上。

2.6.9 在不易碰擦破損部位的船底破損範圍

2.6.9.1 適用範圍

本節適用於船體上所有未定義為易發生 2.6.8.1 所述碰擦破損的部位。破損不應與 2.6.7 或 2.6.8 所定義的破損同時適用。

2.6.9.2 破損範圍

應假定如下破損程度：

.1 首尾線方向的破損長度應為 $0.75\nabla^{1/3}$，或（$3m+0.225\nabla^{1/3}$），或 11m，取最小者；

.2 破損的橫向圍長應為 $0.2\nabla^{1/3}$；和

.3 垂直於船殼的穿破深度應為 $0.02\nabla^{1/3}$，

式中：

∇=相應於設計水線的排水量（m^3）

2.6.10 在將 2.6.8 和 2.6.9 用於多體船，確定任一時刻破損的船體數量時，應考慮設計水線處或其下的寬度為 7m 以內的障礙物。2.6.6 的要求也應採用。

2.6.11 在 2.6.6 至 2.6.10 所假定的任何破損發生之後，船在靜水中應有足夠的浮力和正穩性，以同時確保：

.1 對於兩棲氣墊艇以外的所有高速船，在停止進水和達到平衡狀態之後，最終水線在可能會繼續進水的任何開口以下，距該開口的水平線至少為相應於最壞預計狀況的有義波高的 50%；

.2 對於兩棲氣墊艇，在停止進水和達到平衡狀態之後，最終水線在可能會繼續進水的任何開口以下，距該開口的水平線至少為相應於最壞預計狀況的有義波高的 25%；

.3 從破損水線至救生艇筏登乘位置的乾舷為正值；

.4 組織人員撤離所需的重要應急設備、應急無線電台、供電系統和有線廣播系統保持易接近和可操作；

.5 船的剩餘穩性按表 2.3.4 的要求符合附錄 7 和 8 列出的適用衡準。在附錄 7 和 8 的衡準所確定的正穩性範圍內，無防護的開口不應浸在水中。

2.6.12 在 2.6.11 和 2.6.12 中所述的向下進水開口應包括用於破損控制程序或人員撤離程序的門和艙口，但可以不包括用風雨密門和艙口蓋關閉並且不用於破損控制程序或人員撤離程序的門和艙口。

2.7 傾斜試驗與穩性資料

2.7.1 每一艘建造完工的船舶均應作傾斜試驗，並確定其穩性要素。當不可能作出精確的傾斜試驗時，空船排水量和重心應由空船重量檢驗和精確的計算來確定。

2.7.2 船東應向船長提供符合本條下述規定的與船舶穩性有關的可靠資料。有關穩性的資料在送交船長以前應連同供保持的副本提交主管機關批准，並應包括主管機關在任何特殊情況下可能要求增加和修改的內容。

2.7.3 如果對船舶的任何改建會對提供給船長的穩性資料導致根本性影響時，則還應提交修正的穩性資料。如有必要，船舶應重做傾斜試驗。

2.7.4 每項按本章要求進行的傾斜試驗或空船重量檢驗，以及據此所作空船狀態詳細計算的報告，均應連同供保存的副本提交主管機關批准。批准後的報告應由船東置於船上，由船長負責保管，並當主管機關在任何特殊情況下有要求時，該報告應包括其所要求增加的內容和進行的修正。對平時得到的修正空船狀態細節，應由船長在計算船舶的穩性時使用，代替先前批准的資料。

2.7.5 如主管機關有要求，應在傾斜試驗或空船重量檢驗後把修正的穩性資料提供給船長。所提供的資料應連同供保存的副本一起提交主管機關批准，並應包括主管機關在任何特殊情況下可能要求增加和修改的內容。

2.7.6 證明符合本章要求的穩性資料應以穩性報告書形式編寫，該資料應一直存放在船上由船長負責保管。該資料應包括適用於該船的詳細數據，並應反映船舶的裝載狀況和操作模式。應標註出包括在穩性橫交曲線中的任何封閉上層建築或甲板室以及臨界進水點和進水角。操縱站應有示圖清楚地標明每一層甲板和每個貨艙的水密艙室限界，其中的開口及其關閉裝置和任何控制裝置的位置。

2.7.7 每艘船均應在船艏和船艉設有清晰的吃水標度。如果吃水標誌不是位於容易讀出的地方或因為特殊行業造成的操作限制使得吃水標誌難以讀出，則船上還應設有一個可靠的指明吃水的系統，藉此能確定艏、艉吃水。

2.7.8 船東或船舶建造者，其中合適的一方應確保能精確測定吃水標誌的所在位置，以及該標誌永久性設置於船體上。在傾斜試驗之前，應向主管機關證明吃水標誌的精度。

2.8 裝載與穩性評定

船舶裝載完成後及離港出航之前，船長應確定船的縱傾和穩性，並且還應確認和記錄該船符合有關要求的穩性衡準。主管機關可以同意使用電子裝載和穩性計算機或為此目的的等效手段。

2.9 設計水線的標註與記錄

2.9.1 設計水線應清晰地和永久性地標註在船的外側，位於下述載重線標誌的旁邊。該水線和下文 2.9.2.2 所述基準線應記載在高速船安全證書上。對於無法這樣做的船，例如設有周邊式圍裙的兩棲氣墊艇，應有確定的甲板基準點，用以測量乾舷並由此求得吃水。

2.9.2 載重線標誌

2.9.2.1 載重線標誌由外徑為 300mm，寬為 25mm 的圓圈與長為 450mm，寬為 25mm 的水平線相交組成，該水平線的上緣通過該圓圈的中心。圓圈中心應位於排水狀態下的漂心縱向位置，高度相應於設計水線。

2.9.2.2 為有助於驗證載重線標誌的位置，應在船體的漂心縱向位置用一條長為 300mm，寬為 25mm 的水平線條標註一條基準線，該線條的上緣相當於基準線。

2.9.2.3 如可行，該基準線應與船側的最上層甲板相關聯。如不可能這樣做，應從漂心縱向位置的龍骨底部起確定基準線的位置。

2.9.2.4 核定載重線當局的標誌可標示在通過載重線圓圈中心的水平線上方或上方和下方。此標誌應由不多於四個標明當局名稱的首字母組成，每個字母的高度約為 115mm，寬度約為 75mm。

2.9.2.5 圓圈、線段和字母在深底色上應漆成白色或黃色，在淺底色上應漆成黑色，並且應為永久性標誌。這些標誌應清晰可見。

2.9.3 驗證

在主管機關驗證這些標誌是正確地和永久性地標示在船的兩舷之前，不應發給高速船安全證書。

B 部分－對客運高速船的要求

2.10 通則

如為符合本章的要求而需要考慮乘客重量的影響，應採用下述資料：

.1 每平方米分佈乘客 4 人；

.2 每個乘客質量為 75kg；

.3 坐着的乘客的垂向重心在座椅以上 0.3m 處；

.4 站立的乘客的垂向重心在甲板以上 1.0m 處；

.5 應考慮乘客和行李是在乘客通常可以任意到達的處所；

.6 乘客應分佈在集合站所在的船舶一側甲板區域，並且因此導致乘客產生最不利的橫傾力矩。

2.11 排水狀態下的完整穩性

船舶應具有足夠的完整穩性，使船在靜水狀況下（在所有允許的裝載工況和可能產生的不可控制的乘客移動作用下）所引起的偏離水平位置的傾側不會超過 10°。

2.12 非排水狀態下的完整穩性

2.12.1 在靜水中由於乘客移動的影響和由於附錄 6 中 1.1.4 所述橫向風壓引起的總橫傾角應不超過 10°。如果每當船在非排水狀態下運行時均要求乘客坐在座椅上，則不必考慮乘客的移動。

2.12.2 在所有的裝載工況下，由於回轉引起的向外側橫傾應不超過 8°，並且由於附錄 6 中 1.1.4 所述的橫向風壓和由於回轉引起的向外側總橫傾應不超過 12°。

2.13 破損後排水狀態下的浮力與穩性

2.13.1 在 2.6.6 至 2.6.10 中詳述的任一假設破損發生之後，船舶除滿足 2.6.11 和 2.6.12 的要求以外，還應在靜水中具有足夠的浮力和正穩性，以同時確保：

.1 船舶在任何方向偏離水平線的傾側角通常不超過 10°。然而，如果這是明顯地不切實際的，只要設有有效的防滑甲板表面和諸如防滑孔、防滑條等合適的支撐點，應允許船在破損後立即傾斜至 15°，但能在 15min 內減到 10°；

.2 乘客艙室或脫險通道任何可能的進水不會明顯地阻礙乘客的撤離；

2.13.2 B 類船除 2.13.1 的要求以外，在沿 100%船長 L 遭受碰擦破損後，2.6.8.1 所定義的船體表面任何部分的圍長和穿破情況如同 2.6.8.2.2 所述，則還應符合下列衡準：

.1 船偏離水平位置的傾側角在平衡狀態下應不超過 20°；

.2 正復原力臂範圍在平衡狀態下應至少為 15°；

.3 復原力臂曲線下面的正值範圍在平衡狀態下應至少為 0.015m-rad；

.4 滿足 2.6.11.3 和 2.13.1.2 的要求；和

.5 在進水的中間階段，最大復原力臂應至少為 0.05m，正復原力臂範圍應至少為 7°。

當符合上述衡準時，復原力臂曲線應在進水角終止，並且只需假定僅有一個自由液面。

2.14 傾斜試驗與穩性資料

2.14.1 應按不超過 5 年的定期間隔，對所有客船進行空船重量檢驗，以核查空船排水量和重心縱向位置有無任何變化。與批准的穩性資料相比較，只要發現或預見空船排水量的偏差超過 2%，或重心縱向位置的偏差超過 1%L，則該客船應重做傾斜試驗。

2.14.2 按 2.7.1 要求進行的傾斜試驗或空船重量檢驗的報告，以及據此所作空船狀態詳細計算的報告，應連同供保存的副本提交主管機關批准。該批准的報告應由船東置於船上，並由船長負責保管，當主管機關在任何特殊情況下有要求時，該報告應包括其所要求增加的內容和進行的修正。平時得到的修正空船狀態詳細資料應由船長在計算船舶的穩性時使用，代替先前批准的資料。

2.14.3 如主管機關有要求，應在任何傾斜試驗或空船重量檢驗後，將修正的穩性資料提供給船長。所提供的資料應連同供保存的副本一起提交主管機關批准，並應包括主管機關在任何特殊情況下可能要求增加和修改的內容。

C 部分－對貨運高速船的要求

2.15 破損後排水狀態下的浮力與穩性

在 2.6.6 至 2.6.10 中詳述的任一假設破損發生之後，船舶除滿足 2.6.11 和 2.6.12 的要求之外，還應在靜水中具有足夠的浮力和正穩性，以同時確保船舶在任何方向偏離水平線的傾側角通常不超過 15°。然而，如果這是明顯不切實際的，只要設有有效的防滑甲板表面和合適的支撐點，可允許在船舶破損後立即傾斜至 20°，但能立即在 15min 內減少到 15°。

2.16 傾斜試驗

如果以空船重量檢驗、稱重或其他實證方式確認一艘船的空船重量與該系列的另一艘船按 2.7.1 得到的空船重量基本一致，則主管機關可以不要求按 2.7.1 規定做傾斜試驗。就此而言，處於 2.14.1 參數範圍內的船如與該系列的做過傾斜試驗的船相比較，應被視作與該船基本一致。

第 3 章 結構

3.1 通則

本章涉及構成全船縱向強度和其他主要及局部強度的船體和上層建築的各個構件，也涉及與船體和上層建築直接相連的水翼和圍裙等其他重要部件。

3.2 材料

用於 3.1 中所述的船體和上層建築以及其他部件的材料應適宜於船舶的預定用途。

3.3 結構強度

在船舶的一切經許可的營運條件下，船舶結構應能承受作用在船上的靜、動載荷，不致因這些載荷產生過量的變形和水密損失或妨礙船舶的安全營運。

3.4 周期性載荷

周期性載荷，包括由於船舶振動而產生的那些周期性載荷，不應：

.1 在船舶預定服務年限或主管機關同意的服務年限內損害結構的完整性；

.2 妨礙機器和設備的正常運行；和

.3 影響船員執行其職責的能力。

3.5 設計衡準

設計條件、設計載荷和安全系數的選擇，應與證書所載明的預定航行條件一致，並使主管機關滿意。

3.6 試驗

如主管機關認為有必要，應要求進行實船試驗，以確定所承受的載荷。如試驗結果表明結構計算中的載荷假定不當，應對此加以注意。

第 4 章 艙室佈置與脫險措施

4.1 通則

4.1.1 公共處所和船員起居艙室的設計和佈置，應使該處人員免受不利環境條件的影響，並在正常和應急情況下使該處人員受傷的危險性降至最低程度。

4.1.2 乘客可以進入的處所，不應設置控制裝置、電氣設備、高溫部件和管道、旋轉機件或其他可能導致乘客受傷的設備，除非這些設備已適當遮蔽、隔離或以其他適宜方式保護起來。

4.1.3 公共處所不應設置操縱控制設備，除非這些設備的保護和位置適當，船員在正常和應急情況下操作時，不會受到乘客的妨礙。

4.1.4 乘客和船員艙室的窗應具有足夠的強度，與該船營運許可證書上註明的最壞預計工況相適應，並應採用在破碎時不會裂成危險碎片的材料製造。

4.1.5 公共處所、船員起居艙室以及這些處所或艙室裏的設備的設計要求應是：不論在船舶正常航行或發生故障或操作不當的情況下，船舶正常和應急啟動、停車和操縱時，每個人只要正確使用這些設施都不會受到傷害。

4.2 有線廣播和信息系統

4.2.1 應設置一套通用應急報警系統。所有的公共處所、走廊和樓梯、船員起居艙室、通常有船員工作的處所以及開敞甲板都應能聽到報警，警報的聲壓級應比正常航行情況下的環境噪聲級至少高出 10db（A）。警報在觸發後，應持續作用至正常關閉或在有線廣播系統進行廣播時暫停。

4.2.2 應設置一套有線廣播系統，該系統應能覆蓋乘客和船員能進入的所有區域、脫險通道和登乘救生艇筏的處所，並應在任意一艙進水或着火情況下，該系統的其他部分仍可操作。有線廣播系統及其性能標準應由主管機關參照本組織通過的建議案予以批准。

4.2.3 所有客船均應設置所有就座乘客均能看見的照明或發光或視覺信息系統，以便向乘客通告安全措施。

4.2.4 在認為有利於保護乘客或每當超過附錄 3 的表 1 所列安全水準 1 時，船長應能借助有線廣播系統和視覺信息系統要求乘客“請坐好”。

4.3 設計加速度

4.3.1 對於客船，除非採取了與乘客安全有關的特別預防措施，應避免在船舶重心縱向位置處產生超過 1.0g 的疊加垂向加速度。

4.3.2 客船的設計應考慮與安全有關的設計碰撞加速度 g_{coll}，並顧及人員能安全處於及撤離公共處所、船員起居艙室、脫險通道，包括救生設備部位和應急電源部位。確定碰撞載荷時，應考慮船舶尺度、類型、航速、排水量及建造材料等。碰撞設計應基於船舶以確定的碰撞航速航行時與他物正面相撞的情況。

4.3.3 大質量設備如主機、輔機、墊升風扇、傳動裝置和電力設備等的安裝，應通過計算證明能承受表 4.3.3 所列的設計加速度而不致破壞。

表 4.3.3：g 的倍數設計加速度

船型 方向	除兩棲氣墊船以外的所有高速船	兩棲氣墊船
前向	g_{coll}	6

後向	2，小於 2 即為 g_{coll}	3
橫向	2，小於 2 即為 g_{coll}	3
垂向	2，小於 2 即為 g_{coll}	3

其中：

g_{coll}＝設計碰撞加速度，表示為重力加速度的倍數（$9.806 m/s^2$）

4.3.4 設計碰撞加速度 g_{coll}（對於 g_{coll}＝6 的兩棲氣墊船以外的船）應按下式計算：

$g_{coll}=1.2\left(\frac{p}{g.\Delta}\right)$ ，但所取值不可大於 12，

式中載荷 P 應取 P_1 和 P_2 中的較小值：

$P_1=460\ (M.c_L)^{2/3}\ (E.c_H)^{1/3}$

$P_2=9000.M.c_L\ (c_H D)^{1/2}$

式中船體材料系數 M 應根據船體材料取值：

M＝1.3（對於高強度鋼）；

M＝1.0（對於鋁合金）；

M＝0.95（對於低碳鋼）；

M＝0.8（對於玻璃鋼）；

式中船長系數 C_L 按下式計算：

$$C_L = \frac{(165 + L)}{245}\left(\frac{L}{80}\right)^{0.4}$$

式中船高系數 C_H＝（80－L）/45，但不大於 0.75 或小於 0.3，

式中航速 V_{imp} 時船舶的動能 E 按下式計算：

$$E = 0.5\Delta . V_{imp}^{2}$$

式中船的主要要素如下：

L＝船長（m），見第 1 章定義；

D＝型深（m），龍骨下緣量至船體有效樑頂部；

Δ＝排水量，取空船重量和最大營運重量的平均值（t）；

V_{imp}＝估計的碰撞速度（m/s）＝第 1 章所定義的營運航速的三分之二；

g＝重力加速度＝$9.806 m/s^2$。

對於水翼船，設計碰撞加速度 g_{coll} 應在按以上方式或以下方式計算的二個 g_{coll} 中取較大者：

$g_{coll} = F/(g.\Delta)$

式中：F＝前水翼在營運水線處的破壞載荷（kN）。

4.3.5 作為對 4.3.4 要求的替代，以高出水面不超過 2m 的垂直岩石為基礎進行碰撞載荷分析並使用與 4.3.4 所述排水量 Δ 和碰撞速度 V_{imp} 相同的假設，可以確定設計碰撞加速度 g_{coll}。這種評估可作為安全分析的一部分。如果設計碰撞加速度是通過 4.3.4 的方式和碰撞載荷分析兩種方法確定，可取這二種計算結果中的小值作為設計碰撞加速度值。

4.3.6 應就船舶的實際類型註明已滿足 4.1.5 和 4.3.1 的規定，如附錄 9 所述。

4.3.7 在正常營運狀況和各種最壞預計工況下以營運航速和必要時減速航行時，都應指明船舶營運的限制海況。

4.4 艙室設計

4.4.1 高速船上公共處所、控制站和船員起居艙室的位置和設計，應使乘客和船員在設計碰撞狀況下得到保護。為此，這些處所不應位於橫剖面（見圖 4.4.1）前的下列範圍內：

A_{bow}=0.0035AmfV，但不可小於 0.04A，

式中：

A_{bow}=橫剖面前的船舶能量吸收結構的平面投影面積（m^2）

A=船舶的平面投影總面積（m^2）

m=材料系數=$\frac{0.95}{M}$

M=4.3.4 所列適用的材料系數

如各種材料混合使用，材料系數應取加權平均值，應根據 A_{bow} 所定義部位的材料質量進行加權。

f=架構系數如下：

— 甲板和船殼縱向加強=0.8

－縱向和橫向混合=0.9

－甲板和船殼橫向加強=1.0

V=營運航速（m/s）

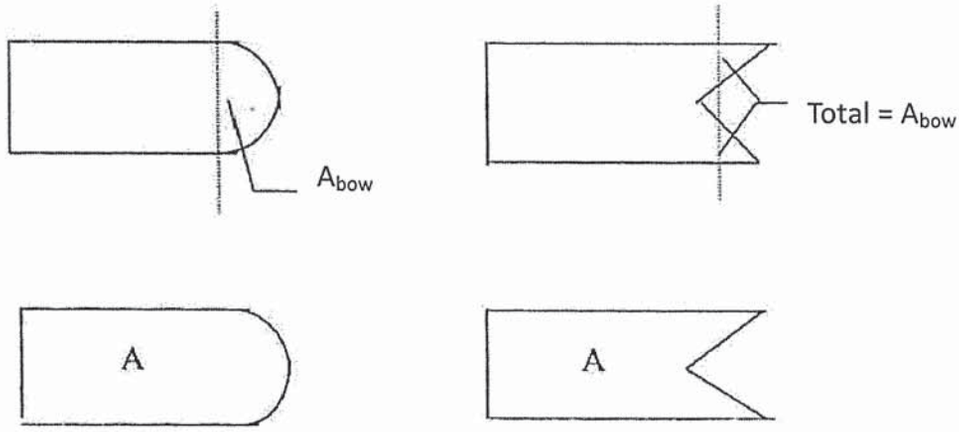


圖 4.4.1 兩種不同式樣船的平面圖

4.4.2 公共處所和船員起居艙室應根據表 4.4.2 給出的“設計導則”設計，或採用其他已被證明能給予同等保護程度的方法進行設計。

4.4.3 公共處所和操作人員艙室中的設備和行李應予定位，並作妥善固定，使其在 4.3.4、4.3.5 和表 4.3.3 所規定的設計碰撞加速度作用下仍能保持原位。

4.4.4 座位、救生設備、具有相當質量的器件及其支承結構均不應在 4.3.4、4.3.5 和表 4.3.3 規定範圍內的任何載荷作用下產生任何形式的變形或移位，以致妨礙乘客迅速撤離。

4.4.5 任何通道的兩側均應設置適宜的扶手，使乘客行走時能保持平穩。

表 4.4.2 設計導則概要*

設計等級 1：g_{coll}<3
1. 座椅/座椅安全帶 1.1 低靠背或高靠背 1.2 座椅方向不受限制 1.3 允許設沙發 1.4 不要求設座椅安全帶 2. 一般允許設桌子 3. 用護墊包住凸出物 4. 公用電話間、酒吧等，無特別限制 5. 行李，無特殊要求 6. 大質量物品應妥善繫固並定位
設計等級 2：g_{coll}＝3～12
1. 座椅/座椅安全 1.1 帶有保護性變形和填充物的高靠背 1.2 座椅方向朝前或朝後 1.3 不允許設沙發作座椅

1.4 座位前方無保護結構時，應設圍腰安全帶
2. 允許設置有保護特性的桌子，並應作動力試驗
3. 用護墊包住凸出物
4. 公共電話間、酒吧等應設在艙壁後側或經認可的其他位置
5. 行李應放在前方有保護的位置
6. 大質量物品應繫固妥善並限位

*其他方案如能達到等效安全等級亦可採用。

4.5 座位設計

4.5.1 對船舶額定的每一位乘客和船員均應提供一個座位。這類座位應設在封閉處所內。

4.5.2 除 4.5.1 所要求的座位外，另增加的座位不允許在危險的航行條件或潛在危險的氣候或海況下使用，並不必滿足 4.5 和 4.6 的要求。這些座位應按 4.4.4 的要求固定，且應清晰地標示不能在危險狀況下使用。

4.5.3 座椅安裝時應注意留有足夠的通道通往起居艙室的任何部位，尤其不能妨礙任何基本應急設備或脫險設施的取用。

4.5.4 座椅及其附件和鄰近結構的外形、設計及佈置應在船舶遭遇 4.4.1 所述的設計碰撞狀況下的假設破損後，使乘客受傷的可能性降至最小程度，且能避免夾阻乘客。危險的凸出物和堅硬的邊緣都應予消除或另包軟墊。

4.5.5 座椅、座椅安全帶、座椅佈置及座椅鄰近的桌子等部件均應按4.3.4 規定的實際的設計碰撞加速度進行設計。

4.5.6 所有座椅、座椅底及其和甲板的連接，應具有良好的吸收能量的特性，並應滿足附錄 10 的要求。

4.6 安全帶

4.6.1 對於所有按 4.3.4 規定算得的設計碰撞加速度 g_{coll} 超過 3g 的高速船，所有用於操縱船舶的座位都應設置可單手釋放的三點式或肩帶式安全帶。

4.6.2 為獲得附錄 10 規定的保護性能，必要時應為乘客座椅和船員座椅提供安全帶。

4.7 脫險出口與脫險設施

4.7.1 為了確保在應急情況下能立即得到船員的幫助，船員起居艙室包括住室，應設在那些有通道能使船員從船內方便、安全迅速通往公共處所的地方。鑑於同樣理由，應為操縱室提供安全和快速的通道直達公共處所。

4.7.2 船舶設計應能使所有在船人員在各種應急情況下不論白天、黑夜都可以安全撤離進入救生艇筏。所有在應急情況下可能使用的出口和所有救生設備的位置、撤離程序的可行性，以及全部乘客和船員撤離時所耗費的時間，都應進行驗證。

4.7.3 凡公共處所、撤離路線、出口、救生衣存放處、救生艇筏存放處，以及登乘站都應按第 12 章規定清晰和永久性地標明，並予以照明。

4.7.4 凡供乘客或船員使用的封閉式公共處所和類似的永久性封閉處所都應至少有兩個出口，其位置應儘量相互遠離。所有出口都應清楚標明撤離站和安全區域的方向。在 A 類船和貨船上，至少應有一個出口通往供所述封閉處所內人員使用的撤離站，所有其他出口應有通道通向開敞甲板上的一個位置並可由此通往撤離站。在 B 類船上，各出口應有通道通向 7.11.1 所要求的替代安全區域；如符合 4.7.3 和 4.7.11 的要求，可接受外部撤離通道。

4.7.5 為提供火災時的庇護，公共處所可按 7.4.4.1 和 7.11.1 的規定進行分隔。

4.7.6 出口門不論白天黑夜應能裏、外均可操縱，且開閉裝置應顯明易見，操作便捷，具有足夠強度。脫險通道上的門的開啓方向應儘量與所在艙室的脫險流向一致。

4.7.7 出口門的關閉、插銷、上鎖的佈置，應使有關船員或通過直接觀察或通過指示器能清楚地知道：出口門被關閉或處於安全操作狀態。外門的設計應將被冰或碎石卡住的可能性降至最小程度。

4.7.8 船上應有足夠數量的出口，使身穿認可救生衣的人員在應急情況（如撞船或失火）下，便於迅速脫險和不受阻礙。

4.7.9 鄰近出口處應有供 1 名船員活動的足夠空間，以確保乘客迅速撤離。

4.7.10 所有出口及其開啟設施都應標明，使船上乘客和船外的救生人員都一目了然。

4.7.11 凡提供從內部至出口的通道的踏板和梯子，應為剛性結構並永久定位。如必須借助扶手才能使人員到達出口時，應設永久性的扶手，這種扶手應在船舶發生任何可能的橫傾或縱傾情況下都能適用。

4.7.12 應為每個人員提供至少兩條暢通無阻的脫險通道。脫險通道的安排應使撤離人員在任何可能發生的險情或應急情況下都能獲得足夠的撤離手段。脫險通道上應有主電源和應急電源供電的充足照明。

4.7.13 構成脫險通道的走道、門道和梯道的寬度，在客船上應不小於900mm，在貨船上應不小於 700mm。對於通常無人佔用處所的走道、門道和梯道，此寬度可減至 600mm。脫險通道上不應有任何可能傷人、鉤住衣服、損壞救生衣或阻礙殘疾人撤離的凸出物。

4.7.14 應設置足夠的指示牌，引導乘客通往出口。

4.7.15 為使撤離的乘客進入救生設備，船上的登乘站應有相應的設施，包括設置扶手、登乘甲板的防滑處理，以及沒有羊角、繫纜柱和類似裝置的空間。

4.7.16 主推進裝置處所和滾裝處所應有二個通向該處所外面位置的脫險設施，從該位置可安全到達撤離站。主推進裝置處所的一個脫險設施應避免直接通至任何滾裝處所。長度小於 5m 和一般無人進入或不是持續有人操作的主推進裝置處所，可單設一個脫險設施。

4.8 撤離時間

4.8.1 撤離設施的設計應使船舶在受控情況下，能在撤離時間內撤離人員。撤離時間為 7.4.2 規定的主要火災危險區結構防火時間（SFP）減去最初探測火情及滅火作業所需的 7min 後餘下時間的三分之一。

$$撤離時間=\frac{SFP-7}{3}\ (\text{min})$$

式中：SFP=結構防火時間（min）

4.8.2 應制訂 1 份撤離程序（包括考慮了本組織制定的導則而進行的撤離分析），供主管機關審批與之相關的防火絕緣圖時使用，並用以幫助船東和建造廠按 4.8.3 規定安排撤離演習。撤離程序內容如下：

.1 船長發出應急通知；

.2 與基地港聯繫；

.3 穿着救生衣；

.4 救生艇筏和應急人員就位；

.5 關閉機器和燃油供給管路；

.6 發出撤離命令；

.7 部署救生艇筏、海上逃生系統和救助艇；

.8 救生艇筏繫攏航運；

.9 監視乘客；

.10 乘客在監視下有秩序地撤離；

.11 船員檢查所有乘客已全部離船；

.12 船員撤離；

.13 救生艇筏脫離大船；

.14 救助艇（如有）集結救生艇筏。

4.8.3 按 4.8.1 要求的撤離時間能否達到，應通過實際演習予以驗證。該演習應在受控情況下並有主管機關人員在場時進行。對於客船，應用文件形式說明，並經主管機關核實。

4.8.4 在進行撤離演習時應考慮到緊急情況下當需要迅速撤離時有可能引起的大批人移動或驚恐加速度的問題。撤離演習在無人下水的情況下進行，救生艇筏應在原來的存放位置，且按下列要求進行：

.1 A 類客船和撤離時間應為第一次發出棄船通知直到最後一名人員已登上救生艇筏所耗費時間，並應包括乘客和船員穿着救生衣的時間。演習時，乘客分佈應按正常航行情況下的任意分佈。

.2 B 類客船和貨船的撤離時間應為發出棄船命令直到最後 1 名人員已登上救生艇筏所耗費時間，乘客和船員可以是已穿好救生衣，並作好撤離準備，且分佈在各個集合站。

.3 所有船的撤離時間應包括救生艇筏投放、充氣膨脹和將救生艇筏繫在船邊準備登乘所需時間。

4.8.5 撤離時間應通過這樣一次撤離演習來考核，即按撤離分析中指出的耗時較長一舷的出口和救生艇筏進行演習。演習時，旅客和船員僅使用該舷的出口和救生艇筏。

4.8.6 如在船上進行一半試驗不現實的話，主管機關可考慮使用撤離分析中指出的最關鍵線路進行局部撤離試驗。

4.8.7 撤離演習應在受控情況下遵照撤離計劃按下列方式進行：

.1 試驗開始時，船應浮在港內，水面平靜，所有機械和設備處於正常航海情況下運轉；

.2 船內所有出口和門，均處於和正常航海情況下相同的狀態；

.3 安全帶（如有）應該繫固；

.4 所有乘客和船員的脫險通道在撤離時應無須有人入水。

4.8.8 對於客船，參加演習的人員應有代表性，在可行和合理範圍內儘可能由具有正常健康狀況、身高、體重、不同性別和年齡的人員組成。

4.8.9 被選出參加演習的人員除船員外，應未受過這種演習的專門訓練。

4.8.10 所有新設計的高速船，以及撤離佈置與原先試驗過的有實質性差別的其他高速船，都應進行應急撤離演習。

4.8.11 作為發證基礎的首次撤離演習所遵循的專門撤離程序，連同 4.8.2 包含的其他撤離程序，應包括在船舶操作手冊中。演習時，船內外都應錄像，該錄像帶應是 18.2 要求的培訓手冊的組成部分。

4.9 行李、備品、小賣部與貨艙

4.9.1 應採取措施防止行李、備品和貨艙內物品的移動，充分注意放有物品的艙室和可能產生的加速度。如採用堆碼方式進行防護不切實際，則應採取限制行李、備品和貨物移動的適當措施。公共處所內應設置存放乘客隨身攜帶行李的行李架和吊架，但要採取適當措施防止行李在任何可能發生的情況下掉落。

4.9.2 鑑於控制裝置、電氣設備、高溫器件、管路等的損壞或故障有可能影響船舶安全營運，船舶航行時船員因工作之需要也可能要接近這些設施，所以這些設施不應設在行李艙、儲藏艙和貨艙內，除非採取足夠的保護措施，使在艙內裝卸物品或移動物品時不會無意中損壞或（如適用）操動這些設施。

4.9.3 若有必要，應在這些艙內設置限制裝載的耐久標誌。

4.9.4 考慮到船舶的用途，行李艙、貨艙和特種處所的外部開口的關閉裝置應為風雨密。

4.10 噪聲等級

4.10.1 公共處所和船員起居艙室的噪聲應儘可能輕微，以便能聽到廣播系統的廣播，一般不應超過 75dB（A）。

4.10.2 操縱室的最大噪聲一般不應超過 65dB（A），以方便在室內通話，並與外部進行無線電通信。

4.11 船員和乘客的保護

4.11.1 在船員或乘客可以到達的甲板的所有露天部位，應裝設有效的護欄或舷牆。安全帶和支索之類替代設施如能提供同等程度的安全，也可接受。舷牆或護欄高度應至少為甲板以上 1m。但如這一高度會干擾船的正常營運，可准許高度小於 1m。

4.11.2 護欄最低一檔下面的開口應不超過 230mm，其他檔距應不超過 380mm。在舷緣為圓弧形的船上，護欄底座應置於甲板平坦處。

4.11.3 應有適當的設施（護欄、救生繩、步橋或甲板下通道之類）保護船員往返住艙、機器處所和船上必需進行的工作所用的其他所有部位。

4.11.4 船舶所載甲板貨的堆放，應使堆貨部位供往返船員住艙、機器處所和船上必需進行的工作所用的其他所有部位使用的任何開口能夠關閉和鎖定，以防進水。如在船舶甲板上下均無方便的通道，應在甲板貨上面為船員提供護欄或救生繩之類有效的保護設施。

第 5 章 方向控制系統

5.1 通則

5.1.1 船舶應配備具有足夠強度和適當設計的方向控制裝置。該裝置應使船舶的首向和航向在主要工況和航速下能最大可能地得到有效的控制，不需在所有航速下和證書核定的所有工況中借助不合適的人力。其性能應按附錄 9 的要求予以驗證。

5.1.2 可借助以下裝置控制方向：空氣舵或水舵、水翼、襟翼、可轉向螺旋槳或噴射器、偏航控制孔或側推器、差動推進器、船舶的可變幾何形狀或其墊升系統部件，或這些裝置的組合。

5.1.3 就本章而言，方向控制系統包括任何操舵裝置或裝置組群、任何機械聯動裝置和所有動力或人力裝置、控制器和驅動系統。

5.1.4 應注意方向控制系統和穩定系統間相互作用的可能性。凡發生這種相互作用或設置有雙重用途的部件，當適用時，也應符合 12.5 和第 16 章及第 17 章的要求。

5.2 可靠性

5.2.1 除諸如擱淺、碰撞或重大火災之類的緊急情況外，船舶在正常運行時，所有方向控制系統完全失效的可能性應極小。

5.2.2 在設計中，由採用動力部件的動力驅動裝置或驅動系統實現正常方向控制時，除設有替代系統外，應備有驅動該裝置的輔助設施。

5.2.3 驅動方向控制裝置的輔助設施可以為人力驅動，但應經主管機關對船舶的尺度、設計和任何航速限制或其他可能的必要參數加以考慮後，認為其適宜可行。

5.2.4 方向控制系統的構造，若適用，應使一個驅動裝置或系統內出現的單一故障不會導致任何一個其他裝置或系統不能工作或不能使船舶處於安全狀態。主管機關可以允許有短暫時間用於連接輔助控制裝置，只要船舶的設計使主管機關認為這種延遲不致危及船舶安全。

5.2.5 故障模式和影響分析應將方向控制系統包括在內。

5.2.6 如有必要使船舶處於安全狀況，用於驅動方向控制裝置的動力裝置，包括要求能將方向轉為前進或倒車的裝置，應能自動操作，並能在發生動力或其他故障後 5s 內正確作出反應。備用電力系統可按 12.2 對輔助柴油發電機或 12.3.6 對應急柴油發電機規定的起動時間來要求。

5.2.7 利用船舶的可變幾何形狀或船舶的墊升系統部件的方向控制系統，其構造應儘可能使驅動聯動裝置或驅動系統的任何故障都不會嚴重危及船舶安全。

5.3 效用試驗

5.3.1 應根據附錄 9 的效用試驗和驗證程序來規定任何方向控制系統的安全使用限度。

5.3.2 按附錄 9 所作的效用試驗應用於確定任何一個控制裝置在發生不可控制的完全偏差情況下對船舶的安全運行所產生的任何不利影響。為確保該系統內的備用或保護裝置具有等效的安全性而可能必需的對船舶運行的任何限制，均應包括在船舶操作手冊中。

5.4 控制位置

5.4.1 所有方向控制系統通常均應能在船舶操縱站內進行操縱。

5.4.2 如在其他位置也能操縱方向控制系統，則應在操縱站和這些其他位置之間佈置雙向通信設備。

5.4.3 在操縱站和這些其他位置應設有足夠的指示器，使船舶操縱人員能驗證方向控制裝置對指令的反應是否正確，並且也能顯示任何異常反應或故障。操舵響應指示器或舵角指示儀應與方向控制系統無關。此種反饋和指示的邏輯應與其他警報和指示一致，以在緊急情況下操縱人員不致於混淆。

第 6 章 錨泊、拖曳及繫泊

6.1 通則

6.1.1 本章的主要假定是：高速船僅需配一隻錨供應急使用。

6.1.2 錨泊、拖曳、繫泊裝置及局部加強結構的配置、佈置和設計，應使船員在執行錨泊、拖曳及繫泊作業時的風險極小。

6.1.3 所有錨泊設備、拖纜樁、繫纜樁、導纜孔、羊角和環眼螺栓的構造及其與船體的連接都應在達到設計載荷時不損及船舶的水密完整性。設計載荷和設定的任一方向限制，均應記入船舶操作手冊。

6.2 錨泊

6.2.1 高速船至少應配置 1 個具有錨鏈或混合式的錨鏈索和回收裝置的錨。每艘高速船還應設置能適當和安全釋放錨及錨鏈索的裝置。

6.2.2 任一存放錨回收裝置的封閉處所的設計應遵循良好的工作實踐，以確保人員使用該裝置時沒有危險，尤其要注意這些處所入口的設施、走道、照明以及錨鏈和回收機械的保護。

6.2.3 在駕駛室與從事拋錨、起錨或釋放錨作業的人員之間應配置適當的雙向語音通信設備。

6.2.4 錨泊佈置應使有可能與錨鏈發生磨擦的任何表面（如錨鏈筒、船體障礙物）都設計成能防止錨鏈受到損傷和纏繞。應配置適宜的裝置以確保在所有操作情況下都能將錨妥善固定。

6.2.5 船體應該受到保護，使錨及錨鏈在正常操作情況下損及船體結構的可能性減到最小。

6.3 拖曳

6.3.1 應配置適宜的裝置使船舶在最壞預計工況下能夠被拖曳。凡拖曳點為一個以上時，應配有適宜的平衡支索。

6.3.2 拖曳佈置應使任何有可能與拖索發生磨擦的表面（如導纜孔）具有足夠曲率半徑，以防拖索承載時受損。

6.3.3 船舶在被拖曳時的最大許用航速應記入操作手冊。

6.4 繫泊

6.4.1 應按需要設置適宜的導纜孔、繫纜樁和繫索。

6.4.2 繫索應有適宜的儲存處所，能取用方便，並予固定，以對抗可能承受的較大的相對風速和加速度。

第 7 章 消防

A 部分－一般規定

7.1 通則

7.1.1 按船舶類型和潛在的火災危險，下列基本原則作為本章規定的基礎體現在相應的條文中：

.1 船上任何艙室失火後，船舶的主要功能和安全系統，包括推進和控制、探火、報警以及未受影響區域的滅火能力得以維持；

.2 B 類船公共處所的分隔應確保任何艙室內的人員，在失火時能逃往其他可用的安全區域或艙室；

.3 以阻燃限界面對船進行分隔；

.4 限制使用可燃材料，以及着火時會發出煙霧和有毒氣體的材料；

.5 火源區內失火的探測、抑制和撲滅；

.6 脫險通道以及滅火通道的保護；和

.7 滅火設備的即刻可用性。

7.1.2 本章的要求適用於下述條件：

.1 探明失火後，船員能立即按消防程序投入滅火行動，把火情通報給基地港並準備使乘客逃往其他可用的安全區域或艙室，或者必要時撤離乘客；

.2 建議不使用閃點低於 43℃ 的燃油。然而只要符合 7.5.1 至 7.5.6 的規定，閃點不低於 35℃ 的燃油可以用於燃氣輪機；

.3 根據本規則第 18 章和第 19 章的要求對船舶進行維修保養；

.4 不允許設置諸如電影院、舞廳和類似處所的減少照明的封閉處所；

.5 除非有負責消防安全的船員陪同，乘客在航行途中不得進入特種處所和開敞滾裝處所。只有被授權的船員才能在航行途中進入裝貨處所。

7.2 定義

7.2.1 “阻火分隔”係指由符合以下規定的艙壁和甲板組成的分隔：

.1 它們應由符合 7.2.1.2 至 7.2.1.6 要求的具有隔熱或阻燃性質的不燃或阻燃材料製成；

.2 它們應有適當的加強；

.3 它們的構造應在相應的防火時間範圍內，能防止煙及火焰通過；

.4 需要時，它們應在相應的防火時間範圍內，仍具有承受載荷的能力；

.5 它們應有這樣的溫度特性，即在相應的防火時間範圍內，背火面的平均溫度較初始溫度的溫升不大於 140℃，而且包括任何接頭在內的任一點的溫升不超過 180℃；

.6 應要求按耐火試驗程序規則對原型艙壁和甲板進行一次試驗，以確保滿足上述要求。

7.2.2 “阻燃材料”係指其性能符合耐火試驗程序規則的材料。

7.2.3 “不燃材料”係指某種材料加熱至約 750℃時，既不燃燒，亦不發出足量的造成自燃的易燃蒸氣。這應根據耐火試驗程序規則確定。

7.2.4 “標準耐火試驗”係指將有關的艙壁、甲板或其他結構的試樣置於試驗爐內、按規定的試驗方法，根據耐火試驗程序規則進行試驗。

7.2.5 凡是出現“鋼或其他等效材料”字樣的地方，“等效材料”係指任何不燃材料由於本身性能或者在隔熱物保護下經過標準耐火試驗後，在結構性能和完整性上與鋼具有同等性能（例如有適當隔熱材料的鋁合金）。

7.2.6 “低播焰性”係指所述表面能有效地限制火焰蔓延，它應根據耐火試驗程序規則確定。

7.2.7 “煙密或能防止煙氣通過”係指用不燃或阻燃材料製成的分隔能阻止煙氣通過。

7.3 處所用途的分類

7.3.1 根據失火危險程度對處所用途所作的分類，應適用如下分組：

.1 “較大失火危險區域”係指表 7.4－1 和 7.4－2 中的 A 類，包括下列處所：

—— 機器處所；

—— 滾裝處所；

—— 裝有危險貨物的處所；

—— 特種處所；

—— 裝有易燃液體的儲藏室；

—— 廚房；

—— 甲板面積為 50m^2 或以上，有易燃液體供出售的賣品部；

—— 直接通向上述處所的圍壁通道。

.2 “中等失火危險區域”係指表 7.4－1 和 7.4－2 中的 B 類，包括下列處所：

—— 輔機處所，定義見 1.4.4；

—— 裝有酒精濃度不超過容積 24%的包裝飲料的保稅儲藏室；

—— 設有鋪位的船員艙室；

—— 服務處所；

—— 甲板面積小於 $50m^2$，供出售的易燃液體儲量有限，且不另設專用庫房的賣品部；

—— 甲板面積為 $50m^2$ 或以上，無易燃液體的賣品部；

—— 直接通向上述處所的圍壁通道。

.3 “較小失火危險區域”係指表 7.4－1 和 7.4－2 中的 C 類，包括下列處所：

—— 輔機處所，定義見 1.4.5 條；

—— 貨物處所；

—— 燃油櫃艙室；

—— 公共處所；

—— 箱櫃、空艙和幾乎沒有或無着火危險的區域；

—— 小賣部；

—— 7.3.1.1 和 7.3.1.2 規定以外的賣品部；

—— 乘客區域的走道和梯口室；

—— 7.3.1.2 所述船員艙室以外的船員艙室；

—— 直接通向上述處所的圍壁通道。

.4 “控制站”係指表 7.4－1 和 7.4－2 中的 D 類，定義見 1.4.15；

.5 “撤離站和外部脫險通道”係指表 7.4－1 和 7.4－2 中的 E 類，包括下述區域：

—— 用作脫險通道的外部梯道和開敞甲板；

—— 外部和內部集合站；

—— 作為救生艇和救生筏登乘與降落地點的開敞甲板處所和圍閉游步甲板處所；

—— 上層建築和甲板室的舷側界面，其範圍自救生筏和撤離滑道的登乘區下方和鄰近的舷側一直至營運狀態下最輕載水線為止。

.6 “開敞處所”係指表 7.4－1 和 7.4－2 中的 F 類，包括下述區域：

—— 除撤離站和外部脫險通道以及“控制站”以外的開敞處所。

7.3.2 主管機關審批結構防火細節時，應考慮所要求的熱屏障在交叉處和終點傳導熱量的危險。

表 7.4－1 客船用作分隔的艙壁和甲板的結構防火時間

	A	B	C	D	E	F
較大失火危險區域 A	60 / 60 1,2 / 1,2	30 / 60 / 1	60 / 3 / 1,8	60 / 3,4 / 1	60 / 3 / 1	- / 60 / 1,7,9
中等失火危險區域 B		30 / 30 / 2	30 / 3 / 8	60 / 3,4	30 / 3	- / 3
較小失火危險區域 C			3 / 3	30 / 3,4 / 8,10	3 / 3	- / 3
控制站 D				3,4 / 3,4	3 / 3,4	- / 3
撤離站和脫險通道 E					3 / 3	- / 3
開敞處所 F						- / -

7.4－2 貨船用作分隔的艙壁和甲板的結構防火時間

	A	B	C	D	E	F
較大失火危險區域 A	60 / 1,2 / 60 / 1,2	30 / 60 / 1	60 / 3 / 60 / 1,8	3,4 / 60 / 1	3 / 60 / 1	- / 60 / 1,7,9
中等失火危險區域 B		2,6 / 2,6	3 / 6	3,4 / 60	3 / 6	- / 3
較小失火危險區域 C			3 / 3	30 / 3,4 / 8	3 / 3	- / 3
控制站 D				3,4 / 3,4	3 / 3,4	- / 3
撤離站和脫險通道 E					3 / 3	- / 3
開敞處所 F						- / -

註： 斜線每一邊的數字表示為相應分隔每邊的保護方式要求的結構防火保護時間。如表中某一分隔採用鋼結構並且要求有兩種不同的結構防火保護時間，只需採用其中較長的保護時間。

1 特種處所、滾裝處所和開敞滾裝處所甲板的上一面不必隔熱。

2 在相鄰處所分類字母相同且有註 2 的地方，如主管當局認為沒有必要時，其間不必設置艙壁或甲板，例如兩個儲藏室間不必設置艙壁。然而，儘管機器處所和特種處所屬相同類別，但其間還應設置艙壁。

3 除要求用不燃材料或阻燃材料構成煙密分隔外，沒有其他結構防火要求。

4 同時為輔機處所的控制站應具有 30min 結構防火能力。

5 表中只有一個“—”符號的地方，對其材料或限界面完整性沒有特別要求。

6 根據標準耐火試驗的前 30min 確定，防火保護時間為 0min，在 30min 內能阻止煙氣和火焰通過。

7 阻燃分隔不必符合 7.2.1.5 的要求。

8 採用鋼結構時，空艙附近的阻燃分隔不必符合 7.2.1.5 的要求。

9 開敞滾裝處所的某些部分並非船舶主要承載結構的基本部分，乘客不能進入並且船員在任何緊急情況下都不必進入這些部分，其防火保護時間可減至 0min。

10 A 類船如僅設一個有噴淋系統保護並靠近操縱室的公共處所（盥洗室除外），此時間值可減至 0min。

7.4 結構防火

7.4.1 主結構

7.4.1.1 無論是何種結構材料，下述要求適用於所有船舶。分隔的艙壁和甲板的結構防火時間應根據表 7.4－1 和 7.4－2 的要求，且結構防火時間都要求在 60min 內提供保護，見 4.8.1。若 4.8.1 中 A 類船舶和貨船採用較少的結構防火時間，這樣 7.4.2.2 和 7.4.2.3 給出的時間可以按比例修改。在任何情況下，結構防火時間不得少於 30min。

7.4.1.2 在應用表 7.4－1 和 7.4－2 時，必須注意每類的名稱只是典型的舉例而不是限制性的。在確定符合相鄰處所限界面的合適的防火完整性標準時，如果對處所的分類有疑問時，則應按有關類別中具有最嚴格的限界面要求的處所來處理。

7.4.1.3 船體、上層建築、結構艙壁、甲板、甲板室和立柱應以認可的具有足夠結構性能的不燃材料建造。只要符合本章要求及材料符合《耐火試驗程序規則》，可以允許採用其他阻燃材料。

7.4.2 阻火分隔

7.4.2.1 較大失火危險區域和中等失火危險區域應符合 7.2.1 要求的阻火分隔進行圍閉，任何這種分隔的免除不致影響船舶安全者除外。這些要求不必適用於那些在輕載條件下與水接觸的結構部件，但是對於與水接觸的船體溫度的影響以及熱在與水接觸的任何無隔熱結構傳到水面以上有隔熱結構的影響，應予特別注意。

7.4.2.2 中等失火危險區域的阻火艙壁和甲板應能通過 30min 的標準耐火試驗，而較大失火危險區域的阻火艙壁和甲板應能通過 60min 的標準耐火試驗，但按 7.4.1.1 要求設置者除外。

7.4.2.3 較大和中等失火危險區域內的主要承載結構，應佈置成分佈載荷，以在其暴露於火焰中時，能在適用的防火保護時間內不致使船體和上層建築發生坍塌，同時承載結構還應符合 7.4.2.4 和 7.4.2.5 的要求。

7.4.2.4 若 7.4.2.3 中規定的結構為鋁合金材料製造，則其隔熱層應使其構芯溫度在 7.4.1.1 和 7.4.2.2 規定的時間內不超過環境溫度以上 200℃ 。

7.4.2.5 如果 7.4.2.3 中的結構由可燃材料製成，其隔熱層應保證在按《耐火試驗程序規則》的要求進行標準耐火試驗時，經過 7.4.1.1 和 7.4.2.3 中所規定的時間後，溫度不會升至使結構破壞造成承載能力受損的程度。

7.4.2.6 所有阻火分隔上的門和門框以及其關閉時的固緊裝置的結構，應能與其所在的艙壁具有同等的防禦煙和火焰侵入的能力。鋼質水密門不必隔熱。另外，對因管路、管隧、控制裝置、電纜等造成的阻火分隔的貫穿，應進行適當的佈置以使防火完整性不致於降低，並按《耐火試驗程序規則》進行必要的試驗。

7.4.3 可燃材料的使用限制

7.4.3.1 不屬阻火分隔的所有獨立分隔、天花板和襯板應用不燃材料或阻燃材料製成。擋風條也應用不燃材料或阻燃材料製成。

7.4.3.2 如果隔熱層位於可能與可燃液體或其蒸氣接觸的地方，其表面應能防止這種液位或其蒸氣的滲入。

7.4.3.3 公共處所和船員起居處所的家具和裝飾應符合下述規定：

.1 除了熱值不超過 45MJ/m^2 的可燃飾面可用於這些物品的暴露表面上外，所有家具應完全用認可的不燃或阻燃材料製成；

2 諸如椅子、沙發、桌子之類的所有其他家具，其框等應以不燃材料或阻燃材料製成；

.3 所有帷幕、窗簾和其他懸掛的編織材料，其阻擋火焰蔓延的能力應由《耐火試驗程序規則》確定；

.4 所有裝飾性墊、套家具其阻止燃燒蔓延的能力應由《耐火試驗程序規則》確定；

.5 所有床上用品其阻止燃燒蔓延的能力應由《耐火試驗程序規則》確定；

.6 所有甲板終飾材料應符合《耐火試驗程序規則》。

7.4.3.4 作為最低標準，下述表面應以低播焰性材料製成：

.1 走廊和梯道環圍內以及所有公共處所、船員起居處所、服務處所、控制站和內部集散站的艙壁（包括窗子）、圍壁和天花板襯板的暴露表面；

.2 所有走廊和梯道環圍、公共處所、船員起居處所、服務處所、控制站和內部集散站內隱蔽或不能到達處所的表面。

7.4.3.5 任何隔熱和隔聲材料應為不燃或阻燃材料，與隔熱材料一起用的氣體障礙和粘合劑，以及冷服務系統的管子附件隔熱材料，不必為不燃材料或阻燃材料，但應保持最小量。其向火面應為低播焰性。

7.4.3.6 走廊和梯道環圍內的向火面以及所有公共處所、船員起居處所、服務處所、控制站及內部集散站的艙壁（包括窗）、圍壁及天花

板襯板的向火面所用的材料，向火時不會產生濃煙或有毒有害氣體，其標準由《耐火試驗程序規則》確定。

7.4.3.7 採用低密度可燃材料建造以提供浮力的空艙，應根據表 7.4－1 和 7.4－2 的要求用阻火分隔加以保護，以免殃及鄰近的失火危險區域。同時，該處所及其關閉裝置應為氣密，但應與大氣連通。

7.4.3.8 以允許吸煙的艙室內，應提供合適的不燃材料製的煙灰缸。在不允許吸煙的艙室，應張貼適當的告示。

7.4.3.9 排氣管的佈置應使着火危險降至最小程度。為此排氣系統應予以隔熱，並且與排氣系統相鄰的艙室和結構，或那些可能受正常運行或緊急情況下廢氣溫升影響的地方，應以不燃材料建造或以不燃材料圍蔽和隔熱，以抵衡高溫。

7.4.3.10 排氣支管和管路的設計和佈置應使廢氣能得以安全排放。

7.4.4 佈置

7.4.4.1 僅與兩層甲板相連的內部梯道，只需通過分隔和自閉門在一層甲板進行封閉。用於隔離每個梯道所服務區域的分隔和自閉門的結構防火時間符合表 7.4－1 和 7.4－2 的要求。若梯道全部位於公共處所內，則不需要環圍。

7.4.4.2 升降機圍阱的設置應能防止煙和火焰從一層甲板蔓延至另一層甲板，並應設置關閉裝置以能控制氣流及煙氣的流通。

7.4.4.3 在公共處所、船員起居處所、服務處所、控制站、走廊和梯道內，封閉在天花板，鑲板或襯板後面的空隙，應用緊密安裝的且間距不大於 14m 的擋風條件作適當分隔。在僅有單個公共處所的 A 類船上，其公共處所不必有擋風條。

7.5 燃油和其他可燃液體油櫃與系統

7.5.1 裝有燃油和其他可燃液體的油櫃應與乘客、船員和行李艙室以氣密環圍或有適當通風和排水的隔離空艙分隔。

7.5.2 燃油櫃不應位於較大失火危險區域內或與其相鄰。然而只要油櫃由鋼或其他等效材料製成，可以在這種區域內存放閃點不低於 60℃的可燃液體。

7.5.3 在破損情況下會使油從儲存櫃、沉澱櫃或日用油櫃泄出的所有管子，應在油櫃上直接安裝旋塞或閥門，並能在此類油櫃所在的處所發生火災時，能從該處所處外部將其關閉。

7.5.4 輸送可燃液體的管路、閥和連接接頭應用鋼或符合國際海事組織標準的等效材料製成，其強主度和防火完整性應與它的工作壓力和所在處所相適應，只要可行應避免使用撓性管。

7.5.5 輸送可燃液體的管道、閥和連接裝置的佈置應儘可能遠離發動機裝置的熱表面或空氣入口、電氣裝置和其他潛在的着火源，並應進行適當佈置和圍蔽以使滲漏的燃油與這些着火源接觸的可能性保持最小。

7.5.6 禁止使用閃點低於 35℃的燃油。對使用閃點低於 43℃（但不低於 35℃）燃油的船舶、其燃油的儲存、輸送和使用的佈置，應顧及使用這種燃油可能引起的在着火和爆炸危險時，能保證船舶及船上人員的安全。其佈置除了符合 7.5.1 至 7.5.5 的要求外，還應符合下述要求：

.1 用於儲存該類燃油的油櫃應位於機器處所以外且距離船殼板和船底板、甲板和艙壁不小於 760mm；

.2 其佈置應防止任何燃油櫃或者燃油系統的任何部件，包括注油管，超壓。任何安全閥和空氣管或溢流管應通向主管機關認為安全的地點；

.3 燃油櫃所在處所應使用排風機並提供每小時不少於 6 次的機械通風。該風機應能避免可燃氣體混合物引燃的可能性。在進風和出風口應裝有合適的金屬濾網護罩。排氣出口應引向主管機關認為安全的地點。該類處所的入口處應張貼“禁止吸煙”的告示；

.4 不能應用接地配電系統，但接地的本質安全電路除外；

.5 在可能發生燃油泄漏的所有處所（包括通風系統）應採用合適的認可安全型電氣設備。在該類處所應僅安裝操作所必需的電氣設備和附件；

.6 在每一個燃油管路通過的處所，應安裝固定氣體探測裝置，同時在持續有人值班的控制站內安裝報警裝置；

.7 必要時，每一個燃油櫃應安裝油盤或油槽，以收集任何可能從該類油櫃中泄漏的燃油；

.8 所有油櫃應設有安全有效的油位測量裝置。測量管不能終止於可能會引燃從測量管內溢出燃油的處所內，特別不能終止於乘客或船員處所。禁止使用玻璃管液面計，除非當局允許在貨船上使用但在表與燃料艙之間應設有平玻璃油位表和自閉閥。任何油櫃上的其他測量裝置也可以接受，如果這些測量裝置不需要在油櫃頂部以下穿孔並且當測量裝置出現故障或過量注入時不會引起燃油溢出；

.9 在加油操作時，船上和加油站附件不應有乘客，並應張貼足夠數量的“禁止吸煙”和“禁止明火”的告示。船與岸的燃油接頭應為封閉型，並在加油時妥善地接地；`

.10 佈置在非整體式燃油櫃的處所內的探火和滅火系統，應符合 7.7.1 至 7.7.3 的要求；

.11 加油應採用認可的加油設施進行，在航線操縱手冊中應予詳細說明，在加油站應提供下述防火設備：

.11.1 適宜的泡沫施放設施，包括泡沫炮和能以不少於 500*l*/min 速率連續供給 10min 泡沫溶液的泡沫支管；

.11.2 總容量不少於 50kg 的乾粉滅火器；

.11.3 總容量不少於 16kg 的 CO_2 滅火器。

7.6 通風

7.6.1 所有通風系統的主要進風口和出風口應能在通風處所之外加以關閉。另外通向較大失火危險區的開口，應能從連續有人值班控制站進行關閉。

7.6.2 所有風機應能在其所服務處所以及其所安裝處外部加以關閉。服務於較大失火危險區的風機應能從連續有人值班的控制站進行操縱。機器處所動力通風的停止裝置應與其他處所的通風停止裝置分開。

7.6.3 較大失火危險區和用作集合站點的處所應有獨立的通風系統和通風導管。較大失火危險區的通風導管不應通過其他處所，除非它們被置於圍壁通道內或置於延伸的機器處所內或按表 7.4－1 和 7.4－2

的要求，被置於絕緣罩殼內；其他處的通風導管不得通過較大失火危險區。較大失火危險區域的通風口的盡頭應離任何控制站、疏散站或外部逃生通道 1 米以上。此外，廚房爐灶的排氣管道應設有：

.1 一個集油器。可取下清潔。假如安裝一個經認可的除油系統，則可替代集油器；

.2 一個擋火閘。位於自動遙控操作的道管下端。此外，還有一個遙控操作擋火閘，位於地道管的上端；

.3 一個固定裝置。用於撲滅導管內的火；

.4 遙控裝置。關閉排氣和送氣風機。用於操縱上述.2 中提到的擋火閘以及操縱滅火系統。該裝置應安裝在緊靠廚房入口的位置。如果裝有多支管系統，應配有關閉裝置，在滅火劑釋入該系統內前切斷所有通過同一主導管排氣的支管；及

.5 適當位置的艙口。用於檢查和清理。

7.6.4 當通風導管穿過阻火分隔時，該分隔附近應安裝故障安全型自動關閉擋火閘。該分隔與擋火閘之間的導管應為鋼質或其他等效材料製成，且其隔熱要求應與阻火分隔的標準相同。假如導管與其穿透的分隔具有相同的結構防火時間，而導管對穿過內阻火分隔包圍的處所，則擋火閘可以省去。如果通風導管穿過煙密分隔，則擋煙閘應設置在貫穿件處，除非穿過該處所的風管不服務於該處所。

7.6.5 當通風系統通過甲板時，其佈置應使該甲板的阻火分隔的有效性不會因此而降低，並應採取預防措施以減少煙氣和高溫氣體從一層甲板通過該通風系統擴散至另一層甲板的可能性。

7.6.6 所有安裝於阻火分隔或煙密分隔上的擋火閘，如應能從分隔的每一邊進行人工關閉，除非它們被安裝在服務於通常無人的處所導管上，如倉庫、洗手間。那裏的擋火閘只能從被服務處所的外面用手工進行操作。所有的擋火閘也應能從持續有人值班的控制室進行遙控關閉。

7.6.7 導管應由不燃材料或阻燃材料製成。但短道管可以由可燃材料製成，不過應符合下列條件：

.1 其橫截面不超過 $0.02m^2$；

.2 長度不超過 2m；

.3 只可用於通風系統的終端；

.4 其位置離防火分隔或阻火分隔的開口處不得小於 600mm；及

.5 其表面具有低播焰性。

7.7 探火與滅火系統

7.7.1 探火系統

較大失火危險區和中等失火危險區及其他不常有人的公共處所和船員起居處所中的圍閉處所，如盥洗室、梯道環圍、走廊和逃生通道，應設有認可型自動煙氣探測系統和符合 7.7.1.1 和 7.7.1.3 要求的手動報警按鈕，以能在控制站顯示所有正常運行條件下發生失火的位置。由熱替代煙氣動作的探測器可以安裝在廚房內。主推進機器室還應設置煙氣探測之外的其他探測器，並通過電視攝像頭從操作艙室對其進行監視。根據需要，公共處所、船員起居處所、走廊、梯道環圍、服務處所和控制站（如有必要）應遍佈手動報警按鈕。在這些處所和較大失火危險區的每一個出入口處均應安裝一個手動報警按鈕。

7.7.1.1 一般要求

.1 任何具有手動報警按鈕的固定探火和失火報警系統均應能隨時立即啟動；

.2 應對系統操作所必需的電源和電路在斷電或故障時作監控（如合適時）。故障發生時，應在控制板上發出聲、光故障信號，這一信號應與失火信號有區別；

.3 供固定探火和失火報警系統操作時使用的電氣設備的電源應不少於兩套，其中一套應為應急電源。應由專用的獨立饋電線供電。這些饋電線應接至位於或鄰近於探火系統控制板上的自動轉換開關；

.4 探測器和手動報警按鈕應分成若干分區，任何探測器或手動報警按鈕運作時，應在控制板和指示裝置上發出聲、光火警信號。若在 2min 內該信號未被引起注意，則應向所有船員起居處所和服務處所、控制站以及機器處所自動發出聲響報警。當所有控制站無人值班時，船員起居區域馬上會發出聲響報警。這一聲響報警系統不必作為探測系統的組成部分；

.5 控制板應位於駕駛室或主防火控制站內；

.6 指示裝置應表明已經運作的探測器或手動報警按鈕所在的分區。至少有一套裝置應位於負責的船員在航行中和在港內任何時候都容易到達的地點，船舶處於非營運狀態時除外。如控制板位於駕駛室以外的處所內，則一套指示裝置應裝在駕駛室內；

.7 在每一指示裝置上或其附近應清楚地表示該裝置所保護的處所和分區的位置；

.8 若探火系統不具備遙控逐一識別每一探測器之功能，一般不允許在公共處所、船員起居處所、走廊、服務處所和控制站內的一個分區超過一層甲板，但包含圍閉梯道的區域除外。為避免延誤識別火源，每一分區所包括的圍閉處所的數量應予限制，並由主管機關決定。在任何情況下，每一分區的圍閉處所不得多於 50 個。如果探測系統配有遙控識別的探測器，則探測分區可覆蓋幾層甲板，且所服務的圍閉處所數目不受限制；

.9 對於客船，如果探測系統不能遙控和逐一識別每個探測器，一個分區的探測器不應用於船舶左右兩舷或多於一層甲板的處所，也不超過一個 7.11.1 規定中的區域。但是，如果主管機關確信船舶的防火並不因此而減弱，可以允許這種分區的探測器用於船舶的左右兩舷和多於一層甲板。對配有逐一識別探測器的客船，一個分區的探測器所服務的處所可同時包括船舶的左右兩舷及幾層甲板；

.10 服務於控制站、服務處所、公共處所、船員起居處所、走廊或梯道環圍的一個分區的探測器， 不應包括有較大失火危險的機器處所；

.11 探測器應通過熱、煙或其他燃燒產物、火焰或任何這些因素的組合而動作。主管機關可考慮採用能通過其他因素動作而顯示出早期火災的探測器，但其靈敏度應不低於前述那些探測器。火焰探測器只能同感煙或感溫探測器一起使用；

.12 應備有適當的說明書及試驗和維修用的備件；

.13 應定期用設備對探測系統的功能進行試驗；方法是用設備產生一定溫度的熱空氣或煙霧或具有一定密度和尺寸的漂浮微粒或其他與早期火焰有關的現象，以使探測器有新反應。所有探測器應為這樣一種型式探測器，即其能夠試驗其正確運行，並恢復正常監視功能而無須更換任何部件；

.14 除了可以允許在控制板上關閉防火門或類似功能外，探火系統不應用於任何其他目的；

.15 具有區域編址識別功能的探火系統應按如下要求佈置：

.1 失火時，探測回路損壞部位不得超過 1 個；

.2 應採取必要措施以確保發生在回路中的任何故障（例如：斷電、短路、接地），將不會導致整個回路失效；

.3 整個佈置應能使該系統在發生故障（電氣、電子、信息）後，能夠恢復到最初的配置狀態；

.4 最先發出的火災報警信號，應不妨礙任何其他探測器激發另外的火災報警信號。

7.7.1.2 安裝要求

.1 除 7.7.1 的要求以外，在每一層甲板走廊內的手動報警按鈕還應便於到達，並使走廊的任何一處與手動報警按鈕的距離不大於 20m；

.2 如果要求在梯道、走廊和逃生通道以外的其他處所安裝固定探火和失火報警系統，則在每一此類處所內應至少安裝 1 個符合 7.7.1.1.11 規定的探測器；

.3 探測器的佈置應能發揮其最佳性能。應避免靠近橫樑和通風導管或有將有影響其性能的氣流的位置，以及有衝擊或物理損壞可能性的位置，一般位於頂部的探測器應至少距艙壁 0.5m；

.4 探測器的最大間距應符合下表：

探測器形式	每一探測器控制的最大探測面積	探測器中心的最大間距	距艙壁的最大距離
感溫式	$37m^2$	9m	4.5m
感煙式	$74m^2$	11m	5.5m

根據證實探測器特性的試驗資料，主管機關可以要求或允許其他間距。

.5 系統的電線應避免佈置在較大失火危險的機器處所和其他較大失火危險的圍閉處所，但有必要在此類處所配置探火或失火報警或接通到相應的電源者除外。

7.7.1.3 設計要求

.1 系統和設備應妥善設計，以能承受船上通常發生的電壓變化和瞬時波動、環境溫度變化、振動、潮濕、衝擊、碰撞和腐蝕；

.2 感煙探測器應經驗證，在煙密度超過每米 12.5%的減光率前應動作，但超過每米 2%的減光率前不應動作。安裝於其他處所內的感煙探測器應在主管機關認為滿意的靈敏度極限內動作。要考慮到避免探測器不靈敏或過於靈敏的情況；

.3 感溫探測器應經驗證，當溫度以每分鐘不大於 1℃的速率升高時，在溫度超過 78℃前應動作，但在超過 54℃之前不應動作。溫升率更大時，感溫探測器應在溫度極限內動作，要考慮避免探測器不靈敏或過於靈敏的情況；

.4 經主管機關同意，在乾燥室或環境溫度一般偏高的類似處所內，感溫探測器動作的許可溫度可以較該類處所的頂部甲板最高溫度增加 30℃；

.5 按 7.7.1.1.11 要求的火焰探測器應具有足夠的靈敏度以能區別火焰和明亮的背景，並應具有一個故障信號識別系統。

7.7.2 周期性無人值班機器處所的探火

周期性無人值班機器處所的固定探火和失火報警系統應符合下述要求：

.1 探火系統的設計和探測器的佈置，就在上述處所的任何部位及在機器正常工作狀況和環境溫度範圍內所需的通風變化情況下，當開始失火時，能迅速地探出火災徵兆。除高度受到限制的處所和特別適宜使用的情況下，不允許僅使用感溫探測器的探火系統。該探火系統應能發出與其他非火災系統報警相區別的聲、光報警信號，並且這些報警信號設置點應足夠地多，以保證駕駛室和負責的輪機員能聽到和看到該報警信號。當駕駛室無人值班時，應能在負責船員的值班處所發出報警；

.2 系統安裝後，應在不同的機器運行工況和通風條件下進行試驗。

7.7.3 固定滅火系統

7.7.3.1 較大失火危險區應用認可的可從控制站進行操縱的足以使火災熄滅的固定滅火系統進行保護。該系統應符合 7.7.3.2 和 7.7.3.3 的要求或主管機關認可的替代裝置的條件。主管機關考慮了本組織所提出的建議和所編製的導則，同時該系統應能進行就地人工控制和從持續有人值班的控制站進行遙控。

7.7.3.2 一般要求

.1 對使用氣體作為滅火劑的船舶，氣體的量應足以提供兩次獨立的施放。第 2 次施放，應只能在被保護處所的外部進行人工施放。如果按本組織編製的導則，該處所安裝局部滅火系統，用於防止排氣閥管箱、渦輪增壓器或主、輔內燃機上類似熱表面附近的燃油、潤滑油和液壓油，則不需要進行第二次施放。

.2 主管機關認為本身或在使用條件下，將會影響地球臭氧層的滅火劑和/或所釋放的有毒氣體足以危及人身安全的滅火劑不應使用；

.3 向被保護處所輸送滅火劑所必需的管路應在其控制閥上清楚地標明該管路通向何處。在氣瓶和集合管之間的施放管路上應裝有止回閥。應採取適當措施防止由於疏忽把滅火劑輸往任何其他處所；

.4 滅火劑分配管路的佈置和噴嘴的位置應使滅火劑得以均勻施放；

.5 應具有關閉所有開口的設施，以避免空氣進入被保護處所或氣體從裏面逸出；

.6 在任何處所中，空氣瓶內含有的自由空氣量如因失火而釋放在該處所內將會嚴重影響固定滅火系統的有效性，則主管機關應要求額外增加滅火劑的量；

.7 對經常有人員在內部工作或出入的處所，應設有施放滅火劑的自動發出聲響警報裝置。它應在滅火劑施放前一段適當的時間發出警報，但不得少於 20s。除聲響警報外，還應設有可視警報；

.8 固定氣體滅火系統的控制裝置，應能易於接近和操作簡便，且應成組地安裝於儘可能少的處所，其所在位置應不致為保護處所的火災所切斷。考慮到人員的安全，在每一處所應備有指導該系統操作的說明書；

.9 不允許採用自動釋放滅火劑的裝置；

.10 如果要求滅火劑的數量能保護一個以上處所時，則可供使用的滅火劑不必大於被保護的任一處所中所需的最大數量；

.11 用於儲存滅火劑的壓力容量應按 7.7.3.2.14 的要求置於被保護處所的外面；壓力容器也可置於該處所內予以保護。這樣，萬一發生泄漏事故，人員不致於受到危害；

.12 應備有供船員安全地檢查容器內滅火劑儲量的設施；

.13 儲存滅火劑的容器和附屬的壓力部件，應考慮到其位置和營運中可能遇到的最高環境溫度；

.14 當滅火劑儲存在被保護處所外面時，該儲存室應位於安全和隨時可到達的地方，並應有有效的通風。這種儲存室最好應能從開敞甲板上進入，且在任何情況下均應與被保護處所分

開。出入口的門應向外開啓，且這種儲存室和毗連圍閉處所之間構成限界面的艙壁和甲板，包括門和關閉其任何開口的其他設施，均應為氣密。這種儲存室應被視作控制站；

.15 該系統的備件應儲存於船上或基地港；

.16 如果滅火劑的施放過量或對被保護處所產生受壓狀態，則應設置限制感應壓力裝置，使壓力控制在可接受的限度，以避免結構損壞。

7.7.3.3 CO_2 系統

.1 對裝貨處所，除另有規定外，所備的 CO_2 量，應足以放出體積至少等於該船最大裝貨處所總容積 30%的自由氣體；

.2 對機器處所，所備的 CO_2 的量，應足以放出至少等於下列兩者中較大值的自由氣體：

.2.1 被保護的最大機器處所總容積的 40%，此容積算至機艙柵的一個水平面為止，在這個水平面上，機艙柵的水平面積等於或小於從雙層底頂至機艙柵最底部分的中點處水平截面面積的 40%；或

.2.2 被保護的最大機器處所包括機艙柵在內的全部容積的 35%；對於 2000 總噸貨船，上述百分數可分別減至 35%和 30%；如兩個或兩個以上的機器處所未完全隔開，應視作一個處所。

.3 這裏所指的 CO_2 自由氣體的容積應以 $0.56m^3/kg$ 計算；

.4 機器處所的固定管路系統應能使 85%的氣體能在 2min 內注入該處所；

.5 應設置兩套獨立的控制裝置，以將 CO_2 釋放至被保護處所，並確保報警裝置的動作。其中，一套控制裝置應用於將氣體從所儲存的容器中排出，另一套控制裝置應用於開啟安裝在將氣體輸送至被保護處所的管路上的閥；

.6 兩套控制裝置應佈置在一個施放箱內，在該箱的特定部位應設醒目標記。如果控制施放箱平時用鎖鎖住，則其鑰匙應置於佈置在控制箱附近的設有玻璃面板的盒子內。

7.7.4 手提式滅火器

控制站、公共處所、船員起居處所、走廊和服務處所應配備經認可類型和設計的手提式滅火器。應備有至少 5 具手提式滅火器，且應佈置在易於獲取處以便即刻可用。另外在每個機器處所入口處至少應配備 1 具適於機器處所滅火的滅火器。

7.7.5 消防泵、消防總管、消防栓及消防水帶

消防泵及相應附屬設備或其等效滅火系統應按如下要求配備：

.1 至少應設兩台獨立動力驅動泵。每台泵應至少為 10.3.5 和 10.3.6 規定的艙底泵排量的三分之二，但不得小於 $25m^3/h$，每台消防泵應能向.4 所要求的消火栓同時提供足夠數量和壓力的消防水；

.2 泵的佈置應使在任一艙失火的情況下，不會導致所有消防泵同時失去作用；

.3 在機器處所內設有 1 台或數台消防泵時，則應在機器處所之外易於到達並站得住的位置裝設隔離閥，使機器處所內的消防總

管能與機器處所外的消防總管隔斷。消防總管應佈置成為隔離閥關閉時，船上的所有消防火（上述機器處所內的除外）能由置於該機器處所外的 1 台消防泵通過不進入該處所的管子供給消防用水。手工操作的閥桿應易於到達，並且所有閥均應有明顯標記；

.4 消防栓的佈置應使來自兩個不同消火栓通過2處消防水帶噴出的水柱能射至船舶的任何地點，其中 1 股僅用單根消防水帶。滾裝處所消火栓的佈置應使來自 2 個不同消火栓通過單根消防水帶噴出的 2 股水柱，能射至該處所內的任何地點；

.5 消防水帶應由耐腐蝕材料製成，其最大長度應經主管機關認可。消防水帶及其必要附件和工具，應存放在消火栓附近的明顯部位備用。所有內部處所的消防水帶應永久地與消火栓連接，每個消火栓應按.4 條的要求備有 1 根消防水帶；

.6 每根消防水帶應配備帶有關閉裝置的認可型兩用水槍（即水霧/水柱型）。

7.7.6 油汆炊具的保護

如果安裝油汆炊具，這類炊具都應配有：

.1 自動或手動固定滅火系統。經試驗符合本組織可接受的有關標準；

.2 兩隻恆溫箱，一隻為常用，一隻為備用。萬一其中一隻失靈，即會向操作人員報警；

.3 自動關閉裝置。在啟用滅火系統時，即會切斷油汆炊具的電源；

.4 報警裝置。顯示安裝設備的廚房間滅火系統的運作情況；及

.5 控制器。用於人工操縱滅火系統。該系統貼有明顯標簽，隨時讓船員使用。

7.8 特種處所和滾裝處所的保護

7.8.1 結構性保護

7.8.1.1 特種處所的限界面應根據表 7.4－1 和表 7.4－2 的要求進行隔熱。若有要求，特種處所或滾裝處所的承重甲板只需在其下部進行熱絕緣；

7.8.1.2 在駕駛室應設有能顯示通向或來自特種處所或滾裝處所的門的關閉與否的指示器。

7.8.1.3 通往車輛甲板下面處所的特種處所邊界的防火門應設有至少 100mm 高的門圍檻。

7.8.2 固定滅火系統

每一特種處所和滾裝處所應設有人工操縱的認可的固定壓力水霧系統，此系統應能保護該處內任何甲板和車輛平台的所有部分，但是主管機關可以允許使用任何其他類型的固定滅火系統，只要此系統業已在某一特種處所內作過模擬流動氣油火災的全面試驗，證明其對上述處所內可能發生的失火的控制效果並不低於壓力水霧滅火系統。

7.8.3 巡邏和探火

7.8.3.1 在特種處所和滾裝處所內應保持連續的消防巡邏制度，除非設有符合 7.7.1 要求的認可型固定探火和失火報警系統，並配有電視監控系統。固定探火系統應具有迅速探明失火的能力。探測器的間距和位置應在考慮到通風和其他有關因素影響的情況下進行調試。

7.8.3.2 根據需要在特種處所和滾裝處所內應遍設手動報警按鈕，且其中一個應位於此類處所的出口附近。手動報警按鈕應佈置成處所無一部分距手動報警按鈕 20m 以上。

7.8.4 滅火設置

每一特種處所和滾裝處所內應設有：

.1 至少 3 具水霧槍；

.2 手提式泡沫槍裝置，它應包括 1 具能以消防水帶連接於消防總管的吸入式空氣泡沫槍，連同 1 隻至少能裝 20 *l* 發泡液的可攜式容器和 1 隻備用容器。泡沫槍應至少能產生 1.5m^3/min 適合於撲滅油類火災的有效泡沫。船上應至少備有供特種處所使用的 2 套手提式泡沫槍裝置。

.3 其類型和設計經認可的手提式滅火器的佈置應使特種處所內任意一點到達 1 具滅火器的步行距離不大於 15m，且每個此類處所的入口處至少應設有 1 具手提式滅火器。

7.8.5 通風系統

7.8.5.1 特種處所和滾裝處所應設有有效的動力通風系統，在航行途中足以提供每小時至少 10 次換氣。在碼頭進行裝卸車輛操作時，則應提供每小時 20 次的換氣。該類處所的動力通風系統應與其他通風系統完全隔開，且在處所內裝有車輛時能連續運行。服務於特種處所和滾裝處所的通風導管應進行有效的密封，且應使每個該類處所相互隔離。通風系統應能在該類處所外部進行控制。

7.8.5.2 通風應佈置成能避免空氣分層及空氣囊的形成。

7.8.5.3 操作艙室應設有指示裝置，以顯示所需通風量的任何損失或減小。

7.8.5.4 考慮到天氣和海況，通風系統應設有失火時可迅速切斷並能有效關閉的裝置。

7.8.5.5 通風導管，包括擋火閘應用鋼或其他等效材料製成。被置於服務處所內的導管可由不燃材料或阻燃材料製成。

7.8.6 排水孔、艙底泵和排水

7.8.6.1 考慮到固定壓力水霧系統工作時會引起甲板上大量積水，因而導致嚴重的穩性損失，應裝設流水口，以保證上述積水能迅速直接排出舷外。另外，泵和排水設施應滿足第 10 章的要求。如果要求保持水密或風雨密的完整性，排水孔應安排在被保護處所的外面進行操作。

7.8.7 防止易燃氣體或液體着火

7.8.7.1 在可能積聚爆炸性氣體的任何裝有車輛的甲板和平台，除了開有足夠大小的孔使汽油蒸氣能向下滲透以外，可能構成可燃蒸氣着火源的設備，特別是電氣設備和電纜應裝設於甲板或平台以上至少 450mm 處。安裝於甲板或平台以上大於 450mm 的電氣設備，應為密閉型式且能防止火星逸出。然而，若為了船舶安全必須使電氣設備和電纜安裝於甲板或平台以上不足 450mm，則此類電氣設備與電纜應為認可型式，且能在爆炸性汽油與空氣混合物中使用。

7.8.7.2 電氣設備及電纜如果安裝在排氣通風導管內，則應為能在易爆炸的汽油和空氣混合物中使用的認可型式。並且任何排氣導管的出口，經考慮其他可能的着火源，應設在一個安全的地點。

7.8.7.3 如果配備泵裝置和排水裝置，應確保：

.1 受汽油或其他易燃物質污染的水不得排入機器處所或其他有火花源的處所；

.2 安裝在油艙裏的電器設備或排水系統的其他部件均應為適用於易燃汽油/空氣混合物的類型。

7.8.8 開敞滾裝處所

7.8.8.1 開敞滾裝處所應符合 7.8.1.1、7.8.2、7.8.3、7.8.4、和 7.8.6 的規定。

7.8.8.2 對於滾裝處所從上方完全敞開的部分，不必符合 7.8.2、7.8.3.1 和 7.8.6 的規定。然而，要有連續的防火巡邏或監視系統。

7.9 其他

7.9.1 船上應有供船長和船員參考的永久地展示的防火控制圖，其上應清楚地表明每層甲板的如下地點：控制站；船上由阻火分隔圍閉的區域連同失火報警、探火系統；自動噴水器裝置；固定式和手提式滅火設備；通往船上各種艙室和甲板通道；通風系統，包括對主風機的控制；擋火閘的位置和服務於每一區域通風機的識別號碼；國際通岸接頭的位置（如有時）及 7.5.3、7.6.2、7.7.1 和 7.7.3.1 中指出的所有控制裝置的位置。該防火控制圖的文本應為船旗國的官方文字。然而，若該文種不是英文、法文或西班牙文，則應譯成這些文字之一種。

7.9.2 防火控制圖包括此圖的手冊的副本，應永久地存放在甲板室以外具有永久標記的水密套內，供岸上消防人員參考。

7.9.3 阻火分隔開口

7.9.3.1 除裝貨處所、特種處所、滾裝處所、儲藏室和行李室之間的艙口以及這些處所和露天甲板之間的艙口以外，所有開口應具有永久設置的關閉裝置，且其阻火能力應與其所處的分隔同樣有效。

7.9.3.2 每扇門應能從艙壁的任一側由一個人開啟或關閉。

7.9.3.3 較大失火危險區和梯道環圍限界面上的防火門應符合下述要求：

.1 門應為自閉型，且能在向關閉方向反向傾斜 3.5°仍能關閉。在船舶處於正浮位置時，鉸式防火門閉合的時間應為門開始移動起約 10s~40s 內。在船舶處於正浮位置時滑動防火門閉合的勻率應為約 0.1m/s~0.2m/s；

.2 遙控滑動門或動力操作的門應設有報警裝置，該裝置在連續有人值班的控制站把門開啟後並在開始移動前的 5s~10s 內發出報警聲響，直到門完全關閉為止。在關閉過程中碰到物體能再次開啟的門應設計成離接觸點 1 米內再次開啟；

.3 所有的門應能從連續有人值班的控制站或同時或分組地進行遙控釋放，並也可以從門的兩側單獨釋放。在連續有人值班的控制站內的防火門顯示屏板上，應能顯示出每扇遙控門是否已被關閉。門的釋放機械裝置應設計成在控制系統或主電源損壞時，門能自動關閉。釋放開關應具有通一斷切能，以防止系統自動復位。不允許使用不能由連續有人值班的控制站脫開的門背鈎；

.4 從連續有人的控制站遙控關閉的門應能通過就地控制門的兩邊重新開啟。在這樣就地開啟後，門會重新自動關閉；

.5 動力操作門所用的蓄能器應位於門的附近，以便門在控制系統或主電源損壞後，至少能就地完成 10 次全開和全關動作；

.6 控制系統或主電源於一扇門的受損不應影響其他門的安全性能；

.7 裝存保持防火完整性所需壓緊裝置的雙頁門，其壓緊裝置應在門被釋放後自動地起作用；

.8 直接通往特種處所的動力操作且自動關閉的門不必裝有.2 和.3 中要求的報警器和遙控釋放裝置。

.9 就地控制系統的部件應易於保養和調節；

.10 由自動操作的門應配備其型號經認可的控制系統。該系統能在失火時起動操作，具體由《耐火試驗程序規則》來確定。該系統應滿足下列要求：

.1 由電力服務的控制系統起碼應能在 200℃的溫度下，連續運行至少 60 分鐘；

.2 不應妨礙對其他非受火災影響的門供電；

.3 溫度超過 200℃，控制系統應自動與電源隔開，並至少能在 945℃的溫度下使門閉而不開。

7.9.3.4 面向開敞處所的阻火分隔外部限界面的完整性要求，不適用於玻璃隔板、窗和舷窗。同樣，面向開敞處所的阻火分隔完整性要求不適用於上層建築和甲板室的外部門。

7.9.3.5 煙密分隔上的門應為自閉式。通常開着的門應自動關閉或由連續有人值班的控制站遙控關閉。

7.10 消防員裝備

7.10.1 除了 A 類客船以外的所有船舶應攜帶至少備有 2 套符合 7.10.3 要求的消防員裝備。

7.10.1.1 另外，對 B 類客船，設有乘客處所和服務處所的甲板，按其乘客處所和服務處所的總長度或這種甲板如多於一層，按其最大的乘客處所和服務處所的總長度，每 80m 或其零數應配備 2 套消防員裝備和 2 套個人配備，每套包括 7.10.3.1.1 至 7.10.3.1.3 規定的項目。

7.10.1.2 對 B 類客船，每副呼吸器應設有 1 具水霧槍，並存放於呼吸器相鄰處。

7.10.1.3 主管機關可根據船舶的大小和類型額外增加個人裝備和呼吸器的數量。

7.10.2 消防員裝備和個人配備，應儲存於易於到達和即刻可用之處，如所配備消防員裝備或個人配備多於 1 套時，其儲存的位置應儘量遠離。

7.10.3 消防員裝備的組成：

.1 個人配備包括：

.1.1 防護服，其材料應能保護皮膚不受火焰的熱輻射，並不受蒸氣的灼傷和燙傷，其外表應為防水型；

.1.2 消防靴和手套，由橡膠或其他不導電材料製成；

.1.3 1 頂能有效抵禦撞擊的剛性消防頭盔；

.1.4 1 盞認可型的安全燈（手提式），其照明時間至少為 3h；

.1.5 1 把消防員手斧。

.2 認可的呼吸器，其型式可為下列之一：

.2.1 1 具裝有適宜的空氣泵和一段空氣軟管的防煙頭盔或防煙面具，其空氣軟管長度應足夠從開敞甲板到達貨艙或機器處所的任一部分，且不受艙口或門口的妨礙。如為符合此項要求，空氣軟管所需長度超過 36m 時，則應用自給式壓縮空氣呼吸器替代或由主管機關確定其他替代辦法；

.2.2 1 具自給式壓縮空氣呼吸器。其筒內空氣儲存量至少為 1200*l*，或 1 具可共使用時間至少為 30min 的其他自給式呼吸器。船上還應配備足夠數量的對所備呼吸器適用的備用充氣器。

.3 每具呼吸器應配有足夠長度與強度的耐火救生繩一根，此繩應能用彈簧卡鉤繫在呼吸器的背帶上，或繫在一條分開的腰帶上，使在拉曳救生繩時防止呼吸器脫開。

B 部分－對客運高速船的要求

7.11 佈置

7.11.1 B 類客船的公共處所應按下述要求分區：

.1 應至少分為兩個區域，每個區域的平均長度不應超過 40m；

.2 各個區域中應有一個備擇的安全區域，供其他區域內人員在失火情況下撤離至內。該備擇安全區域應用延伸至上下甲板的不燃和阻燃材料製成的煙密分隔與其他乘客區域隔開。該備擇安全區域可以是另一個乘客區域。備擇安全區域應按一人一坐位

以及按淨剩面積每人 0.35m^2 確定。根據最高人員數量，他們在應急情況下被召進起居處所。

.3 備擇的安全區域應儘可能位於所服務的乘客區域附近。每一乘客區域應至少有兩個儘可能遠離的出口，並通向該備擇區域。脫險通道應使所有乘客和船員能從該安全區域安全地撤離。

7.11.2 A 類客船不必分區

7.11.3 控制站、救生設施存放點、脫險通道和救生艇的登乘點儘可能不位於較大失火危險區和中等失火危險區附近。

7.12 通風

為公共處所的每個安全區域服務的通風系統應與任何其他區域的通風系統分開。公共處所每一區域的通風，應能從連續有人值班控制站進行獨立控制。

7.13 固定式噴水器系統

7.13.1 公共處所和服務處所、設有臥鋪的船員起居區域，除裝有可燃液體以外的儲存處所，以及類似處所，應使用符合本組織製訂標準的固定噴水器系統保護。人工操作的噴水器系統應分成適當大小的區域，並且每一區域所設的閥門、噴水泵的啟動和報警裝置應能從兩個儘量分開的處所進行操作，其中之一應為連續有人值班控制站。對 B 類客船，噴水器系統不得服務於一個以上由 7.11 所要求的處所。

7.13.2 每一操作站應展示系統圖，應採取適當的佈置以排乾該系統工作時所放出的水。

7.13.3 如有下列情況，A 類船不必符合 7.13.1 和 7.13.2 的規定；

—— 禁止吸煙；

—— 不設小賣部、廚房、服務處所、滾裝處所和貨物處所；

—— 載客最大數量不超過 200；

—— 從出發港至目的港船舶滿載時以常用航速的續航時間不超過 2 小時。

C 部分－對貨運高速船的要求

7.14 控制站

控制站、救生設備存放點、脫險通道和救生艇筏的登乘點應位於船員起成處所附近。

7.15 貨物處所

除了開敞甲板區域或冷藏裝貨處所以外的貨物處所應設有符合 7.7.1 要求的認可的自動煙氣探測系統，以能在控制站顯示出裝置在所有正常操作條件下的失火位置，並且應使用符合 7.7.3.2 要求能從控制站操作的認可型固定快速反應滅火系統保護。

7.16 固定噴水器系統

7.16.1 配有臥鋪的船員起居處所，所佔總甲板的面積大於 $50m^2$（包括服務這類起居的走廊），應按本組織制定的標準，由固定噴水器系統予以保護。

7.16.2 系統圖應能張貼在每一個作業站。當系統啟用時，對排油水的排放有適當的安排。

D 部分－對擬裝載危險貨物的船舶和貨物處所的要求

7.17 通則

7.17.1 除了符合 7.15 對貨船和 7.8 對客船、貨船的規定，7.17.2 規定的擬裝載危險貨物的船舶類型和貨物處所還應符合本條的規定，除裝載限定數量的危險貨物外，除非通過按照本章其他要求達到此類要求，船舶類型和危險貨物的裝載方式參照 7.17.2 和表 7.17－1，其中 7.17.2 中出現的編號參照表格頂行。在 2002 年 7 月 1 日生效之日或生效以後建造的 500 總噸以下的貨船應符合本條的規定，但船旗國的主管機關經與港口國商議後，可以降低要求，而降低的要求應寫進 7.17.4 提及的符合文件。

7.17.2 表 7.17－1 和 7.17－2 的應用範圍

下列船舶類型和貨物處所適用於表 7.17－1 和 7.17－2：

.1 不是專門為載運貨物集裝箱設計的船舶和貨物處所，而是擬載運包裝好的危險貨物，包括貨物集裝箱和輕便貨櫃內的貨物；

.2 擬在貨物集裝箱和輕便貨櫃內載運危險貨物而特製的集裝箱船和貨物場所；

.3 擬載運危險貨物的船舶和滾裝處所；

.4 擬載運散裝固體危險貨物的船舶和貨物處所。

7.17.3 要求

除非另有規定，下列要求就“甲板上”和“甲板下”裝載貨物應適用於表 7.17－1、7.17－2、7.17－3。下列分節的編號在上述表的第一欄中。

表 7.17－1

7.17.3 的要求對船舶和貨物處所載運危險貨物不同模式的適用範圍

第 7.17.2 節 / 第 7.17.3 節	露天甲板包括 7.17.2.1~7.17.2.4	7.17.2.1	7.17.2.2	7.17.2.3		7.17.2.4
		非專門設計的	集裝箱貨物處所	滾裝處所	開敞滾裝處所	散裝固體危險貨物
7.17.3.1.1	X	X	X	X	X	D 部分對不同類別危險貨物適用要求，見表 7.17－2
7.17.3.1.2	X	X	X	X	X	
7.17.3.1.3	—	X	X	X	X	
7.17.3.1.4	—	X	X	X	X	
7.17.3.2	—	X	X	X	X	
7.17.3.3	—	X	X	X	—	
7.17.3.4.1	—	X	X[1]	X	—	
7.17.3.4.2	—	X	X[1]	X	—	
7.17.3.5	—	X	X	X	—	
7.17.3.6.1	X	X	X	X	X	
7.17.3.6.2	X	X	X	X	X	

第 7.17.2 節 / 第 7.17.3 節	露天甲板包括 7.17.2.1~7.17.2.4	7.17.2.1	7.17.2.2	7.17.2.3		7.17.2.4
		非專門設計的	集裝箱貨物處所	滾裝處所	開敞滾裝處所	散裝固體危險貨物
7.17.3.7	X	X	—	—	X	
7.17.3.8.1	—	X	X	X	—	
7.17.3.8.2	—	—	—	X[2]	X	
7.17.3.9	—	—	—	X	X	
7.17.3.10	X	—	—	X	X	

註： 1 第 4 和 5.1 類不適用於封閉貨物集裝箱。第 2、3、6.1 和 8 類，如載運於封閉貨物集裝箱，通風率可以減少到不低於兩次通風。就本要求而言一個可移動罐櫃即是一個閉封貨物集裝箱。

2 僅適用於滾裝處所，不能被密封。

X 表中所出現的“X”，意指本要求適用於表 7.17－3 有關行所述所有類別的危險貨物，但有註釋標明者除外。

表 7.17－2

7.17.3 不同類別的危險貨物對於船舶和貨物處所載運散裝固體危險貨物要求的適用範圍

類別 / 節	4.1	4.2	4.3[3]	5.1	6.1	8	9
7.17.3.1.1	X	X	—	X	—	—	X
7.17.3.1.2	X	X	—	X	—	—	X
7.17.3.2	X	X[4]	X	X[5]	—	—	X[5]
7.17.3.4.1	—	X[4]	X	—	—	—	—
7.17.3.4.2	X[6]	X[4]	X	X[4,6]	—	—	X[4,6]
7.17.3.4.3	X	X	X	X	X	X	X
7.17.3.6	X	X	X	X	X	X	X

註： 3 該類別的危險物質可取散裝，主管機關必須考慮所涉船舶的設備和構造，但符合本表所列要求者除外。

4 僅適用於含有溶劑提取物的種子餅，適用於硝酸銨和銷酸銨肥料。

5 僅適用於硝酸銨和硝酸銨的肥料。但是按《國際電子技術委員會》(79年出版)中“易爆氣體的電氣裝置”的要求，有保護程度即可。

6 僅要求適合的金屬絲網的保護裝置。

表 7.17 — 3

7.17.3 對載運散裝固定危險貨物以外的不同類別危險貨物的適用範圍

類別 / 節	1.1-1.6[8]	1.4S	2.1	2.2	2.3	3.1 3.2 液體 ≤23℃[11]	3.3 液體 >23℃[11] ≤61℃	4.1	4.2	4.3	5.1[9]	5.2	6.1 液體	6.1 液體 ≤23℃[11]	6.1 液體 >23℃[11] ≤61℃	6.1 固體	8 液體	8 液體 ≤23℃[11]	8 液體 >23℃[11] ≤61℃	8 固體	9
7.17.3.1.1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
7.17.3.1.2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	–
7.17.3.1.3	X	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
7.17.3.1.4	X	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
7.17.3.2	X	–	X	–	–	X	–	–	–	–	–	–	–	X	–	–	–	X	–	–	–

7.17.3.3	X	X	X	X	X	X	X	X	X	X	X	–	X	X	X	X	X	X	X	X	–
7.17.3.4.1	–	–	X	–	X	X	–	X[7]	X[7]	X	X[7]	–	–	X	X	X[7]	–	X	X	–	X[7]
7.17.3.4.2	–	–	X	–	–	X	–	–	–	–	–	–	–	X	X	–	–	X	X	–	–
7.17.3.5	–	–	–	–	–	X	–	–	–	–	–	–	X	X	X	–	–	X	–	–	–
7.17.3.6	–	–	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X[10]
7.17.3.7	–	–	–	–	–	X	X	X	X	X	X	–	–	X	X	–	–	X	X	–	–
7.17.3.8	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
7.17.3.9	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
7.17.3.10	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

註： 7 當經修正的《國際海上危險貨物規則》（IMDG Code）對“機械通風處所”有要求時。

8 在任何場合，裝載物應橫向離機器處所界限 3m。

9 參閱《國際海上危險貨物規則》。

10 對被載運的合適貨物。

11 參見閃點。

7.17.3.1 供水

7.17.3.1.1 應配備能確保消防總管遇需要的壓力時馬上供水的裝置，該壓力由永久施壓產生或由處於合適位置的消防泵遙控啟動裝置產生。

7.17.3.1.2 輸送的水量應能供應同一尺寸的四個噴嘴，並在 7.7.5 規定的壓力下，能對準空艙貨物處所的任何部位。該水量可由主管機關滿意的等效裝置來供給。

7.17.3.1.3 應配備由大量水有效冷卻指定甲板下的貨物處所的裝置，或由噴霧器的固定裝置，或用水注入該處所。在主管機關認為隨意的情況下，在小貨物處所和在較大貨物處所的小範圍內，可用消防軟管代替。不管怎樣疏水系統和泵裝置應防止自由面的形成。如果這不可能，應考慮對增加的重量和自由水面穩性的反作用。

7.17.3.1.4 對指定帶有適用的規定介質甲板下貨物處所注水的規定可以由上述 7.17.3.1.3 的要求來替代。

7.17.3.2 着火源

電氣裝置和電纜不應安裝在封閉貨物處所，除非對操作目的很重要。但是，如果電氣設備安裝在這種處所，應該是用於危險環境的有證安全類型。它可能是非封閉的，除非與電氣系統安全隔開（通過去掉耦合線，而不是保險絲）。穿透甲板和艙壁的電纜所經過的空氣或蒸氣通道應予以封閉。電纜敷設線路和貨物處所內的電纜應防止衝擊而造至損壞。不允許使用可能給易燃氣體帶來點火源的任何其他設備。

7.17.3.3 探測系統

應給封閉貨物處所配備符合 7.7.1 要求或符合一種探測系統的經認可的自動煙氣探測系統。據主管機關的看法，那種探測系統提供等效的保護。

7.17.3.4 通風

7.17.3.4.1 封閉處所應配備足夠的動力通風。該裝置應在空艙貨物處所，每小時提供至少六個空氣流，同時應適當去除該處所上、下部分的濕氣。

7.17.3.4.2 風機應能避免點燃可燃混合氣體的可能性。合適的金屬絲網保護裝置應固定在通風出、入口的上方。

7.17.3.4.3 擬載運散裝固體危險貨物的封閉處所，如果沒有機械通風，應設有自然通風條件。

7.17.3.5 艙底排水

如果擬在封閉處所載運易燃液體或有毒液體，艙底排水系統的設計應確保不讓此類液體無意中通過機器處所的管系和泵排出。如果大量載運此類液體，應考慮對那些處所另外提供排水裝置。

7.17.3.6 人員保護

7.17.3.6.1 除了 7.10 要求的消防員裝備外，還應提供 4 套預防化學物質侵襲的全身保護服。保護服應保護所有皮膚，以使身體任何部位不受侵害。

7.17.3.6.2 除了 7.10 的要求之外，至少還應配備兩個自持式呼吸器。

7.17.3.7 便攜式滅火器應為貨物處所配置總容量至少 12 公斤的便攜式乾粉滅火器或等量滅火器。此類滅火器應不同於本章其他地方要求的任何便攜式滅火器。

7.17.3.8 固定式滅火系統

7.17.3.8.1 除露天甲板之外的貨物處所應配備經認可的符合 7.7.3 規定的固定式滅火系統，或配備主管機關認為能為所載貨物提供等效保護的滅火系統。

7.17.3.8.2 每一個上有甲板的敞式滾裝處所及每個無法封閉的滾裝處所均應安裝經認可的手動操作的固定或壓力噴水系統，這樣可在此處所內保護任何甲板和車輛平台的所有地方，除非主管機關可能允許使用任何其他經全方位試驗證明效果不錯的固定式滅火系統。總之，泄水和排水裝置應防止自由面的結集。如果這樣做不可能，應考慮主管機關在認可穩性資料時認為必要的增加重量和自由水面穩性的相反作用。

7.17.3.9 滾裝處所和敞式滾裝處所的分隔

在滾裝處所和毗鄰的敞式滾裝處所之間應設有分隔。分隔應使該類處所之間的危險氣體和液體的通道降低到最小限度。換句話說，如果兩個處所完全符合 D 部分滾裝處所的要求，就不必設置這種分隔。

7.17.3.10 滾裝處所和風雨甲板之間的分隔

滾裝處所和毗鄰的風雨甲板之間應設置分隔。分隔應使該類處所之間的危險氣體和液體通道降低到最小限度。換句話說，如果滾裝處所完全符合 D 部分滾裝處所的要求，就不必設置分隔。但是，如果所載危險貨物只能裝在風雨甲板上，仍然需要設置分隔。

7.17.4 符合文件

主管機關應為船舶提供證明其結構和設備符合 D 部分要求的適當文件。

第 8 章 救生設備與裝置

8.1 通則與定義

8.1.1 救生設備和裝置的配備應能滿足 4.7 和 4.8 關於棄船的要求。

8.1.2 除非本規則中規定，本章中救生設備與裝置的要求應滿足 SOLAS 公約第 III 章和 LSA 規則提出的詳細要求，並經主管機關認可。

8.1.3 在救生設備與裝置予以認可之前，主管機關應確認該救生設備與裝置滿足：

.1 按本組織建議加以試驗，證實其符合本章的要求；或

.2 在主管機關滿意的情況下，成功地經受實質上等效於該項建議所規定的試驗。

8.1.4 在新穎救生設備或裝置予以認可之前，主管機關應確認該項設備或裝置滿足：

.1 提供至少等效於本章規定的安全標準，並按本組織的建議予以鑑定和試驗；或

.2 在主管機關滿意的情況下，成功地經受實質上等效於該項建議的鑑定和試驗。

8.1.5 在接受主管機關原先未予認可的救生設備與裝置之前，主管機關應證實該救生設備與裝置符合本章的要求。

8.1.6 除本規則中另有規定，本章所要求的救生設備的詳細技術要求未列入 LSA 規則者，應滿足主管機關的要求。

8.1.7 主管機關應要求救生設備經受必要的產品試驗，以確保這些救生設備按已認可的原型設備的同一標準進行製造。

8.1.8 主管機關採用的認可程序還應包括保持認可或撤消認可的條件。

8.1.9 主管機關應確定容易老化的救生設備的使用期限。該類救生設備應標明確定其年限的方法或必須更換的日期。

8.1.10 除另有規定外，本章內的定義如下：

.1 “探測”係指存者或救生艇筏位置的測定。

.2 “登乘梯”係指設置在救生艇筏登乘站以供安全進入降落下水後的救生艇筏的梯子。

.3 “登乘站”係指登乘救生艇筏的地方。登乘站如有足夠的場地並能安全進行各種集合行動則可以兼作集合地點。

.4 “自由漂浮下水”係指救生艇筏從下沉中的船舶自動脫開並立即可用的下水方法。

.5 “自由降落下水”係指載足全部乘員和屬具的艇筏在船上脫開並在沒有任何制約裝置的情況下，任其下降到海面的救生艇筏下水方法。

.6 “救生服”係指減少在冷水中穿着該服人員體熱損失的保護服。

.7 “氣脹式設備”係指依靠非剛性的充氣室作浮力，而且在使用前通常保持不充氣狀態的設備。

.8 “充氣設備”係指依靠非剛性的充氣室作浮力，而且無論何時均保持充氣備用狀態的設備。

.9 “降落設備或裝置”係指將救生艇筏或救助艇從其存放位置，安全地轉移到水上的工具。

.10 “海上撤離系統”（MES）係指用來迅速把大量乘員通過通道從登乘站轉移到漂浮平台再登乘到相連的救生艇閥或直接登入相連的救生艇筏的設備。

.11 “新穎救生設備或裝置”係指具有本章規定沒有充分述及的新特徵，但提供同等的或更高的安全標準的救生設備或裝置。

.12 “救助艇”係指為救助遇險人員及集結救生艇筏而設計的艇。

.13 “拯救”係指把幸存者安全尋回。

.14 “逆向反光材料”係指以相反方向反射射入光束的材料。

.15 “救生艇筏”係指從棄船時候起能維持遇險人員生命的艇筏。

.16 “保溫用具”係指採用低導熱率的防水材料製成的袋子或衣服。

8.2 通信

8.2.1 船舶應配備下列無線電救生設備：

.1 任何噸位高速客船和 500 總噸及以上的高速貨船應至少配備 3 具雙向 VHF 無線電話設備，這類設備的性能，應不低於本組織認可的標準。

.2 任何噸位的高速客船和 500 總噸及以上的高速貨船的每舷應至少配備 1 具雷達應答器，這類雷達應答器的性能應不低於組織認可的標準，雷達應答器應存放在能迅速移到任何一隻救生艇筏上去的位置，或者每艘救生艇筏都應放置 1 具雷達應答器。

8.2.2 船舶應配備下列船上通信與報警系統：

.1 船舶應配備 1 套固定式或手提式應急設備或兩者兼備，供船上應變控制站、集合站和登乘站與要害部位之間的雙向通信聯繫使用。

.2 船舶應配備 1 套符合 LSA 規則 7.2.1 條要求的通用應急報警系統，以供召集乘客與船員至集合地點和採取應變部署表所列行動之用。該系統應由符合 LSA 規則 7.2.2 條要求的公共廣播系統或其他適當通信設施進行補充。該系統應能在駕駛室操作。

8.2.3 信號設備

8.2.3.1 所有船舶應在操縱室永久配備 1 盞便攜式白晝信號燈，該信號燈不應依靠船舶的主電源。

8.2.3.2 船舶應至少配備 12 支符合 LSA 規則 3.1 條要求的火箭降落傘火焰信號，並應將其存放在操縱室或其附近。

8.3 個人救生設備

8.3.1 在正常的工作情況下，如果乘客或船員可以到達露天甲板，應在船的兩舷各配備至少 1 隻能從操縱室和從其存放處及附近快速釋放的救生圈，該救生圈應配有 1 盞自亮燈和 1 具自發煙霧信號。自發煙霧信號裝置的放置和固定措施應確保其不會由於船舶碰撞或擱淺產生的加速度而鬆脫或自行放射。

8.3.2 在船舶的每個正常出口附近至少設置 1 隻救生圈，並在乘客和船員容易到達的每層露天甲板，應至少設置 2 隻救生圈。

8.3.3 船舶的每個正常出口附近設置的救生圈應裝有不少於 30m 長的浮式救生索。

8.3.4 至少總數一半的救生圈應設有自亮燈，這些設有自亮燈的救生圈應不包括 8.3.3 要求的裝有浮式救生索的救生圈。

8.3.5 船上每一人員應配備 1 件符合 LSA 規則 2.2.1 或 2.2.2 要求的救生衣，另外還應：

.1 配備船上乘客人數至少 10%的兒童救生衣，或為每個兒童配備 1 件救生衣，取其大者；

.2 每艘客船還應配備不少於船上總人數 5%的救生衣。這些救生衣應存放於甲板上或集合站的顯眼之處；

.3 還應配供值班人員使用和供遠置的救生艇筏站及救助艇站使用的足夠數量的救生衣；且

.4 所有救生衣都應具有符合 LSA 規則 2.2.3 要求的燈。

8.3.6 救生衣應放置在容易到達之處，其位置處應有明顯標誌。

8.3.7 船舶應為每位救助艇員配備 1 件適當規格的符合 LSA 規則 2.3 要求的救生服。

8.3.8 應有每個應變部署表中被指派為操作將乘客乘到救生艇筏的海上撤離系統的人員配備 1 件救生服或抗暴露服。如果船舶固定在溫暖氣候航區航行，則經主管機關批准，可免配上述救生服或抗暴露服。

8.4 應變部署表、應變須知與手冊

8.4.1 船上每一人員應配備 1 份應急場合時必須遵守的明確的須知。

8.4.2 應符合 SOLAS 公約第 III 章 37 條要求的應變部署表張貼在全船各顯眼之處，包括控制室、機艙和各船員起居處所。

8.4.3 應將用適當文字書寫的圖例和應變須知張貼在公共場所，並將其在集合站、其他乘客處所及每張座椅附近明顯地展示。向乘客通知如下：

.1 他們的集合站；

.2 應變時必須採取的行動；

.3 救生衣的穿着方法。

8.4.4 每艘客船應設有乘客集合站，該站應：

.1 設在登乘站附近，並可使所有乘客易於到達登乘站，與登乘站設在同一地點者除外；和

.2 有足夠的集合和指揮乘客用的寬敞場地。

8.4.5 在每間船員餐室和文娛室，應配有 1 份符合 18.2.3 條要求的訓練手冊。

8.5 操作須知

應在救生艇筏及其降落控制器的上面或附近，設置告示或標誌，它們應：

.1 用圖解說明該控制器的用途及其操作程序，並提出有關須知或注意事項；

.2 在使用應急照明時，容易被看清；

.3 使符合國際海事組織要求的符號。

8.6 救生艇筏的存放

8.6.1 救生艇筏應牢固地存放於乘客艙室之外，並儘可能與乘客處所及登乘站靠近。其存放應使每隻救生艇筏能以一種簡單的方式安全地降落，並且在降落過程中和降落後，救生艇閥能繫留在船邊。繫繩的長度及佈置應使救生艇筏保持適當位置以便人員登乘。當出口處有多於一艘救生艇筏使用時，主管機關可以允許使用可調節的繫繩，所有繫繩的繫纜裝置的強度應滿足能在疏散過程中救生艇筏的位置保持不變。

8.6.2 救生艇筏的存放應使在船上其存放位置及附近位置處能解除繫繩裝置，在控制室及附近位置上也可解除。

8.6.3 如可行，救生艇筏應按相等容量佈置在船的兩舷。

8.6.4 氣脹式救生筏應儘可能在降落過程中開始充氣。當不便對筏進行自動充氣時（例如：當救生筏參與海上撤離系統時），救生筏的佈置應能滿足 4.8.1 規定的撤離時間限制。

8.6.5 救生艇筏應在各種操作狀態下以及在受到第 2 章所述的損壞後浸水的各種狀態下能夠降落，然後從指定的登乘站登乘。

8.6.6 救生艇筏降落站的位置，應特別注意與螺旋槳或噴射水柱及船體陡斜懸空部分保持距離，以確保安全降落。

8.6.7 在準備和降落過程中，救生艇筏以及供其降落的水面應有足夠的照明，供給該照明系統的主電源及應急電源應符合第 12 章的要求。

8.6.8 應採取措施避免在降落時船舶任何排水進入救生艇筏。

8.6.9 每艘救生艇筏的存放應：

.1 使該救生艇筏及其存放佈置均不干擾任一其他降落站的任一其他救生艇筏或救助艇的操作；

.2 處在持續的備用狀態；

.3 配齊裝備；

.4 如可行，存放在安全和有遮蔽的地方，並加以保護，免受火災和爆炸引起的損害。

8.6.10 每一隻救生筏存放時，其首纜固定地繫在船上，並應設有符合 LSA 規則 4.1.6 要求的自由漂浮裝置，使救生筏在高速船沉沒時，儘可能自由漂浮，如果是氣脹式救生筏，應能自動充氣。

8.6.11 救助艇的存放應：

.1 使救助艇處於在 5min 以內能降落下水的持續備用狀態；

.2 在適宜於降落並回收的地方；

.3 使救助艇及其存放佈置均不干擾任一其他降落站的任一救生艇筏的操作。

8.6.12 救助艇和救生艇筏應牢固地繫在甲板上，其應至少能經受住由於實船的水平碰撞而產生的載荷以及在存放位置的垂直設計載荷。

8.7 救生艇筏和救助艇的登乘與回收佈置

8.7.1 登乘站應設在從起居處所及工作處所易於到達之處，如果指定集合站不在乘客處所，則該集合站應設在從乘客處所易於到達之所，登乘站也應設在從集合站易於到達之處。

8.7.2 撤離路線、出口和登乘點應符合 4.7 的要求。

8.7.3 通向集合站和登乘站的走道、梯道及出口應給予足夠的照明，供給該照明系統的主電源及應急電源應符合第 12 章的要求。

8.7.4 如沒有配備吊艇架降落的救生艇筏，為了避免人員登乘救生艇筏時進入水中，應設置海上撤離系統或等效的撤離設備。該海上撤離系統或等效的撤離設備應在各種操縱狀態下以及在受到第 2 章所述的損壞後浸水的各種狀態下能使人員登乘到救生艇筏上。

8.7.5 只要救生艇筏和救助艇的登乘佈置在船舶允許運營的海況下以及在所有未損壞及規定損壞的條件下發生的縱、橫傾時是有效的，且水線與指定登乘位置間的乾舷不大於 1.5m，主管機關可接受人員直接登上救生筏的安排。

8.7.6 救助艇登乘裝置應能從救助艇存放位置直接登乘和降落，並且當其載滿全體人員及設備時，能迅速回收。

8.7.7 在下列情況下，B 類船舶的救助艇下水裝置可由該船供電：

.1 吊艇架或吊車應配備由兩個機艙提供的兩路電源；

.2 如僅用一路電源，吊艇架或吊車應符合所要求的下水速度及升降速度；

.3 吊艇架或吊車不允許在救助艇附近起動。

8.7.8 在帶有小 HL_1，橫傾角和縱傾角的多體船上，LSA 規則 6.1 的設計角度可按附件 7 的計算方法從 20°/10°到最大角度，包括橫傾力臂 HL_2、HTL、HL_3 或 HL_4。

8.7.9 救助艇吊艇架或吊車可以設計成由三人放收救生艇筏，條件是按 8.7.5 的規定，在每舷增加一個登乘裝置。

8.7.10 在每個海上撤離系統登乘站設有 1 把安全刀。

8.8 拋繩設備

船舶應配備 1 具符合 LSA 規則 7.1 要求的拋繩設備。

8.9 使用準備狀態、維護保養與檢查

8.9.1 使用準備狀態

船舶在離港前及在整個航行期間，船上一切救生設備應處於正常狀態，並立即可用。

8.9.2 維護保養

8.9.2.1 應備有符合 SOLAS 公約第 III 章 36 條要求的救生設備船上維護保養須知，並應按須知進行保養。

8.9.2.2 主管機關可以同意用包含 SOLAS 公約第 III 章 36 條要求的船上維護保養程序計劃表來代替 8.9.2.1 所規定的須知。

8.9.3 吊艇索的保養

8.9.3.1 應將降落用的吊艇索的兩索端掉轉，間隔期不超過 30 個月，因吊索老化而有必要時，或在不超過 5 年的間隔期中，應予換新，取其較早者。

8.9.3.2 如果由於吊艇索磨損而需要更新或間隔不到 4 年而需要更新，無論何者為先，主管機關可以接受用定期檢驗吊艇索來代替 8.9.3.1 中要求的“兩索端掉轉”。

8.9.4 備件與修理設備

應配備救生設備及其易損或易耗和必須定期更換部件的備件和修理設備。

8.9.5 每周檢查

每周應進行下列的試驗和檢查：

.1 所有救生艇筏、救助艇及降落設備作外觀檢查，以確保立即可用；

.2 只要環境溫度在起動發動機所規定的最低溫度以上，所有救助艇的發動機應進行正車和倒車運轉，總時間不少於 3min。在這段時間內，齒輪箱和齒輪箱組的嚙合應顯示令人滿意。如果救助艇舷外馬達特性不允許與其螺旋槳浸水而操作超過 3min，可這樣操作時間在生產商手冊中應有說明；

.3 通用應急報警系統試驗。

8.9.6 月度檢查

每月應用 SOLAS 公約第 III 章 36.1 條所規定的核對表來檢查救生設備，包括救生艇筏屬具，確保完整無缺，並處於良好狀態。檢查報告應載入航海日誌中。

8.9.7 氣脹式救生筏、氣脹式救生衣、海上撤離系統及充氣救助艇的檢修

每隻氣脹式救生筏、每件氣脹式救生衣及海上撤離系統的檢修應滿足：

.1 間隔期限不得超過 12 個月，如不切實際時，主管機關可展期 1 個月。

.2 應在認可的檢修站進行檢修，該檢修站應能勝任檢修工作，備有正規的檢修器具並僅僱用受過正規訓練的工作人員。

8.9.8 海上撤離系統的循環使用

除了或連同 8.9.7 條所要求的海上撤離系統有關的檢修期限，如果 6 年至少使用一次，在主管機關同意的循環使用時限的基礎上，還應從船上使用每一海上撤離系統。

8.9.9 按 8.1 認可新的氣脹式救生筏裝置，主管機關可以在下列情況下允許延長檢修期限：

.1 新的救助艇裝置應按試驗程序在延長的檢修期限保持同樣的標準。

.2 按 8.9.7 的要求，救助艇系統應由持證人員在船上進行檢查。

.3 間隔不超過 5 年的檢修應按本組織的建議進行。

8.9.10 氣脹式救助艇應按製造商的須知進行所有維修和保養，應急修理可在船上進行。但是徹底修理應在經認可的檢修站進行。

8.9.11 按 8.9.9 的要求，允許對救生筏延長檢修期限，主管機關應按本公約 I/5（b）的要求把此事通知本組織。

8.9.12 靜水壓力釋放器的定期檢修

靜水壓力釋放器的檢修應滿足：

.1 間隔期不得超過 12 個月，如不切實際時，主管機關可展期 1 個月；

.2 在檢修站進行檢修，該檢修站應能勝任檢修該裝置，備有正規的檢修器具，並僅僱用受過正規訓練的工作人員。

8.9.13 堆裝場所的標記

存放救生設備的集裝箱、支架、擱架式其他類似的堆裝場所，應按本組織的建議做上標記，以指明在該場所堆裝的設備。如堆裝一套以上設備則應指明數量。

8.9.14 降落裝置的定期檢修

降落裝置：

.1 應按須知的要求在建議的時限內予以檢修，並按本公約 III/36 的要求在船上予以保養；

.2 在不超過 5 年的間隔期內進行徹底檢查；

.3 按上述.2 檢查完畢後，應按 LSA 規則 6.1.2.5.2 對絞車制動器進行動力試驗。

8.10 救生艇筏與救助艇

8.10.1 所有船舶應配備：

.1 至少兩艘經檢驗合格的能夠容納不少於船上總人數 100%的救生艇筏；

.2 此外，還應配備經檢驗合格的能足夠容納不少於船上總人數 10%的救生艇筏；

.3 即使船舶中心線一舷的所有救生艇筏以及 2.6.7.1 限定的縱向破壞事件內的所有救生艇筏被認為損失或不能使用時，足以容納船上所有人員的救生筏；

.4 應至少配備 1 艘用於援救水上人員的救助艇。當船舶載客 450 名以上時，應在每舷至少配備 1 艘這樣的救助艇；

.5 對於長度小於 30m 的船舶可以不配備救助艇，但需滿足下列所有要求：

.5.1 船舶的佈置應能救起水上無助人員；

.5.2 在駕駛室上能觀察對水上無助人員的救助工作；

.5.3 船舶應有足夠的機動性，以便在能想像的最壞條件下能接近和救起落水人員。

.6 除了以上.4 和.5 規定外，船舶還應配備足夠數量的救助艇，確保供船上全體人員棄船時使用；

.6.1 每艘救助艇所需集結的符合 8.10.1.1 規定的救生筏應不多於 9 隻；或

.6.2 如果主管機關對救助艇同時拖曳一對救生筏的能力表示滿意，則每艘救助艇所需集結的符合 8.10.1.1 規定的救生筏應不多於 12 隻；且

.6.3 船舶能在 4.8 條規定的時間內撤離所有人員。

8.10.2 鑑於航區的遮蔽特性，以及營運區域的氣候條件，主管機關可以允許 A 類高速船使用敞開兩面可用氣脹式救生筏，該救生筏符合附錄 11 的要求作為 LSA 規則 4.2 或 4.3 規定的救生筏的要求替代方案。

8.11 直升飛機登乘區

在兩港口間邊續航行 2h 或 2h 以上的船舶應配備經主管機關認可的本組織所通過的建議案中規定的直升飛機登乘區。

第 9 章 輪機

A 部分－一般規定

9.1 通則

9.1.1 機器以及主機與輔機動力設備有關的管系和附件，其設計和構造應適於它們的用途，且其安裝和保護，應對運動部件、高溫表面以及其他可能的危險進行適當地考慮，以便把對船上人員產生的危險降低到最小程度，在設計中，應對結構材料、擬選設備的用途、使用的工作條件以及船上的環境條件加以注意。

9.1.2 所有溫度超過 220℃的表面，如果系統發生故障，會導致易燃液體射擊該表面，則這些表面應包覆隔熱層。隔熱層應採用抗易燃液體及其蒸氣滲透的材料。

9.1.3 應對單一的主要推進部件的可靠性予以特別考慮，並可要求一個足以提供高速船適航航速的分離的推進動力源，尤其是在非常規佈置的情況下，更應如此。

9.1.4 應提供手段，以保證即使主要輔機之一不能工作時，也能使推進機械的正常運行得以維持或恢復。應對下列裝置的故障予以特別考慮：

.1 主發電機；

.2 發動機燃油供應系統；

.3 潤滑油壓力源；

.4 水壓力源；

.5 起動或控制用空氣壓縮機和空氣瓶；

.6 控制推進主機包括調距槳所用的液壓、氣動或電動裝置。

但是，出於全面的安全考慮，可以同意從正常運轉工況部分降低推進能力。

9.1.5 應提供手段，以便在沒有外部幫助的情況下，確保能使機械裝置從“癱船”狀態投入運轉。

9.1.6 所有受內壓的機器部件、液壓、氣動和其他系統及其附件，在第一次投入運行之前，均應經適當的試驗，包括壓力試驗。

9.1.7 應採取措施，對推進主機和輔助機械包括鍋爐和壓力容器便於清潔、檢查和維修。

9.1.8 安裝在高速船上的機械的可靠性應適合該船的用途。

9.1.9 對於那些在類似場合中使用合格，但在細節方面不完全符合本規則規定的機械，主管機關可同意採用，但應確認：

.1 此類機械的設計、構造、試驗、安裝和規定的維修都適合於其在海上環境的用途；

.2 此類機械能達到同等安全水平。

9.1.10 故障模式和影響分析，應包括機械系統及其控制裝置。

9.1.11 製造廠提供適用的必要資料，諸如操作條件和限制等要素，以確保機器的正確安裝。

9.1.12 推進主機以及高速船的推進和安全所必要的所有輔機機械，應如同安裝在高速船上那樣，設計成在高速船正浮和靜態向任一舷橫傾至不超過 15°，以及動態向任一舷橫搖至不超過 22.5°，並同時艏艉動態縱搖 7.5°的情況下，均能工作。考慮到高速船的類型、尺度和營運條件，主管機關可允許這些角度的偏差。

9.1.13 所有鍋爐和壓力容器及其管系的設計和製造，應適合其預定的用途，並應予以妥善安裝和保護，以便把它們對船上人員造成的危險降至最低限度，應特別注意製造中所用的材料以及設備運轉時，在工作壓力和溫度下，必須提供具有超過材料正常應力的適當安全裕量。每台鍋爐、壓力容器及其管系，都應設有防止使用中超壓的適當裝置，並在投入使用之前進行液壓試驗，且適當時，以後定期以適當高於工作壓力的試驗壓力進行液壓試驗。

9.1.14 應設有裝置，以保證萬一任何液體冷卻系統發生故障，能迅速地監測到並予以報警（光和聲）並採取措施，使上述故障對系統所服務的機器所產生的影響減少到最低程度。

9.2 發動機（通則）

9.2.1 發動機應設有關於轉速、溫度、壓力及其他運行參數的適當安全監測和控制裝置，對機器的控制應在高速船操縱室內進行。B 類高速船和貨運高速船應在機器處所內或其附近設有附加機器控制裝置。機器設備應適合於操作管理，例如在無人值班機器處所內，包括自動探火系統、艙底水報警系統、遙控機器儀錶和報警系統。對於連續有人值班的機器處所，按照主管機關的要求，這一要求可以有所不同。

9.2.2 應防止發動機超速、潤滑油失壓、冷卻介質斷流和高溫、運動部件故障和超負荷等，除了有完全斷裂或爆炸系統的危險外，安全裝置不得在沒有預先報警的情況下導致停機。上述安全裝置應能經得起試驗。

9.2.3 應設有兩個從操縱室操縱的獨立快速停機裝置，在任何運轉工況下均可使用，但不必要求發動機上裝置雙份執行器。

9.2.4 發動機的主要零部件應具有足夠的強度，以承受正常運轉的熱力和動力工況。發動機在轉速或溫度超過正常數值但未超出保護裝置所設定的限度情況下，進行限制性操作時，不應損壞。

9.2.5 發動機設計，應使發生火災或爆炸的危險降至最低限度，並符合第 7 章的防火要求。

9.2.6 應採取措施，將所有過量的燃料和油類排放至安全地點，以避免火災危險。

9.2.7 應採取措施，儘可能保證發動機驅動系統的故障，不致過分影響主要部件的完整性。

9.2.8 在所有可預見的運轉情況下，機器處所通風裝置的能力均應滿足需要。若適當時，通風裝置應確保發動機起動前將封閉的發動機艙室強制通風到大氣壓力。

9.2.9 任何發動機的安裝，應避免高速船內的過大振動。

9.3 燃氣輪機

9.3.1 燃氣輪機應設計成能在海洋環境中運轉，並在直到獲准使用和最高穩定轉速的整個運轉範圍內，不應出現喘振或危險的不穩定現象。渦輪裝置的佈置，應保證其不能連續運轉在可能發生過大振動、停車或喘振的任何轉速範圍之內。

9.3.2 燃氣輪機的設計和安裝，應使壓氣機或渦輪機葉片任何可能的脫落，都不應危及高速船、其他機械、高速船上的乘客或任何其他人員。

9.3.3 關於燃氣輪機在誤起動或停車後可能直入噴管內部或排氣系統內的燃料，9.2.6 要求同樣適用。

9.3.4 渦輪機應儘可能加以防護，防止可能吸入工作環境中的沾染物而受到損壞。應制定出建議性的沾染物最大濃度的適用資料。應採取措施，防止鹽垢在壓氣機和渦輪機上積聚，必要時，還要防止進氣口結冰。

9.3.5 萬一軸或薄弱部件發生故障時，其斷裂端不應直接傷害高速船乘員，也不應損壞高速船或其系統後而危及乘員。必要時，可以裝設保護裝置以滿足上述要求。

9.3.6 每台發動機均應設有應急超停車裝置，如可能，該裝置應直接與每根轉子軸連接。

9.3.7 當設有隔音罩時，應把燃氣發生器和高壓油管完全包圍，並設有隔音罩探火和滅火系統。

9.3.8 製造廠提出的對渦輪機裝置萬一失靈防止危險情況發生的自動安全裝置的詳細資料，應與故障狀態和影響分析報告一起提供。

9.3.9 製造廠應對機殼的堅固性提供證明。中間冷卻器和熱交換器的每側應分別進行液壓試驗。

9.4 主推進與重要輔助柴油機

9.4.1 任何主柴油機推進系統都應具有滿意的扭轉振動和其他振動特性，該特性應由對從發動機直至推進器的系統及其部件進行單獨的以及綜合的扭轉和其他振動分析所證實。

9.4.2 高壓燃油泵和燃油噴嘴之間的所有外部高壓供油管路，均應設有能容納破損的高壓油管所漏出燃油的防護套管系統。該套管系統應包括一個漏油收集裝置和高壓管破損報警裝置。

9.4.3 缸徑 200mm 或曲軸箱容積 0.6m^3 及以上的柴油機，均應設有足夠釋放面積的認可型曲軸箱防爆安全閥。該安全閥應設有裝置，以確保其排出氣體受到控制，從而把傷害人員的可能性降至最低限度。

9.4.4 潤滑油系統的佈置，應在所有運轉轉速下均能有效潤滑，並應對高速船在所有的縱、橫傾情況和運動程度下必須保持滑油吸入和避免溢出予以適當的考慮。

9.4.5 考慮到柴油機內潤滑油的循環速率，應設有裝置，以保證萬一潤滑油壓力或潤滑油液壓降至到安全值以下時，能觸發聲光報警裝置，同時，還應將柴油機轉速自動降低到安全數值，而僅在將導致完全損壞、着火或爆炸的情況下，才觸發自動停車。

9.4.6 若柴油機採用壓縮空氣起、換向或控制時，空氣壓縮機、空氣瓶和空氣起動系統的佈置，應使火災或爆炸的危險降至最低限度。

9.5 傳動裝置

9.5.1 傳動裝置應具有足夠的強度和剛度，以承受運轉中可能出現的最不利的複合載荷而不超過材料的許用應力。

9.5.2 軸系、軸承以及緊固件的設計，應能使其在軸轉速直到原動機設計的超速停車設定轉速的 105%範圍內的任何轉速下，不致發生危險的回旋和過大的振動。

9.5.3 傳動裝置的強度和製造，應使其在整個使用壽命期間，在使用中可能出現的交變載荷作用下，產生危險的疲勞斷裂的可能性極其微小。應通過適當的試驗以及足夠低應力的設計，結合使用抗疲勞材料和適當的施工設計，以證明上述要求得到滿足。若在傳動裝置的某些轉速下發生的扭轉振動或其他振動可能導致發生故障，而這些轉速在高速船的正常運轉中並不使用，則這種情況可以允許存在，但應作為限制條件在高速船操作手冊中予以記錄。

9.5.4 若傳動裝置中設有離合器時，離合器的正常接合不應在傳動裝置或所驅動的部件中造成過度的應力。任何離合器的誤操作也不應在傳動裝置或所驅動的部件中產生危險的高應力。

9.5.5 應採取預防措施，以使傳動裝置任何零件或所驅動部件的故障，不致造成可能危及高速船的損壞或其乘員的傷害。

9.5.6 若潤滑液供應故障或潤滑液失壓可能導致發生危險情況時，則應採取措施，以便能在適當時間內向操作船員顯示上述故障，使能在危險情況出現之前，儘快採取合適的行動。

9.6 推進與墊升裝置

9.6.1 本節各項要求以下列前提為基礎：

.1 推進裝置和墊升裝置可以是分立的，也可以合併為單一的推進和墊升裝置。推進裝置可以是空氣螺旋槳或水螺旋槳或噴水推進器，並且這些要求適用於各類高速船；

.2 推進裝置係指直接提供推進力的裝置，包括機器設備以及主要用來提供推進力的任何導管、槳葉、流體進口和噴嘴等；

.3 本節中的墊升裝置係指直接提高空氣壓力並主要是為氣墊船提供墊升力的機器設備。

9.6.2 推進和墊升裝置應具有足夠強度和剛度。其設計參數、計算書以及必要的試驗，應能確定該裝置運轉期間可能出現的載荷的能力，對此，應證明發生災難性故障的可能性極其微小。

9.6.3 設計推進裝置和墊升裝置時，應適當考慮腐蝕裕量，不同材料間的電解作用以及在自然環境中運轉時遭受水霧、碎石、鹽分、泥沙、結冰等作用而產生的侵蝕或空泡腐蝕等影響。

9.6.4 如適合時，推進裝置和墊升裝置的設計參數和試驗，應適當考慮由於導管堵塞可能產生的任何壓力、固定載荷和交變載荷、外部載荷以及操縱/換向裝置的使用和旋轉部件的軸向位置等。

9.6.5 應採取適當措施，以確保：

.1 使碎石或異物的吸入降至最低限度；

.2 使軸系或旋轉部件傷害人員的可能性降至最低限度；

.3 必要時，營運中應能安全地進行檢查和清除碎石。

B 部分－對客運高速船的要求

9.7 B 類高速船獨立推進裝置

B 類高速船至少應設有兩套獨立的推進裝置，以使在一台發動機或其支持系統發生故障時，不致造成另外的發動機或發動機系統失效，並應在機器處所內或機器處所附近設有附加的機器控制裝置。

9.8 B 類高速船返回避難港口的措施

當任一艙室發生火災或其他災禍時，B 類高速船應能維持重要機器和控制裝置的正常運轉和操作能力，以保證能依靠其自身動力返回避難港口。

C 部分 對貨運高速船的要求

9.9 重要機器設備與控制裝置

當任一艙室發生火災或其他災禍時，貨運高速船應能維持重要機器和控制裝置的正常運轉和控制能力，但不要求能依靠其自身能力返回避難地點。

第 10 章 輔機系統

A 部分－一般規定

10.1 通則

10.1.1 液體系統的製造和佈置，應確保高速船在所有工況所規定的流速和壓力下有安全和足夠的流量。同時應使任一液體系統的中斷或泄漏造成電力系統損壞、火災或爆炸的可能性極其微小，並應注意避免管子泄漏或破損後易燃液體濺落在高溫表面上。

10.1.2 液體系統任何部分的最高許可工作壓力，不得大於考慮了材料的許用應力後所確定的設計壓力。若系統中某些部件，或閥或附件的最高許可工作壓力低於管子或管路的計算值時，則應把該系統的壓力限制在上述各部件最高許可工作壓力中的最低值。每一個可能受到高於其最高許可工作壓力作用的系統均應有適當的安全裝置加以保護。

10.1.3 艙櫃和管系統應經壓力試驗，其試驗壓力保證在受試項目工作壓力以上有一定的安全裕度。對任何儲存櫃或容器的試驗，均應考慮溢流狀態下任何可能的靜壓頭，以及高速運動所引起的動力載荷。

10.1.4 管系所用的材料應與所輸送的液體相容，並對發生火災的危險進行考慮後加以選擇。在保持船體、水密甲板和艙壁完整性的前提下，可以允許在某些系統中使用非金屬管系材料。

10.2 燃油、潤滑油與其他易燃油類的佈置

10.2.1 按 7.1.2.2 的規定，適用於燃油的使用。

10.2.2 燃油、潤滑油與其他易燃油類的管路應加以遮蔽或適當保護，儘可能避免油霧或漏油射向熱表面、進入機器空氣進口或接觸其他着

火源。上述管系的接頭數量應保持最少。輸送易燃液體的軟管應為認可型的。

10.2.3 燃油、潤滑油和其他易燃油類，不得裝在公共處所和船員艙室之前。

燃油佈置

10.2.4 使用燃油的高速船，其燃油的儲存、分佈和使用的佈置應確保高速船和船上人員的安全，並至少符合下列規定：

10.2.4.1 壓力超過 0.18N/mm^2 熱油的燃油系統的所有部分，應儘可能不設在其損傷和泄漏不易觀察到的隱蔽地點。機器處所內燃油系統的上述部分，應有足夠的照明。

10.2.4.2 在所有正常情況下，機器處所均應有足夠的通風，以防止油類蒸氣的積聚。

10.2.4.3 燃油艙櫃的位置，應符合 7.5.2 的規定。

10.2.4.4 燃油櫃不得位於因燃油溢漏到熱表面上而造成危險的地點。參見 7.5 的防火安全要求。

10.2.4.5 燃油管應按 7.5.3 的要求裝設旋塞或閥門。

10.2.4.6 必要時，每個燃油櫃均應設置油盤或油槽，以便收集可能從該油櫃泄漏的燃油。

10.2.4.7 燃油艙櫃均應設有確定其儲油量的安全、有效裝置。

10.2.4.7.1 若採用測量管時，不得終止於有可能引燃測量管溢油危險的處所內，特別是不能終止在公共處所、船員艙室或機器處所內。測

量管終端應設有適當的關閉裝置以及採取防止加油作業期間溢油的預防措施。

10.2.4.7.2 可以採用其他油位表來代替測量管，但應滿足下列條件：

.1 對客運高速船，不應從油櫃頂部以下部位穿過，並且在其失效後或燃油櫃加油過量時，不得有燃油溢出；

.2 禁止使用玻璃管油位表，對貨運高速船，主管機關可允許採用玻璃油位表，但在油位表和燃油櫃之間應設有自閉閥。這些油位表應取得主管機關的認可並應能維護適當的狀態，以確保使用中其持續準確的工作。

10.2.4.8 應採取適當措施，防止任何燃油櫃或包括注入在內的燃油系統的任何部分超壓。無論安全閥以及空氣管或溢流管，均應設在安全地點，以閃點低於 43℃的燃油用的裝置，其排出端應設有符合國際海事組織所制定的標準要求的阻焰器。

10.2.4.9 燃油管及其閥和附件應為鋼質或其他認可的材料製造，但在許可處所限制使用的軟管除外，這些需要使用軟管的處所應經主管機關同意。上述軟管及其端部附件應以認可的具有足夠強度的耐火材料製成，且其製造應使主管機關滿意。

潤滑油佈置

10.2.5 壓力潤滑系統中所用潤滑油的儲存、分佈和使用的佈置，應確保高速船和船上人員的安全。機器處所和輔助機器處所（如可行）的佈置，至少符合 10.2.4.1 和 10.2.4.4 至 10.2.4.8 的規定。但下列除外：

.1 經試驗表明，只要玻璃視流器具有適當的耐火能力，則不排除其在潤滑系統中的使用；

.2 若裝有適當的關閉裝置，則可允許測量管位於機器處所內；

.3 容積小於 500*l* 潤滑儲存櫃，可允許不設 10.2.4.5 所要求的遙控閥。

其他易燃油類的佈置

10.2.6 動力傳動系統、控制和驅動系統，以及加熱系統中，在壓力下使用的其他易燃油類的儲存、分佈和使用的佈置，應確保高速船和船上人員的安全。在有點火設備存在的場所，上述佈置至少應符合 10.2.4.4 和 10.2.4.7 的規定，以及 10.2.4.8 和 10.2.4.9 對強度和製造的有關規定。

機器處所內佈置

10.2.7 除 10.2.1 至 10.2.6 的要求外，燃油和潤滑系統還應符合下列要求：

.1 若日用燃油櫃採用自動或遙控注入的方式，則應設有防止注入過量的溢出流量。

.2 易燃液體的其他自動處理設備，如燃油淨化器切實可行，則應安裝在專門用於淨化器及其加熱器的處所內，還應設有防止超量的溢出裝置。

.3 若日用燃油櫃或燃油沉澱櫃裝有加熱裝置時，若因恆溫控制裝置損壞，可能使油溫達到其閃點，則應設有高溫報警裝置。

10.3 艙底水抽吸與排出系統

10.3.1 應設有排除任何水密艙室內艙底水的裝置，但其中用來永久儲存液體的水密艙室除外。若認為個別艙室沒有排水必要時，則可以免設排水裝置，但應以實例表明其不會削弱高速船的安全。

10.3.2 除用來永久儲存液體的艙室以外，其餘每個水密艙室均應能由所設的艙底抽吸裝置進行排水。這些艙室的容積或位置，應使其浸水後不致影響高速船的安全。

10.3.3 在遭到 2.6.6 到 2.6.10 假設的破損以後，艙底水抽吸系統應能在任何可能的橫傾和縱傾狀態下工作。艙底水抽吸系統的設計，應能防止水從一個艙室流入另一艙室。控制艙底水吸入的必要的閥，應能從基準面以上進行操縱。與艙底水抽吸裝置相連的所有分配閥箱，以及手動操縱閥的所在地點，在正常情況下均應易於接近。手動操作的閥桿應易於接近，而所有閥應做上明顯的記號。

10.3.4 動力驅動的自吸式艙底泵，可以用於諸如滅火或通用等其他用途，但不得用來抽吸燃油或其他易燃液體。

10.3.5 每台動力艙底泵，均應能以不小於 2m/s 的流速來通過所要求的艙底水管進行抽水。

10.3.6 除了艙底總管的實際內徑可以圓整到認可標準接近的尺寸以外，艙底總管的內徑 d 應按照下列公式進行計算：

$$d=25+1.68(L(B+D))^{0.5}$$

式中： d=艙底總管內徑，mm；

L=第 1 章所定義的高速船船長，m；

B=以單體高速船，按第 1 章所定義的高速船船寬，m；而對多片體高速船，是在設計水線處或設計水線以下船體寬度，m；

D=至基準面處高速船的型深，m。

10.3.7 艙底吸入支管的內徑，應滿足主管機關的要求，但不得小於 25mm。吸入支管應裝有有效的濾器。

10.3.8 每個設有推進原動機的機器處所，均應設有一個應急艙底水吸口，該吸口應通往除艙底泵、推進泵或油泵以外的最大可用動力泵。應急艙底水吸口對船舶有共用泵系統應按 10.3.6 要求設置，對船舶有獨立艙底水泵的應按 10.3.13 的要求設置。

10.3.9 海水進口閥的閥桿，應延伸到機器處所花鐵板以上的適當高度。

10.3.10 所有的艙底水吸入管至與艙底泵的接頭前，應獨立於其他管路。

10.3.11 在預期最不利的破損情況下，位於水面以上的處所，可以通過裝有止回閥的排水管，把水直接排至舷外。

10.3.12 任何要求設置艙底水抽吸裝置的無人值班處所，均應設有艙底水報警裝置。

10.3.13 對於高速船具有的艙底泵，每個船體艙底泵的總排量 Q，應不低於 10.3.5 和 10.3.6 中所定義的艙底泵排量的 2.4 倍。

10.3.14 在艙底水抽吸管系佈置中，除公共處所和船員艙室前面的處所以外的其他處所，若未設艙底水總管時，則每一處所應至少設 1 台

固定的潛水泵。此外，還應至少設 1 台能用於各個處所的移動式泵，如果是電動的，該泵應由應急電源供電。每台潛水泵排量 Q_n 應不小於如下規定：

$$Q_n=Q/（N-1）\ t/h \quad （且最小為\ 8t/h）$$

式中：N=潛水泵的數量；

Q=10.3.13 所定義的總排量。

10.3.15 下列部件上應設置止回閥：

.1 艙底水分配閥箱；

.2 直接連接艙底泵或艙底水吸入總管的艙底吸入軟管接管；

.3 直通艙底泵吸入管以及連接艙底水吸入總管的艙底泵接管。

10.4 壓載水系統

10.4.1 通常壓載水不得裝載在燃油艙內。若在高速船上，實際上不能避免把壓載水裝入燃油艙時，則應安裝在油水分離設備或提供處理含油壓載水的其他替代措施；如排入岸上接收設備。本條規定不應妨害生效的“國際防止船舶污染公約”的有關規定。

10.4.2 若燃油駁運系統兼用作壓載用途時，該系統應與任何壓載水系統隔離開來，並應滿足燃油系統及生效的“國際防止船舶污染公約”的要求。

10.5 冷卻系統

所設置的冷卻裝置，在該持證高速船的所有營運期間，應足以使所有潤滑油和液壓液體的溫度，保持在製造廠所推薦的限度之內。

10.6 發動機進氣系統

進氣系統應為發動機提供充足的空氣，並應予以適當的保護，以防異物進入，造成不同於磨損的損傷。

10.7 通風系統

機器處所應有足夠的通風，以保證處所內的機器在全天候包括惡劣氣候條件下全功率運轉時，維持向該處所充足供氣，以供人員安全舒適和機器運轉的需要。輔助機器處所也應有適合於其用途的足夠通風。通風裝置應適當，以確保高速船安全營運。

10.8 排氣系統

10.8.1 所有發動機的排氣系統均應適當，確保機器的正確運轉以及高速船安全工作，而不致發生危險。

10.8.2 排氣系統的佈置，應使排出的廢氣進入有人處所、空調系統的進氣口，以及發動機進氣口的可能性降至最低限度。排氣系統的廢氣不得排至氣墊進氣口。

10.8.3 在水線附近穿過殼板的排氣管，應在殼板上或管端裝設耐衝/腐蝕的截止門或其他裝置並形成認可的佈置，以防止浸入該處所或進入發動機排氣總管。

10.8.4 燃氣輪機排氣管的佈置，應使直接排出的熾熱廢氣，遠離高速船或靠泊時高速船附近有人員出入的區域。

B 部分－對客運高速船的要求

10.9 艙底水抽吸與排出系統

10.9.1 B 類高速船至少應設 3 台、A 類高速船至少應設兩台與艙底水總管相連的動力艙底水泵，其中之一可由推進主機驅動。或者其佈置也可以按 10.3.14 的要求加以實施。

10.9.2 其佈置應至少有一台動力艙底水泵在高速船被要求的所有浸水情況下可以使用。此項要求可採取下列方法之一予以滿足：

.1 所要求的艙底水泵之一，應為 1 台有應急動力源的可靠的潛水式泵；或

.2 各艙底水泵及其動力源應分佈在高速船的全長範圍內，浸水時至少在未破損的艙室內有 1 台泵能供使用。

10.9.3 在多體高速船上，每一片體至少應設 2 台艙底水泵。

10.9.4 連接艙底水抽吸系統的分配閥箱、旋塞和閥的佈置，應確保在任一艙室若浸水時，所設的艙底水泵之一可以工作。另外，一台泵或其與艙底水總管的連接管損壞時，不應使艙底水系統失去作用。在除了主艙底水抽吸系統外，還設一個應急艙底水抽吸系統時，其應獨立於主系統，且其佈置應有一台泵在任一艙室在 10.3.3 所規定的浸水情況下可以工作；在這種情況下，僅應急系統運轉需要的那些閥應能在基準面以上進行操作。

10.9.5 在 10.9.4 中所述的所有能從基準面以上操作的旋塞和閥，應在其操作地點設帶有明顯標記的控制裝置，此外，還應設有明示其是打開或關閉的設施。

C 部分－對貨運高速船的要求

10.10 艙底水抽吸系統

10.10.1 至少應設置 2 台與艙底水總管系統連接的動力泵，其中 1 台可由推進主機驅動。若主管機關認為高速船的安全未受損害，則該艙室內的艙底抽吸裝置可予免除。或也可按 10.3.14 的要求來設置艙底水抽吸裝置。

10.10.2 在多體高速船上，除非在一個片體內的一台艙底水泵也能抽吸其他片體內的艙底水，否則，每片體內應至少配備 2 台動力泵。每片體內至少應有一台泵為獨立動力泵。

第 11 章 遙控、報警與安全系統

11.1 定義

11.1.1 “遙控系統”係指從一個控制地點操作若干裝置的所有必要設備組成的系統。在該控制地點操作者不能直接觀察其動作的結果。

11.1.2 “後備控制系統”係指在主控制系統損壞或失效後，維持高速船安全運轉所必需的控制設備組成的系統。

11.2 通則

11.2.1 任何遙控系統或自動控制系統的故障，均應能發出聽覺和視覺的警報，並且不得妨礙正常的手動控制。

11.2.2 操縱和應急控制裝置，應能使操作船員在沒有困難、不疲勞或不過分專注的情況下，以正常的方式完成他們所負責的工作。

11.2.3 如果在操縱室之外並與之相鄰的若干地點，設有推進或操縱控制裝置時，控制轉換應僅能從負責控制的地點來完成。在可以使用控

制功能所有地點之間，以及上述各地點和監視台之間，均應設有雙向通話設備。操作控制系統或控制轉換的故障，應使高速船在不對乘客或其本身造成危險的情況下降低轉速。

11.2.4 對 B 類高速船和貨運高速而言，推進主機的遙控系統和方向控制裝置，應設有能在操縱室控制的後備控制系統。對於貨運高速船，可以允許用一個能在發動機控制處所（如位於操縱室之外的發動機控制室）進行控制的後備控制系統來代替上述後備控制系統。

11.3 應急控制裝置

11.3.1 在所有高速船上，均應在對高速船操縱和/或其主機進行控制的操縱室內設置一個或數個控制站。控制站應易於到達，並設置具有下列應急用途的控制裝置：

.1 啟動固定滅火系統；

.2 若未和.1 功能合為一體時，關閉固定滅火系統所覆蓋處所的通風開口，並停止供氣通風機；

.3 切斷向主、輔機器處所內機器的燃油供應；

.4 從一般電力分配系統斷開所有電源（操縱控制裝置應予以保護，以減少誤操作的危險）；和

.5 停止主機和輔助機械。

11.3.2 若操縱室外的控制站設有推進和操縱的控制裝置時，這些控制站應設有與操縱室直接聯繫的通信設備，該操縱室應是一個連續有人值班的控制站。

11.3.3 此外，對 B 類船舶在操縱艙外的控制站內應配備 11.3.1 要求的推進控制裝置和操縱控制裝置以及應急功能控制裝置。此控制站應可直接與作為連續有人值班的控制站的指揮艙聯繫。

11.4 報警系統

11.4.1 應設有以視聽方法向高速船製造站通報故障或不安全狀態的報警系統，報警信號應一直保持至得到應答，而各個可視信號則應保留到故障消除為止。故障消除後，報警裝置應自動恢復到正常工作狀態。如果一個報警已被應答，而第一個故障消除之前又發生了第二故障，則應再次發出視聽報警。報警系統應含有試驗裝置。

11.4.1.1 應對下列情況設置應急報警裝置，這類報警裝置的報警信號對需要立即採取行動的不同狀態的顯示，應是各不相同的，而且應在操縱室內船員的整個視域之內：

.1 探火系統的激發；

.2 正常電力供應全部消失；

.3 主機超速；

.4 任何永久安裝的鎳一鎘電池的熱擊穿。

11.4.1.2 與 11.4.1.1 中所述報警裝置不同的具有可視顯示器的報警裝置，應指出需要採取行動的條件，以防惡化到不安全狀態。至少對下列情況應設置這類報警裝置：

.1 除發動機超速外，超過了任何高速船、機器或系統參數的極限值；

.2 電動定向裝置或縱傾控制裝置的正常供電故障；

.3 任何自動艙底水泵運轉；

.4 羅經系統故障；

.5 燃油櫃內燃油低液位；

.6 燃油櫃溢流；

.7 舷燈、桅頂燈或尾航行燈熄滅；

.8 對高速船正常營運實屬重要的液體容器內液體低液位；

.9 任何連接的電源故障；

.10 任何用於易燃蒸氣可積聚處所通風的通風故障；

.11 柴油機燃油管路故障，按照 9.4.2 的要求執行。

11.4.1.3 在所有可能實施控制功能的控制站，均應設有 11.4.1.1 和 11.4.1.2 要求的所有報警裝置。

11.4.2 報警系統應滿足對所需報警裝置在結構上和使用上的適用要求。

11.4.3 對乘客處所、貨物處所，以及機器處所的火災和浸水進行監控的設備，應儘可能把所有緊急情況的監控和觸發控制裝置進行合併形成一個集中的子中心，該子中心可要求設置反饋裝置，以指示初始動作已全部完成。

11.5 安全系統

若對符合 9.2.2 要求的推進主機的任何自動停車系統設置越控裝置時，應使越控裝置不可能被誤操作。當停車系統被觸發時，應在控制站發出視聽警報並應設有越控裝置，以便對除了有完全破損或爆炸危險情況以外的自動停車進行越控。

第 12 章 電氣設備

A 部分－一般規定

12.1 通則

12.1.1 電氣設備應是：

.1 對所有為船舶正常操作和居住條件所必需的電氣輔助設備保證供電，而不求助於應急電源；

.2 有各種應急情況下，能保證對安全所必需的電氣設備供電；

.3 能確保乘客、船員和船舶的安全，免受電氣事故的危害。

考慮到電力故障對供電系統的影響，FMEA（故障形態與影響分析）應包括電力系統。若設備有可能會產生在常規檢查中未能發現的故障時，該分析應考慮故障同時或連續發生的可能性。

12.1.2 電力系統的設計和配備應使船舶在航行中因電力故障而發生危險的可能性降至最低。

12.1.3 特定的重要設備若缺損會嚴重危害船舶時，則該設備應至少由兩條獨立線路供電，以使在供電或配電系統中的單一故障不會同時影響兩路供電。

12.1.4 用於固定蓄電池之類的重物的裝置，應儘可能防止由於擱淺或碰撞而產生的加速度引起過多的位移。

12.1.5 應採取預防措施，以減少由於疏忽或意外打開開關或斷路器，而使主電源和應急電源中斷供電的危險。

12.2 主電源

12.2.1 應配備能足以供 12.1.1 所述設備用電的主電源。主電源應至少由兩套發電機組所組成。

12.2.2 這些發電機組的功率，應是當任一發電機組停止工作或發生故障時，仍能保證對正常推進操作和安全所必需的設備供電。最低舒適居住條件也要得到保證，至少包括烹調、取暖、食品冷凍、機構通風、衛生和淡水等。

12.2.3 船舶主電源的裝置應是：不管推進機械或軸系的速度和轉動的方向如何，應使 12.1.1.1 所指的那些設備處於工作狀態。

12.2.4 此外，發電機組應保證在任一發電機或其初級電源失效時，其餘發電機組仍能向主推進裝置自癱船狀態起動所必需的設備供電。如應急電源單獨或與任何其他電源組合的功率足以同時向 12.7.3.1 至 12.7.3.3 或 12.7.4.1 至 12.7.4.4 或 12.8.2.1 至 12.8.2.2.4.1 所需的設備供電，則此應急電源可用作自癱船狀態起啟動的目的。

12.2.5 如變壓器組成本節所要求供電系統的必要部分，此系統的佈置應能保證 12.2 所述的同樣供電連貫性。

12.2.6 向船上通常能到達的和船員或乘客使用的各個部分提供照明的主照明系統應由主電源供電。

12.2.7 主照明系統的佈置應是：如果應急電源、相聯的應壓設備（如設有）、應急配電板和應急照明配電板所在處所發生火災或其他事故，不應使 12.2.6 所要求的主照明系統失效。

12.2.8 主配電板與一主發電站的相對安裝位置，應儘實際可行，使正常供電的完整性只有在一個處所發生火災或其他事故才會受到影響。主配電板的環境圍蔽，例如利用位於該處所主界限以內的機器控制室，不能視作配電板已與發電機分開。

12.2.9 主匯流排通常應至少分成兩部分，應由一斷路器或其他經認可的裝置來連接；儘實際可行，發電機組之間和其他雙套設備的連接應在這兩部分中平均分配。對於 B 類船舶，主匯流排及其相關發電機的每一部分都必須安裝在獨立的艙室內。

12.3 應急電源

12.3.1 應備有一個獨立應急電源。

12.3.2 應急電源、相聯變壓設備（如設有）、臨時應急電源、應急配電板和應急照明配電板應置於第二章所指的損壞的最壞的最終狀態的水線以上部位，且在此狀況下可以工作，並易於到達。

12.3.3 應急電源、相聯變壓設備（如設有）、臨時應急電源、應急配電板和應急照明配電板，其與主電源、相聯變壓設備（如設有）和主配電板的相對位置應保證在主電源、相聯變壓設備（如設有）和主電配電板所在處所或任何機器處所發生火災或其他事故時，不妨礙應急電源供電、控制和配電。儘實際可行，應急電源、相聯變壓設備（如設有）、臨時應急電源和應急配電板所在處所不應毗鄰於機器處所或主電源、相聯變壓設備（如設有）或主配電板所在處所的限界面。

12.3.4 只要採取保證能在各種環境下獨立應急作業的適當措施， 可例外地允許應急發電機（如設有）短時間向非應急電路供電。

12.3.5 配電板系統的佈置應使來自主電源和應急電源的饋電線在垂直和水平方向儘可能遠地分開。

12.3.6 應急電源可以是一台發電機或一組蓄電池，並應符合下列要求：

.1 應急電源為發電機時，應是：

.1.1 由適當的原動機驅動，獨立供給燃油，燃油閃點滿足 7.1.2.2 的要求。

.1.2 主電源供電發生故障時應能自動起動，並應自動與應急配電板接通；12.7.5 或 12.8.3 所指設備也應轉由應急發電機組供電。自動起動系統和原動機的特性應能儘快地在最多 45s 內使應急發電機安全和實際可行地承擔其全部額定負荷；和

.1.3 備有 12.7.5 或 12.8.3 規定的臨時應急電源。

.2 當應急電源為蓄電池組時，應能：

.2.1 承擔應急負荷而無需再充電，在整個供電階段保持電池的電壓在其額定電壓的±12%之內；

.2.2 主電源發生故障時自動與應急配電板接通；和

.2.3 立即向至少是 12.7.5 或 12.8.3 所指的用途供電。

12.3.7 應急配電板應儘實際可能設在靠近應急電源之處。

12.3.8 當應急電源為發電機時，應急配電板與應急電源設置在同一處所，除非會妨礙應急配電板的操作。

12.3.9 按本條規定裝備的蓄電池組不得與應急配電板設置在同一處所。在船舶操縱艙室的適當位置安裝一指示器，以指示蓄電池正在代替應急電源或 12.3.6.1.3 所指的臨時應急電源進行供電。

12.3.10 在正常工作情況下，應急配電板應用內連饋線由主配電板供電，此內連饋線在主配電板上應有適當保護，以防過載和短路，並能在主電源發生故障時自動在應急配電板處斷開。當此系統採用反饋操作，內連饋線也應在應急配電板處得到保護，至少要防短路。應急配電板在非應急狀態下使用時發生的故障，不應對船舶的航行構成危害。

12.3.11 為了保證應急電源迅速可用，應作出安排當必要時將非應急電路從應急配電板自動斷開，以保證向應急電路供電。

12.3.12 應急發電機及其原動機和任何應急蓄電池組的設計和佈置，應於船舶正浮和有符合 9.1.12 的橫傾或縱傾狀態包括第二章所考慮到的各種損壞狀態或任何組合傾斜角度達到最大時，仍能以滿額定功率發揮作用。

12.3.13 若由蓄電池組向應急負載供電時，應由可靠的船上電源就地向其充電。充電裝置的設計應能無論電池是否在充電均能向負載供電。應採取措施儘可能減少對電池組過充電或過熱的損壞。應採取有效的通風措施。

12.4 應急發電機組的起動裝置

12.4.1 應急發電機組能在 0℃的冰態下迅速起動。如實際上不可行或者不會遇到這種較低的溫度時，應作出維持加熱裝置的規定，以保證發電機組的迅速起動。

12.4.2 每台應急發電機組應配備至少供三次連續起動的貯存能源的起動裝置。該貯存能源應受到保護，免被自動起動系統耗儘，除準備有第二套獨立的起動裝置。此外，除非能證明人工起動是有效的，還應配備能在 30min 內另加三次起動的第二能源。

12.4.3 貯備的能源應在全部時間內維持如下：

.1 電力和液壓起動系統應由應急配電板來維持；

.2 壓縮空氣起動系統可用裝有合適止回閥的主或輔壓縮空氣瓶或應急空氣壓縮機來保護。如該應急空氣壓縮機係由電力驅動，則由應急配電板供電；

.3 所有這些起動、充電和能源貯存裝置應設置在應急發電機處所內；這些裝置除操作應急發電機組外，不作其他目的之用，這關不排除由設置在應急發電機處所內的壓縮空氣系統或輔助壓縮空氣系統通過止回閥向應急發電機組的空氣瓶供氣。

12.5 操舵與穩定

12.5.1 若船舶的操舵和/或穩定主要是依靠一種本身需要連續供電的裝置，如：單板舵或槳塔，則應至少由兩條獨立電路供電，其中一條或來自應急電源或本身來自獨立電源，該電源的佈置不應受到主電源的火災或浸水的影響。在轉換至由備用電源供電時，任一供電故障應不會對船舶或乘客造成任何危害，並且這種轉換佈置應符合 5.2.6 的要求，這些電路應配備短路保護裝置和過載報警器。

12.5.2 可配備過電流保護裝置，該裝置的整定值應不小於所保護的電機或電路的滿負荷電流的兩倍，並應調整妥當，以便在留有裕量的情況下能承受相應的起動電流。若使用三相電源，則在船舶操縱艙室內易於觀察處應設置報警器，以便顯示任何一相的故障。

12.5.3 若操舵及穩定裝置並非依靠電力的連續可用性，而至少另有一套不需要電源的替換裝置，則其電力或控制系統可由 12.5.2 所述的加以保護的單路供電。

12.5.4 有關船舶方向控制系統和穩定系統的電源供應應滿足第 5 章和第 16 章的要求。

12.6 觸電、電氣火災與其他電氣災害的預防措施

12.6.1.1 電機或電氣設備的裸露金屬部分，原來不帶電，但在失誤情況下易變為帶電者，應予接地，除非這些電機或設備為：

.1 所用的電壓，直流不超過 50V 或導體間均方根不超過 50V；不可用自耦變壓器來實現這個電壓；或

.2 由安全絕緣的變壓器供電，電壓不超過 250V，同時這種變壓器只向一個耗電裝置供電；或

.3 是根據雙層絕緣原理構造的。

12.6.1.2 對用於受限制的或特別潮濕的處所的便攜式電氣設備，而這些處所由於導電可能產生特殊危險者，主管機關可要求額外的預防措施。

12.6.1.3 一切電氣裝置的構造和安裝，應在正常使用或接觸時不致造成傷害。

12.6.2 主配電板和應急配電板的佈置，應在需要時易於到達電氣裝置和設備，而對人員無危險。配電板的側面、後面，必要時包括前面，均應作適當的保護。裸露帶電部分的對地電壓超過主管機關規定電壓者，不應裝在這類配電板的板面上。必要時，配電板的前面和後面安放絕緣墊或格棚。

12.6.3 當動力、加熱取暖或照明配電系統，不論是一次系統還是二次系統不接地時，應備有能不斷監控對地絕緣程度和絕緣值異常低時能發出聲光信號的裝置。對個別二次配電系統，主管機關可允許採用手動絕緣檢測設備。

12.6.4 電纜和電線

12.6.4.1 除非經主管機關許可外，電纜的所有金屬護套和鎧裝應為連續導電，並應接地。

12.6.4.2 設備外面的所有電纜和電線至少應為阻燃式，並應在敷設時不損傷其原來的阻燃性能。在特殊需要的情況下、主管機關可允許使用不符合前述要求的專用電纜，如射頻電纜。

12.6.4.3 重要部分和應急動力、照明、內部通信或信號使用的電纜和電線應儘可能地遠離機器處所和其圍壁，以及其他有高度失火危險的區域。當實際可行時，所有這類電纜的敷設，要使它們不因相鄰處所失火所致的艙壁變熱而導致失效。

12.6.4.4 當敷設在危險區域的電纜因這類區域內的電器故障會引起火災或爆炸危險時，應採取主管機關同意的防止這類危險的專門預防措施。

12.6.4.5 電纜和電線敷設和支承，應避免擦傷或其他損害。

12.6.4.6 所有導線的終端和接頭，應保持其原來的電氣、機械、阻燃性，必要時電纜應具有耐火性能。

12.6.5.1 除 12.5 許可或主管機關例外允許外，所有獨立饋電線路應予保護以免短路和過載。

12.6.5.2 每一饋電線路過載保護裝置的額定值或相應的整定值，應在該保護裝置所在位置作永久性標誌。

12.6.6 照明裝置的佈置，應能防止其溫度升高而損傷電纜和電線，並能防止其周圍的材料發生過熱現象。

12.6.7 對在燃料艙或貨艙內的所有照明和動力電路及其終端設備，應在該處所以外備有切斷這些饋電線路的多極開關。

12.6.8.1 對蓄電池組應作適當的罩護，主要用作存放蓄電池組艙室應有適當的構造和有效的通風。

12.6.8.2 除 12.6.9 的許可外，凡能形成易燃氣體着火源的電器或其他設備，不應存放在這些艙室內。

12.6.8.3 蓄電池組不應放在船員起居處所內。

12.6.9 電氣設備組不應安放在任何可燃混合氣體易於積聚的處所，包括專門用來存放蓄電池的艙室、油漆間，乙炔貯藏室或類似處所，除非主管機關認為這些設備是：

.1 操作所必需的；

.2 不致點燃可燃混合氣體的型式；

.3 適合於有關處所；和

.4 經試驗證明可能遇到的灰塵、蒸汽或氣體中能安全使用者。

12.6.10 應滿足以下.1 至.7 的補充要求，並對非金屬船舶也應滿足.8 至.13 的要求：

.1 船舶的配電電壓可以是直流的或交流的，但不應超過：

.1.1 500V，供動力設備、電炊設備、電熱設備，以及其他固定不移動的設備之用；和

.1.2 250V，供照明、內部通信和插座之用。

主管機關可採納較高的電壓供推進之用。

.2 對於電力配電，應使用雙線、三線或四線絕緣系統，如適合，也應滿足 7.5.6.4 或 7.5.6.5 的要求。

.3 應採取有效措施使得在每一電路、各個電路、分電路及所有設備上應能切斷電壓，以防危險。

.4 電氣設備的設計應使意外觸及帶電部件、旋轉和運動部件，以及會引起燃燒或產生火災的熱表面的可能性減少到最小程度。

.5 電氣設備應充分固定。應將由電氣設備的損壞而引起火災危害的可能性降至可接受的最小程度。

.6 每一饋電線路過載保護裝置的額定值或相應的整定值，應在該保護裝置所在位置作永久性標誌。

.7 若在蓄電池艙中和機器起動線路中的蓄電池組專用供電電纜上，不可能設有電氣保護裝置的話，則未加保護的電纜敷設應儘可能短，並應採取特別的預防措施以減少故障的發生，如使用在每芯線和絕緣外加保護套並終端屏蔽的單束電纜。

.8 為了減少火災、結構損壞、觸電，以及由於短暫的閃電或靜電釋放而產生的無線電干擾，船舶的所有金屬部件應屏蔽接地在一起，並儘可能考慮到不同金屬之間的電化鏽蝕，應設一適於電氣設備接地回路的連續導電系統，該系統使得船舶與水面相

連。除非在燃油艙裏，通常結構內部的獨立元件的屏蔽接地是不必要的。

.9 每一個壓力加油點應設一能使加油設備與船舶屏蔽接地的設施。

.10 考慮到液體和氣體的流動，應將會釋放靜電的金屬管在其長度上連續電氣相接，並應相應接地。

.11 載有閃電釋放電流的初級導體如果為銅質，其最小截面積為 $70mm^2$，若為鋁質，則應具有與所載電流量相同的截面積。

.12 用作靜電釋放的均衡、設備的屏蔽接地等而採用作閃電釋放的次級導體如果是銅質，最小截面積應為 $5mm^2$；若為鋁質，則應具有與所載電通量相同的截面積。

.13 除非能證明較高的電阻不會引起危害，不然的話，屏蔽接地物體與主結構之間的電阻值不應超過 0.02ohm。屏蔽接地線路應具有足夠的截面積以使傳送其所承受的最大電流而無過多的電壓降。

B 部分－對客運高速船的要求

12.7 通則

12.7.1 雙套船舶必需的用電設備應由兩路相互獨立的電源供電。其正常工作期間，兩路電源可以連在同一電力線路上，但應設有易於隔離的裝置，每套電源應能向維持推進裝置、操舵裝置、穩定裝置、航行設備、照明，以及通風設備的控制所必需的所有設備供電，並允許最大的重要電機在任何負載情況下起動。非重要設備可允許使用自動負荷分斷器。

12.7.2 應急電源

若主電源設在兩個或兩個以上不相連的艙室裏，每一主電源具有包括電力分配和控制裝置的獨立系統，兩者之間相互完全獨立、並且在任一處所的火災或其他事故不會影響其他處所的配電，或不影響12.7.3 或 12.7.4 所要求的設備的使用，則可以考慮 12.3.1、12.3.2 和 12.3.4 的要求而無需附加的應急電源，只要：

.1 至少一台滿足 12.3.12 的要求，並在至少兩個互不相連的每一處所中提供滿足 12.7.3 或 12.7.4 要求的足夠容量的發電機組；

.2 按.1 所要求的每一處所的佈置，等同於 12.3.6.1、12.3.7~12.3.11 和 12.4 的要求，以使一個電源在所有時間內向 12.7.3 或 12.7.4 所要求的設備供電；和

.3 在.1 所述發電機組及其獨立系統的安裝應使得在任一艙室內的破損或浸水後，其中一台仍能保持工作。

12.7.3 對於 A 類船舶，應急電源應能同時向如下設備供電：

.1 下列處所的 5h 應急照明：

.1.1 救生艇筏的存放、準備、降落和佈置處所以及登乘該艇筏設備的處所；

.1.2 所有脫險通道外，如走廊、梯道、居住和服務處所的出口登乘地點等；

.1.3 公共處所內；

.1.4 機器處所內和主應急發電處所及其控制站；

.1.5 控制站內；

.1.6 消防員裝備的存放處；和

.1.7 操舵裝置處。

.2 供以下設備 5h 用電量：

.2.1 主航行燈（失控燈除外）；

.2.2 在撤離時用於通知乘客和船員的船內電氣通信設備；

.2.3 探火和通用報警系統以及手動火災報警器；和

.2.4 滅火系統的遙控裝置（若為電動時）。

.3 以下設備 4h 的間斷供電：

.3.1 白晝信號燈，若本身無蓄電池組獨立供電者；和

.3.2 船舶號笛（若為電動時）。

.4 供下列設備 5h 用電量：

.4.1 按 14.13.2 所列的船舶無線電設備以及其他負載；和

.4.2 推進機器所必需的電力儀錶和控制裝置，若這些設備無替換電源時。

.5 為失控燈供電 12h；和

.6 以下設備供電 10min：方向控制設備的電力驅動裝置，包括那些要求向前和向後推進的設備，除非有符合 5.2.3 要求，並經主管機關所接受的手動替代裝置。

12.7.4 對於 B 類船舶，應有充足的電力向在緊急狀況下維持安全所必需的設備供電；並應考慮這些設備可以同時運行，考慮到起動電流和一些臨時性負載，應急電源應能在下述時間內滿足至少向下列設備供電（如果這些設備是依靠電力工作的）；

.1 下列處所的 12h 應急照明：

.1.1 救生艇筏的存放、準備、降落和佈置處所以及登乘該艇筏設備的處所；

.1.2 所有脫險通道，如走道、梯道、居住和服務處所的出口處，登乘地點等；

.1.3 乘客艙室；

.1.4 機器處和主應急發電處所包括其控制位置；

.1.5 控制站內；

.1.6 消防員裝備的存放處所；和

.1.7 操舵裝置處。

.2 供下列設備 12h 用電量：

.2.1 現行國際海上避碰規則所要求的航行和其他燈；

.2.2 在撤離時用於通知乘客和船員的船內電氣通信設備；

.2.3 探火和通用報警系統，以及手動火災報警器；和

.2.4 滅火系統遙控裝置（若為電動時）。

.3 供下列設備間斷工作 4h 用電量：

.3.1 白晝信號燈，若本身無蓄電池獨立供電者；和

.3.2 船舶號笛（若為電動時）。

.4 供下列設備 12h 用電量：

.4.1 第十三章所要求的航行設備，若此規定被認為不合理或不合乎實際時，主管機關可對 5000 總噸以下的船舶免除此要求；

.4.2 推進機器處所必需的電力儀錶和控制裝置，若這些設備無替換電源時；

.4.3 按 7.7.5.1 所要求的一台消防泵；

.4.4 噴水系統消防泵和灑水系統（如設有）；

.4.5 第十章所要求的應急艙底水泵以及所有操作電力遙控艙底閥必需的設備；和

.4.6 按 14.13.2 所列的船舶無線電設備以及其他負載；

.5 對第二章所要求和電力操作的水密門以及指示器和警告信號供電 30min；

.6 對方向控制設備的電力驅動裝置，包括那些要求向前和向後推進的設備供電 10min，除非有符合 5.2.3 要求，並經主管機關所接受的手動替代裝置。

12.7.5 臨時應急電源

按 12.3.6.1.3 所要求的臨時應急電源可由在緊急情況下，便於使用的蓄電池組組成，該蓄電池應在整個供電過程中其電壓能保持在標定電壓的±12%範圍內而無需再充電，並且具有充足的容量，其佈置應

使得當主電源或應急電源發生故障時，至少能自動地向以下設備供電（如果這些設備是依靠電力工作的）；

.1 供 12.7.3.1、.2 和.3 或 12.7.4.1、.2 和.3 所述的負荷 30min 之用；和

.2 對於水密門；

.2.1 除非備有一個獨立的臨時存貯能源，不然的話，應提供操作水密門的電力，但不必同時操作，電源應備有足夠的容量，以便對每扇門至少進行三次操作即在逆傾 15°情況下，關閉－打開－關閉；和

.2.2 供水密門控制器、指示器和報警電路 0.5h 之用電量。

12.7.6 可以考慮在 12.7.5 的要求中，如每種用途都具有獨立的作於應急情況下蓄電池組按所需時間供電，則可不設臨時應急電源。對推進系統和方向系統的儀器和控制的供電應是非中斷的。

12.7.7 在公共處所有限 A 類船舶中，只要達到相應的安全標準，可以使用 12.7.9.1 所述的同時符合 12.7.3.1 和 12.7.5.1 要求的應急照明裝置的型式。

12.7.8 應規定對包括 12.7.3 或 12.7.4 和 12.7.5 要求的應急設備在內的整個應急系統進行定期試驗，並應對自動起動裝置進行試驗。

12.7.9 具有特種處所的每艘船舶除 12.7.3.1、12.7.4.1 和 12.7.5.1 所要求的應急照明外；

.1 所有乘客公用處所和走道應設有附加電氣照明。當其他所有電源發生故障和在船舶任何橫傾狀態下，該附加電氣照明仍能至

少工作 3h。所提供的照明應能看清脫險通道，附加照明的電源應是位於是照明裝置之中並可連續充電的蓄電池，若實際可行，充電電源來自應急配電板，或主管機關可以採納至少是有效的任何其他照明設施。

附加照明所使用的燈的任何故障，應易於被立即發現。考慮到所使用環境下的特定服務壽命，所使用的蓄電池應定期更換；和

.2 在每一船員處所、走道、娛樂處所，以及每一工作處所應配備一盞可充電式手提燈，除非配備有.1 所要求的附加應急照明。

12.7.10 配電系統的佈置應使得在任何主豎區內的失火不會影響其他豎區內用於安全的設備，此要求可由通過任何豎區的主電源和應急電源饋電線路在垂向和水平方向都應儘可能遠離來滿足。

C 部分－對貨運高速船的要求

12.8 通則

12.8.1 雙套船舶必需的用電設備應由兩路相互獨立的電源供電。在正常工作期間，這些用電設備可以直接或通過配電板或組合起動器與同一電力線路相連，但可由可移式聯接器或其他認可裝置進行隔離，每一電力線路應能向維持對推進裝置、操舵裝置、穩定裝置、航行設備、照明以及通風設備的控制所必需的所有設備供電。並允許最大的重要電機在任何負載情況起動。無論如何，根據 12.1.2 的要求，可允許在正常工作下的容量有所減少，非雙套船舶必需的用電設備可允許直接或通過配電板連至應急配電板。非重要設備可允許使用自動負載分斷器。

12.8.2 應急電源

12.8.2.1 若主電源設在兩個或其以上互不相加的艙室裏，每一主電源具有包括電力分配和控制裝置的獨立系統，兩者之間完全相互獨立，並且在任一處所的火焰或其他事故不會影響其他處所的配電，或不影響 12.8.2.2 所要求的設備使用，則可考慮達到 12.3.1、12.3.2 和 12.3.4 的要求，而無需附加的應急電源，只要求：

.1 至少有一台滿足 12.3.12 要求，並在至少兩個互不相連的每一處所中，提供滿足 12.8.2.2 要求的足夠容量的發電機組；

.2 按 1 要求的每一處所的佈置等同於 12.3.6.1、12.3.7~12.3.11 以及 12.4 的要求，以使一個電源在所有時間內向 12.8.2 所要求的設備供電；和

.3 在.1 所述發電機組及其獨立系統的安裝應符合 12.3.2 的要求。

12.8.2.2 應具有充足的電力向在緊急狀況下維持安全所必需的設備供電，並應考慮這些設備可以同時運行，考慮到起動電流和一些臨時性負載，應急電源應能在下述時間內滿足同時至少向下列設備供電（如果這些設備是依靠電力工作的）：

.1 下列處所的 12h 應急照明：

.1.1 救生設備存放處；

.1.2 所有的脫險通道，如走道、梯道、居住和服務處所的出口處、登乘地點等；

.1.3 公用處所（如設有）；

.1.4 機器處所和主應急發電處所，包括其控制位置；

.1.5 控制站內；

.1.6 消防員裝備的有效處所；和

.1.7 操舵裝置處。

.2 供下列設備 12h 用電量：

.2.1 現行國際海上避碰規則所要求的航行燈和其他燈；

.2.2 撤離時用於通知的船內電氣通信設備；

.2.3 探火和通用報警系統以及手動火焰報警器；和

.2.4 滅火系統的遙控裝置（若為電動時）。

.3 供下列設備間斷工作 4h：

.3.1 白晝信號燈若本身無蓄電池獨立供電者；和

.3.2 船舶號笛（若為電動時）。

.4 供下列設備 12h 用電量：

.4.1 第十三章所要求的航行設備，此規定被認為不合理或不合乎實際時，主管機關可以對 5,000 總噸以下的船舶免除此要求；

.4.2 推進機器所必需的電力儀錶和控制裝置，若這些設備無替換電源時；

.4.3 按 7.7.5.1 所要求的一台消防泵；

.4.4 噴水器泵和浸濕泵，（如設有）；

.4.5 第十章所要求的應急艙底水泵，以及所有操用力電遙控艙底閥必需的設備；和

.4.6 按 14.13.2 所列的船舶無線電設備以及其他負載；

.5 對方向控制設備的電力驅動裝置，包括要求向前和向後推進的設備 10min，除非有符合 5.2.3 並經主管機關所接受的手動替代裝置。

12.8.2.3 應規定對包括 12.8.2.2 要求的應急用電設備在內的整個應急系統進行定期試驗，並對自動起動裝置進行試驗。

12.8.2.4 若應急電源為一台發電機時，應配備一個符合 12.8.3 要求的臨時應急電源，除非該發電機原動機的特性和自起動裝置使得應急發電機在 45s 內安全且實際地迅速達到其額定負荷功率。

12.8.3 臨時應急電源

按 12.8.2.4 所要求的臨時應急電源可由在緊急情況下便於使用的蓄電池組組成。該蓄電池組應在整個供電過程中其電壓保持在標定電壓的±12%範圍內而無需再充電，並且具有充足的容量；其佈置應使得當主電源或應急電源發生故障時，能至少應自動地向以下設備供電（如果這些設備是依靠電力工作的）；

.1 供 12.8.2.2.1、.2 和.3 所述的負荷 30min 之用；和

.2 對於水密門；

.2.1 除非備有一個獨立的臨時存貯能源，不然的話，應提供操用水密門的電力，但不必同時操作。電源備有足夠的容量，以使得對每扇門至少進行三次操作，即在逆傾 15°情況下，關閉－打開－關閉；和

.2.2 供水密門控制器、指示器和報警器 0.5h 之用電量。

第 13 章 船舶航導系統和設備以及船舶航行數據記錄儀

13.1 航行（通則）

13.1.1 本章只涉及與船舶安全運行不同的、與船舶航行有關的航行設備。下列各段規定了最低要求。

13.1.2 航行設備及安裝應經主管機關認可。主管機關應決定對 150 總噸以下的船舶本章哪些部分不適用。

13.1.3 平航系統和設備所提示的信息應使誤讀的可能性降至最低，並使其精確度儘可能達到最高。

13.2 羅經

13.2.1 船舶應裝有磁羅經，無需電源，且可用於操舵。磁羅經應置於具有所要求的校正裝置的合適的羅經櫃裏，並與船舶的速度和運行特性相適應。

13.2.2 從船舶的正常操縱位置應能容易地讀取羅經標度盤或複示器的讀數。

13.2.3 每個磁羅經應正確校準，並應備有隨時可用的剩餘自差表或曲線。

13.2.4 應對磁羅經或磁性傳感元件採取保護措施，應儘可能消除磁性干擾或使之降至最低點。

13.2.5 載客等於或少於 100 人的客船，除了應配備 13.2.1 所要求的羅經外，還應配備一個與船舶速度和運行特性及航區域相適應的經校準的發送艏向裝置，其航向精度的基準應優於磁羅經。

13.2.6 貨船和載客超過 100 人的客船除了應配備 13.2.1 所要求的羅經外，還應配備一個與船舶速度和運行特性及航區域相適應的電羅經。

13.3 速度和航程測量

13.3.1 船舶應配備測量速度和航程的裝置。

13.3.2 在有自動雷達標繪儀或自動跟蹤儀的船舶上所裝設的速度和航程測量裝置應能測量船舶航行速度和航程。

13.4 回聲測深儀

非兩棲船舶應裝有回聲測深儀。當船舶處於排水狀態時，應能指示具有足夠精確度的水深值。

13.5 雷達裝置

13.5.1 船舶至少應配備一台在 9GHz 波段工作的方位穩定雷達。

13.5.2 大於或等於 500 總噸的船舶或經證明可以載客 450 人以上的船舶，應配備一台 3GHz 雷達或必要時，由主管機關決定配備另外一台 9GHz 雷達以確定其他水面船隻的航距和方位，障礙物，漂浮物，海岸線和航行標誌以助於航行和避免碰撞，所指的雷達的作用獨立於 13.5.1 所指的雷達。

13.5.3 至少有一台雷達備有自動雷達標繪或自動跟蹤功能幫助測定船舶的速度和航向。

13.5.4 雷達操作人員與直接管理船舶的人員之間應備有適當的通信設備。

13.5.5 所配備的雷達裝置應與船舶的預定速度、運行特性和環境條件相適應。

13.5.6 所配備的雷達裝置應安裝在儘可能避免振動的位置。

13.6 電子定位系統

船舶應配備全球航行衛星系統或全球無線電航行系統或其他自動方法不間斷地記錄和更新船舶的航向。

13.7 旋回角速度指示器與舵角指示器

13.7.1 對於 500 總噸及以上的船舶應配置旋回角。對於 500 總噸以下的船舶，如果試驗發現其回轉速率超出附錄 9 所規定的安全等級 1，則也應配備旋回角度指示器。

13.7.2 船舶應配備舵角指示器。如果船舶沒有舵，指示器則顯示操縱推進方向。

13.8 航海圖與航海出版物

13.8.1 船舶應配備航海圖和航海出版物以規劃和顯示船舶的航線並標繪和監視船舶的整個航行動態；電子海圖顯示和信息系統（ECDIS）可以認為符合本節關於海圖的要求。

13.8.2 如果是部分或全部利用電子海圖時，則應有符合 13.8.1 功能要求的備份裝置。

13.9 探照燈與日光信號燈

13.9.1 船舶至少應配備一個適當的探照燈，並應便於在操縱台進行控制。

13.9.2 船舶應配備一個能不依靠主電源而工作的手提式日光信號燈，並應置於駕駛室裏能供隨時使用。

13.10 夜視儀

13.10.1 若工作狀態需要提供夜視增強設備，則應配備夜視儀。

13.11 操舵裝置與推進指示器

13.11.1 操舵裝置的設計應使船舶能與舵輪、舵柄、操縱桿或控制桿同方向旋轉。

13.11.2 船舶應配備顯示推進系統方式的指示器。

13.11.3 具有應急操舵位置的船舶應配備為應急操舵位置提供可視羅經讀數據的裝置。

13.12 自動操舵儀（自動駕駛儀）

13.12.1 船舶應配備自動操舵儀（自動駕駛儀）

13.12.2 應採取措施，能通過人工越控把自動操舵方式轉為手動操舵方式。

13.13 雷達反射器

如果能行得通的話，150 總噸或以下的船舶應配備一個雷達反射器或其他裝置以雷達在 9GHz 和 3GHz 波段協助船舶航行。

13.14 聲音接收系統

當船舶駕駛台完全封閉以且除非主管機關另有決定，船舶應配備聲音接受系統或其他裝置，以使負責航海值班的高級駕駛員能聽到聲音信號並決定其方位。

13.15 自動識別系統

13.15.1 船舶應配備自動識別系統（AIS）

13.15.2 AIS 必須：

.1 自動提供有適當裝備的岸站，及其船舶以及飛行器信息，包括船舶的標識、型號、位置、航向、速度、航行狀態以及其他與安全有關的信息；

.2 自動接受來自其他類似裝備船舶的信息；

.3 監控和跟蹤船舶；

.4 與岸基設施交換信息數據。

13.15.3 如果有國際協議、規則或標準所規定的受保護的航行信息，則 13.5.2 的要求不適用。

13.15.4 AIS 的實施應計及本組織所通過的導則。

13.16 航行數據記錄儀

13.16.1 為有利海難的調查，客船不管其大小以及 3000 總噸及以上的貨船必須裝備航行數據記錄儀（VDR）。

13.16.2 航行數據記錄儀（包括所有的傳感器）必須進行每年一次的性能測試。該測試應由一個經批准的試驗或服務機構進行，測試內容包括其數據的精度，耐久性以及可恢復性。此外，應對記錄器的保護圍壁裝置和固定設施進行測試和檢驗以確定他們的耐用性。船上保留一份由測試頒發的符合證書表明符合的日期以及適用的功能標準。

13.17 系統和設備的認可以及性能標準

13.17.1 本章適用的所有設備必須是經有關主管機關批准的型號。這些設備的性能標準應不低於本組織所採納的標準。

13.17.2 主管機關應要求製造商制定一個質量控制系統，該系統必須經一個有資質的當局審批以確保始終符合型式認可條件。另外，如果產品安裝上船之前已有由資質當局批准的型式認可證書，則可運用產品最終檢驗程序。

13.17.3 如果導航系統或設備包含本章未涉及的新特點，則在批准之前，主管當局必須確認該特點所實現的功能和本章所要求的至少同樣有效。

13.17.4 如果除了本章所述的設備之外，另外還安裝了性能符合本組織要求的設備時，則該另外安裝的設備必須獲得認可，並應儘可能，符合不低於本組織通過的性能標準。

第十四章 無線電通信

14.1 適用範圍

14.1.1 除非另有規定，本章適用於 1.3.1 和 1.3.2 所述的一切船舶。

14.1.2 本章不適用於在北美洲五大湖及其東至加拿大魁北克省蒙特利爾的聖拉姆特船閘下游出口處為止的相連水域和支流內航行的船舶，而該船舶在其他情況下應適用本章本規則。

14.1.3 本章條款不應妨礙任何遇險船舶、救生艇筏或人員使用任何能引起注意、顯示其位置和獲得救助的設備。

14.2 術語與定義

14.2.1 在本章範圍內，下列名詞定義如下：

.1 “駕駛台對駕駛台通信”係指從船舶通常的駕駛位置進行的船舶之間的安全通信。

.2 “連續值班”係指有關的無線電值班不應中斷。除非當船舶接收能力由於自身通信被減弱或阻塞時，或當設備處於定期維修或檢查時，而引起簡短間隔。

.3 “數字選擇性呼叫（DSC）”係指使用數碼使一無線電台與另一電台或一組電台建立聯繫和傳遞信息，並符合國際無線電諮詢委員會（ITU-R）有關建議案的一種技術。

.4 “直接印字電報”係指符合國際無線電諮詢委員會有關建議案的自動電報技術。

.5 “一般無線電通信”係指通過無線電進行的除遇險、緊急和安全通信以外的業務和公共通信業務。

.6 “全球海上遇難和安全系統識別”係指經船舶設備發送及用於識別船隻的海上移動服務標識，船舶呼號、國際海事衛星組織標識以及序號標識。

.7 “國際海事衛星組織（INMARSAT）”係指按 1976 年 9 月 3 日通過的國際海事衛星組織公約成立的組織。

.8 “國際奈伏泰斯業務（國際 NAVTEX）”係指在 518kHz 上，使用窄帶直接印字電報手段用英語協調廣播和自動接收海上安全信息。

.9 “定位”係指發現遇險的船舶、航空器、海上設施或人員。

.10 “海上安全信息”係指航行和氣象警告、氣象預報和其他對船舶廣播的與安全有關的緊急信息通信。

.11 “極軌道衛星業務”係指用極軌道衛星接收和轉播發自衛星緊急無線電示位標的遇險報警，並提供其位置的業務。

.12 “無線電規則”係指在任何時候生效的最新國際電信公約附件或認為將作為附件的無線電規則。

.13 “A1海區”係指至少由一個具有連續DSC報警能力有甚高頻（VHF）岸台的無線電話所覆蓋的區域，該區域可由各締約國政府規定。

.14 “A2海區”係指A1海區以外，至少由一個具有連續DSC報警能力的中頻（MF）岸台的無線電話所覆蓋的區域，該區域可由各締約國政府規定。

.15 “A3海區”係指除A1和A2海區以外，由具有連續報警能力的INMARSAT靜止衛星所覆蓋的區域。

.16 “A4海區”係指A1、A2和A3海區以外的區域。

14.2.2 所有其他用於本章並在無線電規則以及可修訂的國際海上搜救公約（SAR）1979內已定義的名詞和縮略語，其含義與該規則以及SAR公約的定義相同。

14.3 免除

14.3.1 不背離本章的要求是極其必要的，但主管機關可准許個別船舶部分或有條件地免除14.7至14.11的規定。只要：

.1 此類船舶符合 14.5 的功能要求；和

.2 主管機關已考慮到這些免除對所有船舶安全業務總效率的影響。

14.3.2 按 14.3.1 所給予的免除，僅適用於下列情況：

.1 如影響安全的條件致使完全適用於 14.7 至 14.11 為不合理或不必要時；或

.2 在例外情況下，船舶在規定的營運海區外進行單次航行。

14.3.3 各主管機關應於每年 1 月 1 日後，儘快向本組織提交一份上一年度內按 14.3.1 和 14.3.2 所有核准免除的報告，並闡明核准這些免除的理由。

14.4 全球海上遇難和安全系統識別

14.4.1 本節適合所有航區的所有船舶

14.4.2 各主管機關負責保證採取適當措施登記 GMDSS 標識，並使該標識能 24 小時和搜救協調中心保持聯繫。主管機關應該適時把標識報國際組織備案。

14.5 功能要求

14.5.1 每艘船舶在海上應能：

.1 除 14.8.1.1 和 14.10.1.4.3 的規定以外，至少由兩台分開和獨立的裝置發送船對岸遇險報警，且每台裝置應使用不同的無線電通信業務；

.2 接收岸對船遇險報警；

.3 發送和接收船對船遇險報警；

.4 發送和接收搜救協調通信；

.5 發送和接收現場通信；

.6 發送和接收 13.5 要求的定位信號；

.7 發送和接收海上安全信息；

.8 按照 14.15.8 向海岸無線電系統或網絡發送和接收一般無線電通信；和

.9 發送和接收駕駛台對駕駛台的通信。

14.6 無線電裝置

14.6.1 每艘船舶應配備在其整個預定航程中均能符合 14.5 規定的功能要求的無線電裝置；除非按 14.3 已進行免除，否則還應符合 14.7 的要求以及 14.8、14.9、14.10 或 14.11 的要求（視預定航程所過的海域而定）。

14.6.2 每台無線電裝置應：

.1 安裝在機構、電氣或其他干擾源的有害干擾不會影響其正常使用的處所，從而確保電磁兼容性，避免與其他設備和系統產生有害的相互干擾；

.2 設置在最安全和易操作的地方；

.3 防止受水、極端溫度變化和其他不利環境條件的有害影響；

.4 配備獨立於主電源和應急電源的可靠的、永久佈置的電氣照明，為操縱無線電裝置的無線電控制台提供足夠照明；和

.5 清楚地標明呼號、船台識別及其他適於無線電裝置使用的代碼。

14.6.3 對航行安全所需的 VHF 無線電話頻道控制器應設在駕駛台指揮位置附近，可供隨時使用。必要時，在駕駛台兩翼應備有能進行無線電通信的設施，此要求可由便攜式 VHF 設備來滿足。

14.6.4 客船應在明顯位置安裝遇難控制板。該控制板應包括單個按鈕用於觸發遇難警報，該警報將通過船上所要求配備的無線電通訊設備發出，或每一無線電設備和按鈕一一對應。控制板應能清晰地反映該按鈕已觸發。但平時應注意對按鈕的妥善保管，以防無故觸發。如果衛星 EPIRB 作為輔助遇難警報措施並且為非遙控時，則允許在駕駛艙的顯著位置另外安裝一台 EPIRB。

14.6.5 當按動遇難控制板上的按鈕時，客船方位的信息必須隨時自動地傳送到所有有關的無線電通信，包括初始遇難報警。

14.6.6 遇難報警控制板必須安裝在客船的顯著位置處所。該控制板應提供船上收到的任何遇難警報的聲光顯示。並且還應顯示通過哪個無線電設備收到該遇難報警。

14.7 無線電設備一般要求

14.7.1 每艘船舶應配備：

.1 一台 VHF 無線電裝置，能發送和接收：

.1.1 在 156.525MHz（70 頻道）上的 DSC。它應能從船舶通常駕駛的位置，在 70 頻道啟動遇難警報的發送；和

.1.2 在 156.300MHz（6 頻道）、156.650MHz（13 頻道）和 156.800MHz（16 頻道）上的無線電話。

.2 一台能在 VHF-70 頻道上保持連續 DSC 值班的無線電裝置。該裝置可以與 14.7.1.1.1 所要求的功能分開或相結合；

.3 一台能在 9GHz 頻帶上工作的雷達應答器；

.3.1 其存放應便於使用；和

.3.2 可以是 8.2.1.2 要求救生艇筏所配備的其中一台；

.4 如果船舶航行在任何具有國際 NAVTEX 業務的區域，一台能接收國際 NAVTEX 業務廣播的接收機；

.5 如果船舶航行在任何 INMARSAT 覆蓋的區域內，而該區域又未能提供國際 NAVTEX 業務，一台接收來自 INMARSAT 增強群呼系統的海上安全信息的無線電設備，但是，如果船舶僅航行在使用 HF 直接印字電報提供海上安全信息業務的區域，而該船已配備了能接收這種業務的設備，則可免除本款要求。

.6 一台衛星緊急無線電示位標（衛星 EPIRB），且應考慮到 14.8.3 的規定，該示位標應該：

.6.1 能通過在 406MHz 頻帶上工作的極軌道衛星業務發送遇險警報。或者，如果船舶僅航行在 INMARSAT 所覆蓋的區域，通過在 1.6GHz 頻帶工作的 INMARSAT 靜止衛星業務發送遇險警告；

.6.2 存放在易於接近的位置；

.6.3 易於人工釋放和能由一人攜入救生艇筏；

.6.4 當船舶沉沒時，能自由漂浮並能在浮起時自動啟動；和

.6.5 能人工啟動。

14.7.2 每艘客船應配備雙向現場無線電通訊搜救設備，其可在船舶處於任何正常航行位置以海空頻率 121.5MHz 和 123.1MHz 使用。

14.8 無線電設備－A1 海區

14.8.1 除應滿足 14.7 規則的要求外，僅航行在 A1 海區的每艘船舶應配備一台能從船舶通常駕駛的位置啟動船對岸遇險警報的無線電裝置，該裝置應：

.1 在 VHF 使用 DSC 工作。此要求可由 14.8.3 所規定的 EPIRB 來滿足，該 EPIRB 應位於靠近船舶通常駕駛的位置，或能從該位置遙控啟動；或

.2 通過在 406MHz 頻率上工作的極軌道衛星業務來工作。此要求可由 14.7.1.6 所要求的衛星 EPIRB 來滿足，該衛星 EPIRB 應位於靠近船舶通常駕駛的位置、或能從該位置遙控啟動；或

.3 如果船舶在備用 DSC 的 MF 岸台所覆蓋的範圍內航行，在 MF 使用 DSC 工作；或

.4 在 HF 使用 DSC 工作；或

.5 通過 INMARSAT 靜止衛星業務工作； 該要求可由如下設備滿足：

.5.1 一台 INMARSAT 船舶一球站；或

.5.2 按 14.7.1.6 要求的衛星 EPIRB。該衛星 EPIRB 應位於靠近船舶通常駕駛的位置，或能從該位置遙控啟動。

14.8.2 按 14.7.1.1 所要求的 VHF 無線電裝置，也應能用無線電話發送和接收一般無線電通信。

14.8.3 僅為航行在 A1 海區的船舶可以配備一隻 EPIRB 以代替 14.7.1.6 所要求的衛星 EPIRB。該 EPIRB 應能：

.1 能在 VHF-70 頻道上使用 DSC 發送遇險警並通過在 9GHz 頻帶上工作的雷達應答器提供定位；

.2 存放在易於接近的位置；

.3 易於人工釋放和能由一人攜入救生艇筏；

.4 當船舶沉沒時，能自由漂浮並能在浮起時自動啟動；和

.5 能人工啟動。

14.9 無線電設備－A1 和 A2 海區

14.9.1 除應滿足 14.7 的要求外。每艘在 A1 海區以外，但在 A2 海區範圍內航行的船舶應配備：

.1 一台能在下列頻率為遇險和安全進行發送和接收的中頻（MF）無線電裝置。

.1.1 在 2187.5kHz 上使用 DSC；和

.1.2 在 2182kHz 上使用無線電話；

.2 一台能在 2187.5kHz 頻率上保持連續 DSC 值班的無線電裝置。該裝置可以與 14.9.1.1.1 所要求的功能分開或相結合；和

.3 除 MF 以外的無線電業務啟動船對岸遇險警報發射的裝置。它應：

.3.1 通過工作在 406MHz 的極軌道衛星業務進行工作，此要求可由 14.7.1.6 所要求的衛星 EPIRB 來滿足。該衛星 EPIRB 應位於靠近船舶通常駕駛的位置，或能從該位置遙控啟動；或

.3.2 在 HF 使用 DSC 工作；或

.3.3 通過 INMARSAT 靜止衛星業務進行工作；此要求可由下列方式來滿足：

.3.3.1 按 14.9.3.2 所述設備；或

.3.3.2 按 14.7.1.6 所要求的衛星 EPIRB。該衛星 EPIRB 應位於靠近船舶通常駕駛的位置或能從該位置遙控啟動。

14.9.2 能從船舶通常駕駛的位置，通過 14.9.1.1 和 14.9.1.3 所要求的無線電裝置啟動遇險警報的發送。

14.9.3 此外，船舶應能使用下列設備用無線電話或直接印字電報發送和接收一般無線電通信：

.1 一台在 1605~4000kHz 或 4000~27500kHz 頻帶內工作的無線電裝置。此要求可由 14.9.1.1 所要求的設備增加該性能來滿足；或

.2 一台 INMARSAT 船舶地球站。

14.10 無線電設備—— A1、A2 和 A3 海區

14.10.1 除滿足 14.7 的要求外，每艘在 A1 和 A2 海區以外，但在 A3 海區範圍內航行的船舶，如其不符合 14.10.2 的要求，則應配備：

.1 一台 INMARSAT 船舶地球站，且能夠：

.1.1 使用直接印字電報發送和接收遇險和安全通信；

.1.2 啟動和接收遇險優先呼叫；

.1.3 保持岸對船遇險報警值班，包括特別講明的地理區域的遇險報警值班；

.1.4 使用無線電話或直接印字電報發送和接收一般無線電通信；和

.2 一台能在下列頻率為遇險和安全目的進行發送和接收的 MF 無線電裝置；

.2.1 在 2187.5kHz 上使用 DSC；和

.2.2 在 2182kHz 上使用無線電話；

.3 一台能在 2187.5kHz 頻率上保持連續 DSC 值班的無線電裝置，該裝置可以與 14.10.1.2.1 所要求的功能分開或相結合；和

.4 通過無線電業務能啟動對岸遇險警報發送的設備，可以：

.4.1 在 406MHz 頻率上通過極軌道衛星業務進行工作；此要求可由 14.7.1.6 所要求的衛星 EPIPRB 來滿足。 該衛星 EPIRB 應 位於靠近船舶通常駕駛的位置，或可以從該位置遙控啟動；或

.4.2 在 HF 使用 DSC 工作；或

.4.3 由一台附加的船舶地球站或 14.7.1.6 所要求的衛星 EPIRB，通過 INMARSAT 靜止衛星業務進行工作。該衛星 EPIRB 應位於靠近船舶通常駕駛的位置，或可以從該位置遙控啟動；

14.10.2 除應滿足 14.7 的要求外，每艘在 A1 和 A2 海區以外，但在 A3 海區範圍內航行的船舶，如其符合 14.10.1 的要求，則應配備：

.1 一台在 1605~4000kHz 和 4000~27500kHz 頻率內的所有遇險和安全頻率上，為遇險和安全目的進行發送和接收的 MF/HF 無線電裝置；

.1.1 使用 DSC；

.1.2 使用無線電話；和

.1.3 使用直接印字電報；和

.2 能在 2187.5kHz、8414.5kHz 和至少在 4207.5kHz、6312kHz、12577kHz 或 16804.5kHz 遇險和安全 DSC 頻率的任一頻率上保持 DSC 值班的設備。在任何時候，應可能選擇這些 DSC 遇險和安全頻率中的任一頻率。該裝置可以與 14.10.2.1 所要求的設備分開或與其合為一體；和

.3 通過除 HF 以外的無線電通信業務啟動船對岸遇險警報發送的設備，它可以：

.3.1 在 406MHz 頻率上通過極軌道衛星業務進行工作。此要求可以由 14.7.1.6 所要求的衛星 EPIRB 來滿足。該衛星 EPIRB 應位於靠近船舶通常駕駛的位置，或可以從該位置遙控啟動；或

.3.2 通過 INMARSAT 靜止衛星業務進行工作，該要求可由如下方式來滿足：

.3.2.1 一台 INMARSAT 船舶地球站；或

.3.2.2 按 14.7.1.6 所要求的衛星 EPIRB。該衛星 EPIRB 應位於靠近船舶通常駕駛的位置，或可以從該位置遙控啟動；和

.4 此外，船舶應能通過在 1605~4000kHz 和 4000~27500kHz 頻帶內的工作頻率上工作的 MF/HF 無線電裝置，使用無線電話或直接印字電板發送和接收一般無線電通信。此要求由 14.10.2.1 所要求的設備增加該性能來滿足。

14.10.3 在 14.10.1.1、14.10.1.2、14.10.1.4、14.10.2.1、14.10.2.3 中所規定的無線電裝置，應能從船舶通常駕駛的位置啟動遇險警報的發送。

14.11 無線電設備—— A1、A2、A3 和 A4 海區

除應滿足 14.7 的要求外，航行於所有海區的船舶應配備 14.10.2 所要求的無線電裝置和設備。但是，14.10.2.3.2 所要求的設備不得代替 14.10.2.3.1 所要求的設備。

此外，航行於所有海區的船舶還應符合 14.10.3 的要求。

14.12 值班

14.12.1 每艘船舶在海上時，應

.1 按照 14.7.1.2 的要求，安裝有 VHF 無線電裝置的船舶，應在 VHF、DSC－70 頻道上保持連續值班；

.2 按照 14.9.1.2 和 14.10.1.3 的要求，安裝有 MF 無線電裝置的船舶，應在 2187.5kHz DSC 遇險和安全頻率上保持連續監聽值班；

.3 按 14.10.2.2 或 14.11 的要求，安裝有 MF/HF 無線電裝置的船舶，在遇險和安全 DSC 頻率 2187.5kHz 和 8414.5kHz 上，以及至少在遇險和安全 DSC 頻率 4207.5kHz、6312kHz、12577kHz 或 16804.5kHz 中的一個頻率上保持連續守聽值班，視一天中的適當時間和船舶所在的地理位置而定，可用掃描接收機來保持該值班。

.4 按照 14.10.1.1 的要求，安裝有 INMARSAT 船舶地球站的船舶，應對衛星岸對船的遇險警報保持連續監聽值班。

14.12.2 每艘船舶在海上時，應在該船舶航行區域發佈海上安全信息的適當頻率上，對海事安全信息的廣播保持無線電值班。

14.12.3 到 2005 年 2 月 1 日，每艘在海上的船舶，如可行，應在船舶通常駕駛的位置，在 VHF－16 頻道上保持連續監聽值班。

14.13 電源

14.13.1 當船舶在海上時，應始終備有足夠的電源供無線電裝置工作、並對作為無線電裝置的一個或多個備用電源組成部分的蓄電池進行充電。

14.13.2 每艘船舶應配備備用和應急電源，當船舶主電網電源和應急電網電源故障時，向無線電裝置供電，以便進行遇險和安全通信。該備用電源和應急電源應能同電操作 14.7.1.1 所要求的 VHF 無線電裝置和，如適合，視船舶為之配備的海域而定，14.9.1.1 所要求的 MF 無線電裝置，14.10.2.1 或 14.11 所要求的 MF/HF 無線電裝置，或

14.10.1.1 所要求的 INMARSAT 船舶地球站，以及 14.13.5 和 14.13.8 所述的任何附加負載，其供電時間至少為 1h。

14.13.3 備用電源應獨立於船舶推進動力及船舶電力系統。

14.13.4 除 VHF 無線電裝置外，當 14.13.2 提及的兩個或兩個以上的其他無線電裝置可以同備用電源連接時，如適合，應能在 14.13.2 規定的時間內，同時向 VHF 無線電裝置和下述裝置供電；

.1 能同時與一個或多個備用電源連接的所有其他無線電裝置；或

.2 若其他無線電裝置中只有一台能同時與 VHF 無線電裝置一起與備用電源相連接，則應取其他無線電裝置中最耗電的一台裝置。

14.13.5 備用電源可用來向 14.6.2.4 所要求的電力照明供電。

14.13.6 當備用電源由一個或多個可充電的蓄電池組成時：

.1 應備有可對這些蓄電池自動充電的裝置，該裝置應能在 10h 內通過充電使其達到最小容量要求；和

.2 當船舶不出海時，應在不超過 12 個月的間隔期內，使用適當的辦法檢查蓄電池或蓄電池組的容量。

14.13.7 作為備用電源的蓄電池的位置和安裝，應保證：

.1 最有效的使用；

.2 合理的壽命；

.3 合理的安全；

.4 不論充電與否，電池的溫度應保持在出廠說明書規定的溫度範圍內；和

.5 在任何氣候條件下，完全充電後的電池應至少提供要求的最少工作小時數。

14.13.8 如果需要將船舶的導航設備或其他設備的信息連續輸入到本章要求的無線電裝置中，包括 14.18 提及的導航接收機以確保其適當的性能時，應備有能確保在船舶主電源或應急電源發生故障時能繼續提供此類信息的裝置。

14.14 性能標準

14.14.1 本章適用的所有設備應為主管機關認可的型式。這些設備應符合不低於本組織通過的適當的性能標準。

14.15 維修要求

14.15.1 設備的設計應使主要部件易於更換，而無需仔細地重新校準或調整。

14.15.2 如適用，設備的構造和安裝應便於進行檢查和船上維修。

14.15.3 應備有足夠的資料以便對設備進行正確的操作和維修，並考慮本組織的建議案。

14.15.4 應備有足夠的工具和備件，以便對設備進行維修。

14.15.5 主管機關應確保對本章所要求的無線電設備進行維修，以保障 14.5 條的功能要求的有效性，並符合這些設備建議的性能標準。

14.15.6 航行於 A1 和 A2 海區的船舶，經主管機關認可，可通過使用雙套設備、岸上維修或海上電子維修能力或綜合使用上述方法來確保設備的可用性。

14.15.7 航行於 A3 和 A4 海區的船舶，經主管機關認可，應至少綜合使用下述兩種方法。例如：雙套設備、岸上維修或海上電子維修能力來確保設備的可用性，並考慮到本組織的建議案。

14.15.8 然而，對於僅航行於有適當設施可對無線電設備進行岸上維修的港口之間，且該兩港口之間的航程不超過 6h，主管機關可免除該類船舶至少使用兩種維修方法的要求。對於該類船舶應至少使用一種維修方法。

14.15.9 雖然採用一切合理的步驟使設備處於有效工作狀態以確保符合 14.5 所規定的所有功能要求，但是只要船舶能執行所有遇險和安全功能，即 14.8 所要求的用於提供一般無線電通信的設備發生故障，也不應認為該船已不適航，或作為拖延船舶停滯在不易獲得維修設施的港口的理由。

14.15.10 衛星 EPIRB 的每一個操作性能必須在 12 個月內進行一次全面測試，特別是頻率穩定性、信號強度和標記。但是政府可以根據情況展期至 17 個月。測試可以在船上進行也可以批准的其他測試站執行。

14.16 無線電人員

14.16.1 每艘船舶應配有主管機關滿意的、能勝任遇險和安全無線電通信的人員。這些人員應持有無線電規則規定的適當證書。在遇險時，應能指定其中任何人員承擔無線電通信的主要責任。

14.16.2 客船上應至少安排一個符合 14.16.1 要求的船員在遇難事故中行使無線電通訊職責。

14.17 無線電記錄

無線電記錄應記載事關海上人命安全具有重要性的有關無線電業務的一切事件。記錄應令主管機關滿意，並符合無線電規則的要求。

14.18 船舶位置信息更新

本章所適用的船載自動傳遞遇難船舶雙向通訊設備方位應該用內部或外部導航接收裝置向外傳遞。如果船上沒有安裝此類接收裝置，則航行中的船舶方位和時間應該不超過每四小時更新一次，以便通訊設備傳遞。

第 15 章 操縱艙室佈置

15.1 定義

15.1.1 “操縱區域”係指操縱艙室以及船的操縱艙室兩側和接近操縱艙室延伸到船側的部分。

15.1.2 “工作站”係指某個位置，在此位置上執行構成特殊活動的一項或數項工作任務。

15.1.3 “進塢工作站”係指一個配備有用於船舶進塢所必需裝置的地方。

15.1.4 “主控制器”係指船舶在航行時用於安全操縱船舶所必需的所有控制設備，包括應急狀況下所要求的控制設備。

15.2 通則

船員進行船舶操縱的艙室的設計與佈置，應能允許從事操縱的船員以正確的方式執行其職責，而無不合理的麻煩、疲勞或緊張，並能使從事操縱的船員無論在正常情況下，還是緊急情況下受傷的可能性降至最小。

15.3 操縱艙室的視域

15.3.1 操縱站應設在所有其他上層建築之上，以使操作船員能夠從駕駛工作站獲得整個水平環繞視域。如果從單個駕駛工作要滿足本條要求為不現實時，則操縱站的設計應能通過兩個駕駛工作站的組合或為主管機關滿意的任何其他方式來獲得整個水平環繞視域。

15.3.2 盲區應儘可能少和小，而且不應該影響從操縱站處保持安全瞭望。如果窗子之間設有防撓材，則此防撓材不應對駕駛室內產生更多的阻擋。

15.3.3 從正前方到任一舷向後 22.5°的扇形區中總的盲區不應超過 20°，每一單獨盲區不能超過 5°，在兩個盲區之間的可視扇形區不應小於 10°。

15.3.4 若主管機關認為必要，從駕駛工作站的視域應允許駕駛人員從這個位置利用船舶後部的導標進行航跡監控。

15.3.5 操縱站的海面視域，當駕駛人員就座時，從船艏前方到一舷 90°，不論船舶吃水、縱傾和甲板貨物情況如何，盲區不得超過一個船長。

15.3.6 如進塢工作站遠離操縱站，則該工作站的視域應能允許一個駕駛人員安全地操縱船到塢床。

15.4 操縱艙室

15.4.1 操縱艙室的設計與佈置，包括單獨工作站的位置與佈置，應確保每項工作所要求的視域。

15.4.2 船舶的操縱艙室不得用於駕駛、通信和安全操縱船舶、船舶主機、乘客及貨物等所必要的工作之外的目的。

15.4.3 操縱艙室應設有一個能從事指揮、駕駛、操縱和通信的綜合操縱站，其佈置應能容納安全駕駛船舶所要求的全部人員。

15.4.4 用於駕駛、操縱、控制、通信的設備和裝置，以及其他必需的儀錶的佈置應相對集中，以能使負責駕駛員及任何助理駕駛員在其就座的情況下能接收到所有必需的信息，並按要求使用這些設備和進行控制。如有必要，用於這些功能的設備和裝置應為雙份。

15.4.5 如果在操縱艙室內設有用於監測主機性能的獨立工作站，則此工作站的位置和使用不得干擾在操縱站內要執行的主要功能。

15.4.6 無線電設備的位置不得干擾操縱站的主要駕駛功能。

15.4.7 船員從事船舶操縱的艙室以及主控制器的相對位置的設計與佈置應對照基本操縱人員配備標準進行評估。當建議最少配員標準時，則主控制器和通信控制器的設計和佈置，應形成一個綜合操縱和應急控制中心。在所有運行和緊急狀態下，由操作船員從這個中心來控制船舶，而無需任何一名船員離開該艙室。

15.4.8 主控制器以及座位的相對位置應為：每一操作船員在其座位適當調整後，並在不違反 15.2 的規定下能夠：

.1 不受任何干擾，充分而無拘無束地操作每個控制裝置，既可分別操作，也可對其他控制裝置按實際可行的組合進行操作，並且

.2 在所有工作站，施加適當的控制力就可完成應執行的操作。

15.4.9 位於操縱船舶處所的座位，經調整到適宜操作者就座後，不得再為操縱任何控制裝置再變動座位位置。

15.4.10 若主管機關認為船上有必要配備安全帶，以供操作船員使用時，則當操作船員繫妥其安全帶後，應能滿足 15.4.4 的要求。但對於某些能被證明僅在極少數情況下才需使用的控制裝置以及無須安全約束的控制器可以例外。

15.4.11 綜合操縱站應設有能提供相關資料的設備，使負責駕駛員及其任何助理駕駛員能安全和有效地履行航行和安全的職能。

15.4.12 應採取適當的措施以防止乘客分散操作船員注意力。

15.5 儀錶與海圖桌

15.5.1 儀錶、儀錶板和控制裝置應在考慮操作維護和環境條件後，永久性地安裝在控制台上或其他合適的地方。但是，只要所提供的調和不低於認可的標準，此要求並不妨礙使用新的控制器或指示技術。

15.5.2 所有儀錶應按其功能符合邏輯地分組。為了將混淆的危險降至最小，儀錶不得通過共用功能或互換開關使之合理化。

15.5.3 任何一名操作船員使用的儀錶應當清晰可見和容易閱讀：

.1 從其正常就座位置和視線觀察的實際偏差應最小；並

.2 在一切可能的運行情況下，混淆的危險應最小。

15.5.4 安全操縱船舶的主要儀錶，如果不另行將其任何限制條件向操作員作清楚的說明，則應將這種限制條件清楚地標明。構成對救生筏投放和滅火系統監控的應急控制儀錶板，應設置在操縱區域內獨立且明顯劃定的位置。

15.5.5 為了將眩目和反射降至最小，並防止在強光下儀錶和控制裝置模糊不清，應設有屏蔽的遮光裝置。

15.5.6 控制台頂部和儀錶表面應為無眩目的深色。

15.5.7 為一個以上人員提供可視信息的儀錶和指示器，應設在所有使用者，同時能共同易於看到的位置。如不能達到此要求時，該儀錶和指示器應設雙份。

15.5.8 若主管機關認為必要時，則操縱艙室內應設置供海圖作業的適宜桌子。應設有海圖的照明設備。海圖桌照明設備應加以屏蔽。

15.6 照明

15.6.1 應設有隨時可用且一定亮度的照明設備，使操作人員無論在海上還是在港內，白晝抑是黑夜均能完全履行其所有的職責。在可能發生系統故障的情況下，應只能有限地降低主要儀錶和控制裝置的照明。

15.6.2 應避免在操作區域環境中發生眩目和雜散鏡象反射。應避免在工作區域及其周圍環境之間形成較大的亮度反差。應使用非反射或無光澤表面來降低非直接眩目至最小程度。

15.6.3 應在照明系統中使用令人滿意的柔性結構，使操作人員能夠根據操縱艙室內不同區域和各個儀錶與控制裝置的要求調整照明強度和照明方向。

15.6.4 為了保持暗的環境，當某個區域或某些設備的部件在操作狀態時需要照明，應採用紅色燈，但海圖桌除外。

15.6.5 在夜間，應能識別顯示的信息和控制設施。

15.6.6 參閱 12.7 和 12.8 關於照明的附加要求。

15.7 玻璃窗

15.7.1 設在前方、兩側以及門上的玻璃窗之間的分檔應保持最小。直接裝在操縱站前方的玻璃窗不允許有分檔。

15.7.2 不論氣候條件如何，在任何時候通過操縱艙室玻璃窗觀察的清晰度應使主管機關滿意。保持玻璃窗清晰狀態的裝置應使合理而可能的單個故障不會導致減少清晰的視域，以致嚴重影響操作船員繼續操縱船舶而停船。

15.7.3 應設有這樣的裝置以使操縱站的前方視域不受陽光閃爍的影響。

15.7.4 操縱艙室的玻璃窗為減少有害的反射，應呈傾斜狀。

15.7.5 玻璃窗應採用破裂時不會裂成危險碎片的材料製成。

15.8 通信設備

15.8.1 應配備認為必要的設備，以使船員在正常以及應急情況下彼此保持通信聯繫，並能抵達船上其他人員處的通道。

15.8.2 在操縱艙室和設有重要機器設備的處所之間，包括操縱艙室和任何應急操舵位置之間，應配備通信裝置，不論這些機器設備是遙控的還是就地控制的。

15.8.3 從控制站到所有乘客和船員可以進入的區域應配備用於廣播和安全同知的裝置。

15.8.4 應對操縱艙室內用於監控、接收和發送無線電安全信息的裝置作出規定。

15.9 溫度與通風

操縱艙室應裝設適宜的溫度和通風控制系統。

15.10 顏色

操縱艙室內部表面材料應具有適宜的顏色和覆層以避免反射。

15.11 安全措施

操縱區域不應對操作人員構成任何危險，地板在乾燥和潮濕的情況下都能防滑，並設計數量足夠的扶手。應設有防止門移動的裝置，不論其處於開啟還是關閉的狀態。

第 16 章 穩定系統

16.1 定義

16.1.1 “穩定控制系統”係指用以穩定船舶狀態的主要參數：橫傾、縱傾、航向、高度及控制船舶運動：橫搖、縱搖、艏搖、升沉的一種系統。該術語不包括與船舶安全營運無關的那些設備，諸如減少船舶運動或墊航控制的系統。

穩定控制系統的主要部件可包括如下：

.1 執行裝置，諸如舵、水翼、襟翼、圍裙、風扇、噴水器、可回轉和可控制的螺旋槳、轉輸液體的泵等；

.2 驅動執行裝置的動力機械，和

.3 搜集和處理數據並作出判斷，發出指令的穩定設備，諸如傳感器、邏輯處理器和自動安全控制器等。

16.1.2 “自穩”係指船舶儀依靠其自身的特性保證穩定性。

16.1.3 “強制穩定”係指依靠下列手段使船舶達到穩定：

.1 自控系統；或

.2 手控輔助系統；或

.3 自控及手控輔助相結合的聯合系統。

16.1.4 “增穩”係指自穩和強制相結合的一種穩定。

16.1.5 “穩定裝置”係指依靠 16.1.1.1 所列舉的裝置產生的力來控制船舶位置的一種裝置。

16.1.6 “自動安全控制器”係指當船舶出現不安全情況時能處理數據，並發出指令將船舶置於排水狀態或其他安全狀態的一種邏輯單元。

16.2 通則

16.2.1 穩定系統的設計應滿足：當任一穩定裝置或設備失效或故障時，仍能憑藉正在工作的穩定裝置保證船舶的主要運動參數維持在安全極限內，或使船舶置於排水狀態或其他安全狀態。

16.2.2 當任一自動設備或穩定裝置或其動力驅動失效時，船舶的運動參數仍應保持在安全極限內。

16.2.3 設有自動穩定系統的船舶，除非該系統內的冗餘能提供等效的安全性，否則應配有自動安全控制器。若配有自動安全控制器，則應採取措施，使能從主控站越控該自動控制器和撤消該越控。

16.2.4 任何自動安全控制器發出降速和使船舶安全進入排水狀態或其他安全狀態的指令時，其參數和等級應考慮到與該特定船舶及其用途相適應的橫傾、縱傾、艏搖及結合縱傾和吃水的安全值，以及推進、墊升或穩定裝置等動力源失效時可能引起的後果。

16.2.5 自動穩定系統提供的船舶穩定性參數和程度，就該船用途和營運條件而言應是令人滿意的。

16.2.6 故障模式和影響分析應將穩定系統包括在內。

16.3 側向與高度控制系統

16.3.1 裝有自控系統的船舶應設置自動安全控制器。可能發生的故障或失靈對自控系統的操作應影響不大，且易被操作人員迅速消除。

16.3.2 任何自動控制系統發出降速和使船舶安全進入排水狀態或其他安全狀態的指令時，其參數和等級應考慮附錄 3 第 2.4 節中給出的安全值以及與該特定船舶及其用途相適應的安全運動值。

16.4 效用試驗

16.4.1 穩定控制系統的任何設備、裝置的安全使用極限應用通過附錄 9 所規定的效用試驗和鑑定程序確定。

16.4.2 按附錄 9 所作的效用試驗應該確定：當任一控制設備發生不能控制的完全偏差時對該船安全操作的不利影響有多大。為了確保提供等效安全的穩定系統的冗餘或安全措施，任何可能為必要的船舶操作方面的限制都應列入該船舶操作手冊之中。

第 17 章 操作、可控性與其他性能

17.1 通則

適用本規則的船舶，當其處於正常的工作狀態和處於設備故障狀態時的船舶操作安全，都應通過原型船的實船試驗證實。該試驗的目的是為了取得下列有關資料和數據，以便納入該船操作手冊：

.1 操作限制；

.2 限制範圍內的船舶操作程序；

.3 在前述故障事故中應採取的行動；和

.4 在規定的故障事故後，對安全操作所作的限制。

船上應備有操作信息指南，或儀錶系統以備對操作功能作在線檢查，政府在批准該檢查時應按本主機制定的呈遞和處理措施的標準至少應對船舶縱向中心點附近的 3 個坐標軸的加速度進行測量。

17.2 合格的證明

17.2.1 納入船舶操作手冊的關於船舶可控性和操縱性的資料應包括按 17.5 所述的特性，按 17.6 規定可控性和操縱性受到損害的最不利情況下的參數清單，17.9 所述有關安全最大速度的資料以及按附錄 9 驗證過的性能數據。

17.2.2 航線操縱手冊中的操作限制信息必須包含 17.2.1、17.5.4.1 和 17.5.4.2 中的特性。

17.3 重量與重心

應該實在最大允許重量範圍內對船舶操作安全有重大量影響的所有重量、重心組合是否符合船舶操作、可控性和性能等每項要求。

17.4 故障的影響

應對操縱和控制設備、服務設施或部件（如動力運行、輔助動力、平衡和增強穩性的設備）可能發生的任一故障的影響作出評估，以便使船舶運行的安全程度得以保持。根據附錄 4 確定的臨界故障影響，應根據附錄 9 要求予以核實。

17.5 可控性與可操縱性

17.5.1 前述的故障出現後，應採取的行動和對船舶的限制等有關須知，應列入船舶操作手冊。

17.5.2 必須保證操作人員在最壞預期情況下操作控制裝置使船舶保持安全營運所需花費的努力不會導致自身疲勞或精神崩潰。

17.5.3 船舶應是可控的，並在該船達到臨界設計狀態時，能完成船舶安全操縱所需的基本機動動作。

17.5.4.1 主管機關在確定船舶操作性時，應特別注意在正常操作中，出現故障時和故障後的下列情況：

.1 偏航；

.2 轉向；

.3 自動駕駛和操舵性能；

.4 在正常和應急情況下停車；

.5 在非排水狀態時船舶在三個軸向上的穩定和升沉；

.6 縱傾；

.7 橫搖；

.8 埋首；

.9 墊升動力限制；

.10 橫甩；

.11 砰擊；

.12 艏下沉。

17.5.4.2 對 17.5.4.1 中的第 2 項、第 6 項、第 7 項和第 11 項定義如下：

.1 “轉向”係指船舶在特定的風、浪條件下，以最大營運航速航行時船舶的方向變化率。

.2 “埋首”係指航行中的全墊升氣墊船在氣墊系統局部漏氣情況下，因阻力增加而造成船體的一種被動的運動。

.3 “墊升動力限制”係指對提供升力的機械和設備所作的種種限制。

.4 “砰擊”係指船艏部下側受到的水衝擊。

17.6 運動表面與狀態的改變

當船舶從一種型式的運動表面或狀態轉到另一種運行表面或狀態時，船舶的穩性、可控或姿態不應發生不安全的變化。運行表面和狀態轉變時，船舶有關運動特性的變化資料應提供給船長。

17.7 表面不平度

對限制船舶越過傾斜的、台階狀的或不連續的地面的營運能力的有關因數，應按適用情況加以確定，並提供給船長。

17.8 加速與減速

主管機關應該確認：凡因任何可能的失速、應急停車或其他可能的原因造成的最壞的加速或減速，均不會危及船上人員安全。

17.9 航速

應確定船舶的最大安全航速。應計及 4.3.1 中的限制；如營運狀態、風力、風向，以及在靜水、波浪和其他表面上運行時，任一升舉系統或推進系統可能發生故障後的影響。

17.10 最小水深

船舶在各種狀態下營運時，所需的最小水深和其他適當數據都應予以確定。

17.11 硬結構的間距

對於兩棲船，應確定該船墊態時其船體硬結構的最低點與硬質平坦表面之間的間距。

17.12 夜航

試驗大綱應包括通過充分的運行對船舶內部照明和外部照明及其亮度作出評估。運行試驗應在營運狀態、航行狀態、靠碼頭操縱狀態下分別採用正常供電和應急供電進行。

第 18 章 營運要求

A 部分－一般規定

18.1 船舶營運控制

18.1.1 船上應持有“高速船安全證書”、“高速船營運許可證書”或其副本，以及航行操作手冊和船舶操縱手冊副本，若主管機關有要求，還應持有保養手冊中操作部分的副本。

18.1.2 船舶不應故意在“高速船營運許可證書”、“高速船安全證書”或有關文件規定的最壞設想條件和各種限制範圍外的情況下營運。

18.1.3 當主管機關對船舶營運人從總體安全角度出發，在下述方面所採取的措施感到滿意時，應頒發“高速船營運許可證書”。若主管機關認為這些措施未能保持到其滿意的程度時，則應撤銷其營運許可證書：

.1 考慮到航線操作手冊中所載的安全限制和有關資料，對船舶從事業務的適宜性；

.2 航線操作手冊中所載的操縱條件的適宜性；

.3 獲得准予開航所依據的氣象資料的措施；

.4 設有符合 18.1.4 要求的設施的基地港作業區域內的管理規定；

.5 指派負責人根據情況獲取的氣象資料決定取消或延遲某一特定的航班；

.6 操縱船舶、部署與駕駛救生艇筏，以及營運許可證書中規定的正常和應急情況下對乘客、車輛、貨物實施監督所需的足夠船員編制。船員編制應考慮：船舶在航行途中，操縱艙室內應有兩名駕駛員值班，其中之一可為船長；

.7 船員資格考核與培訓，包括有關特殊類型船舶和擬從事業務的能力，以及他們安全操作程序方面的須知；

.8 有關對船員工作時間，作息的限制和防止疲勞的任何其他措施，包括足夠的休息周期；

.9 船員在船舶操縱和應變程序方面的培訓；

.10 船員操縱和應急程序方面能力的保持；

.11 終點港的安全設施，若適當，應符合任何現有的安全設施；

.12 交通管制措施，若合適，應符合任何現有的交通管制；

.13 關於定位、夜間或視線受限情況下航行的限制和/或規定，若適當，包括使用雷達和/或其他電子助航設備；

.14 由於擬從事業務的特殊性，例如夜航，可能要求的額外設備；

.15 在船舶與岸台，基地港電台，應急服務站和其他船舶之間的通信聯繫，包括所使用的電台頻率和所保持的值班；

.16 須持下列記錄以備主管機關核查：

.16.1 船舶按規定的參數營運；

.16.2 應急和安全操作程序的遵守；

.16.3 操作船員的工作時間；

.16.4 船上的乘客數量；

.16.5 執行該船應遵守的任何法規；

.16.6 船舶操縱；以及

.16.7 船舶及其機器按批准的計劃表進行的維護保養；

.17 確保設備按主管機關的要求進行維護保養的措施以及確保船舶和設備的可維修性的資料在船舶營運機構內管運部門與維修部門之間協調一致的措施；

.18 具備並使用下列說明；

.18.1 船舶裝載情況，以便有效執行對重量、重心的限制，必要時，對貨物進行適當繫固；

.18.2 足夠的燃油儲備；

.18.3 合理，且可預見的應急情況下的對策；以及

.19 營運人為應付可預見的偶然事件而制訂的應變方案，包括岸基為應付每一事件所採取的行動。該方案應提供給操作船員和有關的搜索救援（SAR）當局及當地主管機關和機構。這些主管機關和機構可以用設備協助完成由船員承擔的任務。

18.1.4 對 18.1.3 規定作出評估後，主管機關應確定距基地港或庇護地的最大許可距離。

18.1.5 船長應建立有效的報告和監督體系以落實 2.2.4.2 和 2.2.4.3 涉及的通道的開啟和關閉。

18.2 船舶文件

公司應確保船上備有以技術手冊形式的適當資料和指導性文件，以使船舶能被安全地操縱和保養。這些技術手冊應由航線操作手冊、船舶操縱手冊、培訓手冊、保養手冊和檢修計劃表組成。應採取措施使這些資料在必要時更新。

18.2.1 船舶操縱手冊

船舶操縱手冊至少應包括下列資料：

.1 船舶的主要特徵；

.2 船舶及其設備的說明；

.3 核查浮力艙完整性的程序；

.4 根據第二章的要求，可能被船員在緊急情況下直接實際應用的細節；

.5 破損控制程序；(如 SOLAS II-1/23 或 II-1/25-8.2 所要求的破損控制圖)；

.6 機器系統的說明和操作；

.7 輔助系統的說明和操作；

.8 遙控和報警系統的說明和操作；

.9 電氣設備的說明和操作；

.10 裝載程序和限制、包括最大營運重量、重心位置和載荷分配，包括根據操作限制或損壞情況而要求的貨物或汽車繫固佈置和程序，但該佈置和程序不應是公約第 VI 章所要求的單獨貨物繫固手冊的一部分；

.11 探火和滅火設備的說明和操作；

.12 結構防火佈置圖；

.13 無線電設備和導航設備的說明和操作；

.14 按第十七章的規定有關船舶操縱的資料；

.15 適用時，最大的許可拖曳速度和拖曳載荷；

.16 進乾塢或起吊程序，包括各種限制；

.17 本手冊特別應提供有關章中清楚規定的資料：

.17.1 指示應急情況或危及安全的故障、要求採取的行動以及在操縱船舶或其機器時的任何事後限制；

.17.2 撤離程序；

.17.3 操縱限制，包括最壞設想條件；

.17.4 安全操作要求的所有機器參數的限制值。

有關機器或系統故障的數據資料，應考慮在船舶設計期間制訂的任何“故障模式與影響分析”（FMEA）報告中的結果。

18.2.2 航線操作手冊

航線操作手冊至少應包括下列資料：

.1 撤離程序；

.2 操縱限制，包括最壞設想條件；

.3 在.2 的限制條件內，船舶的操縱程序；

.4 在可預見的偶然事件中，用於主要及輔助救援的適用應變計劃的諸要素，包括用於每一事件的岸基設施和活動；

.5 獲得氣象資料的措施；

.6 指定“基地港”；

.7 指定作出取消或延遲航班決定的責任人員；

.8 規定船員編制、職責和資格；

.9 對船員工作時間的限制；

.10 中轉碼頭的安全設施；

.11 適用時，交通管制措施和限制；

.12 特定航線情況或有關定位，夜間和視線受限制情況的操作，包括使用雷達或其他電子助航設備；以及

.13 在船舶與岸台，基地港電台，應急服務站和其他船舶之間的通信聯繫，包括使用的電台頻率和保持的守聽值班。

18.2.3 培訓手冊

培訓手冊可由各分冊組成，它應以通俗易懂的術語，可能時還應附以圖例表達有關撤離、火災和破損控制的設備和系統，以及最佳逃生方法的說明和資料。這類資料的任何部分都可用音視製品的方式提

供，以代替本手冊。若適用，培訓手冊的內容可以包含在船舶操縱手冊之中。下列事項應予詳細說明：

.1 救生衣和救生服的穿着，如適用時；

.2 指定的集合地點；

.3 登乘、降落和解脫救生艇筏與救助艇；

.4 從救生艇筏內降落自身艇筏的方法；

.5 與降落裝置脫開；

.6 在降落區域內實施保護裝置的使用與方法，如適用時；

.7 降落區域的照明；

.8 所有救生設備的使用；

.9 所有探測設備的使用；

.10 借助圖例，使用無線電救生設備；

.11 浮錨的使用；

.12 發動機和附件的使用；

.13 救生艇筏和救助艇的回收，包括存放和繫固；

.14 暴露的危險和對保溫服的需要；

.15 為達到幸存，救生艇筏設施的最佳使用；

.16 獲救的方法，包括使用直升飛機救助設備，（吊環、吊籃、提升機）褲形救生圈和岸上救生設施以及船上拋繩器；

.17 在應變部署表和應變須知中所包含的所有其他職責；以及

.18 緊急修復救生設施須知；

.19 防火和滅火設備與系統的使用須知；

.20 火災時，消防員裝備（若設有）的使用導則；

.21 與火災安全有關的報警與通信設備的使用；

.22 檢查破損的方法；

.23 破損控制設施和系統的使用，包括水密門和艙底泵的操作；以及

.24 客船在應急情況下對乘客的控制與通信。

18.2.4 保養和服務手冊

船舶保養和服務手冊應至少包括：

.1 船舶安全營運所要求的所有船舶結構、機構裝置和所有安裝的設備與系統的詳細說明和示圖。

.2 與保養有關的所有充注液體和結構材料的規格和數量；

.3 以參數、振動和充注液體的消耗數值表示的主機的操作限制；

.4 結構或主機部件損耗限制，包括要求按日期或運行時間換新的部件的壽命；

.5 有關裝卸主、輔機械、傳動裝置、推進裝置、墊升裝置和柔性結構部件程序的詳細說明，包括應採取的任何安全預防措施或要求的專用設備。

.6 機器或系統部件更換後或故障診斷時應遵循的試驗程序；

.7 船舶起吊或進塢程序，包括重量或狀態的限制；

.8 關於船舶的浮態和確定重心縱向位置（LCG）的程序；

.9 當船舶可能需拆卸運輸時，應提供有關拆卸、運輸和裝配的說明；

.10 檢修計劃表，無論是包括在保養手冊內還是單獨出版，應詳細說明為保持船舶及其機器和系統的安全操作所要求的定期和維護操作。

18.2.5 乘客信息

18.2.5.1 啟航前所有船上乘客人數應予清點。

18.2.5.2 所有有關應急情況下需要特別照顧的協助人員的詳細情況應在啟航前記錄並向船長報告。

18.2.5.3 船上人員的姓名和性別，以成年人、兒童和嬰兒分類以便搜救時使用。

18.2.5.4 18.2.5.1、18.2.5.2 和 18.2.5.3 所要求的信息應在岸上備份以便搜救時能被及時調用。

18.2.5.5 對於行駛於間隔 2 小時或少於 2 小時停靠港口的船舶，主管機關可以免除 18.2.5.3 的要求。

18.3 培訓與合格證明

18.3.1 對船長和每一船員認為必要的能力等級和培訓應作出規定，並按下列導則予以發證，使主管機關對船舶的特殊類型、型式以及擬從

事的業務感到滿意，應有一個以上的船員經培訓後，能在正常和緊急情況下執行所有的基本操作任務。

18.3.2 主管機關應對船長和每個船員規定適當的操作培訓期限。如必要，應制定出適當的再培訓期限。

18.3.3 經過適當期限的操作/模擬培訓，通過考試合格，包括在有關的特定類型和型式的船上和所從事的航線上經過相應的操作任務的實際測試之後，主管機關應給船長和所有擔任操作任務的船員簽發型式等級證書。型式等級培訓應至少包括下列項目：

.1 船上所有推進和控制系統，包括通信和航行設備、操縱、電氣、液壓與氣動系統，以及艙底泵和消防泵方面的知識；

.2 控制、操縱和推進系統的故障模式和針對故障採取的正確措施；

.3 船舶的操縱特性和限制的操縱條件；

.4 駕駛室通信和航海程序；

.5 完整與破艙穩性，以及在破損情況下船舶的殘存能力；

.6 船舶救生設施，包括救生艇筏裝置的位置與使用；

.7 船上逃生與乘客撤離的位置與使用；

.8 在船上發生火災的情況下，防火與滅火設施和系統的位置和使用；

.9 破損控制設施和系統的位置和使用，包括水密門和艙底泵的操作；

.10 貨物和車輛的存放繫固系統；

.11 應急情況下對乘客的控制和通信的方法；以及

.12 培訓手冊中列出的所有其他項目的位置和使用。

18.3.4 對於一艘特定類型和型式的船舶，其型式等級證書只有在其完成擬從事的航線上的實際試航並經主管機關簽署後，且從事該特定航線的營運時才有效。

18.3.5 型式等級證書每兩年應重新簽證，並且主管機關應制訂重新簽證的程序。

18.3.6 所有船員均應接受 18.3.3.6 至 18.3.3.12 所規定的須知和培訓。

18.3.7 主管機關應根據有關的航線和船舶，規定船員的健康標準和體格檢查的周期。

18.3.8 船舶營運所在國，如非船旗國，其主管機關應確認船長和每名船員的培訓經歷和資格。船舶營運國政府對船長和船員根據經修訂的《1978 年海員培訓、發證和值班標準國際公約（STCW）》所持有的有效資格證書或經簽署的執照應該視同其為培訓資格的良好證明。

18.4 救生艇筏人員配置與監督

船長和公司應確保：

.1 船上應有足夠數量的業經培訓的人員，以集約和幫助未受培訓的人員。

.2 船上應有足夠數量的船員，可以是駕駛人員或持證人員、來操作救生艇筏、救助艇及其降落裝置，以滿足全體船上人員棄船時之需。

.3 每艘救生艇筏均應有一名駕駛人員或持證人員負責。主管機關在進一步考慮航行的特點、船上人員的數量和救生艇筏的特徵後，可以允許每個或一組救生筏上有一名駕駛人員，或持證人員在操作和操縱救生筏方面有經驗的數名人員負責。

.4 負責救生艇筏的人員應各有一份救生艇筏乘員的清單，並應使其指揮下的船員清楚自己的職責。

.5 每艘救助艇和機動救生艇筏上應指定一名能開動發動機和調整操作的人員。

.6 船長應負責保證人員平均分佈在.1 至.3 所述的救生艇筏上。

18.5 應變須知與應變演習

18.5.1 公司確保實施 18.5.1 至 18.5.10 中涉及的應急方針和訓練、船長負責具體的船上講解和演練。在開航時或開航前，乘客應被告知在應急情況下救生衣的使用和應急採取的行動，特別提請乘客注意 8.4.1 和 8.4.3 所要求的應變須知。

18.5.2 船員應在船上進行應急火災和撤離演習、客船演習間隔期不應超過一周，貨船不超過一月。

18.5.3 每名船員每月至少參加一次撤離、滅火和破損控制演習。

18.5.4 船上的演習應儘實際可能來模擬實際應急情況。此類模擬應包括船上的撤離、火災與破損控制設施和系統的指導和操作。

18.5.5 船上撤離，火災與破損控制設施和系統的指導和操作，應包括船員之間的交叉培訓。

18.5.6 應向每位乘客和船員提供一份包括全船應變設施和佈置圖在內的應變須知。該圖應以適當的語言文字標明所有出口、撤離線路、應急裝置、救生裝置和設施的位置，以及救生衣穿着圖例。應變須知應置於每位乘客和船員座位附近的明顯之處。

18.5.7 記錄

18.5.7.1 舉行應變部署的日期以及棄船演習、滅火演習、其他救生設備的演習和船上培訓的細節均應記錄在可能為主管機關規定的航海日誌上。如不能在指定日期舉行完整的應變部署、演習和培訓，則應在航海日誌上作出記錄，寫明所舉行的應變部署、演習或培訓的情況和範圍。該資料的副本應提交營運管理部門。

18.5.7.2 船長應確保船舶離開泊位時對 2.2.4.2 和 2.2.4.3 所涉及的通道的最後關閉時間進行記錄。

18.5.8 撤離演習

18.5.8.1 撤離演習內容應每周不同，以便模擬各種應急情況。

18.5.8.2 每次船舶撤離演習應包括：

.1 船員根據 8.2.2.2 所要求的警報被召集到集合地點，並且確保他們了解應變部署表中規定的棄船順序；

.2 到集合站報到並準備履行應變部署表中規定的職責；

.3 檢查船員的穿着是否適宜；

.4 檢查救生衣的穿着是否正確；

.5 操作吊架用於降落救生筏；

.6 由適當的船員穿着救生服或防火衣；

.7 試驗用於應急部署和棄船的應急照明；以及

.8 講授船上救生設施的使用和海上生存的須知。

18.5.8.3 救助艇演習

.1 作為撤離演習的一部分，只要合理並且實際可行，每月應降落救助艇一次，艇上載有指定船員且在水中操縱。在所有情況下，此要求至少每三個月應遵照執行一次。

.2 如果救助艇降落演習係在船舶以航行速度前進時進行，由於所涉及的危險性，此類演習應僅在遮蔽水域中進行，並應由對此類演習有經驗的駕駛員負責監督。

18.5.8.4 單次輔導可以涉及船上救生系統的不同部分，但對客船應用一個月，對貨船用 2 個月的時間，複習船上全部救生裝置和設施。每名船員都應接受輔導，此類輔導應當包括，但不必限於：

.1 船上氣脹救生筏的操作和使用；

.2 體溫過低問題、體溫過低的急救處理以及其他適宜的急救程序；以及

.3 在惡劣氣候和惡劣海況下使用船上的救生設施所必需的特別輔導。

18.5.8.5 在船上培訓使用吊艇架落救生筏，對每艘無該類設施的船應不超過 4 個月的間隔期舉行。當實際可行時，此類培訓應包括救生筏的充氣和下降。這種筏可以是一種特殊的、僅擬用於培訓目的筏，它不屬船上救生設備的一部分。這種特殊的救生筏應予以明顯標記。

18.5.9 消防演習

18.5.9.1 消防演習的險情應每周變化，以便模擬船上不同艙室着火的應急狀況。

18.5.9.2 每次消防演習應包括：

.1 將船員召集到防火站；

.2 到防火站報到並準備履行應變部署表中的職責；

.3 穿着消防員裝備；

.4 操作防火門和擋火閘；

.5 操作消防泵和滅火設備；

.6 操作通信設備、應急信號和通用報警；

.7 操作探火系統；以及

.8 講授船上滅火設備和水噴淋和灑水系統，如設有時。

18.5.10 破損控制演習

18.5.10.1 破損控制演習險情應每周變化，以便模擬不同破損情況的應急狀態。

18.5.10.2 每次破損控制演習應包括：

.1 將船員召集到破損控制站；

.2 到控制站報到並準備履行應變部署表中的職責；

.3 操作水密門和其他水密關閉裝置；

.4 操作艙底泵並試驗艙底報警和自動艙底泵啟動系統；以及

.5 講授破損檢查、船上破損控制系統的使用和在應急情況下對乘客的控制。

B 部分－對客運高速船的要求

18.6 船員適任培訓

18.6.1 公司應落實船員適任培訓。對全體船員而言，船員適任培訓除 18.3.5 的規定外，還應包括對乘客的控制和撤離。

18.6.2 當船上裝載貨物時，除本篇規定外，還應符合本章 C 部分要求。

18.7 應變須知與應變演習

公司應確保應急計劃予以實施，而且船長應負責在乘客上船後介紹應變須知的規定。

C 部分－對貨運高速船的要求

18.8 船員適任培訓

船公司應確保落實 18.3 所要求的船員適任培訓。對全體船員而言，船員適任培訓在應包括貨物與車輛存放區域中繫固系統的知識。

第 19 章 檢驗與維修保養要求

19.1 船舶營運人組織或船舶營運人可能要求對其船舶作維修保養的任何組織，應能使主管機關滿意。考慮了該組織的人員數量及能力，可用的設施情況、必要時邀請專家幫助的措施、紀錄保持、通信和職責分配後，主管機關應對該組織內各部門可以承擔的職責範圍作出規定。

19.2 船舶防護設備的維修保養應使主管機關滿意，特別是：

.1 定期防護檢查和維修保養應按主管機關認可的計劃表進行。該計劃表至少應首先考慮工廠的計劃表。

.2 在進行維修工作時，應對主管機關認可的保養手冊、修理報告給予進一步注意，並對主管機關對這方面的任何補充指示給予進一步注意；

.3 所有改建工作均應予以記錄，並對其安全狀態予以調查研究。若對安全可能產生任何影響，改建部分及其安裝應能使主管機關滿意；

.4 應採取適當的措施，將船舶及其設備的可維修性的情況通報船長；

.5 應明確規定操作船員在保養維護方面的職責，以及當船舶離開基地港時要求有廠方協助修理的手續；

.6 船長應向維修廠報告在運行期間發生的任何已知的故障和修理；

.7 應保存故障及修復的記錄。對於經常性的故障或者對船舶或人身安全產生不利影響的故障，應向主管機關報告。

19.3 為保證船上配備的所有救生設施和遇險信號均能得到適當的檢驗、維護和記錄而採取的措施，應能使主管機關滿意。

附錄 1　高速船安全證書格式

《高速船安全證書》

本證書應附有一份《設備記錄》

（公章）（國名）

根據《2000 年國際高速船安全規則》（海安會 MSC.97（73）號決議）

本證書由_____（國家全名）政府授權_____（主管機關授權的個人或該組織的全名）發給。

船舶特徵*

船名：_____

建造廠號和船舶編號：_____

特徵編號或特徵字符：_____

IMO 編號**：_____

船籍港：_____

總噸位：_____

該船舶被證明航行於_____

海區（根據 14.2.1 條的要求）

設計水線相應於縱浮心標準線以下的高度_____以及首吃水_____，尾吃水_____的吃水

---

* 船舶特徵也可以一一在水平排列的格子中列出。

** 按國際海事組織通過的 A.600（15）決議《IMO 船舶識別編號程序表》的要求。

縱浮心標準線的上緣_____（最上層甲板邊緣以下 mm）***（龍骨底線以上 mm）***

類別：A 類客船/B 類客船/客船***

船舶類型：全墊升氣墊船/水面效應船/水翼船/單體/多體/其他（給出具體類型）***

安放龍骨或處於相應建造階段的日期，或重大改裝開始的日期：

本證書證明

1. 上述船舶業經依照《2000 年國際高速船安全規則》的規定進行了相應的檢驗。

2. 檢驗查明，該船的結構、設備、屬具、無線電設備、材料，及其狀況等各方面均良好，且該船符合上述規則的有關規定。

3. 救生設備僅供總人數_____人用，計有：_____

4. 按本規則 1.11 規定，該船的下列等效已被批准：

章節_____等效佈置_____

本證書有效期至止_____止*。

_____年_____月_____日發於（證書頒發地點）____

正式授權簽發證書者簽字：_____

發證機構蓋章或鋼印：_____

*** 不適合時可刪除。

* 插入由主管機關按本規則 1.8.4 條規定的到期日期。本日期的月和日應對應本規則 1.4.3 條規定的周年日期，除非已按本規則 1.8.12.1 條的規定進行修正。

定期檢驗的簽署

按規則 1.5 的要求進行的檢驗，證明該船已符合規則的有關規定。

定期檢驗： 簽字：_____

（經授權的官員簽署）

地點：_____

日期：_____

（發證單位蓋章或鋼印）

定期檢驗： 簽字：_____

（經授權的官員簽署）

地點：_____

日期：_____

（發證單位蓋章或鋼印）

定期檢驗： 簽字：_____

（經授權的官員簽署）

地點：_____

日期：_____

（發證單位蓋章或鋼印）

定期檢驗： 簽字：_____

（經授權的官員簽署）

地點：_____

日期：_____

（發證單位蓋章或鋼印）

證書展期的簽署，按規則 1.8.8 如果證書有效期不到五年

本船符合規則 1.8.8 的規定，本證書的有效期可延長至：_____

止。

簽字：_____

（經授權的官員簽署）

地點：_____

日期：_____

（發證單位蓋章或鋼印）

完成換新檢驗和本規則 1.8.9 適用時的簽署

本船符合規則 1.8.9 的規定，本證書：_____止。

簽字：_____

（經授權的官員簽署）

地點：_____

日期：_____

（發證單位蓋章或鋼印）

證書展期的簽署，按規則 1.8.10 證書展期到抵檢驗港時日止按規則 1.8.10 的規定，本證書的有效期可延長至：_____。

簽字：_____

（經授權的官員簽署）

地點：_____

日期：_____

（發證單位蓋章或鋼印）

當應用本規則 1.8.12 規定，證書周年日提前的簽署

按規則 1.8.12 的規定，新的周年日為：_____止。

簽字：_____

（經授權的官員簽署）

地點：_____

日期：_____

（發證單位蓋章或鋼印）

按規則 1.8.12 的規定，新的周年日為：_____止。

簽字：_____

（經授權的官員簽署）

地點：_____

日期：_____

（發證單位蓋章或鋼印）

高速船安全證書的設備記錄

本記錄應永久附在《高速船安全證書》之後。

符合“2000 年國際高速船安全規則”的設備記錄

1 船舶特徵

船名：_____

建造廠號和船舶編號：_____

特徵編號或特徵字符：_____

IMO 編號*：_____

類別：A 類客船/B 類客船/貨船**

船舶類型：全墊升氣墊船/水面效應船/水翼船/單體/多體/其他（給出具體類型）**

經認可的乘客數：_____

有資格操作無線電設備的最低人數：_____

---

* 按國際海事組織通過的 A.600（15）號決議《IMO 船舶識別編號程序表》。

** 不適合時可刪除。

2 救生設備的詳細情況

1 提供救生設備的總人數：	_____
2 救生艇總數：	_____
2.1 所有救生艇能容納的總人數：	_____
2.2 符合救生設備規則 4.5 節的部分封閉救生艇的數量：	_____
2.3 符合救生設備規則 4.6 和 4.7 節的全封閉救生艇的數量：	_____
2.4 其他救生艇	_____
2.4.1 數量：	_____
2.4.2 類型：	_____
3 救助艇數量	_____
3.1 計入救生艇總數內的救助艇數量：	_____
4 符合救生設備規則 4.1 至 4.3 節，且配備合適的裝置降落的救生筏數量	_____
4.1 救生筏數量：	_____
4.2 救生筏能裝載的總人數：	_____

5 開敞式兩面可用救生閥（見本規則附錄 11）	_____
5.1 救生筏數量：	_____
5.2 救生筏能裝載的總人數：	_____
6 海上撤離系統（MES）的數量：	_____
6.1 可經 MES 撤離的人數：	_____
7 救生圈數量：	_____
8 救生衣數量：	_____
8.1 成人救生衣數量：	_____
8.2 兒童救生衣數量：	_____
9 浸水服	_____
9.1 總數：	_____
9.2 符合救生衣要求的浸水服數量：	_____
10 防暴露服	_____
10.1 總數：	_____
10.2 符合救生衣要求的防暴露衣數量：	_____

11 用於救生設備的無線電設備	_____
11.1 雷達應答器數量：	_____
11.2 雙向甚高頻無線電話數量：	_____

3 導航系統和設備

	項　　目	實際配置數
1.1	磁羅經	_____
1.2	發送船舶首向裝置	_____
1.3	電羅經	_____
2	航速和航程測量裝置	_____
3	回聲測深儀	_____
4.1	9GHz 雷達	_____
4.2	第二雷達裝置（3GHz/9GHz*）	_____
4.3	雷達自繪儀/自動跟蹤儀*	_____
5	全球衛星導航系統接受器/地球導航系統/其他定位裝置**	_____
6.1	旋回角速度指示器	_____
6.2	舵角指示器/操舵推力方向指示器*	_____
7.1	海圖/電子圖顯示和信息系統*	_____

* 不適用者刪除。

** 若爲其他裝置時，則應明確地陳述。

7.2	電子圖顯示和信息系統的備份裝置	_____
7.3	航海出版物	_____
7.4	航海出版物的備份佈置	_____
8	探照燈	_____
9	日光信號燈	_____
10	夜視設備	_____
11	顯示推進模式的辦法	_____
12	自動操舵儀（自動舵）	_____
13	雷達反射器/其他裝置**	_____
14	聲響接受系統	_____
15	自動識別系統	_____
16	航行數據記錄儀	_____

4 無線電設備

項　　目	實際配置數
1. 主系統	_____
1.1 VHF 無線電設備	_____
1.1.1 DSC 編碼器	_____
1.1.2 DSC 值班接收機	_____
1.1.3 無線電話	_____
1.2 MF 無線電設備	_____
1.2.1 DSC 編碼器	_____
1.2.2 DSC 值班接收機	_____
1.2.3 無線電話	_____
1.3 MF/HF 無線電設備	_____
1.3.1 DSC 編碼器	_____
1.3.2 DSC 值班接收機	_____
1.3.3 無線電話	_____

1.3.4 直接打印無線電報機	_____
1.4 INMARSAT 船舶地球站	_____
2. 次級報警設備	_____
3. 海上安全信號接收裝置	_____
3.1 海上電傳接收機	_____
3.2 EGC 接收機	_____
3.3 HF 直接打印電報接收機	_____
4. 衛星應急無線電示位標	_____
4.1 COSPAS－SARSAT 系統	_____
4.2 INMARSAT 系統	_____
5. VHF 應急無線電示位標	_____
6. 船舶雷達應答器	_____

5 保證無線電設備有效工作的手段（見本規則 14.15.6、14.15.7 和 14.15.8）

5.1 備用設備_____

5.2 岸基維護_____

5.3 海上維護_____

茲證明：本記錄在各方面均正確無誤。

本記錄於（簽發時間）_____ 在（簽發地點）_____ 簽發。

經授權的簽發本記錄的官員簽字：_____

（發證單位蓋章或鋼印）

附錄 2 高速船營運許可證書格式

《高速船營運許可證書》

根據《2000 年國際高速船安全規則》的規定頒發

（海安會 MSC.97（73）號決議）

1 船名：_____

2 建造廠號和船舶編號：_____

3 特徵編號或特徵字符：_____

4 IMO 編號*：_____

5 船籍港：_____

6 船舶類型：A 類客船/B 類客船/貨船**

7 船東名稱：_____

8 營運航區和航線：_____

9 基地港：_____

10 至避難處所的最大距離：_____

11 人數：_____

（1）最大核准載客數：_____

（2）要求配備的船員數：_____

---

* 按國際海事組織通過的 A.600（15）決議《IMO 船舶識別編號程序表》。

** 不適合時可刪除。

12 最壞設想條件：_____

13 其他營運限制：_____

本許可證書證明：

上述服務符合本規則的 1.2.2 至 1.2.7 的一般要求。

本許可證書由_____政府授權簽發。

本證書有效期至_____，隸屬於有效的高速船安全證書。

本證書於（簽發時間）_____在（簽發地點）_____簽發。

經授權的簽發證書的官員簽字：_____

（發證單位蓋章或鋼印）

附錄 3 概率概念的使用

1 通則

1.1 人類在任何活動中不可能達到絕對的安全。很自然地，在制定安全要求時必須考慮這樣一個事實，就是說，這些要求並不意味着絕對安全。對於傳統的船舶，常常能夠在設計或建造的某些方面作出相當詳細的規定，在某種程度上適應了多少年來一向被直覺地認作無需下定義的危險程度。

1.2 對於高速船，把技術要求包括在本規則中，常常會顯得限制過分。因此，一些要求須寫成（當此問題提出時）這種含義："……主管機關應根據各項試驗、調查和以往的經驗確信……的概率是小到可以接受"。由於不同的不良事故可認為具有不同的可接受概率的大概等級（例如推進裝置的暫損壞與不可控制的火災相比），因此，合適的辦法是，商定一系列能用於表達各種事故的相對可接受概率的標準措辭，即實行一種質量分級方法，下面給出的詞匯目的是確保在需要描述那種不得被超出的危險限度時，保持所提各種要求之間的一致性。

2 與概率有關的術語

不同的不良事故可有不同的可接受概率的等級，因此，合適的辦法是，商定標準措辭用以表達各種事故的相對可接受概率，即實行一種質量分級方法。

2.1 事故

2.1.1 "事故"係指可能會降低安全程度的一種情況。

2.1.2 “故障”係指船舶的一個或幾個部件失效或工作不正常的事故，例如失控。故障包括：

.1 個別故障；

.2 與一個系統有關的獨立故障；

.3 涉及一個以上系統的獨立故障，包括：

.3.1 任何已出現但未被探測到的故障；

.3.2 有理由預計將跟隨正在處理中的故障之後，還會發生的進一步的故障*；以及

.4 共同原因故障（由相同的原因引起一個以上部件或系統的失效）。

2.1.3 “事件”係指起源於船外因素（例如波浪）的事故。

2.1.4 “差錯”係指由於操作人員或維修人員不正確的行動而造成的事故。

2.2 事故的概率

2.2.1 “經常”係指在一特定船的使用期限內，可能經常發生的。

2.2.2 “有可能”係指在一特定船的總使用期限內，不可能經常發生，但可能發生幾次的。

2.2.3 “復發的”係指包括經常的和相當可能的這兩者總範圍的術語。

---

* 在估計隨後發生的進一步的故障時，應考慮到時當時尚未出現故障的設備將會造成更嚴重工況的任何故障。

2.2.4 “可能性很小”係指不可能每艘船發生，但在同一類型的許多船的總使用期限內，其中的少數船可能發生。

2.2.5 “可能性極小”係指從同一類型許多船的總使用期限內考慮時不可能發生，但還是須當作可能發生來考慮。

2.2.6 “極不可能”係指是如此地極少可能，以至須當作不可能發生來考慮。

2.3 後果

2.3.1 “後果”係指事故的結果造成的情況。

2.3.2 “輕微後果”係指可能由於如 2.1.2、2.1.3 和 2.1.4 所定義的故障、事件或差錯所造成的，可由操作船員迅速補救的後果，其包括：

.1 稍微增加船員的工作任務，或稍微增加其執行任務的困難；或

.2 操作性能中等程度的降低；或

.3 細微地改變許可的工作條件。

2.3.3 “重大後果”係指產生下列情況的後果：

.1 明顯加重船員的工作任務，或增加其執行任務的困難，如果沒有其他重大後果同時發生，該任務不應超出合格船員的能力；或

.2 操作性能明顯地降低；或

.3 明顯地改變許可的工作條件，但不要求操作船員具有超出正常的技能仍具有可安全完成一個航程的能力。

2.3.4 “危險後果”係指產生下列情況的後果：

.1 危險地加重船員的工作任務，或增加其執行任務的困難，以致難以指望船員去克服這些困難，而很可能需要外來援助；或

.2 操作性能危險的降低；或

.3 船舶強度危險的降低；或

.4 產生危及乘員的臨界狀態或傷害乘員；或

.5 非得外來救援不可。

2.3.5 “災難性後果”係指導致沉船和/或死人後果。

2.4 安全等級

“安全等級”係指表徵船舶性能（以水平單幅加速度 g 表示）和加速度載荷對站着和坐着的人的影響程度之間關係的數值。

安全等級和相應的對乘客影響的嚴重性及對船舶性能的安全衡準應遵照表 1 中的規定。

3 數值

在採用概率數值評定以類似上述術語制定的要求是否得到滿足時，可使用下列近似數值作為指南以提供有普遍意義的參考。所引用的概率應以每小時或每一航程為基礎，取決於何者更適合於所評定的情況。

經常	大於 10^{-3}
有可能	10^{-3} 至 10^{-5}

可能性很小	10^{-5} 至 10^{-7}
可能性極小	10^{-7} 至 10^{-9}
極不可能	以此雖然沒有定出大致的概率數值，但如用數字，則應比 10^{-9} 小得多。

註：不同的事故，根據其後果的嚴重程度，可以有不同的可接受概率（見表 2）。

表 1

後果	不得超出的衡準載荷類型	數值	註釋
等級 1 輕微後果 中等降低安全性	水平方向測得的最大加速度 [1]	0.20g [2]	0.08g：老年人抓住把手時，能保持平衡 0.15g：普通人抓住把手時，能保持平衡 0.15g：坐着的人需開始抓住把手
等級 2 重大後果 明顯降低安全性	水平方向測得的最大加速度 [1]	0.35g	0.25g：普通人抓住把手時，能保持平衡的最大負荷 0.45g：普通人未繫座椅帶時，會從座椅上跌下

等級 3 危險後果 嚴重降低安全性	計算的碰撞設計情況根據重心處垂向加速度確定的最大結構設計載荷	參考 4.3.3 參考 4.3.1	傷害乘客的危險，碰撞後的安全緊急操作 1.0g：乘客安全性降低
等級 4 災難性後果			沉船和/或死人

註：1 所用加速度計的精度應至少為滿刻度的 5%，並且具有一個不小於 20Hz 的頻率響應。抽樣頻率響應不小於 5 倍最大頻率響應。如果使用抗失真濾波器，則其應具有一個相等於頻率響應的通頻帶。

2 g——重力加速度（$9.81 m/s^2$）。

表 2

安全等級	1	1	1	2	3	4
對船舶和乘員的影響	正常	干擾	操作限制	緊急步驟： 安全限界明顯減小； 船員應付不利情況有困難；乘客受到傷害	安全限界大幅減小； 因工作負荷或環境條件，船員不堪忍受； 少量乘員受嚴重傷害	死人， 通常船舶沉沒
F.A.R.[1] 概率 （僅供參考）	←	可能	→	←	不大可能	極不可能 →
JAR-25[2] 概率	←	可能	→	←	不大可能	極不可能 →
	← 經常	→	有可能 →	← 可能性很小	可能性極小 →	
	10^{0}	10^{-1} 10^{-2}	10^{-3} 10^{-4}	10^{-5} 10^{-6}	10^{-7} 10^{-8}	10^{-9}
後果類型	← 輕微	→	← 重大	→	← 危險 →	災難性

1 美國聯邦航空規則（F.A.R）。

2 歐洲聯合飛行性能規則（JAR）。

附錄 4 故障模式與影響分析程序

1 前言

1.1 對於傳統的船舶，已能夠在設計或建造的某些方面作出相當詳細的規定，在某種程度上適應多少年來一向被直覺地認作無需下定義的危險程度。

1.2 隨着大型高速船的發展，所需要的經驗還相當不全面。然而，隨着從整體上作工業安全性評價的概率方法正在被廣泛地接受，因而可以提出用故障特性分析來幫助評價高速船操作的安全性。

1.3 應對船舶及其部件系統的故障特性進行一種實際、真實和書面的評價，以對可能存在的重要故障情況作出定義和進行研究為目標。

1.4 本附錄描述一種故障模式和影響分析（FMEA），並給出如何通過下述來應用的指南：

.1 解釋基本原則；

.2 規定為進行分析而必需的程序步驟；

.3 確定合適的術語、假設、措施和故障模式；以及

.4 提供所需工作表格的例子。

1.5 對高速船，FMEA 是建立在單個故障概念基礎上的。據此在系統功能體系的各個狀態的每一個系統，在任一時刻，假定其他可能由於一個原因發生故障。該假定故障的影響按其嚴重性進行分析和分類。這些影響可以包括在其他程度上的次級故障（或多重故障）。任何可能引起船舶災難性後果的故障模式應通過系統或設備冗餘加以防範。除

非這種故障的概率為極不可能（參閱第 13 條）。對於引起危險後果的故障模式，可以接受糾正措施來代替。應制定試驗程序以確證 FMEA 的結論。

1.6 雖然 FMEA 被認為是最靈活的分析技術之一，但同時也承認存在其他可用的方法，在某些環境條件下，也可以對特定的故障特性提供同等的綜合分析。

2 目的

2.1 FMEA 的基本目的是提供一個全面的、系統的和書面的調研，以建立船舶的重大故障情況，從而評價其對船舶及其乘員和環境的安全性的重要性。

2.2 進行分析的主要目的是：

.1 為主管機關提供船舶故障特性的研究結果，以便對所建議的船舶操作安全水平進行評定；

.2 為船舶營運方提供產生全面培訓、操作和維護程序及說明的數據；和

.3 為船舶和系統設計者提供審核其建議的設計資料。

3 適用範圍

3.1 每一艘高速船在投入營運之前，對於按本規則 5.2、9.1.10、12.1.1 和 16.2.6 要求的系統應完成 FMEA。

3.2 對設計相同並具有相同設備的船舶，只需對首制船進行一次 FMEA，但每艘船應進行相同 FMEA 結論的試驗。

4 系統故障模式與影響分析

4.1 在對系統部件故障關於系統功能輸出所產生的影響進行詳細的 FMEA 之前，必須先對船舶重要系統進行功能故障分析。這樣，僅對那些功能故障分析失敗的系統需通過更詳細的 FMEA 進行研究。

4.2 當實施系統 FMEA 時，應考慮以下船舶正常設計環境條件中的典型操作模式：

.1 正常情況下全速航行；

.2 擁擠水域中最大允許操作航速；以及

.3 靠碼頭操縱。

4.3 為使故障影響易於被理解，這些系統的功能相互關係還應以框圖或故障框圖加以說明或以敘述方式說明。所要分析的每個系統應儘可能假定在以下故障模式下失效：

.1 完全失去功能；

.2 迅速改為最大或最小輸出；

.3 輸出不受控制或改變輸出；

.4 過早操作；

.5 在規定的時間不能操作；和

.6 在規定的時間不能停止運轉。

根據所考慮的系統，其他故障模式也可計及。

4.4 如果系統失效不會造成危險性後果或災難性後果，就不必將詳細的 FMEA 引進系統結構。對那些個別的故障能造成危險性後果或災難性後果的系統，且無備用系統，則就應遵循以下所述的詳細 FMEA。系統功能故障分析的結果應通過按分析所擬定的實際試驗程序來說明和證實。

4.5 如果一個可能因其故障而造成危險性後果或災難性後果的系統配有一個備用系統，就可不要求詳細的 FMEA，但其前提是：

.1 備用系統能在 4.2 中所述最麻煩的操作模式的時間限制內，投入運轉或接替失效的系統而不危及船舶；

.2 備用系統完全獨立於該系統，並且不共用會導致該系統和備用系統都會發生故障的公共系統部件。但如果故障概率符合第 13 條的要求，則公共系統部件可予以接受；以及

.3 備用系統可以與該系統共用同一動力源。在這種情況下，備用動力源應能按上述.1 的要求迅速投入運行。

還應考慮操作者失誤，引進備用系統的可能性和後果。

5 設備故障模式和影響分析

要在這方面作更詳細 FMEA 研究的系統應包括所有那些系統 FMEA 已經失敗的系統，並且可以包括對船舶及其乘員的安全有非常重要影響的系統，以及包括要求作較系統功能故障分析更深一層研究的系統。這些系統常常專門為船舶設計或採用的，例如船舶的電力和液壓系統。

6 程序

實施 FMEA 應遵循以下步驟：

.1 確定要分析的系統；

.2 利用方框圖說明系統功能部件的相互關係；

.3 確定所有功能的故障模式及其原因；

.4 評估每種故障模式對系統的影響；

.5 確定故障探測方法；

.6 確定故障模式的糾正措施；

.7 如可能，評定引起危險後果或災難性後果的概率；

.8 編寫分析資料；

.9 制定試驗程序；

.10 準備 FMEA 報告。

7 系統定義

FMEA 研究的第一步是利用圖紙和設備手冊詳細研究要分析的系統。應編製包括以下資料的系統及其功能要求的敘述說明：

.1 系統操作和結構的一般說明；

.2 系統部件之間的功能關係；

.3 在每一種典型的運行模式中系統及其組成部件的可接受的功能限制；以及

.4 系統約束。

8 系統框圖的編製

8.1 第二步是編製說明系統功能流程的框圖，以便從技術上了解系統的功能和運行，及其隨後進行的分析，框圖至少應包括：

.1 將系統劃分成主要子系統或設備；

.2 所有固定用以適當標記每一個子系統的輸入、輸出和標識號碼；

.3 所有冗餘、選擇性符號路線和提供“故障——安全”措施的其他工程細節。

附件 1 中給出了一種系統框圖的例子。

8.2 對每一種運行模式必要時可提供不同形式的框圖。

9 故障模式、原因及影響的識別

9.1 故障模式是藉以觀測故障的方式，其一般地描述了故障發生的情形以及對設備或系統的影響。作為一個例子，表 1 中給出了故障模式的例子。表 1 中所列的故障模式使得可以用相當明確的術語描述任一系統部件的故障，當在系統框圖中一起使用帶有控制輸入和輸出的性能說明，就能標識和描述所有可能的故障模式。例如，供電可能有描述為“失電”（29）的故障模式，以及說明為“斷路”（31）的故障原因。

9.2 系統部件的故障模式也可能是系統故障的原因，例如，舵機系統的液壓管路可能有“外部泄漏”（10）的故障模式。此液壓管路的故障模式可能成為該舵機系統故障模式“失壓”（29）的故障原因。

9.3 每個系統應視作一個從系統的功能輸出的從上到下的過程，故障應假定在某一時刻由一個可能的原因引起。既然一個故障模式可能具有不止一個原因，則對每一個故障模式的所有可能的相互獨立的原因都應加以標識。

9.4 如果主要系統失效不引起任何有害的後果，則沒有進一步對其進行考慮的必要，除非該故障不能被操作者發現。判斷不存在有害的影響並不意味着正好具有系統冗餘。冗餘應表現為立即起作用或可以忽略的時間滯後到位。另外，如果次序是："故障——報警——操作者動作——備用開始——備用運行"則應考慮滯後的影響。

10 故障後果

10.1 設備或系統的運行、功能、或狀態方面故障模式的結果稱為"故障後果"。所考慮的一特定子系統或設備方面的故障後果被稱為"局部故障後果"。評估局部故障後果將有助於在該系統水平上確定任何備件或糾正行動的有效性。在某些情況下，除故障模式本身以外可能不存在局部後果。

10.2 設備或子系統故障對系統輸出（系統功能）的影響被稱為"末端後果"。末端後果應按照以下類型進行評估和劃分嚴重程度：

.1 災難性的；

.2 危險的；

.3 重大的；和

.4 輕微的。

本規則附錄 3 的 2.3 中給出了這四類故障後果的定義。

10.3 如果故障的末端後果劃定為危險性的或災難性的，則為了預防這類後果或將其減至最小，常常要求設有備用設備。對危險性故障後果可以同意採用糾正操作程序。

11 故障探測

11.1 通常 FMEA 研究僅根據系統中單個故障分析故障後果，因此應確定故障探測方式，例如聲或光報警裝置、自動檢測裝置、傳感儀或其他專用指示器等。

11.2 如果系統部件故障是不可探測的（即隱匿的損壞或任何不同操作者發出聲、光指示的故障），且系統能以規定的操作繼續運行則分析應擴大至測定第二個故障的後果，該故障連同第一個未探測到的故障可能導致更嚴重故障後果，例如危險性後果或災難性後果。

12 糾正措施

12.1 為預防或減小系統部件或設備故障模式的影響，還應確定和評估在給定的系統水平上起動任何備用設備或任何糾正行動的響應。

12.2 為了消除失靈或故障造成的後果，在任何系統水平上作為設計細節的措施，諸如為防止產生或擴散故障後果的控制，或關閉系統部件，或啟動備用件，或輔助部件，或系統等，均應予以說明，糾正設計措施包括：

.1 允許連續安全運轉的備用設備；

.2 限制操作或限制損壞的安全設備、監視或報警設備；和

.3 操作的替代模式。

12.3 為防止或減輕假定故障的後果而要求操作者採取的措施應予以說明。當評估消除局部故障後果的措施時，如果糾正措施或備用設備的啓動要求操作者介入，則應考慮操作者錯誤的可能性和後果。

12.4 應注意的是一種操作模式中可接受糾正響應不為另一種操作模式所接受，例如一個具有較大時間滯後的備用系統部件引入到管路中，其符合操作模式“全速正常航行情況”，但可能在另一種操作模式，例如“擁擠水域中最大允許操作航速”中導致災難性後果。

13 概率概念的應用

13.1 如果未向任何故障提供前述條款說明的糾正措施或冗餘，作為替代此類故障的發生概率應滿足下列可接受的衡準：

.1 導致災難性後果的故障模式應評為極不可能；

.2 評為可能性極小的故障模式應不導致較危險後果更壞的結果；和

.3 評為經常的或有可能的故障模式應不導致輕微後果更壞的結果。

13.2 本規則附錄 3 第 3 條中列出了各種概率水平的數值。在沒有來自船舶的資料以測定故障概率水平時，可以利用其他的來源，諸如：

.1 車間試驗；或

.2 用在其他領域中類似的操作情況下的可靠性記載；或

.3 數學模式，如適用時。

14 文件

14.1 附註 2 給出的工作表格對實施 FMEA 是有益的。

14.2 工作表格應如此填寫，即首先顯示最高一級系統水平，然後順序往下減小系統水平。

15 試驗程序

15.1 應擬定 FMEA 試驗程序以證明 FMEA 的結論，為此建議：試驗程序應包括其故障會導致下列後果的所有系統或系統部件：

.1 重大或更嚴重的後果；

.2 限制操作；和

.3 任何其他糾正措施。

對其故障不易在船上模擬的設備，可用其他試驗的結果來確定對系統和船舶的後果和影響。

15.2 試驗還應包括下列調研：

.1 控制站的佈置為確保減少船員可能的無意和不正確操作（尤其是在應急情況下），應考慮開關和其他控制設備的相對定位，以及為防止對重要系統運行誤操作的連鎖裝置的預防措施；

.2 特別與開航前檢查單有關的船舶操作文件的存在和質量。這些檢查必須包括在故障分析中確認的未展示的故障模式；且

.3 理論分析中所說明的主要故障的後果。

15.3 由本規則 5.3、16.4 和 17.4 所規定的船上 FMEA 試驗應在船舶投入營運之前進行。

16 FMEA 報告

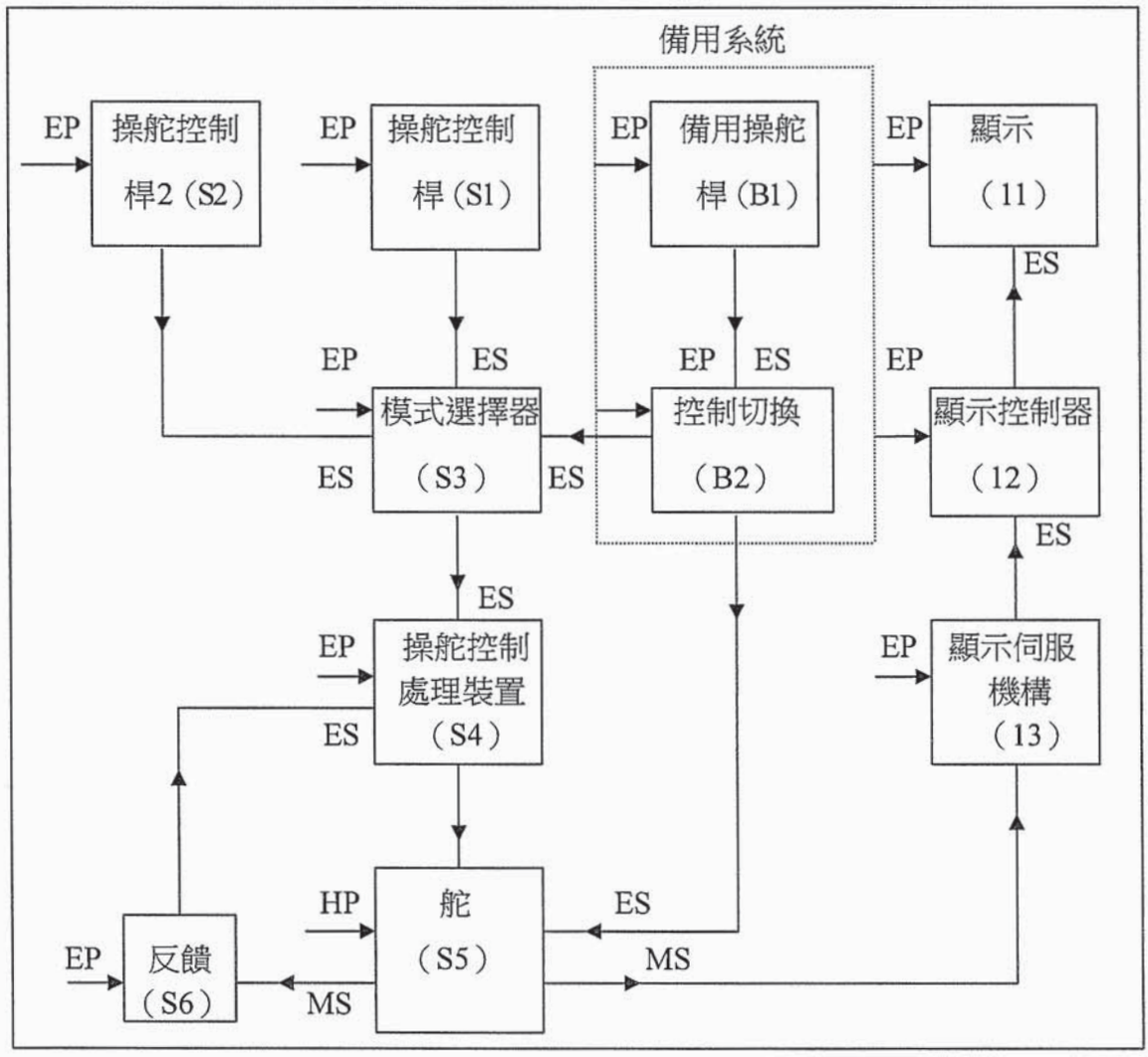
FMEA 報告應是一份完備的文件，其應對船舶、船舶的系統及其功能、建議的操作和故障模式、原因及後果和環境條件進行充分的闡述，且均不必借助於不在該報告之內的其他圖紙和文件而能夠被理解。如需要，該文件應包括分析的假設和系統框圖，報告應包含結論的摘要，以及系統故障分析和設備故障分析中的每一個所分析系統的說明。如需要，還應列出所有可能的故障及其故障概率，在每一種所分析操作模式中對每一個系統的糾正措施或操作限制。該報告應包含有試驗程序、所參考的所有其他試驗報告和 FMEA 試驗。

附註 1

系統框圖的例子

操舵控制系統 日期：_____

分析者：_____



其中：EP----電力

HP----液壓力

ES----電信號

MS----機械信號

表 1

一組故障模式例子

1	結構故障（破裂）	18	假動作
2	機械性咬合或卡塞	19	未能制動
3	振動	20	未能啟動
4	未能處於（適當位置）	21	未能轉換
5	未能打開	22	超前運行
6	未能關閉	23	延遲運行
7	出故障時自動打開	24	錯誤輸入（增加）
8	出故障時自動關閉	25	錯誤輸入（減少）
9	內部泄漏	26	錯誤輸出（增加）
10	外部泄漏	27	錯誤輸出（減少）
11	偏離公差（高）	28	失去輸入
12	偏離公差（低）	29	失去輸出
13	誤運行	30	短路（電）
14	斷續運行	31	斷開（電）
15	不穩定運行	32	漏電
16	錯誤指示	33 系統特性、要求和操作限制方面的其他異常故障情況	
17	限制流動		

參考 IEC 出版物：IEC812（1985）系統可靠性分析技術故障模式和影響分析（FMEA）程序。

附註 2

FMEA 工作單

系統名稱_____ 參考_____

操作模式_____ 系統方框圖_____

表格編號_____ _____

日期_____ _____

分析員姓名_____ 圖表_____

設備名稱或編號	功能	標識號	故障模式	故障原因	故障後果		故障探測	糾正措施	故障後果的嚴重程度	故障概率（如適用）	附註
					局部後果	末端後果					

附錄 5 適用於各種船舶結冰的有關規定

1 結冰允許量

1.1 在結冰可能性較大區域營運的船舶，其穩性計算可採用如下的結冰允許量：

.1 露天甲板和舷梯，30kg/m^2；

.2 船舶水線以上，每舷的側投影面積，7.5kg/m^2；

.3 欄桿、各種吊桿、桿或柱（桅除外）和索具等的不連續表面的側投影面積，以及其他小件物品的側投影面積，可將連續表面的側投影總面積增加 5%，以及將此總面積的靜力矩增加 10%來計算；

.4 由於在橋體結構處結冰的不對稱，穩性要降低。

1.2 對於在預料會結冰區域營運的船舶：

.1 在 2.1、2.3、2.4 和 2.5 規定的區域內，與 1.1 有大不相同冰凍情況可採用規定的結冰允許量的 0.5~2 倍作為結冰允許量；

.2 在 2.2 規定的區域內，預料結冰超過 1.1 規定允許量的 2 倍，可採用比 1.1 規定更高要求。

1.3 在計算本附件規定的各種情況下船舶的狀態時，需作一些假設。為此，應提供有關下列情況的資料：

.1 以到達目的地和返回港口所需時間來表示的續航力；

.2 在航行中燃料、水、供應品和其他船用物資的消耗量。

2 冰區

在運用第 1 段時，適用的冰區如下：

.1 北緯 65°30' 以北，界於西經 28°和冰島西海岸之間；冰島北海岸以北；從北緯 66°、西經 15°至北緯 73°30' 、東經 15°的恆向線以北；北緯 73°30' 以北、界於東經 15°和 35°之間；和東經 35°以東，以及波羅的海內、北緯 56°以北等區域；

.2 北緯 43°以北，西部以北美海岸為界，東部以從北緯 43°、西經 48°至北緯 63°、西經 28°，然後沿着西經 28°的恆向線為界的區域；

.3 北美大陸以北，本條.1 和.2 規定區域以西的所有海區；

.4 白令海、鄂霍次克海和在結冰季節的韃靼里海峽；

.5 南緯 60°以南。

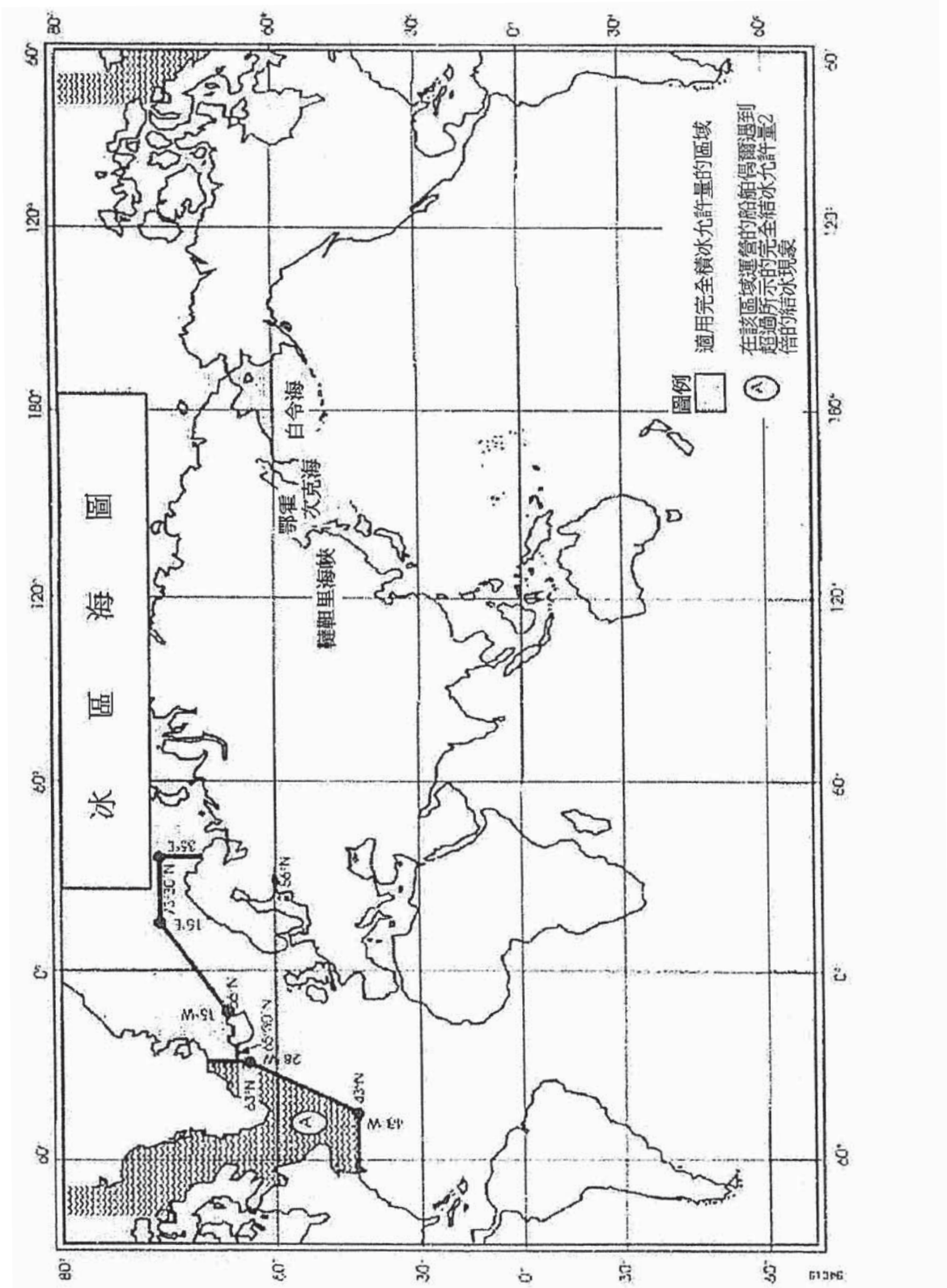
附有 1 份標明冰區的海圖。

3 特殊要求

預定在已知會發生結冰的區域營運的船舶應：

.1 設計成能使結冰減少到最小限度；和

.2 如主管機關有要求應配備可消除結冰的裝置。


冰區海圖
白令海
鄂霍次克海
韃靼里海峽
圖例
適用完全積冰允許量的區域
在該區域運營的船舶偶爾遇到超過所示的完全結冰允許量2倍的結冰現象
A

附錄 6 水翼船的穩性

應考慮這些船舶在排水狀態、過渡狀態與翼航狀態中的穩性。研究穩性時還應考慮外力的影響。以下是研究穩性的簡要指南。

1 割劃式水翼船

1.1 排水狀態

1.1.1 穩性應充分滿足本規則 2.3、2.4 和 2.6 的要求。

1.1.2 回轉橫傾力矩

在排水狀態操縱船舶的過程中產生的橫傾力矩，可按下式計算：

$$M_R=0.196\frac{V_o^2}{L}\cdot\Delta\cdot KG \text{（kNm）}$$

式中：M_R=橫傾力矩；

V_o=船舶回轉速度，m/s；

△=排水量，t；

L=設計水線長度，m；

KG=重心距基線高度，m；

本公式適用於回轉半徑與船長之比為 2 至 4 的情況。

1.1.3 符合氣象衡準數的傾覆力矩和傾側力矩之間的關係

排水狀態水翼船的穩性可用下列氣象衡準數 K 進行核查：

$$K=\frac{M_c}{M_v}\geq 1$$

式中：M_C=根據橫搖確定的最小傾覆力矩；

M_v=風壓傾側力矩。

1.1.4 風壓傾側力矩

傾側力矩在整個橫傾角範圍內應為常數並按下式計算：

$$M_v=0.001P_vA_vZ \qquad (kNm)$$

式中：P_v=風壓以 $750(V_w/26)^2$ (N/m^2)；

A_v=包括水線以上船體、上層建築各種結構側表面投影的受風面積，m^2；

Z=受風面積力臂即自水線至受風面積幾何中心的垂直距離，m；

V_w=相應於最差預定條件下的風速，m/s。

1.1.5 排水狀態中最小傾覆力矩 M_c 的計算

最小傾覆力矩是通過計及橫搖的靜穩性曲線和動穩性曲線來確定的。

.1 當用靜穩性曲線時，如圖 1 所示，應考慮橫搖，使傾覆和回復力矩（或力臂）曲線下的面積相等而確定 M_c。圖中 θ_z 是橫搖角，MK 是平行於橫坐標的直線，此線使陰影面積 S_1 和 S_2 相等。

M_c=OM，如縱坐標標尺為力矩。

M_c=OM×排水量，如縱坐標標尺為力臂。

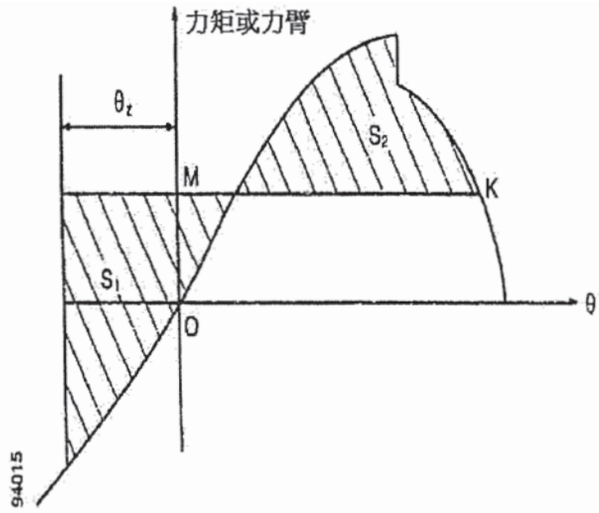


圖 1 靜穩性曲線

.2 當使用動穩性曲線時，首先應確定輔助點 A，為此沿橫坐標向右定出橫搖角，找到 A' 點（見圖 2）。過 A' 點作一平行於橫坐標軸的線 AA' ，使其長度等於橫搖角的兩倍（AA' =2θ_z），從而找到要求的輔助點 A。作出動穩性曲線的切線 AC。從 A 點起，作一平行於橫坐標軸的線 AB，使其等於 1 rad（57.3°）。從 B 點作一垂線，與切線相交於 E 點。如沿動穩性曲線的縱坐標軸量取，則$\overline{BE}$的長度等於傾覆力矩。如縱坐標軸表示動穩性力臂，則$\overline{BE}$為傾覆力臂，在此情況下。傾覆力矩 M_c 應以$\overline{BE}$的長度（以 m 為單位）乘以相應排水量△（以 t 為單位）而確定：

M_C=9.81$\Delta\overline{BE}$（kNm）

.3 橫搖角 θ_z 是通過船模和在不規則波浪中實船試驗確定的，以作為船舶在最惡劣的設計海況中與波浪方向成 90°行駛時橫搖 50 次中的最大橫傾角。如果缺乏這樣的數據，則橫搖角可假設為 15°。

.4 穩性曲線的有效性應以進水角為極限。

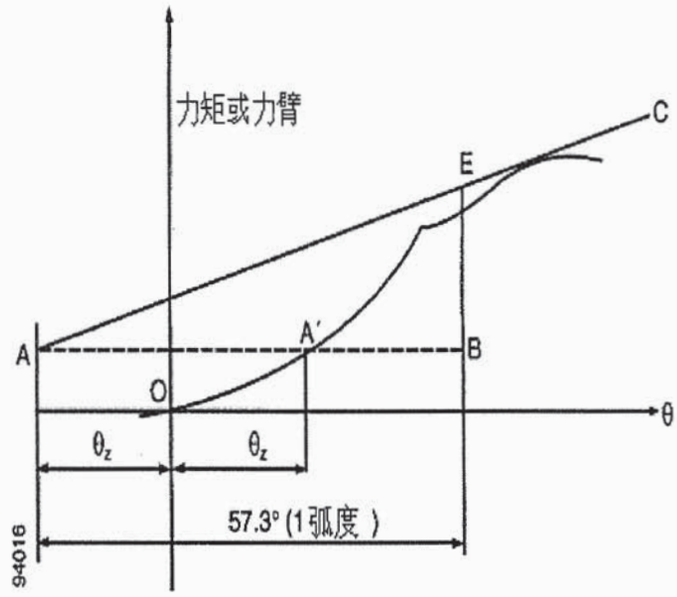


圖 2 動穩性曲線

1.2 過渡狀態和翼航狀態

1.2.1 穩性應符合本規則 2.4 和 2.5 的要求。

1.2.2.1.1 應審核船舶預定用途的各種裝載情況下，在過渡狀態和翼航狀態下的穩性。

1.2.2.2 過渡狀態和翼航狀態下的穩性可通過計算或根據船模試驗獲得的數據來確定，並應通過實船試驗核實。實船試驗是用偏離中心線的壓載重量，造成一系列已知的橫傾力矩進行的，並記錄這些力矩產生的橫傾角。當船舶進入排水狀態，起飛、穩定翼航狀態再回到排水狀態時，其結果將會表明船在過渡狀態中各種情況的穩性數值。

1.2.2.3 在翼航狀態中，由於乘客集中於一舷所引起的橫傾角應不超過8°。在過渡狀態中，由於乘客集中一舷所引起的橫傾角應不超過12°。該乘客集中程度應由主管機關在考慮本規則附錄7提供的指南後作出決定。

1.2.3 圖3中提供了一典型水翼船在設計階段估算翼航狀態初穩心高度（GM）的一種可能的方法。

$$GM=n_B\left(\frac{L_B}{2\tan I_B}-S\right)+n_H\left(\frac{L_H}{2\tan I_H}-S\right)$$

式中：n_B=前翼負荷的百分比；

n_H=後翼負荷的百分比；

L_B=前翼間距；

L_H=後翼間距；

a=龍骨底部至水面距離；

g=重心距龍骨底部高度；

I_B=前翼傾斜於水平線的角度；

I_H=後翼傾斜於水平線的角度；

S=重心距水面高度。

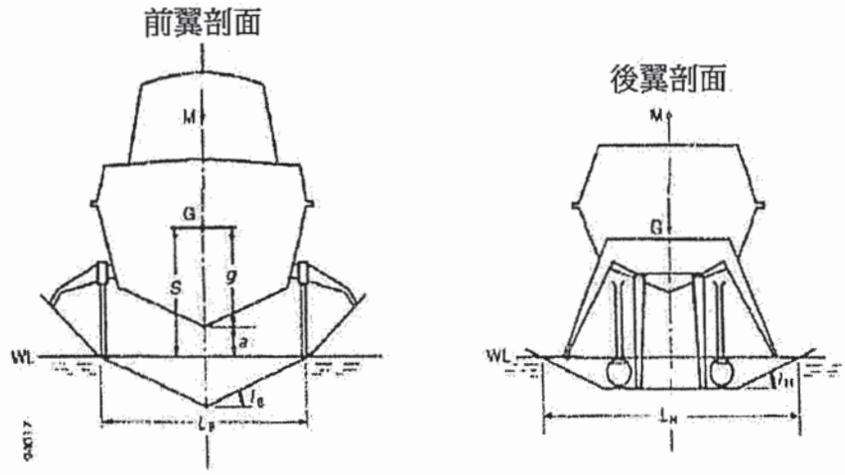


圖 3

2 全浸式水翼船

2.1 排水狀態

2.1.1 排水狀態的穩性應符合本規則 2.3 和 2.6 的要求。

2.1.2 本附錄 1.1.2 至 1.1.5 的要求也適用於處於排水狀態此類型的船舶。

2.2 過渡狀態

2.2.1 應使用校驗過的計算機仿真檢驗穩性，以評估在正常的情況下和在限定的營運範圍內，以及在任何故障影響情況下，船舶的運動、性能及響應。

2.2.2 應對過渡階段在系統或操作程序中，存在的將會危及船舶的水密完整性和穩性的任何潛在故障造成的穩性狀況進行檢查。

2.3 翼航狀態

船舶翼航狀態的穩性應符合本規則 2.4 的要求。還應符合本附錄 2.2 的規定。

2.4 本附錄 1.2.2.1、1.2.2.2 和 1.2.2.3 的要求應按適當情況應用於這類船舶。任何計算機仿真或設計計算都應通過實船試驗予以驗證。

附錄 7 多體船的穩性

1 完整狀態下的穩性衡準

在完整狀態下，船舶在海上橫搖時，應有足夠的穩性，以能承受本附件 1.4 規定的乘客集中一舷或高速回轉的影響。如果符合本條的要求則應認為船舶的穩性是足夠的。

1.1 GZ 曲線下的面積

GZ 曲線下至 θ 角的面積（A_1）應不小於：

$A_1=0.055\times30^\circ/\theta$ （m · rad）

式中：θ 取下列角度中之最小者：

.1 進水角；

.2 最大 GZ 值對應角；和

.3 30°。

1.2 最大 GZ 值

最大 GZ 值應對於不小於 10°的角度處。

1.3 由風引起的橫傾

應假定在各個傾側角度下的風傾力臂為常數，並應按下式計算：

$$HL_1=\frac{P_i\cdot AZ}{9800\Delta}\ (\mathrm{m})$$

$HL_2=1.5H_{L1}$（m）（見圖 1）

式中：$P_i=500\ (V_w/26)^2$ （N/m^2）；

V_w=相應於最差預定條件下的風速，m/s；

A=船舶最輕營運水線以上部分的側投影面積，m^2；

Z=從面積 A 之中心至船舶最輕營運吃水一半時的一點的垂直距離，m；

△=排水量，t。

1.4 由於乘客聚集或高速回轉引起的橫傾

由於乘客集中一舷或高速回轉引起的橫傾。其中之大者應與風傾力臂（HL_2）結合起來應用。

1.4.1 乘客集中一舷引起的橫傾；

當計算乘客集中一舷引起的橫傾角時，乘客集中一舷力臂應使用本規則 2.10 中規定的假設來計算。

1.4.2 高速回轉引起的橫傾

當計算高速回轉的作用引起的橫傾角時，高速回轉力臂應利用以下公式計算、或者採用考慮到船型而特別制定的一種等效方法、或者利用試驗、或者採納船模試驗數據來獲取：

$$TL=\frac{1}{g}\frac{V_o^2}{R}\left(KG-\frac{d}{2}\right)\ (\mathrm{m})$$

式中：TL=回轉力臂，m；

V_o=船舶回轉時速度，m/s；

R=回轉半徑，m；

KG=重心距龍骨的垂直高度，m；

d=平均吃水，m；

g=重力加速度

1.5 波浪中橫搖（圖 1）

船舶在海上橫搖對穩性的影響應用數學方法加以闡明。為此，GZ 曲線下的剩餘面積（A_2），即橫傾角 θ_h 至橫搖角 θ_r 的面積應不小於 0.028m・rad。在缺乏模型試驗或其他資料時，θ_r 應取 15°和（$\theta_d-\theta_h$）中之小者。

2 破損後剩餘穩性衡準

2.1 剩餘穩性曲線衡準的應有和方法相似於完整穩性，但船破損後最終狀態下剩餘穩性應符合如下標準：

.1 要求的面積 A_2 應不小於 0.028m・rad（見圖 2）；以及

.2 對最大 GZ 所對應的角度無要求。

2.2 用於剩餘穩性曲線的風傾力臂在各個傾角下均假定為常數並應按下式計算：

$$HL_3=\frac{P_d \cdot AZ}{9800\Delta}$$

式中：$P_d=120\ (V_w/26)^2\ (N/m^2)$；

V_w=相應於最差預定條件下的風速，m/s；

A=船舶最輕營運水線以上部分的側投影面積，m^2；

Z=從面積 A 之中心至船舶最輕營運吃水一半的一點的垂直距離，m；

△=排水量，t。

2.3 橫搖角應採用與完整穩性所用的相同值。

2.4 進水點十分重要，其被視作剩餘穩性曲線的終止，因此，面積 A_2 應在進水角處被截斷。

2.5 應檢查船舶發生如本規則 2.6 所規定的那樣破損時，破損後最終狀態下船舶的穩性，並表明其符合衡準。

2.6 在進水的中間階段，最大復原力臂不小於 0.05m，復原力臂正值範圍應不小於 7°。在所有情況下，均假定船體只有一個破口和只有一自由液面。

3 傾側力臂的應用

3.1 在將傾側力臂應用至完整的和破損後的曲線時，應考慮：

3.1.1 對完整狀態：

.1.1 風傾力臂（包括陣風影響）（HL_1）；和

.1.2 風傾力臂（包括陣風影響）加乘客集中一舷力臂或高速回轉力臂兩者中之大者（HT_L）。

3.1.2 對破損狀態：

.2.1 風傾力臂=定常風（HL_3）；和

.2.2 風傾力臂加乘客集中一舷力臂，HL_4。

3.2 定常風引起的橫傾角

3.2.1 按 1.3 所得的由陣風的風傾力臂 HL_2 引起的橫傾角用於完整穩性曲線時，應不超過 10°；和

3.2.2 按 2.2 所得的由定常風的風傾力臂 HL_3 引起的橫傾角用於破損後的剩餘穩性曲線時，對客船應不超過 15°，而對貨船不超過 20°。

多體船衡準

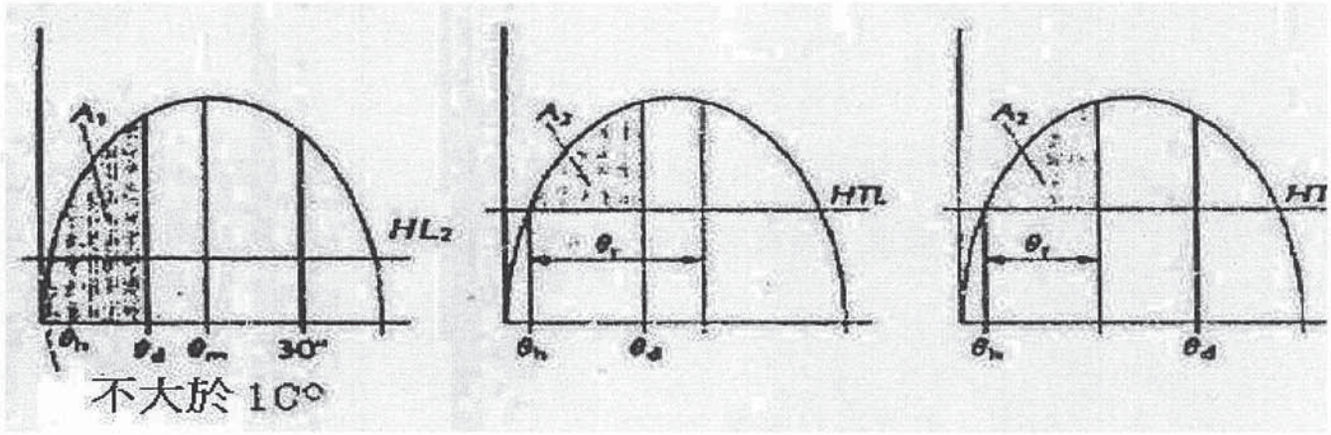


圖 1 完整穩性

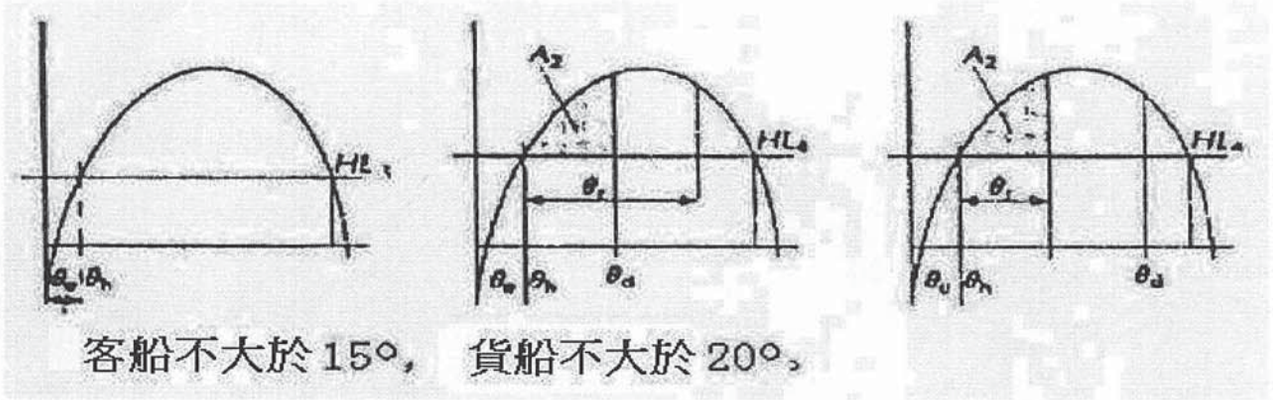


圖 2 破損穩性

用於圖 1 和圖 2 的縮寫：

HL_2=風傾力臂；

HTL=（定常風+突風+乘客集中一舷或回轉）傾側力臂；

HL_3=風側力臂；

HL_4=（定常風+乘客集中一舷或回轉）傾側力臂；

θ_m=最大 GZ 對應角；

θ_d=進水角；

θ_r=橫搖角；

θ_e=假定無風、無乘客集中一舷或回轉影響下的平衡角；

θ_h=傾側力臂 HL_2、HTL、HL_3 或 HL_4 引起的橫傾角；

$A_1 \geq 1.1$ 所要求的面積；

$A_2 \geq 0.028$m.rad。

附錄 8 單體船的穩性

1 完整狀態下的穩性衡準

1.1 完整穩性規則的 3.2 條氣象衡準應適用。應用氣象衡準時，風壓值 P（N/m^2）應取（$500\{Vw/26\}^2$），式中：V_w 為對應於最差預定條件下的風速，（m/s）。當應用氣象衡準時，應考慮橫搖衰減特性以評估假設橫搖角 θ_1，其可從船模或實船試驗中求出。具有大量增加阻尼特性的殼體，諸如：浸沒的舷側殼體、堅實的水翼列、或撓性裙板或氣墊密封，很容易經受較小幅度的橫搖角。因此，對於此類船舶，其橫搖角應從船模或實船試驗中求出或在無這類數據應取值為 15°。

1.2 復原力臂曲線（GZ 曲線）下至 θ 角的面積，當其最大復原力臂發生在 θ=15°時，則應不小於 0.07m.rad，當其最大復原力臂發生在 θ=30°或以上時，則應不小於 0.055m.rad。當最大復原力臂發生在 θ=15°和 θ=30°之間時，則對應於復原力臂曲線下的面積應為：

$A=0.055+0.001\ (30^\circ-\theta_{max})$（m.rad）

式中：θ_{max} 為復原力臂達到最大值之時的橫搖角。

1.3 在 θ=30°和 θ=40°之間或在 θ=30°和進水角 θ_F*，如該角小於 40°，之間，復原力臂曲線下的面積應不小於 0.03m.rad。

1.4 在橫傾角等於或大於 30°時，復原力臂（GZ）應至少為 0.2m。

1.5 最大復原力臂應發生在不小於 15°的橫傾角。

1.6 初穩性高度 GM_T 應不小於 0.15m。

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* 當應用此衡準時，通過其不會發生繼續進水的小開口無須被認為是開啟的。

2 破損後剩餘穩性衡準

2.1 船破損後以及平衡(如提供)後，最終狀態下要求的穩性應按 2.1.1 至 2.1.4 條的要求決定。

2.1.1 正剩餘復原力臂曲線應至少有一個超過平衡角 15°的範圍。如果復原力臂曲線為 2.1.2 所規定的，則該範圍可以減少至 10°按下列比率增加：15/範圍式中：範圍以°表示。

2.1.2 復原力臂曲線下的面積應至少為 0.015m.rad 量自下列較小的平衡角：

.1 在該角度進一步進水發生；和

.2 量自正浮 27°。

2.1.3 剩餘復原力臂應在正穩性範圍內獲取，計及下列最大橫傾力矩：

.1 集聚所有乘客於船舷一側；

.2 降落船舷一側的所有滿載吊艇式救生艇後；以及

.3 因風壓按下列公式進行計算：

$$GZ=\frac{\text{橫搖力矩}}{\text{排水量}}+0.04\ \ (m)$$

但無論何況，該復原力臂應不小於 0.1m。

2.1.4 為計算 2.1.3 的橫傾力矩，應進行下列估計：

.1 因乘客集聚產生的力矩。其應按本規則 2.10 條要求精心計算。

.2 因降落船舷一側的所有滿載吊艇式救生艇筏而產生的力矩；

.2.1 船舶在經受破損後向一舷傾斜，安裝在該舷的所有救生艇和救助艇應被假設成滿載轉出舷外且準備降落；

.2.2 對於佈置成從存放位置進行滿載降落的救生艇，則應考慮降落期間的最大橫傾力矩；

.2.3 船舶在經受破損後向一舷傾斜，附於在該舷每一吊艇架滿載吊艇架降落救生艇應被假設轉出舷外準備降落；

.2.4 不在轉出舷外的救生設備內的人員不提供附加橫傾或復原力矩；以及

.2.5 相對於船舶已傾側的另一舷上的救生設備應被假設在存放位置。

.3 由於風壓原因引起的力矩：

.3.1 風壓應取（$120\{V_w/26\}^2$）（N/m^2），式中：V_w 為風速，m/s，相應於最壞預期狀況；

.3.2 適用的面積為相應於完整狀態水線之上船舶的橫向投影面積，以及

.3.3 力矩臂應自對應於完整狀態的平均吃水一半的一點至該橫向面積重心的垂直距離。

2.2 在進水中間階段，最大復原力臂應至少為 0.05m，且正復原力臂的範圍應至少為 7°。在所有的情況下，只有一個船寬度和只有一個自由表面需要假設。

附錄 9 有關運行與安全性能的定義、要求和規定標準

本附錄適用所有類型的船舶。為評估運行的安全性，應對新設計的或設計中具有可能改變原先試驗結果的新穎特徵的船舶進行原型試驗。這種試驗應按主管機關和建造廠商間協商一致的計劃表進行。若營運條件認為附加試驗是必要的話（例如低溫），則主管機關或基地港所在國當局在適宜時，可要求作進一步驗證。有關了解和評估船舶性能的功能說明、技術和系統說明書應可供使用。

這些試驗的目的是要提供必需的資料和指南，使船舶在設計航速和環境條件範圍內、在正常和緊急情況下，均能安全地運行。

下列程序中提出了有關船舶性能驗證要求的要點。

1 性能

1.1 通則

1.1.1 船舶應在發證要求的所有最大限度的乘客和裝置配置情況下滿足本規則第 17 章和本附錄中適合操縱要求。有關不同操縱模式下的限制海況應通過發證所要求的試驗和對船舶類型的分析來驗證。

1.1.2 船舶的操縱控制應按照營運申請人制定的程序進行。所制定的程序應包括啟航程序、航行程序、正常和應急停船與操縱程序。

1.1.3 按 1.1.2 制定的程序應：

.1 證明船舶的正常運行和對故障的響應時其性能保持不變；

.2 使用安全可靠的方法或裝置；以及

.3 在執行營運中可以被預期的程序時，允許有任何時間滯後。

1.1.4 本附錄所要求的程序應能在足夠的水深範圍內實施，使船舶的性能不受影響。

1.1.5 試驗應在實際可行的最小重量情況下進行，而附加性試驗則應在最大重量情況下進行，該最大重量足以確定附加限制的需要，以及通過試驗來檢查重量的影響。

2 停船

2.1 本試驗是為了確定停船時所經受的加速度，此時船處於風平浪靜水域，船上無乘客載荷或貨物載荷，且應在下列情況下進行：

.1 在最大營運航速下正常停船；

.2 在最大營運航速下應急停船；以及

.3 從最大營運航速和從任何瞬態模式航速急速停船。

2.2 按 2.1.1 和 2.1.2 所述的試驗應提供資料證明：當按照船舶操作手冊中所制定的程序使用控制桿或在自動模式中時，加速度應不超過附錄 3 中的安全等級 1。若在正常停船過程中加速度超過安全等級 1，則應修正控制系統，以避免這種超過，或應要求乘客在停船過程中就坐。若在緊急停船過程中加速度超過安全等級 1，則在船舶操作手冊的文字程序中應包括如何避免這種超過的詳細資料，或應修正控制系統而避免這種超過。

2.3 按 2.1.3 所述的試驗應提供資料證明：當使用自動模式的控制桿而產生的最大加速度時，該加速度不應超過附錄 3 中的安全等級 2。若超出安全等級 2，則在船舶操作手冊中應包括一個警告：如果實施急速停船，將會造成乘客受傷。

2.4 為了確定在操縱中需要或不需要實施任何有關的速度限制，應在船舶回轉期間重複進行其他試驗。

3 航行性能

3.1 本試驗是為了確定船舶的性能和在航行模式期間和所經受的加速度，此時船上無乘客載荷或貨物載荷，且在下列情況下進行；

.1 正常航行情況：係指船舶在任何首航向情況下均能安全航行，不論手動操作、自動駕駛儀輔助操作或借助任何置於正常模式的自動控制系統操作；以及

.2 本規則 1.4.57 所述的預定最不利情況：係指不需要特殊的引航技巧，船舶應能維持安全航行。但是，在所有相對於風和海況的首航向情況下的操縱，可認為不可能。對於在非排水狀態下具有較高性能標準的船型，其性能和加速度也應在船舶處於預定最不利情況下，操縱時的排水模式下確定。

3.2 按 3.1 中所定義的操縱水平應通過實船試驗來確定和提供證明資料，這種試驗至少應在兩個有關海況和迎浪、橫浪和隨浪情況下進行。應顯示為獲取可靠的測量數據，每次試驗時間和系列數量是足夠的。每種試驗（運行）海況以一個方向航行的整個時間應不少於 15min。可以採用模型試驗和數學模擬，以驗證船舶在預定最不利情況下的性能。

應通過測量船速、首航向相對波浪方向，以及對按附錄 3 中 2.4 要求所得到的最大水平加速度測量值的插值，來提供對正常操作情況限制的證明資料。波高和波浪周期的測量值應取最大實用範圍。

應通過測量船速、波高和波浪周期、首航向相對波浪方向，以及通過對按附錄 3 中 2.4 要求得到的水平加速度和接近船舶重心縱向位置的垂向加速度取得均方根（RMS）值來提供對最不利情況作限制的證明資料。均方根值可用於外推峰值。為了獲得有關結構設計載荷和安全等級（第 5min 超出 1 次）所要求的峰值，可將均方根乘以 3.0 或

$$C=\sqrt{2\ln N}$$

式中：N 係有關周期內相繼振幅的數目。

如果不另外以模型試驗或數學計算進行驗證，則可以假定基於在兩種情況下測量值所得到的波高和加速度之間存在線性關係。對預定最不利情況的限制應寫入與附錄 3 中 2.4 要求的乘客安全和聯系船舶的實際結構設計載荷有關的文件。

3.3 試驗和驗證過程應提供對船舶的安全運行所限制的海況的證明資料：

.1 在處於最大營運航速的正常航行情況下，加速度不應超過附錄 3 中的安全等級 1，量計時取每 5min 一個平均值。船舶操作手冊中應包括：為防止超出而採取的減速或改變船舶相對波浪方向的首航向所產生影響的詳細說明；

.2 在預定最不利情況下，必要時採取減速。其加速度不應超過附錄 3 中的安全等級 2，量計時取每 5min 一個平均值。任何其他船舶的特徵運動，如縱搖、橫搖和首搖也不應超過可能有礙乘客安全的等級。在最不利的預定情況下，必要時採取減速，使船舶能安全操縱，並具有足夠的穩性，使船舶能夠持續安全航行到最近的避難地。如超出附錄 3 中的安全等級 1，則應要求乘客就坐；以及

.3 在船舶的實際結構設計載荷範圍內，必要時採取減速和改變航向。

3.4 回轉和可操縱性

船舶在下列狀態下均應能安全控制和操縱：

.1 排水狀態下營運；

.2 非排水狀態下營運；

.3 起飛、降落；

.4 任何中間或過渡狀態，如適用；以及

.5 錨泊操作，如適用。

4 故障或誤動作的影響

4.1 通則

應通過模擬可能的設備故障的實船試驗的結果檢驗和提出對安全營運的限制、特殊的操作程序和任何限制。

所檢驗的故障應為能導致主要的或較嚴重後果的故障，這種影響可由 FMEA 評估中或類似分析中確定。

所檢驗的故障應在船舶建造廠商和主管機關之間取得一致，並應對每一故障均應以漸進方式檢查。

4.2 試驗目的

對每一故障的檢查應導致：

.1 確定船舶在故障發生時運行的安全限制，如超出該安全限制將導致安全等級 1 降至安全等級 2 以下；

.2 確定船員的行動，如有任何需要的話，以抵消或將故障的影響降至最小；及

.3 確定船舶或機器需遵循的限制、以使船舶處於故障情況下能夠到達避難地。

4.3 需檢驗的故障

設備故障應包括下列項目，但不限於此：

.1 推進動力全部喪失；

.2 墊升動力全部喪失（對於氣墊船和水面效應船）；

.3 一套推進系統的控制全部失效；

.4 一套系統中全推進推力（正的或負的）的誤動作；

.5 一套方向控制系統的控制失效；

.6 一套方向控制系統的偶然完全偏差；

.7 縱傾控制系統的控制失效；

.8 一個縱傾控制系統元件的偶然完全偏差；以及

.9 供電全部喪失。

故障應能充分代表營運狀況，並且應儘可能準確模擬最惡劣的船舶操作情況，在此情況下故障將具有最大的影響。

4.4.“癱船”試驗

為了確定船舶運動和相對風和浪的方向，以決定撤離船舶的條件，應停船並關閉所有主機一段足夠長的時間，以使相對於風浪的船舶首航向穩定下來。這種試驗應在隨機的基礎上建立各種風和海況下所設計的“癱船”狀態。

附錄 10 乘客與船員座椅的試驗衡準與評估

1 目的與適用範圍

本衡準係對乘客和船座椅、座椅固定、座椅附件及其安裝作出規定，旨在使船遭到碰撞時所引起的乘員受傷和/或出入通道受堵降至最低。

2 座椅靜力試驗

2.1 本節的要求適用於所有船員和乘客座椅。

2.2 本節適用於所有座椅、連同座椅支座，及其與甲板的連接應設計成至少能承受船上下列各方向的靜力作用：

.1 向前：2.25kN；

.2 向後：1.5kN；

.3 橫向：1.5kN；

.4 垂直向下：2.25kN；

.5 垂直向上：1.5kN。

座椅應由座墊框架、座椅墊和椅背組成，作用於座椅上向前的或向後的力應水平地作用於座墊以上 350mm 處的椅背上。作用於座椅上橫向的力應水平地作用於座椅墊處。垂直向上的力應均勻分佈在座墊框架的角上。垂直向下的力則應均勻分佈在座墊上。

若一套座椅有幾個座位組成，則這些力在試驗時應均勻地作用於每個座位上。

2.3 當力作用到 1 隻座椅上時，應考慮到船上座椅的朝向。例如，座椅朝向側邊，則船上橫向力應作用於座椅的前後；船上向前的力應作用於座椅的橫向。

2.4 用於試驗的每一套座椅，應使用類似於在船上將其固定在甲板結構上的方式固定在支承結構上，雖然某一剛性支承結構可用於這些試驗，但最好是用具有與船上支承結構一樣強度和扶強形式的支承結構。

2.5 按 2.2.1 至 2.2.3 中所述的力應通過一半徑為 80mm，寬度至少等於座椅寬的圓柱表面作用於座椅，該表面應至少配有一個力傳感器，以測出作用的力。

2.6 下列座椅應認為是可以接受的，如果：

.1 在受到 2.2.1 至 2.2.3 中的力作用下，在力作用點測得的永久性位移不超過 400mm；

.2 試驗期間，座椅的任何部件、座椅底座或其他附件均未完全脫落；

.3 當一個或多個固定件部分鬆動時，座椅仍能繫固；

.4 在整個試驗期間，所有的鎖緊系統應保持鎖緊（試驗後，調整和操作鎖緊系統不必保持其原有的功能）；且

.5 座椅上乘員可能觸及的硬質部件，應做成半徑至少為 5mm 的曲面。

2.7 若試驗時的加速度至少等於 3g 時，可用第 3 節的要求來代替本節的要求。

3 座椅動力試驗

3.1 除上述 2.1 的規定外，本節的要求還適用於船舶設計碰撞載荷大於、等於 3g 的船員和乘客座椅。

3.2 本節適用的所有座椅、座椅支承結構、座椅與甲板結構的連接、安全帶或肩帶（如有時）等均應設計成能承受在設計碰撞時作用於其上的最大加速度力。應考慮到該座椅相對於該加速度力方向（即，座椅朝向船艏、船艉還是朝向舷側）。

3.3 作用於座椅上的加速度衝量，應能代表船舶碰撞與時間的關係，如果不知道該碰撞與時間的關係或不能模擬；則可使用圖中加速度與時間的包絡線。

3.4 在試驗框架中，每一座椅及其部件（如安全帶和肩帶）都應固定在支承結構上，其固定方式應與其固定在船上的方式相似。該支承結構可以是某一剛性表面，但最好是具有與船上支承結構相同強度和扶強形式的支承結構。在船舶碰撞時，凡該座椅就坐者，有可能碰及的其他座椅和/或桌子亦應包括在試驗框架內，並按其在船上的實際位置，以及典型的固定方式安裝。

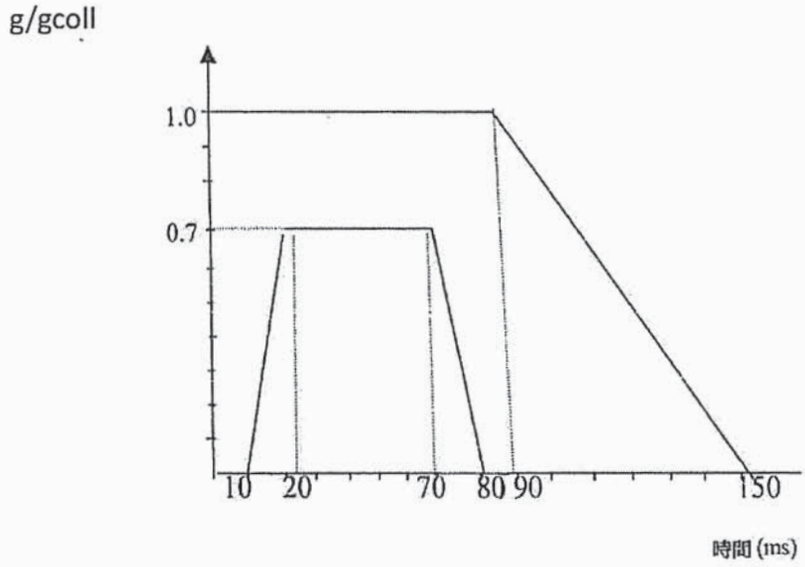


圖 加速度與時間關係的包絡線

3.5 座椅動力試驗時，一個 50%仿真試驗假人（適合於所進行的該項試驗）應以正常坐姿，置於該座椅上。如果一個典型的座椅由幾個座位組成，則每個座位均應放置假人。應按照公認的國家標準的程序將假人繫牢在座椅上，如設有安全帶和肩帶，則應僅用安全帶和肩帶將假人繫牢。餐桌及類似裝置應設置在最容易對人員造成潛在傷害的位置。

3.6 試驗的假人按照公認的國家標準的要求安裝儀器和標定，以便至少計算頭部損傷指數和胸部損傷指數，並測量大腿骨的受力，如可能還應測量頸部的伸長和彎曲。

3.7 如果試驗中需用不止一個假人，則設備在乘客最有可能受到傷害的座椅處的假人應安裝一套儀器，其他假人不必安裝儀器。

3.8 應按公認的國家標準的規定進行試驗，並對測試儀器進行校準，表明該儀器能足夠可靠地反映出假人的反應。

3.9 在下列情況下，按本節要求進行試驗的座椅可認為是滿意的：

.1 座椅和安裝在座椅上或附近的桌面並未與支承它們的甲板結構脫開，也未產生那種可能夾住乘客或使乘客受傷的變形；

.2 如設有安全帶在碰撞過程中，安全帶應牢固且繫緊在假人骨盆處，如設有肩帶則在碰撞過程中，肩帶應牢固且繫緊在假人肩膀附近。碰撞後，任何設備的安全帶和肩帶的鬆開機械裝置仍應能操作；

.3 應滿足下列可接受衡準：

.3.1 按下式算得的頭部受傷指數（HIC）應不超過 500：

$$HIC=(t_2-t_1)\left[\frac{1}{t_2-t_1}\int_{t_1}^{t_2}a(t)dt\right]^{2.5}$$

式中： t_1t_2 分別為當 HIC 達到最大值的那段時間的開始和結束時間（s），a（t）是假人頭部加速度測定的結果，用 g 來表示。

.3.2 按下式算得的胸部損傷指數（TTI）應不超過 30g（碰撞時間小於 3ms 者除外）：

$$TTI=\frac{g_R+g_{LS}}{2}\text{或重心處的加速度}$$

式中：g_R=上肋骨或下肋骨處的加速度，g；

g_{LS}=人體下脊柱的加速度，g。

.3.3 大腿骨處的力不超過 10kN，如碰撞時間大於 20ms，則大腿骨處的力不能超過 8kN。

.4 軀幹安全帶上的載荷不超過 7.8kN，如果是雙帶，則總載荷不超過 8.9kN。

附錄 11 開敞式兩面可用救生筏

1 通則

1.1 所有開敞式兩面可用救生筏：

.1 應用良好的工藝和適當的材料製造；

.2 應在-18℃至+65℃的室溫範圍內存放而不致損壞；

.3 應能在-18℃至+65℃的氣溫範圍，以及在-1℃至+30℃的海水溫度範圍內使用；

.4 應能防腐爛、耐腐蝕，並不受海水、原油或霉菌侵襲的過度影響；

.5 充氣及全部受載後應保持其形狀不變；以及

.6 應裝貼反光材料，以便被發覺；反光材料應符合本組織通過的建議案標準。

2 構造

2.1 開敞式兩面可用救生筏的構造應是：從 10m 高度將其容器投落水後，救生筏及其屬具應符合使用要求。如開敞式兩面可用救生筏準備存放在超過最輕載重海水線以上的 10m 高度處、則應曾在從這個高度處做過滿意的投落試驗。

2.2 漂浮的開敞式兩面可用救生筏應能經受從至少 4.5m 高度處反複蹬跳。

2.3 開敞式兩面可用救生筏及其艙裝件的構造，應使救生筏在載足全部乘員及屬具並拋下 1 隻錨後，在靜水中能以 3kn 航速被拖帶。

2.4 全部充氣後的開敞式兩面可用救生筏，不論哪一面朝上，應能從水中登上救生筏。

2.5 主浮力艙應分成：

.1 不少於兩個獨立艙，每個艙通過止回充氣閥充氣；以及

.2 浮力艙的佈置應是在任一艙萬一損壞或充氣失效時，完整的這個艙應能支持該筏額定乘員，且開敞式兩面可用救生筏的整個周圍均應具有正的乾舷。每個乘員的重量以 75kg 計，且都坐在規定的座位上。

2.6 開敞式兩面可用救生筏筏底應為水密。

2.7 開敞式兩面可用救生筏應用無毒氣體充氣，充氣系統應符合國際救生設備規則 4.2.2 段的要求。環境溫度為 18℃至 20℃時，應在一分鐘內充足氣；環境溫度為-18℃時，應在 3min 內完全充足氣，充氣後，救生筏在載滿全部乘員和屬具的情況下，應保持其形狀不變。

2.8 每個充氣隔艙應能經受至少等於 3 倍工作壓力的超壓，並應不論使用安全閥或限制供氣方法，均能防止其壓力超過 2 倍工作壓力。並應提供用來安裝充氣泵或皮老虎的設施。

2.9 浮胎的表面應為防滑材料，至少有 25%的浮胎應是很容易識別的顏色。

2.10 開敞式兩面可用救生筏的乘員定額，應等於下列較小者；

.1 充氣後其主浮胎的容量（就此而言，不包括橫座板，如設有）以 m^3 計時，除以 0.096 後所得的最大整數；或

.2 開敞式兩面可用救生筏測量浮胎的最內邊的內水平橫剖面面積（可包括一個或多個橫座板在內，如設有）以 m^2 計時，除 0.372 所得的最大整數；或

.3 可坐在浮胎內，全部穿着救生衣且不妨礙任何救生筏屬具操作人員，每人的平均重量為 75kg 。

3 開敞式兩面可用救生筏屬具

3.1 救生繩應繫固在開敞式兩面可用救生筏的內外四周。

3.2 開敞式兩面可用救生筏應配備有適合於在水面自動充氣的、足夠長度的有效首纜。對容納超過 30 名乘員的開敞式兩面可用救生筏，應配附加拉索。

3.3 首纜系統，包括其繫連於開敞式兩面可用救生筏上設施的破斷負荷按國際救生設備規則 4.1.6.2 條要求的薄弱環除外，應該是：

.1 對 8 名乘員以下的開敞式兩面可用救生筏，為 7.5kN；

.2 對 9 到 30 名乘員的開敞式兩面可用救生筏，為 10.0kN；及

.3 對超過 30 名乘員的開敞式兩面可用救生筏，為 15.0kN；

3.4 開敞式兩面可用救生筏應至少配有下列數量的充氣登筏踏板，以助於不論救生筏充氣後哪一面朝上都能從水中登筏：

.1 對 30 名乘員以下的開敞式兩面可用救生筏，1 塊登筏踏板；或

.2 對超過 30 名乘員的開敞式兩面可用救生筏，設 2 塊相距 180° 的登筏踏板。

3.5 開敞式兩面可用救生筏應配備符合下列要求的水袋：

.1 水袋的橫剖面積呈等腰三角形，其三角形底邊附連於救生筏的下面；

.2 水袋應設計成在佈放的 15s 到 25s 內能充到大約 60%的容量；

.3 通常對乘員在 10 名及 10 名以下的開敞式兩面可用救生筏，其水袋的總容量在 125*l* 和 150*l* 之間；

.4 對額定乘員超過 10 名的開敞式兩面可用救生筏，其水袋的總容量應儘可能有 12 N litres。其中：N 為筏的乘員數。

.5 每一水袋在浮胎上應這樣附連，即當水袋在佈放位置時，應沿下浮胎最低下部分的上邊緣或接近最低下部分全長分佈；以及

.6 水袋應在救生筏的四周對稱分佈，且每一水袋之間應有足夠間隔，以能讓空氣容易泄出。

3.6 在浮胎的上下表面應至少裝有 1 盞符合要求的人工控制燈。

3.7 開敞式兩面可用救生筏筏底的每一面，應按下列方式設有適當的自動排水裝置：

.1 對容納 30 名及 30 名以下乘員的救生筏配 1 個排水裝置；

.2 對容納 30 名以上乘員的救生筏，配 2 個排水裝置。

3.8 每具開敞式兩面可用救生筏的屬具應包括：

.1 繫有不短於 30m 長浮索的可浮救生圈 1 個，浮索的破斷負荷至少為 1.0kN；

.2 2 把具有浮柄的非折疊型安全刀，用 1 根細繩繫固在救生筏上，且應存放在護套內。並且不管開敞式兩面可用救生筏用什麼方式充氣，至少能在上浮胎頂部一個適當位置處，容易得到 1 把安全刀，以便割斷首纜；

.3 1 隻浮瓢；

.4 2 塊海綿；

.5 1 隻海錨，在救生筏上的固定方式，應能在救生筏充氣時容易佈放。海氏的位置應在 2 隻浮胎上明顯地加以標誌；

.6 2 把可浮手劃槳；

.7 1 套急救藥包，置於使用後可以緊蓋的防水箱內；

.8 1 隻哨笛或等效的音響號具；

.9 2 支手持火焰信號；

.10 1 支適於摩爾氏通信的防水手電筒，連同備用電池一副，備用燈泡 1 隻，裝在同一防水容器內；

.11 1 套修理工具，用來修理浮胎內的破裂；以及

.12 1 隻充氣泵或數隻皮老虎。

3.9 按 3.8 配備的救生筏屬具應以印刷體大寫字母標誌，如“HSC Pack”。

3.10 如適合，屬具應存放在容器內，如容器不是救生筏的整體部分或固定在救生筏上的話，則容器應存放並繫固在救生筏內，並能在水面漂浮至少 30min，而不致損壞其內存的屬具。不論屬具容器是救生筏整體部分，還是固定在救生筏上，其屬具應在不論救生筏哪一面朝上

的情況下，都能很容易地被接近。繫固屬具、容器的纜繩的破斷負荷應為 2kN 或所繫固的整套屬具質量的 3 倍，取較大者。

4 開敞式兩面可用氣脹式救生筏的容器

4.1 開敞式兩面可用救生筏應裝在容器內，該容器：

.1 其結構應能承受海上所遇到的各種狀況；

.2 具有充裕的自然浮力。當其裝有的救生筏及屬具時，如船沉沒後，應能從內部位首纜，並拉動充氣裝置；以及

.3 應儘可能地水密。但容器底部的泄水孔除外。

4.2 容器上應標明：

.1 製造廠名或商標；

.2 出廠編號；

.3 額定乘員數；

.4 非 SOLAS 公約兩面可用型；

.5 內裝應急袋的型號；

.6 最近一次檢修日期；

.7 首纜長度；

.8 水線以上最大許可存放高度（取決於拋落試驗高度）；以及

.9 降落須知。

5 開敞式兩面可用氣脹式救生筏上的標誌

開敞式兩面可用救生筏應標明：

.1 製造廠或商標；

.2 出廠編號；

.3 製造日期（ 年 月）；

.4 最近一次檢修站名稱和地點；以及

.5 每一浮胎頂上允許容納的乘員數，字高不小於 100mm，其顏色同浮胎的顏色形成明顯的對比。

6 說明書與資料

所要求的說明書和資料的書寫形式應採用適合於包括在高速船上所採用救生設備培訓手冊和維修說明書的格式。說明書和資料應該用簡明扼要的形式書寫，且應包括下列合適的項目：

.1 開敞式兩面可用救生筏及屬具的一般說明；

.2 安裝佈置；

.3 操作須知，包括有關拯救設備的使用；以及

.4 檢修要求。

7 開敞式兩面可用救生筏的試驗

當按照 MSC.81（70）決議的建議案的部分 1 的要求進行試驗開敞式兩面可用救生筏時：

.1 試驗項目 5.5、5.12、5.16、5.17.2、5.17.10、5.17.11、5.17.12、5.18 和 5.20 可以省略；

.2 試驗項目 5.8 有關關閉裝置的部分可以省略；

.3 第 5.17.3 和 5.17.5 項試驗中的溫度-30°可代之以-18°；以及

.4 試驗項目 5.1.2 中投落高度 18m 可以用 10m 來替代。

上述省略和替代必須在形式認可證書中反映出來。

RESOLUTION MSC.97(73)

(adopted on 5 December 2000)

ADOPTION OF THE INTERNATIONAL CODE OF SAFETY FOR HIGH-SPEED CRAFT, 2000 (2000 HSC CODE)

THE MARITIME SAFETY COMMITTEE,

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

NOTING the International Code for the Safety of High-Speed Craft (1994 HSC Code) and chapter X of the International Convention for the Safety of Life at Sea (SOLAS), 1974 (hereinafter referred to as "the Convention"), which made the 1994 HSC Code mandatory under the Convention,

RECOGNIZING that development of novel types and sizes of high-speed craft and improvements of maritime safety standards since the adoption of the 1994 HSC Code necessitate the revision of the provisions for the design, construction, equipment and operation of high-speed craft in order to maintain the highest practical level of safety,

NOTING ALSO resolution MSC.99(73) by which it adopted amendments to chapter X of the Convention to make the provisions of the International Code for the Safety of High-Speed Craft, 2000 (2000 HSC Code) mandatory under the Convention for high-speed craft constructed on or after 1 July 2002,

HAVING CONSIDERED, at its seventy-third session, the text of the draft 2000 HSC Code which has been developed following a thorough revision of the 1994 HSC Code,

1. ADOPTS the International Code of Safety for High-Speed Craft, 2000 (2000 HSC Code), the text of which is set out in the Annex to the present resolution;

2. INVITES Contracting Governments to the Convention to note that the 2000 HSC Code will take effect on 1 July 2002 upon entry into force of the amendments to chapter X of the Convention;

3. REQUESTS the Secretary-General to transmit certified copies of the present resolution and the text of the 2000 HSC Code contained in the Annex to all Contracting Governments to the Convention;

4. FURTHER REQUESTS the Secretary-General to transmit copies of this resolution and the Annex to all Members of the Organization which are not Contracting Governments to the Convention.

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INTERNATIONAL CODE OF SAFETY FOR HIGH-SPEED CRAFT, 2000

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INTERNATIONAL CODE OF SAFETY FOR HIGH-SPEED CRAFT, 2000

Preamble

1 The international conventions ratified in respect of conventional ships and the regulations applied as a consequence of such conventions have largely been developed having in mind the manner in which conventional ships are constructed and operated. Traditionally, ships have been built of steel and with the minimum of operational controls. The requirements for ships engaged on long international voyages are therefore framed in such a way that, providing the ship is presented for survey and a Ship Safety Certificate is issued, the ship may go anywhere in the world without any operational restrictions being imposed. Providing the ship is not involved in a casualty, all that is needed is that it is made available to the Administration for the purpose of a satisfactory resurvey before the Ship Safety Certificate expires and the Certificate will be reissued.

2 The traditional method of regulating ships should not be accepted as being the only possible way of providing an appropriate level of safety. Nor should it be assumed that another approach, using different criteria, could not be applied. Over a long period of time, numerous new designs of marine vehicles have been developed and have been in service. While these do not fully comply with the provisions of the international conventions relating to conventional ships built of steel, they have demonstrated an ability to operate at an equivalent level of safety when engaged on restricted voyages under restricted operational weather conditions and with approved maintenance and supervision schedules.

3 The High-Speed Craft Code 1994 (1994 HSC Code) was derived from the previous Code of Safety for Dynamically Supported Craft (DSC Code) adopted by IMO in 1977, recognizing that safety levels can be significantly enhanced by the infrastructure associated with regular service on a particular route, whereas the conventional ship safety philosophy relies on the ship being self-sustaining with all necessary emergency equipment being carried on board.

4 The safety philosophy of this Code is based on the management and reduction of risk as well as the traditional philosophy of passive protection in the event of an accident. Management of risk through accommodation arrangement, active safety systems, restricted operation, quality management and human factors engineering should be considered in evaluating safety equivalent to current conventions. Application of mathematical analysis should be encouraged to assess risk and determine the validity of safety measures.

5 This Code takes into account that a high-speed craft is of a light displacement compared with a conventional ship. This displacement aspect is the essential parameter to obtain fast and competitive sea transportation and consequently this Code allows for use of non-conventional shipbuilding materials, provided that a safety standard at least equivalent to conventional ships is achieved.

6 To clearly distinguish such craft, criteria based on speed and volumetric Froude number have been used to delineate those craft to which this Code applies from other, more conventional, craft.

7 The Code requirements also reflect the additional hazards which may be caused by the high speed compared with conventional ship transportation. Thus, in addition to the normal requirements (including life-saving appliances, evacuation facilities, etc.) provided in case of an accident occurring, further emphasis is placed on reducing the risk of hazardous situations arising. Some advantages result from the high-speed craft concept, i.e. the light displacement provides a large reserve buoyancy in relation to displacement, reducing the hazards addressed by the International Convention on Load Lines, 1966. The consequences of other hazards, such as of collision at high speed, are balanced by more stringent navigational and operational requirements and specially developed accommodation provisions.

8 The above-mentioned safety concepts were originally reflected in the DSC Code and in the 1994 HSC Code. The development of novel types and sizes of craft has led to the development of pressures within the maritime industry for craft which are not dynamically supported cargo craft or passenger craft carrying larger numbers of passenger or operating further afield than permitted by that Code to be certified according to those concepts. Additionally, improvements of maritime safety standards since 1994 were required to be reflected in the revisions of the 1994 HSC Code to maintain safety equivalence with conventional ships.

9 Accordingly, two differing principles of protection and rescue were embodied in the 1994 HSC Code.

10 The first of these recognizes the craft which were originally foreseen at the time of development of the DSC Code. Where rescue assistance is readily available and the total number of passengers is limited, a reduction in passive and active protection may be permitted. Such craft are called "assisted craft" and form the basis for "category A passenger craft" of this Code.

11 The second concept recognizes the further development of high-speed craft into larger craft. Where rescue assistance is not readily available or the number of passengers is unlimited, additional passive and active safety precautions are required. These additional requirements provide for an area of safe refuge on board, redundancy of vital systems, increased watertight and structural integrity and full fire-extinguishing capability. Such craft are called "unassisted craft" and form the basis for "cargo craft" and "category B passenger craft" of this Code.

12 These two concepts have been developed as a unified document on the basis that an equivalent level of safety to that normally expected on ships complying with the International Convention for the Safety of Life at Sea, 1974, is achieved. Where the application of new technology or design indicates an equivalent safety level to the strict application of this Code, the Administration is permitted to formally recognize such equivalence.

13 It is important that an Administration, in considering the suitability of a high-speed craft under this Code, should apply all sections of the Code because non-compliance with any part of the Code could result in an imbalance which would adversely affect the safety of the craft, passengers and crew. For a similar reason, modifications to existing craft, which may have an effect on safety, should be approved by the Administration.

14 In developing this Code, it has been considered desirable to ensure that high-speed craft do not impose unreasonable demands on existing users of the environment or conversely suffer unnecessarily through lack of reasonable accommodation by existing users. Whatever burden of compatibility there is, it should not necessarily be laid wholly on the high-speed craft.

15 Paragraph 1.15.1 of the 1994 HSC Code states that it should be reviewed by the Organization at intervals preferably not exceeding 4 years to consider revision of existing requirements to take account of new developments in design and technology. Experience gained with the application of the 1994 HSC Code since it entered into force in 1996 has led to the recognition that it needed to be revised and updated. Subsequent work in the Organization has resulted in the development of the present Code to ensure that safety is not compromised as a result of continuous introduction of state-of-the-art technology and innovative developments into the new and generally much larger and faster high-speed craft.

CHAPTER 1

GENERAL COMMENTS AND REQUIREMENTS

1.1 General comments

This Code shall be applied as a complete set of comprehensive requirements. It contains requirements for the design and construction of high-speed craft engaged on international voyages, the equipment which shall be provided and the conditions for their operation and maintenance. The basic aim of the Code is to set levels of safety which are equivalent to those of conventional ships required by the International Convention for the Safety of Life at Sea, 1974, as amended, (SOLAS Convention) and the International Convention on Load Lines, 1966, (Load Line Convention) by the application of constructional and equipment standards in conjunction with strict operational controls.

1.2 General requirements

The application of the provisions of this Code is subject to the following general requirements that:

.1 the Code will be applied in its entirety;

.2 the management of the company operating the craft exercises strict control over its operation and maintenance by a quality-management system;

.3 the management ensures that only persons qualified to operate the specific type of craft used on the intended route are employed;

.4 the distances covered and the worst intended conditions in which high-speed craft operations are permitted will be restricted by the imposition of operational limits;

.5 the craft will at all times be in reasonable proximity to a place of refuge, having due regard to the provisions of 1.3.4;

.6 adequate communications facilities, weather forecasts and maintenance facilities are available within the area of craft operation;

.7 in the intended area of operation suitable rescue facilities will be readily available;

.8 areas of high fire risk, such as machinery spaces and special category spaces, are protected with fire-resistant materials and fire-extinguishing systems to ensure, as far as is practicable, containment and rapid extinguishing of fire;

.9 efficient facilities are provided for the rapid and safe evacuation of all persons into survival craft;

.10 all passengers and crew are provided with seats; and

.11 no enclosed sleeping berths for passengers are provided.

1.3 Application

1.3.1 This Code applies to high-speed craft as specified in 1.3.4 engaged in international voyages the keels of which are laid or which are at a similar stage of construction on or after 1 July 2002.

1.3.2 For the purpose of this Code, the term "a similar stage of construction" means the stage at which:

.1 construction identifiable with a specific craft begins; and

.2 assembly of that craft has commenced comprising at least 50 tonnes or three per cent of the estimated mass of all material used in the structure, including superstructure and deckhouse, whichever is less.

1.3.3 For the purpose of this Code :

.1 the expression "craft constructed" means craft the keels of which are laid or which are at a similar stage of construction; and

.2 a cargo craft, whenever built, which is converted to a passenger craft shall be treated as a passenger craft constructed on the date on which such a conversion commences.

1.3.4 This Code applies to:

.1 passenger craft which do not proceed in the course of their voyage more than four hours at operational speed from a place of refuge; and

.2 cargo craft of 500 gross tonnage and upwards which do not proceed in the course of their voyage more than 8 h at operational speed from a place of refuge when fully laden.

1.3.5 This Code, unless expressly provided otherwise, does not apply to:

.1 craft of war and troopcraft;

.2 craft not propelled by mechanical means;

.3 wooden craft of primitive build;

.4 pleasure craft not engaged in trade; and

.5 fishing craft.

1.3.6 This Code does not apply to craft solely navigating the Great Lakes of North America and the River St. Lawrence as far east as a straight line drawn from Cap des Rosiers to West Point, Anticosti Island and, on the north side of Anticosti Island, the 63rd meridian.

1.3.7 The application of this Code shall be verified by the Administration and be acceptable to the Governments of the States to which the craft will be operating.

1.4 Definitions

For the purpose of this Code, unless expressly provided otherwise, the terms used therein have the meanings defined in the following paragraphs. Additional definitions are given in the general parts of the various chapters.

1.4.1 "Administration" means the Government of the State whose flag the craft is entitled to fly.

1.4.2 "Air-cushion vehicle (ACV)" is a craft such that the whole or a significant part of its weight can be supported, whether at rest or in motion, by a continuously generated cushion of air dependent for its effectiveness on the proximity of the surface over which the craft operates.

1.4.3 "Anniversary date" means the day and the month of each year which will correspond to the date of expiry of the relevant certificate.

1.4.4 "Assembly station" is an area where passengers can be gathered in the event of an emergency, given instructions and prepared to abandon the craft, if necessary. The passenger spaces may serve as assembly stations if all passengers can be instructed there and prepared to abandon the craft.

1.4.5 "Auxiliary machinery spaces" are spaces containing internal combustion engines of a power output up to and including 110 kW, driving generators, sprinkler, drencher or fire pumps, bilge pumps, etc., oil filling stations, switchboards of aggregate capacity exceeding 800 kW, similar spaces and trunks to such spaces.

1.4.6 "Auxiliary machinery spaces having little or no fire risk" are spaces such as refrigerating, stabilizing, ventilation and air conditioning machinery, switchboards of aggregate capacity 800 kW or less, similar spaces and trunks to such spaces.

1.4.7 "Base port" is a specific port identified in the route operational manual and provided with:

.1 appropriate facilities providing continuous radio communications with the craft at all times while in ports and at sea;

.2 means for obtaining a reliable weather forecast for the corresponding region and its due transmission to all craft in operation;

.3 for a category A craft, access to facilities provided with appropriate rescue and survival equipment; and

.4 access to craft maintenance services with appropriate equipment.

1.4.8 "Base port State" means the State in which the base port is located.

1.4.9 "Breadth (B)" means breath of the broadest part of the moulded watertight envelope of the rigid hull, excluding appendages, at or below the design waterline in the displacement mode with no lift or propulsion machinery active.

1.4.10 "Cargo craft" is any high-speed craft other than a passenger craft, and which is capable of maintaining the main functions and safety systems of unaffected spaces after damage in any one compartment on board.

1.4.11 "Cargo spaces" are all spaces other than special category spaces and ro-ro spaces used for cargo and trunks to such spaces. For the purposes of chapter 7, part D, "cargo spaces" include ro-ro spaces, special category spaces and open deck spaces.

1.4.12 "Category A craft" is any high-speed passenger craft:

.1 operating on a route where it has been demonstrated to the satisfaction of the flag and port States that there is a high probability that in the event of an evacuation at any point of the route all passengers and crew can be rescued safely within the least of:

- the time to prevent persons in survival craft from exposure causing hypothermia in the worst intended conditions,

- the time appropriate with respect to environmental conditions and geographical features of the route, or

- 4 hours; and

.2 carrying not more than 450 passengers.

1.4.13 "Category B craft" is any high-speed passenger craft other than a category A craft, with machinery and safety systems arranged such that, in the event of any essential machinery and safety systems in any one compartment being disabled, the craft retains the capability to navigate safely. The damage scenarios considered in chapter 2 should not be inferred in this respect.

1.4.14 "Company" means the company as defined in chapter IX of the Convention.

1.4.15 "Continuously manned control station" is a control station which is continuously manned by a responsible member of the crew while the craft is in normal service.

1.4.16 "Control stations" are those spaces in which the craft's radio or navigating equipment or the emergency source of power and emergency switchboard are located, or where the fire recording or fire control equipment is centralized, or where other functions essential to the safe operation of the craft such as propulsion control, public address, stabilization systems, etc., are located.

1.4.17 "Convention" means the International Convention for the Safety of Life at Sea, 1974, as amended.

1.4.18 "Crew accommodation" are those spaces allocated for the use of the crew, and include cabins, sick bays, offices, lavatories, lounges and similar spaces.

1.4.19 "Critical design conditions" means the limiting specified conditions, chosen for design purposes, which the craft shall keep in displacement mode. Such conditions shall be more severe than the "worst intended conditions" by a suitable margin to provide for adequate safety in the survival condition.

1.4.20 "Datum" means a watertight deck or equivalent structure of a non-watertight deck covered by a weathertight structure of adequate strength to maintain the weathertight integrity and fitted with weathertight closing appliances.

1.4.21 "Design waterline" means the waterline corresponding to the maximum operational weight of the craft with no lift or propulsion machinery active and is limited by the requirements of chapters 2 and 3.

1.4.22 "Displacement mode" means the regime, whether at rest or in motion, where the weight of the craft is fully or predominantly supported by hydrostatic forces.

1.4.23 "Failure Mode and Effect Analysis (FMEA)" is an examination, in accordance with annex 4, of the craft's system and equipment to determine whether any reasonably probable failure or improper operation can result in a hazardous or catastrophic effect.

1.4.24 "Fire Test Procedures Code (FTP Code)" means the International Code for Application of Fire Test Procedures, as defined in chapter II-2 of the Convention.

1.4.25 "Flap" means an element formed as integrated part of, or an extension of, a foil, used to adjust the hydrodynamic or aerodynamic lift of the foil.

1.4.26 "Flashpoint" means a flashpoint determined by a test using the closed-cup apparatus referenced in the International Maritime Dangerous Goods (IMDG) Code.

1.4.27 "Foil" means a profiled plate or three dimensional construction at which hydrodynamic lift is generated when the craft is under way.

1.4.28 "Fully submerged foil" means a foil having no lift components piercing the surface of the water in the foil-borne mode.

1.4.29 "Galleys" are those enclosed spaces containing cooking facilities with exposed heating surfaces, or which have any cooking or heating appliances each having a power of more than 5 kW.

1.4.30 "High-speed craft" is a craft capable of maximum speed, in metres per second (m/s), equal to or exceeding:

$$3.7\ \nabla^{0.1667}$$

where:

∇ = volume of displacement corresponding to the design waterline (m^3)

excluding craft the hull of which is supported completely clear above the water surface in non-displacement mode by aerodynamic forces generated by ground effect.

1.4.31 "Hydrofoil craft" is a craft the hull of which is supported completely clear above the water surface in non-displacement mode by hydrodynamic forces generated on foils.

1.4.32 "Length (L)" means the overall length of the underwater watertight envelope of the rigid hull, excluding appendages, at or below the design waterline in the displacement mode with no lift or propulsion machinery active.

1.4.33 "Lightweight" is the displacement of the craft in tonnes without cargo, fuel, lubricating oil, ballast water, fresh water and feedwater in tanks, consumable stores, passengers and crew and their effects.

1.4.34 "Life-Saving Appliances Code (LSA Code)" means the International Life-Saving Appliance Code as defined in chapter III of the Convention.

1.4.35 "Machinery spaces" are spaces containing internal combustion engines with an aggregate total power output of more than 110 kW, generators, oil fuel units, propulsion machinery, major electrical machinery and similar spaces and trunks to such spaces.

1.4.36 "Maximum operational weight" means the overall weight up to which operation in the intended mode is permitted by the Administration.

1.4.37 "Maximum speed" is the speed achieved at the maximum continuous propulsion power for which the craft is certified at maximum operational weight and in smooth water.

1.4.38 "Non-displacement mode" means the normal operational regime of a craft when non-hydrostatic forces substantially or predominantly support the weight of the craft.

1.4.39 "Oil fuel unit" includes any equipment for the preparation of oil fuel and delivery of oil fuel, heated or not, to boilers and engines (including gas turbines) at a pressure of more than 0.18 N/mm^2.

1.4.40 "Open ro-ro spaces" are those ro-ro spaces:

.1 to which any passengers carried have access; and

.2 which either:

.2.1 are open at both ends; or

.2.2 have an opening at one end and are provided with permanent openings distributed in the side plating or deckhead or from above, having a total area of at least 10% of the total area of the space sides.

1.4.41 "Operating limitations" means the craft limitations in respect of handling, controllability and performance and the craft operational procedures within which the craft is to operate.

1.4.42 "Operating compartment" means the enclosed area from which the navigation and control of the craft is exercised.

1.4.43 "Operating station" means a confined area of the operating compartment equipped with necessary means for navigation, manoeuvring and communication, and from where the functions of navigating, manoeuvring, communication, commanding, conning and lookout are carried out.

1.4.44 "Operational speed" is 90% of maximum speed.

1.4.45 "Organization" means the International Maritime Organization.

1.4.46 "Passenger" is every person other than:

.1 the master and members of the crew or other persons employed or engaged in any capacity on board a craft on the business of that craft; and

.2 a child under one year of age.

1.4.47 "Passenger craft" is a craft which carries more than twelve passengers.

1.4.48 "Place of refuge" is any naturally or artificially sheltered area which may be used as a shelter by a craft under conditions likely to endanger its safety.

1.4.49 "Public spaces" are those spaces allocated for the passengers and include bars, refreshment kiosks, smoke rooms, main seating areas, lounges, dining rooms, recreation rooms, lobbies, lavatories and similar spaces, and may include sales shops.

1.4.50 "Refreshment kiosks" are those spaces which are not enclosed, serving refreshments and containing food warming equipment having a total power of 5 kW or less and with an exposed heating surface temperature not above 150°C.

1.4.51 "Ro-ro craft" is a craft fitted with one or more ro-ro spaces.

1.4.52 "Ro-ro spaces" are spaces not normally subdivided in any way and normally extending to either a substantial length or the entire length of the craft in which motor vehicles with fuel in their tanks for their own propulsion and/or goods (packaged or in bulk, in or on rail or road cars, vehicles (including road or rail tankers), trailers, containers, pallets, demountable tanks or in or on similar stowage units or other receptacles) can be loaded and unloaded, normally in a horizontal direction.

1.4.53 "Service spaces" are those enclosed spaces used for pantries containing food warming equipment but no cooking facilities with exposed heating surfaces, lockers, sales shops, store-rooms and enclosed baggage rooms.

1.4.54 "Significant wave height" is the average height of the one third highest observed wave heights over a given period.

1.4.55 "Special category spaces" are those enclosed ro-ro spaces to which passengers have access. Special category spaces may be accommodated on more than one deck provided that the total overall clear height for vehicles does not exceed 10 m.

1.4.56 "Surface-effect ship" (SES) is an air-cushion vehicle whose cushion is totally or partially retained by permanently immersed hard structures.

1.4.57 "Transitional mode" means the regime between displacement and non-displacement modes.

1.4.58 "Watertight" in relation to a structure means capable of preventing the passage of water through the structure in any direction under the head of water likely to occur in the intact or damaged condition.

1.4.59 "Weather deck" is a deck which is completely exposed to the weather from above and from at least two sides.

1.4.60 "Weathertight" means that water will not penetrate into the craft in any wind and wave conditions up to those specified as critical design conditions.

1.4.61 "Worst intended conditions" means the specified environmental conditions within which the intentional operation of the craft is provided for in the certification of the craft. This shall take into account parameters such as the worst conditions of wind force allowable, significant wave height (including unfavourable combinations of length and direction of waves), minimum air temperature, visibility and depth of water for safe operation and such other parameters as the Administration may require in considering the type of craft in the area of operation.

1.5 Surveys

1.5.1 Each craft shall be subject to the surveys specified below:

.1 an initial survey before the craft is put in service or before the Certificate is issued for the first time;

.2 a renewal survey at intervals specified by the Administration but not exceeding 5 years except where 1.8.5 or 1.8.10 is applicable;

.3 a periodical survey within three months before or after each anniversary date of the Certificate; and

.4 an additional survey as the occasion arises.

1.5.2 The surveys referred to in 1.5.1 shall be carried out as follows:

.1 the initial survey shall include:

.1.1 an appraisal of the assumptions made and limitations proposed in relation to loadings, environment, speed and manoeuvrability;

.1.2 an appraisal of the data supporting the safety of the design, obtained, as appropriate, from calculations, tests and trials;

.1.3 a failure mode and effect analysis as required by this Code;

.1.4 an investigation into the adequacy of the various manuals to be supplied with the craft; and

.1.5 a complete inspection of the structure, safety equipment, radio installations and other equipment, fittings, arrangements and materials to ensure that they comply with the requirements of the Code, are in satisfactory condition and are fit for the service for which the craft is intended;

.2 the renewal and periodical surveys shall include a complete inspection of the structure, including the outside of the craft's bottom and related items, safety equipment, radio installations and other equipment as referred to in 1.5.2.1 to ensure that they comply with the requirements of the Code, are in satisfactory condition and are fit for the service for which the craft is intended. The inspection

of the craft's bottom shall be conducted with the craft out of the water under suitable conditions for close-up examination of any damaged or problem areas; and

.3 an additional survey, either general or partial according to the circumstances, shall be made after a repair resulting from investigations prescribed in 1.7.3, or whenever any important repairs or renewals are made. The survey shall be such as to ensure that the necessary repairs or renewals have been effectively made, that the material and workmanship of such repairs or renewals are in all respects satisfactory, and that the craft complies in all respects with the requirements of the Code.

1.5.3 The periodical surveys referred to in 1.5.1.3 shall be endorsed on the High-Speed Craft Safety Certificate.

1.5.4 The inspection and survey of the craft, so far as regards the enforcement of the provisions of the Code, shall be carried out by officers of the Administration. The Administration may, however, entrust the inspections and surveys either to surveyors nominated for the purpose or to organizations recognized by it.

1.5.5 An Administration nominating surveyors or recognizing organizations to conduct inspections and surveys as set forth in 1.5.4 shall, as a minimum, empower any nominated surveyor or recognized organization to:

.1 require repairs to a craft; and

.2 carry out inspections and surveys if requested by the appropriate authorities of a port State.

The Administration shall notify the Organization of the specific responsibilities and conditions of the authority delegated to nominated surveyors or recognized organizations.

1.5.6 When a nominated surveyor or recognized organization determines that the condition of the craft or its equipment does not correspond substantially with the particulars of the Certificate or is such that the craft is not fit to operate without danger to the craft or persons on board, the surveyor or organization shall immediately ensure that corrective action is taken and shall, in due course, notify the Administration. If such corrective action is not taken, the Certificate shall be withdrawn and the Administration shall be notified immediately; and, if the craft is in an area under the jurisdiction of another Government, the appropriate authorities of the port State shall be notified immediately. When an officer of the Administration, a nominated surveyor or a recognized organization has notified the appropriate authorities of the port State, the Government of the port State concerned shall give such officer, surveyor or organization any necessary assistance to carry out their obligations under this section. When applicable, the Government of the port State concerned shall ensure that the craft shall not continue to operate until it can do so without danger to the craft or the persons on board.

1.5.7 In every case, the Administration shall fully guarantee the completeness and efficiency of the inspection and survey, and shall undertake to ensure the necessary arrangements to satisfy this obligation.

1.6 Approvals

The owner of a craft shall accept the obligation to supply sufficient information to enable the Administration to fully assess the features of the design. It is strongly recommended that the Company and the Administration and, where appropriate, the port State or States shall commence discussions at the earliest possible stage so that the Administration may fully evaluate the design in determining what additional or alternative requirements shall be applied to the craft, to achieve the required level of safety.

1.7 Maintenance of conditions after survey

1.7.1 The condition of the craft and its equipment shall be maintained to conform with the provisions of this Code to ensure that the craft in all respects will remain fit to operate without danger to the craft or the persons on board.

1.7.2 After any survey of the craft under section 1.5 has been completed, no change shall be made to structure, equipment, fittings, arrangements and materials covered by the survey, without the sanction of the Administration.

1.7.3 Whenever an accident occurs to a craft or a defect is discovered, either of which affects the safety of the craft or the efficiency or completeness of structure, equipment, fittings, arrangements and materials, the person in charge or owner of the craft shall report at the earliest opportunity to the Administration, the nominated surveyor or recognized organization responsible, who shall cause investigations to be initiated to determine whether a survey, as required by section 1.5, is necessary. If the craft is in an area under the jurisdiction of another Government, the person in charge or the owner shall also report immediately to the appropriate authorities of the port State and the nominated surveyor or recognized organization shall ascertain that such a report has been made.

1.8 High-Speed Craft Safety Certificate

1.8.1 A Certificate called a High-Speed Craft Safety Certificate is issued after completion of an initial or renewal survey to a craft which complies with the requirements of the Code. The Certificate shall be issued or endorsed either by the Administration or by any person or organization recognized by it. In every case, that Administration assumes full responsibility for the Certificate.

1.8.2 A Contracting Government to the Convention may, at the request of the Administration, cause a craft to be surveyed and, if satisfied that the requirements of the Code are complied with, shall issue or authorise the issue of a Certificate to the craft and, where appropriate, endorse or authorize the endorsement of a Certificate on the craft in accordance with the Code. Any Certificate so issued shall contain a statement to the effect that it has been issued at the request of the Government of the State the flag of which the craft is entitled to fly, and it shall have the same force and receive the same recognition as a Certificate issued under 1.8.1.

1.8.3 The Certificate shall be that of the model given in the annex 1 to the Code. If the language used is not English, French or Spanish, the text shall include a translation into one of these languages.

1.8.4 The High-Speed Craft Safety Certificate shall be issued for a period specified by the Administration which shall not exceed 5 years.

1.8.5 Notwithstanding the requirements of 1.8.4, when the renewal survey is completed within three months before the expiry date of the existing Certificate, the new Certificate shall be valid from the date of completion of the renewal survey to a date not exceeding 5 years from the date of expiry of the existing Certificate.

1.8.6 When the renewal survey is completed after the expiry date of the existing Certificate, the new Certificate shall be valid from the date of completion of the renewal survey to a date not exceeding 5 years from the date of expiry of the existing Certificate.

1.8.7 When the renewal survey is completed more than 3 months before the expiry date of the existing Certificate, the new Certificate shall be valid from the date of completion of the renewal survey to a date not exceeding 5 years from the date of completion of the renewal survey.

1.8.8 If a Certificate is issued for a period of less than 5 years, the Administration may extend the validity of the Certificate beyond the expiry date to the maximum period specified in 1.8.4, provided that the surveys required when a Certificate is issued for a period of 5 years are carried out.

1.8.9 If a renewal survey has been completed and a new Certificate cannot be issued or placed on board the craft before the expiry date of the existing Certificate, the person or organization authorized by the Administration may endorse the existing Certificate and such a Certificate shall be accepted as valid for a further period which shall not exceed 5 months from the expiry date.

1.8.10 If a craft, at the time when a Certificate expires, is not in the place in which it is to be surveyed, the Administration may extend the period of validity of the Certificate but this extension shall be granted only for the purpose of allowing the craft to proceed to the place in which it is to be surveyed, and then only in cases where it appears proper and reasonable to do so. No Certificate shall be extended for a period longer than one month, and a craft to which an extension is granted shall not, on its arrival in the place in which it is to be surveyed, be entitled by virtue of such extension to leave that place without having a new Certificate. When the renewal survey is completed, the new Certificate shall be valid to a date not exceeding 5 years from the date of expiry of the existing Certificate before the extension was granted.

1.8.11 In special circumstances, as determined by the Administration, a new Certificate need not be dated from the date of expiry of the existing Certificate as required by 1.8.6 or 1.8.10. In these circumstances, the new Certificate shall be valid to a date not exceeding 5 years from the date of completion of the renewal survey.

1.8.12 If a periodical survey is completed before the period specified in section 1.5 then:

.1 the anniversary date shown on the relevant Certificate shall be amended by endorsement to a date which shall not be more than 3 months later than the date on which the survey was completed;

.2 the subsequent periodical survey required by section 1.5 shall be completed at the intervals prescribed by 1.5 using the new anniversary date; and

.3 the expiry date may remain unchanged provided one or more periodical surveys are carried out so that the maximum intervals between the surveys prescribed by 1.5.1.3 are not exceeded.

1.8.13 A Certificate issued under 1.8.1 or 1.8.2 shall cease to be valid in any of the following cases:

.1 if the relevant surveys are not completed within the periods specified in 1.5.1;

.2 if the Certificate is not endorsed in accordance with 1.5.3;

.3 upon transfer of the craft to the flag of another State. A new Certificate shall only be issued when the Government issuing the new Certificate is fully satisfied that the craft is in compliance with the requirements of 1.7.1 and 1.7.2. In the case of a transfer between Governments that are Contracting Governments to the Convention, if requested within 3 months after the transfer has taken place, the Government of the State whose flag the craft was formerly entitled to fly shall, as soon as possible, transmit to the Administration a copy of the Certificate carried by the craft before the transfer and, if available, copies of the relevant survey reports.

1.8.14 The privileges of the Code may not be claimed in favour of any craft unless it holds a valid Certificate.

1.9 Permit to Operate High-Speed Craft

1.9.1 The craft shall not operate commercially unless a Permit to Operate High-Speed Craft is issued and valid in addition to the High-Speed Craft Safety Certificate. Transit voyages without passengers or cargo may be undertaken without the Permit to Operate High-Speed Craft.

1.9.2 The Permit to Operate High-Speed Craft shall be issued by the Administration to certify compliance with 1.2.2 to 1.2.7 and stipulate conditions of the operation of the craft and drawn up on the basis of the information contained in the route operational manual specified in chapter 18 of this Code.

1.9.3 Before issuing the Permit to Operate, the Administration shall consult with each port State to obtain details of any operational conditions associated with operation of the craft in that State. Any such conditions imposed shall be shown by the Administration on the Permit to Operate and included in the route operational manual.

1.9.4 A port State may inspect the craft and audit its documentation for the sole purpose of verifying its compliance with the matters certified by and conditions associated with the Permit to Operate. Where deficiencies are shown by such an audit, the Permit to Operate ceases to be valid until such deficiencies are corrected or otherwise resolved.

1.9.5 The provisions of 1.8 shall apply to the issue and the period of validity of the Permit to Operate High-Speed Craft.

1.9.6 The Permit to Operate High-Speed Craft shall be that of the model given in annex 2 to this Code. If the language used is not English, French or Spanish, the text shall include a translation into one of these languages.

1.10 Control

The provisions of regulation I/19 of the Convention shall be applied to include the Permit to Operate High-Speed Craft in addition to the Certificate issued under 1.8.

1.11 Equivalents

1.11.1 Where this Code requires that a particular fitting, material, appliance or apparatus, or type thereof, shall be fitted or carried in a craft, or that any particular provision shall be made, the Administration may allow any other fitting, material, appliance or apparatus, or type thereof, to be fitted or carried, or any other provision to be made in the craft, if it is satisfied by trial thereof or otherwise that such fitting, material, appliance or apparatus, or type thereof, or provision, is at least as effective as that required by this Code.

1.11.2 Where compliance with any of the requirements of this Code would be impractical for the particular designs of the craft, the Administration may substitute those with alternative requirements, provided that equivalent safety is achieved. The Administration which allows any such substitution shall communicate to the Organization particulars of these substitutions and the reasons therefor, which the Organization shall circulate to its Member Governments for their information.

1.12 Information to be made available

1.12.1 The Administration shall ensure that the management of the Company operating the craft has provided the craft with adequate information and guidance in the form of manuals to enable the craft to be operated and maintained safely. These manuals shall include a route operational manual, craft operating manual, maintenance manual and servicing schedule. Such information shall be updated as necessary.

1.12.2 The manuals shall contain at least the information specified in chapter 18, and shall be in a language understood by the crew. Where this language is not English, a translation into English shall be provided of at least the route operational manual and the craft operating manual.

1.13 Further developments

1.13.1 It is recognized that there is much ongoing research and development in the design of high-speed craft and that new types may emerge which have a different geometry to that envisaged during the formulation of this Code. It is important that this Code does not restrict this progress and the development of new designs.

1.13.2 A design may be produced which cannot comply with the provisions of this Code. In such a case the Administration shall determine the extent to which the provisions of the Code are applicable to the design and, if necessary, develop additional or alternative requirements to provide an equivalent level of safety for the craft.

1.13.3 The foregoing shall be considered by the Administration when assessing the granting of equivalents under the Code.

1.14 Circulation of safety information

1.14.1 In the event that an Administration has cause to investigate an accident involving a craft to which this Code applies, that Administration shall provide a copy of the official report to the Organization, which will invite Member States to note the existence of the report and to obtain a copy.

1.14.2 In the event that operational experience reveals structural or equipment failures affecting the safety of a design, craft owners shall inform the Administration.

1.15 Review of the Code

1.15.1 The Code shall be reviewed by the Organization at intervals preferably not exceeding four years to consider revision of existing requirements to take account of new developments in design and technology.

1.15.2 Where a new development in design and technology has been found acceptable to an Administration, that Administration may submit particulars of such development to the Organization for consideration for incorporation into the Code during the periodical review.

CHAPTER 2

BUOYANCY, STABILITY AND SUBDIVISION

PART A - GENERAL

2.1 General

2.1.1 A craft shall be provided with:

.1 stability characteristics and stabilization systems adequate for safety when the craft is operated in the non-displacement mode and during the transitional mode;

.2 buoyancy and stability characteristics adequate for safety where the craft is operated in the displacement mode, both in the intact condition and the damaged condition; and

.3 stability characteristics in the non-displacement and transitional modes adequate to transfer the craft safely to displacement mode in case of any system malfunction.

2.1.2 Account shall be taken of the effect of icing in the stability calculations. An example of established practice for ice accretion allowances is given in annex 5 for the guidance of the Administration.

2.1.3 For the purpose of this and other chapters, unless expressly defined otherwise, the following definitions apply:

.1 "Downflooding point" means any opening through which flooding of the spaces which comprise the reserve buoyancy could take place while the craft is in the intact or damaged condition, and inclines to an angle past the angle of equilibrium.

.2 "Fully submerged foil" means a foil having no lift components piercing the surface of the water in the foil-borne mode.

.3 "Monohull craft" means any craft which is not a multihull craft.

.4 "Multihull craft" means a craft which in any normally achievable operating trim or heel angle, has a rigid hull structure which penetrates the surface of the sea over more than one discrete area.

.5 "Permeability" of a space means the percentage of the volume of that space which can be occupied by water.

.6 "Skirt" means a downwardly extending, flexible structure used to contain or divide an air cushion.

2.1.4 Other means of demonstrating compliance with the requirements of any part of this chapter may be accepted, provided that the method chosen can be shown to provide an equivalent level of safety. Such methods may include:

.1 mathematical simulation of dynamic behaviour;

.2 scale model testing; and

.3 full-scale trials.

2.1.5 Model or full-scale tests and/or calculations (as appropriate) shall also include consideration of the following known stability hazards to which high-speed craft are known to be liable, according to craft type:

.1 directional instability, which is often coupled with roll and pitch instabilities;

.2 broaching and bow diving in following seas at speeds near to wave speed, applicable to most types;

.3 bow diving of planing monohulls and catamarans due to dynamic loss of longitudinal stability in relatively calm seas;

.4 reduction in transverse stability with increasing speed of monohulls;

.5 porpoising of planing monohulls, being coupled pitch and heave oscillations, which can become violent;

.6 chine tripping, being a phenomenon of planing monohulls occurring when the immersion of a chine generates a strong capsizing moment;

.7 plough-in of air-cushion vehicles, either longitudinal or transverse, as a result of bow or side skirt tuck-under or sudden collapse of skirt geometry, which, in extreme cases, can result in capsize;

.8 pitch instability of SWATH (small waterplane area twin hull) craft due to the hydrodynamic moment developed as a result of the water flow over the submerged lower hulls;

.9 reduction in effective metacentric height (roll stiffness) of surface effect ships (SES) in high speed turns compared to that on a straight course, which can result in sudden increases in heel angle and/or coupled roll and pitch oscillations; and

.10 resonant rolling of SES in beam seas, which, in extreme cases, can result in capsize.

2.1.6 Suitable calculations shall be carried out and/or tests conducted to demonstrate that, when operating within approved operational limitations, the craft will, after a disturbance causing roll, pitch, heave or heel due to turning or any combination thereof, return to the original attitude.

2.2 Intact buoyancy and watertight and weathertight integrity

2.2.1 Intact buoyancy

2.2.1.1 All craft shall have a sufficient reserve of buoyancy at the design waterline to meet the intact and damage stability requirements of this chapter. The Administration may require a larger reserve of buoyancy to permit the craft to operate in any of its intended modes. This reserve of buoyancy shall be calculated by including only those compartments that are:

.1 watertight and situated below the datum, or

.2 watertight or weathertight and situated above the datum.

In considering the stability after damage, flooding shall be assumed to occur until limited by watertight boundaries in the equilibrium condition, and weathertight boundaries in intermediate stages of flooding and within the range of positive righting lever required to satisfy the residual stability requirements.

Craft built in conformity with the requirements of organizations recognised by the Administration, in accordance with regulation XI/1 of the Convention, may be considered to possess adequate strength and integrity.

2.2.1.2 Arrangements shall be provided for checking the watertight or weathertight integrity of those compartments taken into account in 2.2.1.1, and the details incorporated in the craft operating manual required by 18.2.1.

2.2.2 Openings in watertight divisions

2.2.2.1 The number of openings in watertight bulkheads shall be reduced to the minimum compatible with the design and proper working of the craft, and all such doors shall be closed prior to departure of the craft from the berth.

2.2.2.2 Doors in watertight bulkheads may be hinged or sliding. They shall be shown by suitable testing to be capable of maintaining the watertight integrity of the bulkhead. Such testing shall be carried out for both sides of the door and shall apply a pressure head 10% greater than that determined from the minimum permissible height of a downflooding opening. Testing may be carried out either before or after the door is fitted into the craft but, where shore testing is adopted, satisfactory installation in the craft shall be verified by inspection and hose testing.

2.2.2.3 Type approval may be accepted in lieu of testing individual doors, provided the approval process includes pressure testing to a head equal to, or greater, than the required head (refer to 2.2.2.2).

2.2.2.4 All watertight doors shall be capable of being operated when the craft is inclined up to 15°, and shall be fitted with means of indication in the operating compartment showing whether they are open or closed. All such doors shall be capable of being opened and closed locally from each side of the bulkhead.

2.2.2.5 Watertight doors shall remain closed when the craft is at sea, except that they may be opened for access. A notice shall be attached to each door to the effect that it is not to be left open.

2.2.2.6 Watertight doors shall be capable of being closed by remote control from the operating compartment in not less than 20 s and not more than 40 s, and shall be provided with an audible alarm, distinct from other alarms in the area, which will sound for at least 5 s but no more than 10 s before the doors begin to move whenever the door is closed remotely by power, and continue sounding until the door is completely closed. The power, control and indicators shall be operable in the event of main power failure, as required by regulation II-1/15.7.3 of the Convention. In passenger areas and areas where the ambient noise exceeds 85 dB(A) the audible alarm shall be supplemented by an intermittent visual signal at the door. If the Administration is satisfied that such doors are essential for the safe work of the craft, hinged watertight doors having only local control may be permitted for areas to which crew only have access, provided they are fitted with remote indicators as required by 2.2.2.4.

2.2.2.7 Where pipes, scuppers, electric cables, etc. are carried through watertight divisions, the arrangements for creating a watertight penetration shall be of a type which has been prototype tested under hydrostatic pressure equal to or greater than that required to be withstood for the actual location in the craft in which they are to be installed. The test pressure shall be maintained for at least 30 min and there must be no leakage through the penetration arrangement during this period. The test pressure head shall be 10% greater than that determined from the minimum permissible height of a downflooding opening. Watertight bulkhead penetrations which are effected by continuous welding do not require prototype testing. Valves on scuppers from weathertight compartments, included in the stability calculations, shall have arrangements for remote closing from the operating station.

2.2.2.8 Where a ventilation trunk forms part of a watertight boundary, the trunk shall be capable of withstanding the water pressure that may be present taking into account the maximum inclination angle allowable during all stages of flooding.

2.2.3 Inner bow doors

2.2.3.1 Where ro-ro craft are fitted with bow loading openings, an inner bow door shall be fitted abaft such openings, to restrict the extent of flooding in the event of failure of the outer closure. This inner bow door, where fitted, shall be:

.1 weathertight to the deck above, which deck shall itself be weathertight forward to the bow loading opening;

.2 so arranged as to preclude the possibility of a bow loading door causing damage to it in the case of damage to, or detachment of, the bow loading door;

.3 forward of all positions on the vehicle deck in which vehicles are intended to be carried; and

.4 part of a boundary designed to prevent flooding into the remainder of the craft.

2.2.3.2 A craft shall be exempted from the requirement for such an inner bow door where one of the following applies:

.1 the vehicle loading deck at the inner bow door position is above the design waterline by a height more than the significant wave height corresponding to the worst intended conditions;

.2 it can be demonstrated using model tests or mathematical simulations that when the craft is proceeding at a range of speeds up to the maximum attainable speed in the loaded condition at all headings in long crested seas of the greatest significant wave height corresponding to the worst intended conditions, either:

.1 the bow loading door is not reached by waves; or

.2 having been tested with the bow loading door open to determine the maximum steady state volume of water which accumulates, it can be shown by static analysis that, with the same volume of water on the vehicle deck(s) the residual stability requirements of 2.6.11 and 2.13 or 2.15 are satisfied. If the model tests or mathematical simulations are unable to show that the volume of water accumulated reaches a steady state, the craft shall be considered not to have satisfied the conditions of this exemption.

Where mathematical simulations are employed they shall already have been verified against full-scale or model testing;

.3 bow loading openings lead to open ro-ro spaces provided with guard-rails or having freeing ports complying with 2.2.3.2.4;

.4 the deck of the lowest ro-ro space above the design waterline is fitted on each side of the deck with freeing ports evenly distributed along the sides of the compartment. These shall either be proven to be acceptable using tests according to 2.2.3.2.2 above or comply with the following:

.1 $A \geq 0.3\ l$

where :

A = the total area of freeing ports on each side of the deck in m^2; and

l = the length of the compartment in m;

.2 the craft shall maintain a residual freeboard to the deck of the ro-ro space of at least 1 m in the worst condition;

.3 such freeing ports shall be located within the height of 0.6 m above the deck of the ro-ro space, and the lower edge of the ports shall be within 0.02 m above the deck of the ro-ro space; and

.4 such freeing ports shall be fitted with closing devices or flaps to prevent water entering the deck of the ro-ro space whilst allowing water which may accumulate on the deck of the ro-ro space to drain.

2.2.4 Other provisions for ro-ro craft

2.2.4.1 All accesses in the ro-ro space that lead to spaces below the deck shall have a lowest point which is not less than the height required from the tests conducted according to 2.2.3.2.2 or 3 m above the design waterline.

2.2.4.2 Where vehicle ramps are installed to give access to spaces below the deck of the ro-ro space, their openings shall be capable of being closed weathertight to prevent ingress of water below.

2.2.4.3 Accesses in the ro-ro space that lead to spaces below the ro-ro deck and having a lowest point which is less than the height required from the tests conducted according to 2.2.3.2.2 or 3 m above the design waterline may be permitted provided they are watertight and are closed before the craft leaves the berth on any voyage and remain closed until the craft is at its next berth.

2.2.4.4 The accesses referred to in 2.2.4.2 and 2.2.4.3 above shall be fitted with alarm indicators in the operating compartment.

2.2.4.5 Special category spaces and ro-ro spaces shall be patrolled or monitored by effective means, such as television surveillance, so that any movement of vehicles in adverse weather conditions and unauthorized access by passengers thereto can be detected whilst the craft is underway (refer to 7.8.3.1).

2.2.5 Indicators and surveillance

2.2.5.1 Indicators

Indicators shall be provided in the operating compartment for all shell doors, loading doors and other closing appliances which, if left open or not properly secured, could lead to major flooding in the intact and damage conditions. The indicator system shall be designed on the fail-safe principle and shall show by visual alarms if the door is not fully closed or if any of the securing arrangements are not in place and fully locked, and by audible alarms if such door or closing appliance becomes open or the securing arrangements become unsecured. The indicator panel in the operating compartment shall be equipped with a mode selection function 'harbour/sea voyage' so arranged that an audible alarm is given in the operating compartment if the craft leaves harbour with the bow doors, inner doors, stern ramp or any other side shell doors not closed or any closing device not in the correct position. The power supply for the indicator systems shall be independent of the power supply for operating and securing the doors.

2.2.5.2 Television surveillance

Television surveillance and a water leakage detection system shall be arranged to provide an indication to the operating compartment and to the engine control station of any leakage through inner and outer bow doors, stern doors or any other shell doors which could lead to major flooding.

2.2.6 Integrity of superstructure

2.2.6.1 Where entry of water into structures above the datum would significantly influence the stability and buoyancy of the craft, such structures shall be:

.1 of adequate strength to maintain the weathertight integrity and fitted with weathertight closing appliances; or

.2 provided with adequate drainage arrangements; or

.3 an equivalent combination of both measures.

2.2.6.2 Weathertight superstructures and deckhouses located above the datum shall in the outside boundaries have means of closing openings with sufficient strength such as to maintain weathertight integrity in all damage conditions where the space in question is not damaged. Furthermore, the means of closing shall be such as to maintain weathertight integrity in all operational conditions.

2.2.7 Doors, windows, etc., in boundaries of weathertight spaces

2.2.7.1 Doors, windows, etc., and any associated frames and mullions in weathertight superstructures and deckhouses shall be weathertight and shall not leak or fail at a uniformly applied pressure less than that at which adjacent structure would experience permanent set or fail. Conformity with the requirements of organizations recognized by the Administration in accordance with regulation XI/1 of the Convention may be considered to possess adequate strength.

2.2.7.2 For doors in weathertight superstructures, hose tests shall be carried out with a water pressure from the outside in accordance with specifications at least equivalent to those acceptable to the Organization.

2.2.7.3 The height above the deck of sills to doorways leading to exposed decks shall be as high above the deck as is reasonable and practicable, particularly those located in exposed positions. Such sill heights shall in general not be less than 100 mm for doors to weathertight spaces on decks above the datum, and 250 mm elsewhere. For craft of 30 m in length and under, sill heights may be reduced to the maximum which is consistent with the safe working of the craft.

2.2.7.4 Windows shall not be permitted in the boundaries of special category spaces or ro-ro spaces or below the datum. If required by restrictions in the Permit to Operate, forward facing windows, or windows which may be submerged at any stage of flooding shall be fitted with hinged or sliding storm shutters ready for immediate use.

2.2.7.5 Sidescuttles to spaces below the datum shall be fitted with efficient hinged deadlights arranged inside so that they can be effectively closed and secured watertight.

2.2.7.6 No sidescuttle shall be fitted in a position so that its sill is below a line drawn parallel to and one metre above the design waterline.

2.2.8 Hatchways and other openings

2.2.8.1 Hatchways closed by weathertight covers

The construction and the means for securing the weathertightness of cargo and other hatchways shall comply with the following:

.1 coaming heights shall in general not be less than 100 mm for hatches to weathertight spaces on decks above the datum, and 250 mm elsewhere. For craft of 30 m in length and under, coaming heights may be reduced to the maximum which is consistent with the safe working of the craft;

.2 the height of these coamings may be reduced, or the coamings omitted entirely, on condition that the Administration is satisfied that the safety of the ship is not thereby impaired in any sea conditions up to the worst intended conditions. Where coamings are provided, they shall be of substantial construction; and

.3 the arrangements for securing and maintaining weathertightness shall ensure that the tightness can be maintained in any sea conditions up to the worst intended conditions.

2.2.8.2 Machinery space openings

2.2.8.2.1 Machinery space openings shall be properly framed and efficiently enclosed by casings of ample strength and, where the casings are not protected by other structures, their strength shall be specially considered. Access openings in such casings shall be fitted with weathertight doors.

2.2.8.2.2 Heights of sills and coaming shall, in general, not be less than 100 mm for openings to weathertight spaces on decks above the datum, and 380 mm elsewhere. For craft of 30 m in length and under, these heights may be reduced to the maximum which is consistent with the safe working of the craft.

2.2.8.2.3 Machinery space ventilator openings shall comply with the requirements of 2.2.8.4.2.

2.2.8.3 Miscellaneous openings in exposed decks

2.2.8.3.1 Manholes and flush scuttles on the datum or within superstructures other than enclosed superstructures shall be closed by substantial covers capable of being made watertight. Unless secured by closely spaced bolts, the covers shall be permanently attached.

2.2.8.3.2 Service hatches to machinery, etc. may be arranged as flush hatches provided that the covers are secured by closely spaced bolts, are kept closed at sea, and are equipped with arrangements for portable guardrails.

2.2.8.3.3 Openings in exposed decks leading to spaces below the datum or enclosed superstructures other than hatchways, machinery space openings, manholes and flush scuttles shall be protected by an enclosed superstructure, or by a deckhouse or companionway of equivalent strength and weathertightness.

2.2.8.3.4 The height above the deck of sills to the doorways in companionways shall, in general, not be less than 100 mm for doors to weathertight spaces on decks above the datum, and 250 mm elsewhere. For craft of 30 m in length and under sill heights may be reduced to the maximum which is consistent with the safe working of the craft.

2.2.8.4 Ventilators

2.2.8.4.1 Ventilators to spaces below the datum or decks of enclosed superstructures shall have substantially constructed coamings efficiently connected to the deck. Coaming heights shall in general not be less than 100 mm for ventilators to weathertight spaces on decks above the datum, and 380 mm elsewhere. For craft of 30 m in length and under, coaming heights may be reduced to the maximum which is consistent with the safe working of the craft.

2.2.8.4.2 Ventilators the coamings of which extend to more than one metre above the deck or which are fitted to decks above the datum need not be fitted with closing arrangements unless they face forward or are specifically required by the Administration.

2.2.8.4.3 Except as provided in 2.2.8.4.2, ventilator openings shall be provided with efficient weathertight closing appliances.

2.2.8.4.4 Ventilator openings shall face aft or athwartships wherever practicable.

2.2.9 Scuppers, inlets and discharges

2.2.9.1 Discharges led through the shell either from spaces below the datum or from within superstructures and deckhouses fitted above the datum shall be fitted with efficient and accessible means for preventing water from passing inboard. Normally each separate discharge shall have one automatic non-return valve with a positive means of closing it from a position above the datum. Where, however, the vertical distance from the design waterline to the inboard end of the discharge pipe exceeds 0.01 L, the discharge may have two automatic non-return valves without positive means of closing, provided that the inboard valve is always accessible for examination under service conditions. Where that vertical distance exceeds 0.02 L, a single automatic non-return valve without positive means of closing may be accepted. The means for operating the positive action valve shall be readily accessible and provided with an indicator showing whether the valve is open or closed.

2.2.9.2 Valves on scuppers from weathertight compartments included in the stability calculations shall be operable from the operating compartment.

2.2.9.3 In manned machinery spaces, main and auxiliary sea inlets and discharges in connection with the operation of machinery may be controlled locally. Such controls shall be readily accessible and shall be provided with indicators showing whether the valves are open or closed. In unmanned machinery spaces, main and auxiliary sea inlets and discharges in connection with the operation of machinery shall be operable from the operating compartment.

2.2.9.4 Scuppers leading from superstructures or deckhouses not fitted with weathertight doors shall be led overboard.

2.2.9.5 All shell fittings and the valves required by this Code shall be of a suitable ductile material. Valves of ordinary cast iron or similar material shall not be acceptable.

2.2.10 Air pipes

2.2.10.1 Main storage tanks containing flammable liquids or tanks which can be pumped or filled from the sea shall have air pipes which do not terminate in enclosed spaces.

2.2.10.2 All air pipes extending to exposed decks shall have a height from the deck to the point where water may have access below of at least 300 mm where the deck is less than 0.05L above the design waterline, and 150 mm on all other decks.

2.2.10.3 Air pipes may discharge through the side of the superstructure provided that this is at a height of at least 0.02L above any waterline when the intact craft is heeled to an angle of 15°, or 0.02L above the highest waterline at all stages of flooding as determined by the damaged stability calculations, whichever is higher.

2.2.10.4 All air pipes shall be equipped with weathertight closing devices that close automatically.

2.2.11 Freeing ports

2.2.11.1 Where bulwarks on weather decks form wells, ample provision shall be made for rapidly freeing the decks of water and for draining them. The minimum freeing port area (A) on each side of the craft for each well on the weather deck of the main hull(s) shall be:

.1 where the length of bulwark (l) in the well is 20 m or less:

$A = 0.7 + 0.035\ l\ (m^2)$; and

.2 where l exceeds 20 m:

$A = 0.07\ l\ (m^2)$,

and, in no case, l need be taken as greater than 0.7 L.

If the bulwark is more than 1.2 m in average height, the required area shall be increased by 0.004 square metres per metre of length of well for each 0.1 m difference in height. If the bulwark is less than 0.9 m in average height, the required area shall be decreased by 0.004 square metres per metre of length of well for each 0.1 m difference in height.

2.2.11.2 Such freeing ports shall be located within the height of 0.6 m above the deck and the lower edge shall be within 0.02 m above the deck.

2.2.11.3 All such openings in the bulwarks shall be protected by rails or bars spaced approximately 230 mm apart. If shutters are fitted to freeing ports, ample clearance shall be provided to prevent jamming. Hinges shall have pins or bearings of non-corrodible material. If shutters are fitted with securing appliances, these appliances shall be of approved construction.

2.2.11.4 Craft having superstructures which are open in front or both ends shall comply with the provisions of 2.2.11.1.

2.2.11.5 In craft having superstructures which are open at the aft end the minimum freeing port area shall be:

$A = 0.3\ b\ (m^2)$

where:

b = the breadth of the craft at the exposed deck (m).

2.2.11.6 Ro-ro craft fitted with bow loading openings leading to open vehicle spaces shall comply with the provisions of 2.2.3.

2.3 Intact stability in the displacement mode

2.3.1 Hydrofoil craft fitted with surface-piercing foils and/or fully submerged foils shall have sufficient stability under all permitted cases of loading to comply with the relevant provisions of annex 6 and specifically maintain a heel angle of less than 10° when subjected to the greater of the heeling moments in 1.1.2 and 1.1.4 of that annex.

2.3.2 Subject to 2.3.4, multihull craft other than hydrofoil craft shall meet the relevant requirements of annex 7 in all permitted cases of loading.

2.3.3 Subject to 2.3.4, monohull craft other than hydrofoil craft shall meet the relevant requirements of annex 8 in all permitted conditions of loading.

2.3.4 Where the characteristics of multihull craft are inappropriate for application of annex 7 or the characteristics of monohull craft are inappropriate for application of annex 8, the Administration may accept alternative criteria equivalent to those stipulated, as appropriate to the type of craft and area of operation. The requirements of annexes 7 and 8 may be applied as indicated in the table below.

Table **showing application of annexes 7 and 8 to monohull and multihull craft**

GM_T	$\frac{B_{WL} \cdot A_{WP}}{\nabla}$	
	≤ 7	> 7
≤ 3.0	annex 8	annex 8 or annex 7
> 3.0	annex 8 or annex 7	annex 7

where:

B_{WL} = maximum waterline beam at the design waterline (m); for multihull, this shall be taken to the outside of sidehulls
A_{WP} = waterplane area at the design waterline (m^2)
∇ = volume of displacement at the design waterline (m^3)
GM_T = transverse metacentric height in the loading condition corresponding to the design waterline, corrected for free surface effects (m)

2.4 Intact stability in the non-displacement mode

2.4.1 The requirements of this section and section 2.12 shall be applied on the assumption that any stabilisation systems fitted are fully operational.

2.4.2 The roll and pitch stability on the first and/or any other craft of a series shall be qualitatively assessed during operational safety trials as required by chapter 18 and annex 9. The results of such trials may indicate the need to impose operational limitations.

2.4.3 Where craft are fitted with surface-piercing structure or appendages, precautions shall be taken against dangerous attitudes or inclinations and loss of stability subsequent to a collision with a submerged or floating object.

2.4.4 In designs where periodic use of cushion deformation is employed as a means of assisting craft control, or periodic use of cushion air exhausting to atmosphere for purposes of craft manoeuvring, the effects upon cushion-borne stability shall be determined, and the limitations on the use by virtue of craft speed or attitude shall be established.

2.4.5 In the case of an air cushion vehicle fitted with flexible skirts, it shall be demonstrated that the skirts remain stable under operational conditions.

2.5 Intact stability in the transitional mode

2.5.1 Under weather conditions up to the worst intended conditions, the time to pass from the displacement mode to the non-displacement mode and vice versa shall be minimized unless it is demonstrated that no substantial reduction of stability occurs during this transition.

2.5.2 Hydrofoil craft shall comply with the relevant provisions of annex 6.

2.6 Buoyancy and stability in the displacement mode following damage

2.6.1 The requirements of this section apply to all permitted conditions of loading.

2.6.2 For the purpose of making damage stability calculations, the volume and surface permeabilities shall be, in general, as follows:

Spaces	Permeability
Appropriated to cargo or stores	60
Occupied by accommodation	95
Occupied by machinery	85
Intended for liquids	0 or 95*
Appropriated for cargo vehicles	90
Void spaces	95

*whichever results in the more severe requirements

2.6.3 Notwithstanding 2.6.2, permeability determined by direct calculation shall be used where a more onerous condition results, and may be used where a less onerous condition results from that provided according to 2.6.2.

2.6.4 The Administration may permit the use of low-density foam or other media to provide buoyancy in void spaces, provided that satisfactory evidence is provided that any such proposed medium is the most suitable alternative and is:

.1 of closed-cell form if foam, or otherwise impervious to water absorption;

.2 structurally stable under service conditions;

.3 chemically inert in relation to structural materials with which it is in contact or other substances with which the medium is likely to be in contact (reference is made to 7.4.3.7); and

.4 properly secured in place and easily removable for inspection of the void spaces.

2.6.5 The Administration may permit void bottom spaces to be fitted within the watertight envelope of the hull without the provision of a bilge system or air pipes provided that:

.1 the structure is capable of withstanding the pressure head after any of the damages required by this section;

.2 when carrying out a damage stability calculation in accordance with the requirements of this section, any void space adjacent to the damaged zone shall be included in the calculation and the criteria in 2.6, 2.13 and 2.15 complied with;

.3 the means by which water which has leaked into the void space is to be removed shall be included in the craft operating manual required by chapter 18; and

.4 adequate ventilation is provided for inspection of the space under consideration as required by 2.2.1.2.

2.6.6 Any damage of a lesser extent than that postulated in 2.6.7 to 2.6.10, as applicable, which would result in a more severe condition shall also be investigated. The shape of the damage shall be assumed to be a parallelepiped.

2.6.7 Extent of side damage

The following side damages shall be assumed anywhere on the periphery of the craft:

.1 the longitudinal extent of damage shall be $0.75\nabla^{1/3}$, or $(3\ m + 0.225\nabla^{1/3})$, or 11 m, whichever is the least;

.2 the transverse extent of penetration into the craft shall be $0.2\nabla^{1/3}$. However, where the craft is fitted with inflated skirts or with non-buoyant side structures, the transverse extent of penetration shall be at least $0.12\ \nabla^{1/3}$ into the main buoyancy hull or tank structure; and

.3 the vertical extent of damage shall be taken for the full vertical extent of the craft,

where:

∇ = volume of displacement corresponding to the design waterline (m^3).

2.6.8 Extent of bottom damage in areas vulnerable to raking damage

2.6.8.1 Application

.1 Any part of the surface of the hull(s) is considered to be vulnerable to raking damage if:

.1 it is in contact with the water at operational speed in smooth water, and

.2 it also lies below two planes which are perpendicular to the craft centreline plane and at heights as shown in figure 2.6.8.1.

For multihulls, individual hulls shall be considered separately.

.2 Raking damage shall be assumed to occur along any fore-and-aft line on the surface of the hull(s) between the keel and the upper limit defined in the figure below:

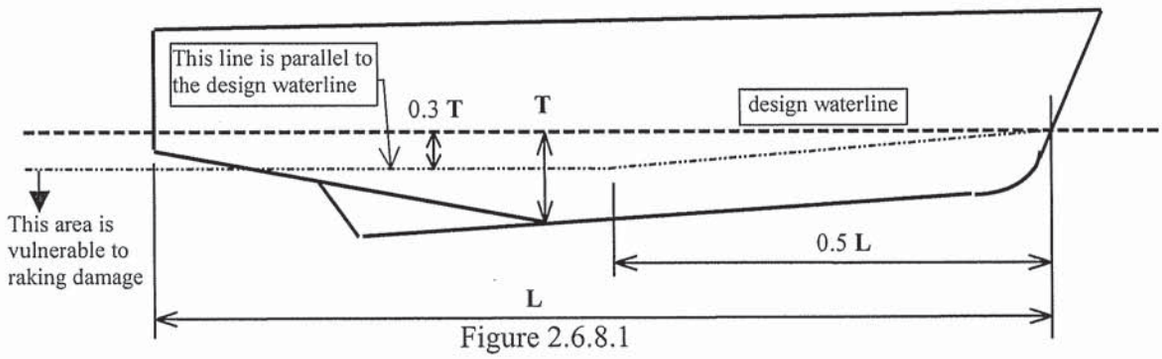


Figure 2.6.8.1

where: T = maximum draught of the hull (each hull considered individually in the case of multihulls) to the design waterline, excluding any non-buoyant structure.

.3 Damage shall not be applied at the same time as that defined in 2.6.7 or 2.6.9.

2.6.8.2 Extent

2.6.8.2.1 Two different longitudinal extents shall be considered separately:

.1 55% of the length L, measured from the most forward point of the underwater buoyant volume of each hull; and

.2 a percentage of the length L, applied anywhere in the length of the craft, equal to 35% for craft where L = 50m and over and equal to (L/2 + 10)% for craft where L is less than 50m.

2.6.8.2.2 Except as provided below, the penetration normal to the shell shall be $0.04\nabla^{1/3}$ or 0.5 m, whichever is the lesser, in association with a girth along the shell equal to $0.1\nabla^{1/3}$, where ∇ is the volume of displacement corresponding to the design waterline (m^3). However this

penetration or girth shall under no circumstances extend above the vertical extent of the vulnerable area as specified in 2.6.8.1.1.

2.6.9 Extent of bottom damage in areas not vulnerable to raking damage

2.6.9.1 Application

This applies to all parts of the hull(s) which are not defined as vulnerable to raking damage in 2.6.8.1. Damage shall not be applied at the same time as that defined in 2.6.7 or 2.6.8.

2.6.9.2 Extent

The following extent of damage shall be assumed:

.1 the length of damage in the fore-and-aft direction shall be $0.75\nabla^{1/3}$, or $(3\text{ m} + 0.225\nabla^{1/3})$, or 11 m whichever is the least;

.2 the athwartships girth of damage shall be $0.2\nabla^{1/3}$; and

.3 the depth of penetration normal to the shell shall be $0.02\nabla^{1/3}$,

where:

∇ = volume of displacement corresponding to the design waterline (m^3).

2.6.10 In applying 2.6.8 and 2.6.9 to multihull craft, an obstruction at or below the design waterline of up to 7 m width shall be considered in determining the number of hulls damaged at any one time. The requirement of 2.6.6 shall also be applied.

2.6.11 Following any of the postulated damages detailed in 2.6.6 to 2.6.10, the craft in still water shall have sufficient buoyancy and positive stability to simultaneously ensure that:

.1 for all craft other than amphibious air-cushion vehicles, after flooding has ceased and a state of equilibrium has been reached, the final waterline is below the level of any opening through which further flooding could take place by at least 50% of the significant wave height corresponding to the worst intended conditions;

.2 for amphibious air-cushion vehicles, after flooding has ceased and a state of equilibrium has been reached, the final waterline is below the level of any opening through which further flooding could take place by at least 25% of the significant wave height corresponding to the worst intended conditions;

.3 there is a positive freeboard from the damage waterline to survival craft embarkation positions;

.4 essential emergency equipment, emergency radios, power supplies and public address systems needed for organizing the evacuation remain accessible and operational; and

.5 the residual stability of craft meets the appropriate criteria as laid out in annexes 7 and 8 according to table 2.3.4. Within the range of positive stability governed by the criteria of annexes 7 or 8, no unprotected opening shall be submerged.

2.6.12 Downflooding openings referred to in 2.6.11.1 and 2.6.11.2 shall include doors and hatches which are used for damage control or evacuation procedures, but may exclude those which are closed by means of weathertight doors and hatch covers and not used for damage control or evacuation procedures.

2.7 Inclining and stability information

2.7.1 Every craft, on completion of build, shall be inclined and the elements of its stability determined. When an accurate inclining is not practical, the lightweight displacement and centre of gravity shall be determined by a lightweight survey and accurate calculation.

2.7.2 The master shall be supplied by the owner with reliable information relating to the stability of the craft in accordance with the following provisions of this paragraph. The information relating to stability shall , before issued to the master, be submitted to the Administration for approval, together with a copy thereof for their retention, and shall incorporate such additions and amendments as the Administration may in any particular case require.

2.7.3 Where any alterations are made to a craft so as significantly to affect the stability information supplied to the master, amended stability information shall be provided. If necessary, the craft shall be re-inclined.

2.7.4 A report of each inclining or lightweight survey carried out in accordance with this chapter and of the calculation therefrom of the lightweight condition particulars shall be submitted to the Administration for approval, together with a copy for their retention. The approved report shall be placed on board the craft by the owner in the custody of the master and shall incorporate such additions and amendments as the Administration may in any particular case require. The amended lightweight condition particulars so obtained from time to time shall be used by the master in substitution for such previously approved particulars when calculating the craft's stability.

2.7.5 Following any inclining or lightweight survey, the master shall be supplied with amended stability information if the Administration so requires. The information so supplied shall be submitted to the Administration for approval, together with a copy thereof for their retention, and shall incorporate such additions and amendments as the Administration may in any particular case require.

2.7.6 Stability information demonstrating compliance with this chapter shall be furnished in the form of a stability information book which shall be kept on board the craft at all times in the custody of the master. The information shall include particulars appropriate to the craft and shall reflect the craft loading conditions and mode of operation. Any enclosed superstructures or deck-houses included in the cross curves of stability and the critical downflooding points and angles shall be identified. At the operating station there shall be plans showing clearly for each deck and hold the boundaries of the watertight compartments, the openings therein with their means of closure and position of any controls thereof.

2.7.7 Every craft shall have scales of draughts marked clearly at the bow and stern. In the case where the draught marks are not located where they are easily readable, or operational constraints for a particular trade make it difficult to read the draught marks, then the craft shall also be fitted with a reliable draught-indicating system by which the bow and stern draughts can be determined.

2.7.8 The owner or builder, as appropriate, shall ensure that the positions of the draught marks are accurately determined and that the marks are located on the hull in a permanent manner. Accuracy of the draught marks shall be demonstrated to the Administration prior to the inclining experiment.

2.8 Loading and stability assessment

On completion of loading of the craft and prior to its departure on a voyage, the master shall determine the trim and stability of the craft and also ascertain and record that the craft is in compliance with stability criteria of the relevant requirements. The Administration may accept the use of an electronic loading and stability computer or equivalent means for this purpose.

2.9 Marking and recording of the design waterline

2.9.1 The design waterline shall be clearly and permanently marked on the craft's outer sides by the load line mark described below. This and the reference line described in 2.9.2.2 below shall be recorded in the High-Speed Craft Safety Certificate. For craft where this is not practical, e.g. amphibious air-cushion vehicles fitted with peripheral skirts, defined deck reference points shall be provided, from which the freeboard can be measured, and hence the draughts obtained.

2.9.2 Load line mark

2.9.2.1 The load line mark shall consist of a ring with an outside diameter of 300 mm and width of 25 mm which is intersected by a horizontal line of length 450 mm and having a breadth of 25 mm, the upper edge of which passes through the centre of the ring. The centre of the ring shall be placed at the longitudinal centre of flotation in the displacement mode and at a height corresponding to the design waterline.

2.9.2.2 To assist in verifying the position of the load line mark, a reference line shall be marked on the hull at the longitudinal centre of flotation by a horizontal bar having a length of 300 mm and a breadth of 25 mm and having the upper edge corresponding to the reference line.

2.9.2.3 Where practicable, the reference line should be related to the uppermost deck at side. Where it is not possible, the position of the reference line should be defined from the underside of keel at the longitudinal centre of flotation.

2.9.2.4 The mark of the Authority by whom the load lines are assigned may be indicated alongside the load line ring above the horizontal line which passes through the centre of the ring, or above and below it. This mark shall consist of not more than four initials to identify the Authority's name, each measuring approximately 115 mm in height, and 75 mm in width.

2.9.2.5 The ring, lines and letters shall be painted in white or yellow on a dark ground or in black on a light ground, and permanently marked. The marks shall be plainly visible.

2.9.3 Verification

The High-Speed Craft Safety Certificate shall not be delivered until the Administration has verified that the marks are correctly and permanently indicated on the sides of the craft.

PART B - REQUIREMENTS FOR PASSENGER CRAFT

2.10 General

Where compliance with this chapter requires consideration of the effects of passenger weight, the following information shall be used:

.1 The distribution of passengers is 4 persons per square metre.

.2 Each passenger has a mass of 75 kg.

.3 Vertical centre of gravity of seated passengers is 0.3 m above seat.

.4 Vertical centre of gravity of standing passengers is 1 m above deck.

.5 Passengers and luggage shall be considered to be in the space normally at their disposal.

.6 Passengers shall be distributed on available deck areas towards one side of the craft on the decks where assembly stations are located and in such a way that they produce the most adverse heeling moment.

2.11 Intact stability in the displacement mode

The craft shall have sufficient intact stability that, when in still water conditions, the inclination of the craft from the horizontal would not exceed 10° (under all permitted cases of loading and uncontrolled passenger movements as may occur).

2.12 Intact stability in the non-displacement mode

2.12.1 The total heel angle in still water due to the effect of passenger movements or due to beam wind pressure as per 1.1.4 of annex 6 shall not exceed 10°. Passenger movement need not be considered where passengers are required to be seated whenever the craft is operating in the non-displacement mode.

2.12.2 In all loading conditions, the outward heel due to turning shall not exceed 8°, and the total heel due to beam wind pressure as per 1.1.4 of annex 6 and due to turning shall not exceed 12° outward.

2.13 Buoyancy and stability in the displacement mode following damage

2.13.1 Following any of the postulated damages detailed in 2.6.6 to 2.6.10, in addition to satisfying the requirements of 2.6.11 and 2.6.12, the craft in still water shall have sufficient buoyancy and positive stability to simultaneously ensure that:

.1 the angle of inclination of the craft from the horizontal does not normally exceed 10° in any direction. However, where this is clearly impractical, angles of inclination up to 15° immediately after damage but reducing to 10° within 15 min shall be permitted provided that efficient non-slip deck surfaces and suitable holding points, e.g., holes, bars, etc., are provided; and

.2 any flooding of passenger compartments or escape routes which might occur will not significantly impede the evacuation of passengers.

2.13.2 In addition to the requirements in 2.13.1, category B craft shall also satisfy the following criteria after sustaining raking damage of 100% of length L, having the girth and penetration given in 2.6.8.2.2, to any part of the surface of the hull(s) defined in 2.6.8.1:

.1 the angle of inclination of the craft from the horizontal shall not exceed 20° in the equilibrium condition;

.2 the range of positive righting lever shall be at least 15° in the equilibrium condition;

.3 the positive area under the righting lever curve shall be at least 0.015 m-rad in the equilibrium condition;

.4 the requirements of 2.6.11.3 and 2.13.1.2 are satisfied; and

.5 in intermediate stages of flooding, the maximum righting lever shall be at least 0.05 m and the range of positive righting lever shall be at least 7°.

In complying with the above, the righting lever curve shall be terminated at the angle of downflooding, and only one free surface need be assumed.

2.14 Inclining and stability information

2.14.1 At periodical intervals not exceeding 5 years, a lightweight survey shall be carried out on all passenger craft to verify any changes in lightweight displacement and longitudinal centre of gravity. The passenger craft shall be re-inclined whenever, in comparison with the approved stability information, a deviation from the lightweight displacement exceeding 2%, or a deviation of the longitudinal centre of gravity exceeding 1% of *L* is found or anticipated.

2.14.2 A report of each inclining or lightweight survey carried out in accordance with 2.7.1 and of the calculation therefrom of the lightweight condition particulars shall be submitted to the Administration for approval, together with a copy for their retention. The approved report shall be placed on board the craft by the owner in the custody of the master and shall incorporate such additions and amendments as the Administration may in any particular case require. The amended lightweight condition particulars so obtained from time to time shall be used by the master in substitution for such previously approved particulars when calculating the craft's stability.

2.14.3 Following any inclining or lightweight survey, the master shall be supplied with amended stability information if the Administration so requires. The information so supplied shall be submitted to the Administration for approval, together with a copy thereof for their retention, and shall incorporate such additions and amendments as the Administration may in any particular case require.

PART C - REQUIREMENTS FOR CARGO CRAFT

2.15 Buoyancy and stability in the displacement mode following damage

Following any of the postulated damages detailed in 2.6.6 to 2.6.10, in addition to satisfying the requirements of 2.6.11 and 2.6.12, the craft in still water shall have sufficient buoyancy and positive stability to simultaneously ensure that the angle of inclination of the craft from the horizontal does not normally exceed 15° in any direction. However, where this is clearly impractical, angles of inclination up to 20° immediately after damage but reducing to 15° within 15 min may be permitted provided that efficient non-slip deck surfaces and suitable holding points are provided.

2.16 Inclining

Where it is satisfied by lightweight survey, weighing or other demonstration that the lightweight of a craft is closely similar to that of another craft of the series to which 2.7.1 has been applied, the Administration may waive the requirement of 2.7.1 for craft to be inclined. In this regard, a craft which lies within the parameters of 2.14.1, when compared with a craft of the series which has been inclined, shall be regarded as being closely similar to that craft.

CHAPTER 3

STRUCTURES

3.1 General

This chapter covers those elements of hull and superstructure which provide longitudinal and other primary and local strength of the craft as a whole and also other important components such as foils and skirts which are directly associated with the hull and superstructure.

3.2 Materials

Materials used for the hull and superstructure and the other features referred to in 3.1 shall be adequate for the intended use of the craft.

3.3 Structural strength

The structure shall be capable of withstanding the static and dynamic loads which can act on the craft under all operating conditions in which the craft is permitted to operate, without such loading resulting in inadmissible deformation and loss of watertightness or interfering with the safe operation of the craft.

3.4 Cyclic loads

Cyclic loads, including those from vibrations which can occur on the craft, shall not:

.1 impair the integrity of structure during the anticipated service life of the craft or the service life agreed with the Administration;

.2 hinder normal functioning of machinery and equipment; and

.3 impair the ability of the crew to carry out its duties.

3.5 Design criteria

The Administration shall be satisfied that the choice of design conditions, design loads and accepted safety factors corresponds to the intended operating conditions for which certification is sought.

3.6 Trials

If the Administration consider it necessary, it shall require full-scale trials to be undertaken in which loadings are determined. Cognisance shall be taken of the results where these indicate that loading assumptions of structural calculations have been inadequate.

CHAPTER 4

ACCOMMODATION AND ESCAPE MEASURES

4.1 General

4.1.1 Public spaces and crew accommodation shall be designed and arranged so as to protect the occupants from unfavourable environmental conditions and to minimize the risk of injury to occupants during normal and emergency conditions.

4.1.2 Spaces accessible to passengers shall not contain controls, electrical equipment, high-temperature parts and pipelines, rotating assemblies or other items, from which injury to passengers could result, unless such items are adequately shielded, isolated, or otherwise protected.

4.1.3 Public spaces shall not contain operating controls unless the operating controls are so protected and located that their operation by a crew member shall not be impeded by passengers during normal and emergency conditions.

4.1.4 Windows in passenger and crew accommodation shall be of adequate strength and suitable for the worst intended conditions specified in the Permit to Operate and be made of material which will not break into dangerous fragments if fractured.

4.1.5 The public spaces, crew accommodation and the equipment therein shall be designed so that each person making proper use of these facilities will not suffer injury during craft's normal and emergency start, stop and manoeuvring in normal cruise and in failure or maloperation conditions.

4.2 Public address and information system

4.2.1 A general emergency alarm system shall be provided. The alarm shall be audible throughout all the public spaces, corridors and stairways, crew accommodation and normal crew working spaces and open decks, and the sound pressure level shall be at least 10 dB(A) above ambient noise levels under way in normal cruise operation. The alarm shall continue to function after it has been triggered until it is normally turned off or is temporarily interrupted by a message on the public address system.

4.2.2 There shall be a public address system covering all areas where passengers and crew have access, escape routes, and places of embarkation into survival craft. The system shall be such that flooding or fire in any compartment does not render other parts of the system inoperable. The public address system and its performance standards shall be approved by the Administration having regard to the recommendations developed by the Organization.

4.2.3 All passenger craft shall be equipped with illuminated or luminous notices or video information system(s) visible to all sitting passengers, in order to notify them of safety measures.

4.2.4 The master shall, by means of the public address system and the visual information system, be able to request passengers "please be seated" when found to be appropriate to safeguard passengers and always when the safety level 1 according to table 1 of annex 3 is exceeded.

4.3 Design acceleration levels

4.3.1 For passenger craft, superimposed vertical accelerations above 1 g at longitudinal centre of gravity shall be avoided unless special precautions are taken with respect to passenger safety.

4.3.2 Passenger craft shall be designed for the collision design acceleration g_{coll} with respect to the safety in, and escape from, the public spaces, crew accommodation and escape routes, including in way of life-saving appliances and emergency source of power. The size and type of craft together with speed, displacement and building material shall be taken into consideration when the collision load is determined. The collision design condition shall be based on head-on impact at a defined collision speed.

4.3.3 Mounting of large masses such as main engines, auxiliary engines, lift fans, transmissions and electrical equipment shall be proved by calculation to withstand, without fracturing, the design acceleration given in table 4.3.3.

Table 4.3.3 - Design acceleration as multiples of g

Types of craft / Direction	All HSC except amphibious ACVs	Amphibious ACVs
Forward direction	g_{coll}	6
After direction	2 or g_{coll} if less	3
Transverse direction	2 or g_{coll} if less	3
Vertical direction	2 or g_{coll} if less	3

where:

g_{coll} = the collision design acceleration expressed as a multiple of the acceleration due to gravity (9.806 m/s^2)

4.3.4 Collision design acceleration g_{coll} (for craft other than amphibious ACVs where $g_{coll} = 6$) shall be calculated as follows:

$$g_{coll} = 1.2\left(\frac{P}{g \cdot \Delta}\right)$$, but not to be taken greater than 12,

where the load P shall be taken as the lesser of P_1 and P_2, where:

$$P_1 = 460\,(M \cdot C_L)^{2/3}(E \cdot C_H)^{1/3}$$

$$P_2 = 9000 \cdot M \cdot C_L\,(C_H\,D)^{1/2}$$

where the hull material factor M shall be taken as:

M = 1.3 for high tensile steel

M = 1 for aluminium alloy.

M = 0.95 for mild steel

M = 0.8 for fibre-reinforced plastics,

where the length factor C_L of the craft is:

$$C_L = \frac{(165 + L)}{245}\left(\frac{L}{80}\right)^{0.4}$$

where the height factor C_H = (80 - L)/45 but not greater than 0.75 or less than 0.3,

where the kinetic energy of the craft at speed V_{imp} is:

$$E = 0.5\ \Delta \cdot V_{imp}^{2}$$

where the main particulars of the craft are:

L = craft length as defined in chapter 1 (m)

D = depth of the craft from the underside of keel to the top of the effective hull girder (m)

Δ = craft displacement, being the mean of the lightweight and maximum operational weight (t)

V_{imp} = estimated impact speed (m/s) = two-thirds of operational speed as defined in chapter 1

g = acceleration due to gravity = 9.806 m/s^2.

For hydrofoils, the collision design acceleration, g_{coll} shall be taken as the greater of either the g_{coll} as calculated above or:

$$g_{coll} = F/(g \cdot \Delta)$$

where:

F = failure load of bow foil assembly applied at the operational waterline (kN).

4.3.5 As an alternative to the requirements of 4.3.4, the collision design acceleration g_{coll} may be determined by carrying out a collision load analysis of the craft on a vertical rock having a maximum height of 2 m above the waterline and using the same assumption for displacement Δ and impact speed V_{imp} as described in 4.3.4. This evaluation may be carried out as part of the safety analysis. If the collision design accelerations are determined by both 4.3.4 and the collision load analysis, the lower resulting value may be used as the collision design acceleration.

4.3.6 Compliance with the provisions of 4.1.5 and 4.3.1 shall be shown for the actual type of craft, as described in annex 9.

4.3.7 Limiting sea states for operation of the craft shall be given in normal operation condition and in the worst intended conditions, at operational speed and at reduced speed as necessary.

4.4 Accommodation design

4.4.1 The public spaces, control stations and crew accommodation of high-speed craft shall be located and designed to protect passengers and crew in the design collision condition. In this respect, these spaces shall not be located forward of a transverse plane (see figure 4.4.1) such that:

A_{bow} = 0.0035 A m f V, but never less than 0.04 A,

where:

A_{bow} = the plan projected area of craft energy absorbing structure forward of the transverse plane (m^2)

A = total plan projected area of craft (m^2)

m = material factor = $\frac{0.95}{M}$

M = appropriate hull material factor as given in 4.3.4

Where materials are mixed, the material factor shall be taken as a weighted mean, weighted according to the mass of material in the area defined by A_{bow}.

f = framing factor as follows:

- longitudinal deck and shell stiffening = 0.8
- mixed longitudinal and transverse = 0.9
- transverse deck and shell stiffening = 1

V = operational speed (m/s).

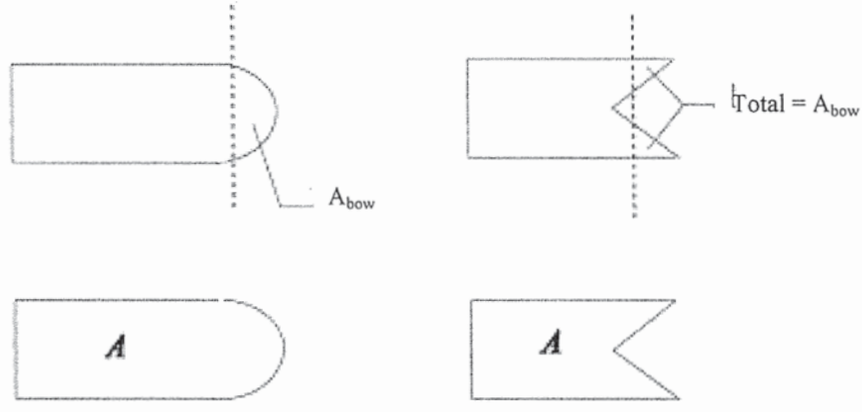


Figure 4.4.1: Plan view of two different craft styles

4.4.2 The public spaces and crew accommodation shall be designed based on the guidelines given in table 4.4.2 or by other methods which have been proven to give equal protective qualities.

4.4.3 Equipment and baggage in public spaces and in the operator's compartment shall be positioned and secured so that they remain in the stowed position when exposed to the collision design acceleration according to 4.3.4, 4.3.5 and table 4.3.3.

4.4.4 Seats, life-saving appliances and items of substantial mass and their supporting structure shall not deform or dislodge under any loads up to those specified in 4.3.4, 4.3.5 and table 4.3.3 in any manner that would impede subsequent rapid evacuation of passengers.

4.4.5 There shall be adequate handholds on both sides of any passage to enable passengers to steady themselves while moving about.

Table 4.4.2 - Overview general design guidelines*

Design level 1: g_{coll} less than 3	
1	Seat/seat belts
1.1	Low or high seatback
1.2	No restrictions on seating direction
1.3	Sofas allowed
1.4	No seat belts requirement
2	Tables in general allowed
3	Padding of projecting objects
4	Kiosks, bars, etc., no special restrictions
5	Baggage, no special requirements
6	Large masses, restrainment and positioning
Design level 2: g_{coll} = 3 to 12	
1	Seat/seat belts
1.1	High seatback with protective deformation and padding
1.2	Forward or backward seating direction
1.3	No sofas allowed as seat
1.4	Lap belt in seats when no protective structure forward
2	Tables with protective features allowed. Dynamic testing
3	Padding of projecting objects
4	Kiosks, bars, etc., on aft side of bulkheads, or other specially approved arrangements
5	Baggage placed with protection forward
6	Large masses, restrainment and positioning

* Other arrangements may be employed if an equivalent level of safety is achieved.

4.5 Seating construction

4.5.1 A seat shall be provided for each passenger and crew member for which the craft is certified to carry. Such seats shall be arranged in enclosed spaces.

4.5.2 Seats fitted in addition to those required under 4.5.1 and which are not permitted to be used in hazardous navigational situations or potentially dangerous weather or sea conditions need not comply with 4.5 or 4.6. Such seats shall be secured according to 4.4.4 and clearly identified as not being able to be used in hazardous situations.

4.5.3 The installation of seats shall be such as to allow adequate access to any part of the accommodation space. In particular, they shall not obstruct access to, or use of, any essential emergency equipment or means of escape.

4.5.4 Seats and their attachments, and the structure in the proximity of the seats, shall be of a form and design, and so arranged, such as to minimize the possibility of injury and to avoid trapping of the passengers after the assumed damage in the collision design condition according to 4.4.1. Dangerous projections and hard edges shall be eliminated or padded.

4.5.5 Seats, seat belts, seat arrangements and adjacent parts such as tables shall be designed for the actual collision design acceleration as specified in 4.3.4.

4.5.6 All seats, their supports and their deck attachments shall have good energy-absorbing characteristics and shall meet the requirements of annex 10.

4.6 Safety belts

4.6.1 One-hand-release safety belts of three-point type or with shoulder harness shall be provided for all seats from which the craft may be operated for all craft with the g_{coll} acceleration from the collision design acceleration exceeding 3g, as prescribed in 4.3.4.

4.6.2 Safety belts shall be provided on passenger seats and crew seats, if necessary, to obtain the protective performance measures described in annex 10.

4.7 Exits and means of escape

4.7.1 In order to ensure immediate assistance from the crew in an emergency situation, the crew accommodation, including any cabins, shall be located with due regard to easy, safe and quick access to the public spaces from inside the craft. For the same reason, easy, safe and quick access from the operating compartment to the public spaces shall be provided.

4.7.2 The design of the craft shall be such that all occupants may safely evacuate the craft into survival craft under all emergency conditions, by day or by night. The positions of all exits which may be used in an emergency, and of all life-saving appliances, the practicability of the evacuation procedure, and the evacuation time to evacuate all passengers and crew shall be demonstrated.

4.7.3 Public spaces, evacuation routes, exits, lifejacket stowage, survival craft stowage, and the embarkation stations shall be clearly and permanently marked and illuminated as required in chapter 12.

4.7.4 Each enclosed public space and similar permanently enclosed space allocated to passengers or crew shall be provided with at least two exits as widely separated as practical. All exits shall clearly indicate the directions to the evacuation station and safe areas. On category A craft and cargo craft, at least one exit shall give access to the evacuation station serving the persons in the enclosed space considered, and all other exits shall give access to a position on the open deck from which access to an evacuation station is provided. On category B craft, exits shall provide access to the alternative safe area required by 7.11.1; external routes may be accepted providing that the requirements of 4.7.3 and 4.7.11 are complied with.

4.7.5 Subdivision of public spaces to provide refuge in case of fire may be required in compliance with 7.4.4.1 and 7.11.1.

4.7.6 Exit doors shall be capable of being readily operated from inside and outside the craft in daylight and in darkness. The means of operation shall be obvious, rapid and of adequate strength. Doors along escape routes should, wherever appropriate, open in the direction of escape flow from the space served.

4.7.7 The closing, latching and locking arrangements for exits shall be such that it is readily apparent to the appropriate crew member when the doors are closed and in a safe operational condition, either in direct view or by an indicator. The design of external doors shall be such as to minimize the possibility of jamming by ice or debris.

4.7.8 The craft shall have a sufficient number of exits which are suitable to facilitate the quick and unimpeded escape of persons wearing approved lifejackets in emergency conditions, such as collision damage or fire.

4.7.9 Sufficient space for a crew member shall be provided adjacent to exits for ensuring the rapid evacuation of passengers.

4.7.10 All exits, together with their means of opening, shall be adequately marked for the guidance of passengers. Adequate marking shall also be provided for the guidance of rescue personnel outside the craft.

4.7.11 Footholds, ladders, etc., provided to give access from the inside to exits shall be of rigid construction and permanently fixed in position. Permanent handholds shall be provided whenever necessary to assist persons using exits, and shall be suitable for conditions when the craft has developed any possible angles of list or trim.

4.7.12 At least two unobstructed evacuation paths shall be available for the use of each person. Evacuation paths shall be disposed such that adequate evacuation facilities will be available in the event of any likely damage or emergency conditions, and evacuation paths shall have adequate lighting supplied from the main and emergency sources of power.

4.7.13 The width of corridors, doorways and stairways which form part of the evacuation paths shall be not less than 900 mm for passenger craft and 700 mm for cargo craft. This width may be reduced to 600 mm for corridors, doorways and stairways serving spaces where persons are not normally employed. There shall be no protrusions in evacuation paths which could cause injury, ensnare clothing, damage lifejackets or restrict evacuation of disabled persons.

4.7.14 Adequate notices shall be provided to direct passengers to exits.

4.7.15 Provision shall be made on board for embarkation stations to be properly equipped for evacuation of passengers into life-saving appliances. Such provision shall include handholds, anti-skid treatment of the embarkation deck, and adequate space which is clear of cleats, bollards and similar fittings.

4.7.16 Main propulsion machinery spaces and ro-ro spaces shall be provided with two means of escape leading to a position outside the spaces from which a safe route to the evacuation stations is available. One means of escape from the main propulsion machinery spaces shall avoid direct access to any ro-ro space. Main propulsion machinery spaces having a length of less than 5 m

and not being routinely entered or continuously manned, may be provided with a single means of escape.

4.8 Evacuation time

4.8.1 The provisions for evacuation shall be designed such that the craft can be evacuated under controlled conditions in a time of one third of the structural fire protection time (SFP) provided in 7.4.2 for areas of major fire hazard areas after subtracting a period of 7 min for initial detection and extinguishing action.

$$\text{Evacuation time} = \frac{(\text{SFP} - 7)}{3} \text{ (min)}$$

where:

SFP = structural fire protection time (min)

4.8.2 An evacuation procedure, including an evacuation analysis carried out taking into account the guidelines developed by the Organization shall be developed for the information of the Administration in connection with the approval of fire insulation plans and for assisting the owners and builders in planning the evacuation demonstration required in 4.8.3. The evacuation procedures shall include:

.1 the emergency announcement made by the master;

.2 contact with base port;

.3 the donning of lifejackets;

.4 manning of survival craft and emergency stations;

.5 the shutting down of machinery and oil fuel supply lines;

.6 the order to evacuate;

.7 the deployment of survival craft and marine escape systems and rescue boats;

.8 the bowsing in of survival craft;

.9 the supervision of passengers;

.10 the orderly evacuation of passengers under supervision;

.11 crew checking that all passengers have left the craft;

.12 the evacuation of crew;

.13 releasing the survival craft from the craft; and

.14 the marshalling of survival craft by the rescue boat, where provided.

4.8.3 Achievement of the required evacuation time (as ascertained in accordance with 4.8.1) shall be verified by a practical demonstration conducted under controlled conditions in the presence of the Administration, and shall be fully documented and verified for passenger craft by the Administration.

4.8.4 Evacuation demonstrations shall be carried out with due concern for the problems of mass movement or panic acceleration likely to arise in an emergency situation when rapid evacuation is necessary. The evacuation demonstrations shall be dry shod with the survival craft initially in their stowed positions and be conducted as follows:

.1 The evacuation time on a category A craft shall be the time elapsed from the moment the first abandon craft announcement is given, with any passengers distributed in a normal voyage configuration, until the last person has embarked in a survival craft, and shall include the time for passengers and crew to don lifejackets.

.2 The evacuation time on a category B craft and cargo craft shall be the time elapsed from the moment the order to abandon the craft is given until the last person has embarked in a survival craft. Passengers and crew may be wearing lifejackets and prepared for evacuation, and they may be distributed among assembly stations.

.3 For all craft the evacuation time shall include the time necessary to launch, inflate and secure the survival craft alongside ready for embarkation.

4.8.5 The evacuation time shall be verified by an evacuation demonstration which shall be performed using the survival craft and exits on one side, for which the evacuation analysis indicates the greatest evacuation time, with the passengers and crew allocated to them.

4.8.6 On craft where a half trial is impracticable, the Administration may consider a partial evacuation trial using a route which the evacuation analysis shows to be the most critical.

4.8.7 The demonstration shall be carried out in controlled conditions in the following manner in compliance with the evacuation plan.

.1 The demonstration shall commence with the craft afloat in harbour, in reasonably calm conditions, with all machinery and equipment operating in the normal seagoing condition.

.2 All exits and doors inside the craft shall be in the same position as they are under normal seagoing condition.

.3 Safety belts, if required, shall be fastened.

.4 The evacuation routes for all passengers and crew shall be such that no person need enter the water during the evacuation.

4.8.8 For passenger craft, a representative composition of persons with normal health, height and weight shall be used in the demonstration, and shall consist of different sexes and ages so far as it is practicable and reasonable.

4.8.9 The persons, other than the crew selected for the demonstration, shall not have been specially drilled for such a demonstration.

4.8.10 An emergency evacuation demonstration shall be carried out for all new designs of high-speed craft and for other craft where evacuation arrangements differ substantially from those previously tested.

4.8.11 The specific evacuation procedure followed during the craft's initial demonstration on which certification is based shall be included in the craft operating manual together with the other evacuation procedures contained in 4.8.2. During the demonstration, video recordings shall be made, both inside and outside the craft, which shall form an integral part of the training manual required by 18.2.

4.9 Baggage, stores, shops and cargo compartments

4.9.1 Provision shall be made to prevent shifting of baggage, stores and cargo compartment contents, having due regard to occupied compartments and accelerations likely to arise. If safeguarding by positioning is not practicable, adequate means of restraint for baggage, stores and cargo shall be provided. Shelves and overhead shelves for storage of carry-on baggage in public spaces shall be provided with adequate means to prevent the luggage from falling out in any conditions that may occur.

4.9.2 Controls, electric equipment, high-temperature parts, pipelines or other items, the damage or failure of which could affect the safe operation of the craft or which may require access by crew members during a voyage, shall not be located in baggage, store and cargo compartments unless such items are adequately protected so that they cannot be damaged or, where applicable, operated inadvertently by loading, by unloading or by movement of the contents of the compartment.

4.9.3 Loading limits, if necessary, shall be durably marked in those compartments.

4.9.4 Having regard to the purpose of the craft, the closures of the exterior openings of the luggage and cargo compartments as well as special category spaces shall be appropriately weathertight.

4.10 Noise levels

4.10.1 The noise level in public spaces and crew accommodation shall be kept as low as possible to enable the public address system to be heard, and shall not in general exceed 75 dB(A).

4.10.2 The maximum noise level in the operating compartment shall not in general exceed 65 dB(A) to facilitate communication within the compartment and external radiocommunications.

4.11 Protection of the crew and passengers

4.11.1 Efficient guard rails or bulwarks shall be fitted on all exposed parts of decks to which crew or passengers have access. Alternative arrangements such as safety harnesses and jack-stays may be accepted if they provide an equivalent level of safety. The height of the bulwarks or guard rails shall be at least 1 m from the deck, provided that where this height would interfere with the normal operation of the craft, a lesser height may be approved.

4.11.2 The opening below the lowest course of the guard rails shall not exceed 230 mm. The other courses shall be not more than 380 mm apart. In the case of craft with rounded gunwales the guard rail supports shall be placed on the flat of the deck.

4.11.3 Satisfactory means (in the form of guard rails, life lines, gangways or underdeck passages, etc.) shall be provided for the protection of the crew in getting to and from their quarters, the machinery space and all other parts used in the necessary work of the craft.

4.11.4 Deck cargo carried on any craft shall be so stowed that any opening which is in way of the cargo and which gives access to and from the crew's quarters, the machinery space and all other parts used in the necessary work of the craft, can be properly closed and secured against the admission of water. Effective protection for the crew in the form of guard rails or life lines shall be provided above the deck cargo if there is no convenient passage on or below the deck of the craft.

CHAPTER 5

DIRECTIONAL CONTROL SYSTEMS

5.1 General

5.1.1 Craft shall be provided with means for directional control of adequate strength and suitable design to enable the craft's heading and direction of travel to be effectively controlled to the maximum extent possible in the prevailing conditions and craft speed without undue physical effort at all speeds and in all conditions for which the craft is to be certificated. The performance shall be verified in accordance with annex 9.

5.1.2 Directional control may be achieved by means of air or water rudders, foils, flaps, steerable propellers or jets, yaw control ports or side thrusters, differential propulsive thrust, variable geometry of the craft or its lift-system components or by a combination of these devices.

5.1.3 For the purpose of this chapter, a directional control system includes any steering device or devices, any mechanical linkages and all power or manual devices, controls and actuating systems.

5.1.4 Attention is drawn to the possibility of interaction between directional control systems and stabilisation systems. Where such interaction occurs or where dual-purpose components are fitted, the requirements of 12.5 and chapters 16 and 17 are also to be complied with, as applicable.

5.2 Reliability

5.2.1 The probability of total failure of all directional control systems shall be extremely remote when the craft is operating normally, i.e., excluding emergency situations such as grounding, collision or a major fire.

5.2.2 A design incorporating a power drive or an actuation system employing powered components for normal directional control shall provide a secondary means of actuating the device unless an alternative system is provided.

5.2.3 The secondary means of actuating the directional control device may be manually driven when the Administration is satisfied that this is adequate, bearing in mind the craft's size and design and any limitations of speed or other parameters that may be necessary.

5.2.4 The directional control systems shall be constructed so that a single failure in one drive or system, as appropriate, will not render any other one inoperable or unable to bring the craft to a safe situation. The Administration may allow a short period of time to permit the connection of a secondary control device when the design of the craft is such that such delay will not, in their opinion, hazard the craft.

5.2.5 A failure mode and effect analysis shall include the directional control system.

5.2.6 If necessary to bring the craft to a safe condition, power drives for directional control devices, including those required to direct thrust forward or astern, shall become operative automatically, and respond correctly, within 5 s of power or other failure. Back-up electrical

systems may be required for the starting-up time of an auxiliary diesel according to 12.2 or an emergency diesel generator according to 12.3.6.

5.2.7 Directional control devices involving variable geometry of the craft or its lift system components shall, so far as is practicable, be so constructed that any failure of the drive linkage or actuating system will not significantly hazard the craft.

5.3 Demonstrations

5.3.1 The limits of safe use of any of the control system devices, shall be based on demonstrations and a verification process in accordance with annex 9.

5.3.2 Demonstration in accordance with annex 9 shall determine any adverse effects upon safe operation of the craft in the event of an uncontrollable total deflection of any one control device. Any limitation on the operation of the craft as may be necessary to ensure that the redundancy or safeguards in the systems provide equivalent safety shall be included in the craft operating manual.

5.4 Control position

5.4.1 All directional control systems shall normally be operated from the craft's operating station.

5.4.2 If directional control systems can also be operated from other positions, then two-way communication shall be arranged between the operating station and these other positions.

5.4.3 Adequate indications shall be provided at the operating station and these other positions to provide the person controlling the craft with verification of the correct response of the directional control device to this demand, and also to indicate any abnormal responses or malfunction. The indications of steering response or rudder angle indicator shall be independent of the system for directional control. The logic of such feedback and indications shall be consistent with the other alarms and indications so that in an emergency operators are unlikely to be confused.

CHAPTER 6

ANCHORING, TOWING AND BERTHING

6.1 General

6.1.1 A primary assumption made in this chapter is that high-speed craft will only need an anchor for emergency purposes.

6.1.2 The arrangements for anchoring, towing and berthing and the local craft structure, the design of the anchor, towing and berthing arrangements and the local craft structure shall be such that risks to persons carrying out anchoring, towing or berthing procedures are kept to a minimum.

6.1.3 All anchoring equipment, towing bitts, mooring bollards, fairleads, cleats and eyebolts shall be so constructed and attached to the hull that, in use up to design loads, the watertight integrity of the craft will not be impaired. Design loads and any directional limitations assumed shall be listed in the craft operating manual.

6.2 Anchoring

6.2.1 High-speed craft shall be provided with at least one anchor with its associated cable or cable and warp and means of recovery. Every craft shall be provided with adequate and safe means for releasing the anchor and its cable and warp.

6.2.2 Good engineering practice shall be followed in the design of any enclosed space containing the anchor-recovery equipment to ensure that persons using the equipment are not put at risk. Particular care shall be taken with the means of access to such spaces, the walkways, the illumination and protection from the cable and the recovery machinery.

6.2.3 Adequate arrangements shall be provided for two-way voice communication between the operating compartment and persons engaged in dropping, weighing or releasing the anchor.

6.2.4 The anchoring arrangements shall be such that any surfaces against which the cable may chafe (for example, hawse pipes and hull obstructions) are designed to prevent the cable from being damaged and fouled. Adequate arrangements shall be provided to secure the anchor under all operational conditions.

6.2.5 The craft shall be protected so as to minimize the possibility of the anchor and cable damaging the structure during normal operation.

6.3 Towing

6.3.1 Adequate arrangements shall be provided to enable the craft to be towed in the worst intended conditions. Where towage is to be from more than one point, a suitable bridle shall be provided.

6.3.2 The towing arrangements shall be such that any surface against which the towing cable may chafe (for example fairleads) is of sufficient radius to prevent the cable being damaged when under load.

6.3.3 The maximum permissible speed at which the craft may be towed shall be included in the operating manual.

6.4 Berthing

6.4.1 Where necessary, suitable fairleads, bitts and mooring ropes shall be provided.

6.4.2 Adequate storage space for mooring lines shall be provided such that they are readily available and secured against the high relative wind speeds and accelerations which may be experienced.

CHAPTER 7

FIRE SAFETY

PART A - GENERAL

7.1 General requirements

7.1.1 The following basic principles underlie the provisions in this chapter and are embodied therein as appropriate, having regard to the category of craft and the potential fire hazard involved:

.1 maintenance of the main functions and safety systems of the craft, including propulsion and control, fire-detection, alarms and extinguishing capability of unaffected spaces, after fire in any one compartment on board;

.2 division of the public spaces for category B craft, in such a way that the occupants of any compartment can escape to an alternative safe area or compartment in case of fire;

.3 subdivision of the craft by fire-resisting boundaries;

.4 restricted use of combustible materials and materials generating smoke and toxic gases in a fire;

.5 detection, containment and extinction of any fire in the space of origin;

.6 protection of means of escape and access for fire fighting; and

.7 immediate availability of fire-extinguishing appliances.

7.1.2 The requirements in this chapter are based on the following conditions:

.1 Where a fire is detected, the crew immediately puts into action the fire-fighting procedures, informs the base port of the accident and prepares for the escape of passengers to alternative safe area or compartment, or, if necessary, for the evacuation of passengers.

.2 The use of fuel with a flashpoint below 43°C is not recommended. However, fuel with a lower flashpoint, but not lower than 35°C, may be used in gas turbines only subject to compliance with the provisions specified in 7.5.1 to 7.5.6.

.3 The repair and maintenance of the craft is carried out in accordance with the requirements given in chapters 18 and 19.

.4 Enclosed spaces having reduced lighting, such as cinemas, discothèques, and similar spaces are not permitted.

.5 Passenger access to special category spaces and open ro-ro spaces is prohibited during the voyage except when accompanied by a crew member responsible for fire safety. Only authorized crew members shall be permitted to enter cargo spaces at sea.

7.2 Definitions

7.2.1 "Fire-resisting divisions" are those divisions formed by bulkheads and decks which comply with the following:

.1 They shall be constructed of non-combustible or fire-restricting materials which by insulation or inherent fire-resisting properties satisfy the requirements of 7.2.1.2 to 7.2.1.6.

.2 They shall be suitably stiffened.

.3 They shall be so constructed as to be capable of preventing the passage of smoke and flame up to the end of the appropriate fire protection time.

.4 Where required they shall maintain load-carrying capabilities up to the end of the appropriate fire protection time.

.5 They shall have thermal properties such that the average temperature on the unexposed side will not rise more than 140°C above the original temperature, nor will the temperature, at any one point, including any joint, rise more than 180°C above the original temperature during the appropriate fire protection time.

.6 A test of a prototype bulkhead or deck in accordance with the Fire Test Procedures Code shall be required to ensure that it meets the above requirements.

7.2.2 "Fire-restricting materials" are those materials which have properties complying with the Fire Test Procedures Code.

7.2.3 "Non-combustible material" is a material which neither burns nor gives off flammable vapours in sufficient quantity for self-ignition when heated to approximately 750°C, this being determined in accordance with the Fire Test Procedures Code.

7.2.4 "A standard fire test" is one in which specimens of the relevant bulkheads, decks or other constructions are exposed in a test furnace by a specified test method in accordance with the Fire Test Procedures Code.

7.2.5 Where the words "steel or other equivalent material" occur, "equivalent material" means any non-combustible material which, by itself or due to insulation provided, has structural and integrity properties equivalent to steel at the end of the applicable exposure to the standard fire test (e.g., aluminium alloy with appropriate insulation).

7.2.6 "Low flame-spread" means that the surface thus described will adequately restrict the spread of flame, this being determined in accordance with the Fire Test Procedures Code.

7.2.7 "Smoke-tight" or "capable of preventing the passage of smoke" means that a division made of non-combustible or fire-restricting materials is capable of preventing the passage of smoke.

7.3 Classification of space use

7.3.1 For the purposes of classification of space use in accordance with fire hazard risks, the following grouping shall apply:

.1 "Areas of major fire hazard", referred to in tables 7.4-1 and 7.4-2 by A, include the following spaces:

- machinery spaces
- ro-ro spaces
- spaces containing dangerous goods
- special category spaces
- store-rooms containing flammable liquids
- galleys
- sales shops having a deck area of 50 m^2 or greater and containing flammable liquids for sale
- trunks in direct communication with the above spaces.

.2 "Areas of moderate fire hazard", referred to in tables 7.4-1 and 7.4-2 by B, include the following spaces:

- auxiliary machinery spaces, as defined in 1.4.4
- bond stores containing packaged beverages with alcohol content not exceeding 24% by volume
- crew accommodation containing sleeping berths
- service spaces
- sales shops having a deck area of less than 50 m^2 containing a limited amount of flammable liquids for sale and where no dedicated store is provided separately
- sales shops having a deck area of 50 m^2 or greater not containing flammable liquids
- trunks in direct communication with the above spaces.

.3 "Areas of minor fire hazard", referred to in tables 7.4-1 and 7.4-2 by C, include the following spaces:

- auxiliary machinery spaces, as defined in 1.4.5
- cargo spaces

- fuel tank compartments
- public spaces
- tanks, voids and areas of little or no fire risk
- refreshment kiosks
- sales shops other than those specified in 7.3.1.1 and 7.3.1.2
- corridors in passenger areas and stairway enclosures
- crew accommodation other than that mentioned in 7.3.1.2
- trunks in direct communication with the above spaces.

.4 "Control stations", referred to in tables 7.4-1 and 7.4-2 by D, as defined in 1.4.15.

.5 "Evacuation stations and external escape routes", referred to in tables 7.4-1 and 7.4-2 by E, include the following areas:

- external stairs an open decks used for escape routes
- assembly stations, internal and external
- open deck spaces and enclosed promenades forming lifeboat and liferaft embarkation and lowering stations
- the craft's side to the waterline in the lightest seagoing condition, superstructure and deckhouse sides situated below and adjacent to the liferaft's and evacuation slide's embarkation areas.

.6 "Open spaces", referred to in tables 7.4-1 and 7.4-2 by F, include the following areas:

- open spaces locations other than evacuation stations and external escape routes and control stations.

7.3.2 In approving structural fire protection details, the Administration shall have regard to the risk of heat transmission at intersections and terminal points of required thermal barriers.

Table 7.4-1

Structural fire protection times for separating bulkheads and decks of passenger craft

	A	B	C	D	E	F
Areas of major fire hazard A	60 / 60 *1,2* / *1,2*	30 / 60 *1*	60 *3* / *1,8*	60 *3,4* / *1*	60 *3* / *1*	- / 60 *1,7,9*
Areas of moderate fire hazard B		30 / 30 *2* / *2*	30 *3* / *8*	60 *3,4*	30 *3*	- / *3*
Areas of minor fire hazard C			*3* / *3*	30 *3,4* / *8,10*	*3* / *3*	- / *3*
Control stations D				*3,4* / *3,4*	*3* / *3,4*	- / *3*
Evacuation stations And escape routes E					*3* / *3*	- / *3*
Open spaces F						- / -

Table 7.4-2

Structural fire protection times for separating bulkheads and decks of cargo craft

	A	B	C	D	E	F
Areas of major fire hazard A	60 / 60 *1,2* — 60 *1,2*	30 / 60 *1* — 60 *1*	3 / 60 *1,8* — 60 *1,8*	*3,4* / 60 *1* — 60 *1*	3 / 60 *1* — 60 *1*	- / 60 *1,7,9* — 60 *1,7,9*
Areas of moderate fire hazard B		*2,6* / 60 — *2,6*	3 / 6 — *6*	*3,4* / 60 — 60	3 / 6 — 6	- / 3 — *3*
Areas of minor fire hazard C			3 / 30 *8* — *3*	*3,4* / 30 *8* — *3,4*	3 / 3 — *3*	- / 3 — *3*
Control stations D				*3,4* / 3 *3,4* — *3,4*	3 / 3 *3,4* — *3,4*	- / 3 — *3*
Evacuation stations and escape routes E					3 / 3 — 3	- / 3 — *3*
Open spaces F						- / - — -

NOTES:

The figures on either side of the diagonal line represent the required structural fire protection time for the protection system on the relevant side of the division. When steel construction is used and two different structural fire protection times are required for a division in the table, only the greater one need be applied.

1 The upper side of the decks of special category spaces, ro-ro spaces and open ro-ro spaces need not be insulated.

2 Where adjacent spaces are in the same alphabetical category and a note 2 appears, a bulkhead or deck between such spaces need not be fitted if deemed unnecessary by the Administration. For example, a bulkhead need not be required between two store-rooms. A bulkhead, is however, required between a machinery space and a special category space even through both spaces are in the same category.

3 No structural fire protection requirements; however, a smoke-tight division made of non-combustible or fire restricting material is required.

4 Control stations which are also auxiliary machinery spaces shall be provided with 30 min structural fire protection.

5 There are no special requirements for material or integrity of boundaries where only a dash appears in the tables.

6 The fire protection time is 0 min and the time for prevention of passage of smoke and flame is 30 min as determined by the first 30 min of the standard fire test.

7 Fire resisting divisions need not comply with 7.2.1.5.

8 When steel construction is used, fire resisting divisions adjacent to void spaces need not comply with 7.2.1.5.

9 The fire protection time may be reduced to 0 min for those parts of open ro-ro spaces which are not essential parts of the craft's main load bearing structure, where passengers have no access to them and the crew need not have access to them during any emergency.

10 On category A craft, this value may be reduced to 0 min where the craft is provided with only a single public space (excluding lavatories) protected by a sprinkler system and adjacent to the operating compartment.

7.4 Structural fire protection

7.4.1 Main structure

7.4.1.1 The requirements below apply to all craft irrespective of construction material. The structural fire protection times for separating bulkheads and decks shall be in accordance with tables 7.4-1 and 7.4-2, and the structural fire protection times are all based on providing protection for a period of 60 min as referred to in 4.8.1. If any other lesser structural fire protection time is determined for category A craft and cargo craft by 4.8.1, then the times given below in 7.4.2.2 and 7.4.2.3 may be amended pro rata. In no case shall the structural fire protection time be less than 30 min.

7.4.1.2 In using tables 7.4-1 and 7.4-2, it shall be noted that the title of each category is intended to be typical rather than restricted. For determining the appropriate fire integrity standards to be applied to boundaries between adjacent spaces, where there is doubt as to their classification for the purpose of this section, they shall be treated as spaces within the relevant category having the most stringent boundary requirement.

7.4.1.3 The hull, superstructure, structural bulkheads, decks, deckhouses and pillars shall be constructed of approved non-combustible materials having adequate structural properties. The use of other fire-restricting materials may be permitted provided the requirements of this chapter are complied with and the materials are in compliance with the Fire Test Procedures Code.

7.4.2 Fire-resisting divisions

7.4.2.1 Areas of major and moderate fire hazard shall be enclosed by fire-resisting divisions complying with the requirements of 7.2.1 except where the omission of any such division would not affect the safety of the craft. These requirements need not apply to those parts of the structure in contact with water at the lightweight condition, but due regard shall be given to the effect of temperature of hull in contact with water and heat transfer from any uninsulated structure in contact with water to insulated structure above the water.

7.4.2.2 Fire-resisting bulkheads and decks shall be constructed to resist exposure to the standard fire test for a period of 30 min for areas of moderate fire hazard and 60 min for areas of major fire hazard except as provided in 7.4.1.1.

7.4.2.3 Main load-carrying structures within areas of major fire hazard and areas of moderate fire hazard and structures supporting control stations shall be arranged to distribute load such that there will be no collapse of the construction of the hull and superstructure when it is exposed to fire for the appropriate fire protection time. The load-carrying structure shall also comply with the requirements of 7.4.2.4 and 7.4.2.5.

7.4.2.4 If the structures specified in 7.4.2.3 are made of aluminium alloy their installation shall be such that the temperature of the core does not rise more than 200°C above the ambient temperature in accordance with the times in 7.4.1.1 and 7.4.2.2.

7.4.2.5 If the structures specified in 7.4.2.3 are made of combustible material, their insulation shall be such that their temperatures will not rise to a level where deterioration of the construction will occur during the exposure to the standard fire test in accordance with the Fire Test Procedures Code to such an extent that the load-carrying capability, in accordance with the times in 7.4.1.1 and 7.4.2.3, will be impaired.

7.4.2.6 The construction of all doors, and door frames in fire-resisting divisions, with the means of securing them when closed, shall provide resistance to fire as well as to the passage of smoke and flame equivalent to that of the bulkheads in which they are situated. Watertight doors of steel need not be insulated. Also, where a fire-resisting division is penetrated by pipes, ducts, electrical cables etc., arrangements shall be made to ensure that the fire-resisting integrity of the division is not impaired, and necessary testing shall be carried out in accordance with the Fire Test Procedures Code.

7.4.3 Restricted use of combustible materials

7.4.3.1 All separating divisions, ceilings or linings if not a fire-resisting division, shall be of non-combustible or fire-restricting materials. Draught stops shall be of non-combustible or fire-restricting material.

7.4.3.2 Where insulation is installed in areas in which it could come into contact with any flammable fluids or their vapours, its surface shall be impermeable to such flammable fluids of vapours.

7.4.3.3 Furniture and furnishings in public spaces and crew accommodation shall comply with the following standards:

.1 all case furniture is constructed entirely of approved non-combustible or fire-restricting materials, except that a combustible veneer with a calorific value not exceeding 45 MJ/m^2 may be used on the exposed surface of such articles;

.2 all other furniture such as chairs, sofas and tables, is constructed with frames of non-combustible or fire-restricting materials;

.3 all draperies, curtains and other suspended textile materials have qualities of resistance to the propagation of flame, this being determined in accordance with the Fire Test Procedures Code;

.4 all upholstered furniture has qualities of resistance to the ignition and propagation of flame, this being determined in accordance with the Fire Test Procedures Code;

.5 all bedding components have qualities of resistance to the ignition and propagation of flame, this being determined in accordance with the Fire Test Procedures Code; and

.6 all deck finish materials comply with the Fire Test Procedures Code.

7.4.3.4 The following surfaces shall, as a minimum standard, be constructed of materials having low flame-spread characteristics:

.1 exposed surfaces in corridors and stairway enclosures, and of bulkheads (including windows), wall and ceiling linings in all public spaces, crew accommodation, service spaces, control stations and internal assembly and evacuation stations;

.2 surfaces in concealed or inaccessible spaces in corridors and stairway enclosures, public spaces, crew accommodation, service spaces, control stations and internal assembly and evacuation stations.

7.4.3.5 Any thermal and acoustic insulation shall be of non-combustible or of fire-restricting material. Vapour barriers and adhesives used in conjunction with insulation, as well as insulation of pipe fittings for cold service systems need not be non-combustible or fire-restricting, but they shall be kept to the minimum quantity practicable and their exposed surfaces shall have low flame spread characteristics.

7.4.3.6 Exposed surfaces in corridors and stairway enclosures, and of bulkheads (including windows), wall and ceiling linings, in all public spaces, crew accommodation, service spaces, control stations and internal assembly and evacuation stations shall be constructed of materials which, when exposed to fire, are not capable of producing excessive quantities of smoke or toxic products, this being determined in accordance with the Fire Test Procedures Code.

7.4.3.7 Void compartments, where low-density combustible materials are used to provide buoyancy, shall be protected from adjacent fire hazard areas by fire-resisting divisions, in accordance with tables 7.4-1 and 7.4-2. Also, the space and closures to it shall be gastight but it shall be ventilated to atmosphere.

7.4.3.8 In compartments where smoking is allowed, suitable non-combustible ash containers shall be provided. In compartments where smoking is not allowed, adequate notices shall be displayed.

7.4.3.9 The exhaust gas pipes shall be arranged so that the risk of fire is kept to a minimum. To this effect, the exhaust system shall be insulated and all compartments and structures which are contiguous with the exhaust system, or those which may be affected by increased temperatures caused by waste gases in normal operation or in an emergency, shall be constructed of non-combustible material or be shielded and insulated with non-combustible material to protect from high temperatures.

7.4.3.10 The design and arrangement of the exhaust manifolds or pipes shall be such as to ensure the safe discharge of exhaust gases.

7.4.4 Arrangement

7.4.4.1 Internal stairways connecting only two decks need only be enclosed at one deck by means of divisions and self-closing doors having the structural fire protection time as required by tables 7.4-1 and 7.4-2 for divisions separating those areas which each stairway serves. Stairways may be fitted in the open in a public space, provided they lie wholly within such public space.

7.4.4.2 Lift trunks shall be so fitted as to prevent the passage of smoke and flame from one deck to another and shall be provided with means of closing so as to permit the control of draught and smoke.

7.4.4.3 In public spaces, crew accommodation, service spaces, control stations, corridors and stairways, air spaces enclosed behind ceilings, panelling or linings shall be suitably divided by close-fitting draught stops not more than 14 m apart. On category A craft provided with only a single public space, draught stops need not be provided in such public space.

7.5 Fuel and other flammable fluid tanks and systems

7.5.1 Tanks containing fuel and other flammable fluids shall be separated from passenger, crew, and baggage compartments by vapour-proof enclosures or cofferdams which are suitably ventilated and drained.

7.5.2 Fuel oil tanks shall not be located in, be formed by any part of the structural boundary of, areas of major fire hazard. However, flammable fluids of a flashpoint not less than 60°C may be located within such areas provided the tanks are made of steel or other equivalent material.

7.5.3 Every fuel oil pipe which, if damaged, would allow oil to escape from a storage, settling or daily service tank shall be fitted with a cock or valve directly on the tank capable of being closed from a position outside the space concerned in the event of a fire occurring in the space in which such tanks are situated.

7.5.4 Pipes, valves and couplings conveying flammable fluids shall be of steel or such alternative material satisfactory to a standard, in respect of strength and fire integrity having regard to the service pressure and the spaces in which they are installed. Wherever practicable, the use of flexible pipes shall be avoided.

7.5.5 Pipes, valves and couplings conveying flammable fluids shall be arranged as far from hot surfaces or air intakes of engine installations, electrical appliances and other potential sources of ignition as is practicable and be located or shielded so that the likelihood of fluid leakage coming into contact with such sources of ignition is kept to a minimum.

7.5.6 Fuel with a flash point below 35°C shall not be used. In every craft in which fuel with a flashpoint below 43°C is used, the arrangements for the storage, distribution and utilization of the fuel shall be such that, having regard to the hazard of fire and explosion which the use of such fuel may entail, the safety of the craft and of persons on board is preserved. The arrangements shall comply, in addition to the requirements of 7.5.1 to 7.5.5, with the following provisions:

.1 tanks for the storage of such fuel shall be located outside any machinery space and at a distance of not less than 760 mm inboard from the shell side and bottom plating, and from decks and bulkheads;

.2 arrangements shall be made to prevent overpressure in any fuel tank or in any part of the oil fuel system, including the filling pipes. Any relief valves and air or overflow pipes shall discharge to a position which, in the opinion of the Administration, is safe;

.3 the spaces in which fuel tanks are located shall be mechanically ventilated, using exhaust fans providing not less than six air changes per hour. The fans shall be such as to avoid the possibility of ignition of flammable gas-air mixtures. Suitable wire mesh guards shall be fitted over inlet and outlet ventilation openings. The outlets for such exhausts shall discharge to a position which, in the opinion of the Administration is safe. 'No Smoking' signs shall be posted at the entrance to such spaces;

.4 earthed electrical distribution systems shall not be used, with the exception of earthed intrinsically safe circuits;

.5 suitable certified safe type electrical equipment be used in all spaces where fuel leakage could occur, including the ventilation system. Only electrical equipment and fittings essential for operational purposes shall be fitted in such spaces;

.6 a fixed vapour-detection system shall be installed in each space through which fuel lines pass, with alarms provided at the continuously manned control station;

.7 every fuel tanks shall, where necessary, be provided with "savealls" or gutters which would catch any fuel which may leak from such tank;

.8 safe and efficient means of ascertaining the amount of fuel contained in any tank shall be provided. Sounding pipes shall not terminate in any space where the risk of ignition of spillage from the sounding pipe might arise. In particular, they shall not terminate in passenger or crew spaces. The use of cylindrical gauge glasses is prohibited, except for cargo craft where the use of oil-level gauges with flat glasses and self-closing valves between the gauges and fuel tanks may be permitted by the Administration. Other means of ascertaining the amount of fuel contained in any tank may be permitted if such means do not require penetration below the top of the tank, and providing their failure or overfilling of the tank will not permit the release of fuel;

.9 during bunkering operations, no passenger shall be on board the craft or in the vicinity of the bunkering station, and adequate 'No Smoking' and 'No Naked Lights' signs shall be posted. Vessel-to-shore fuel connections shall be of closed type and suitably grounded during bunkering operations;

.10 the provision of fire detection and extinguishing systems in spaces where non-integral fuel tanks are located shall be in accordance with requirements of 7.7.1 to 7.7.3; and

.11 refuelling of the craft shall be done at the approved refuelling facilities, detailed in the route operational manual, at which the following fire appliances are provided:

.11.1 a suitable foam applicator system consisting of monitors and foam-making branch pipes capable of delivering foam solution at a rate of not less than 500 *l*/min for not less than 10 min;

.11.2 dry powder extinguishers of a total capacity not less than 50 kg; and

.11.3 carbon dioxide extinguishers of a total capacity not less than 16 kg.

7.6 Ventilation

7.6.1 The main inlets and outlets of all ventilation systems shall be capable of being closed from outside the spaces being ventilated. In addition, such openings to areas of major fire hazard shall be capable of being closed from a continuously manned control station.

7.6.2 All ventilation fans shall be capable of being stopped from outside the spaces which they serve, and from outside the spaces in which they are installed. Ventilation fans serving areas of major fire hazard shall be capable of being operated from a continuously manned control station. The means provided for stopping the power ventilation to the machinery space shall be separated from the means provided for stopping ventilation of other spaces.

7.6.3 Areas of major fire hazard and spaces serving as assembly stations shall have independent ventilation systems and ventilation ducts. Ventilation ducts for areas of major fire hazard shall not pass through other spaces, unless they are contained within a trunk or in an extended machinery space or casing insulated in accordance with tables 7.4-1 and 7.4-2; ventilation ducts of other spaces shall not pass through areas of major fire hazard. Ventilation outlets from areas of major fire hazard shall not terminate within a distance of 1 m from any control station, evacuation station or external escape route. In addition, exhaust ducts from galley ranges shall be fitted with:

.1 a grease trap readily removable for cleaning unless an alternative approved grease removal system is fitted;

.2 a fire damper located in the lower end of the duct which is automatically and remotely operated, and in addition a remotely operated fire damper located in the upper end of the duct;

.3 a fixed means for extinguishing a fire within the duct;

.4 remote control arrangements for shutting off the exhaust fans and supply fans, for operating the fire dampers mentioned in .2 and for operating the fire-extinguishing system, which shall be placed in a position close to the entrance to the galley. Where a multi-branch system is installed, means shall be provided to close all branches exhausting through the same main duct before an extinguishing medium is released into the system; and

.5 suitably located hatches for inspection and cleaning.

7.6.4 Where a ventilation duct passes through a fire-resisting division, a fail safe automatic closing fire damper shall be fitted adjacent to the division. The duct between the division and the damper shall be of steel or other equivalent material and insulated to the same standard as required for the fire-resisting division. The fire damper may be omitted where ducts pass through spaces surrounded by fire-resisting divisions without serving those spaces providing that the duct has the same structural fire protection time as the divisions it penetrates. Where a ventilation duct passes through a smoke-tight division, a smoke damper shall be fitted at the penetration unless the duct which passes through the space does not serve that space.

7.6.5 Where ventilation systems penetrate decks, the arrangements shall be such that the effectiveness of the deck in resisting fire is not thereby impaired and precautions shall be taken to reduce the likelihood of smoke and hot gases passing from one between-deck space to another through the system.

7.6.6 All dampers fitted on fire-resisting or smoke-tight divisions shall also be capable of being manually closed from each side of the division in which they are fitted, except for those dampers fitted on ducts serving spaces not normally manned such as stores and toilets that may be manually operated only from outside the served spaces. All dampers shall also be capable of being remotely closed from the continuously manned control station.

7.6.7 Ducts shall be made of non-combustible or fire-restricting material. Short ducts, however, may be of combustible materials subject to the following conditions:

.1 their cross-section does not exceed 0.02 m^2;

.2 their length does not exceed 2 m;

.3 they may only be used at the terminal end of the ventilation system;

.4 they shall not be situated less than 600 mm from an opening in a fire-resisting or fire-restricting division; and

.5 their surfaces have low flame-spread characteristics.

7.7 Fire detection and extinguishing systems

7.7.1 Fire detection systems

Areas of major and moderate fire hazard and other enclosed spaces not regularly occupied within public spaces and crew accommodation, such as toilets, stairway enclosures, corridors and escape routes shall be provided with an approved automatic smoke detection system and manually operated call points complying with the requirements of 7.7.1.1 and 7.7.1.3 to indicate at the control station the location of outbreak of a fire in all normal operating conditions of the installations. Detectors operated by heat instead of smoke may be installed in galleys. Main propulsion machinery room(s) shall in addition have detectors sensing other than smoke and be supervised by TV cameras monitored from the operating compartment. Manually operated call points shall be installed throughout the public spaces, crew accommodation, corridors and stairway enclosures, service spaces and where necessary control stations. One manually operated call point shall be located at each exit from these spaces and from areas of major fire hazard.

7.7.1.1 General requirements

.1 Any required fixed fire-detection and fire alarm system with manually operated call points shall be capable of immediate operation at all times.

.2 Power supplies and electric circuits necessary for the operation of the system shall be monitored for loss of power or fault conditions as appropriate. Occurrence of a fault condition shall initiate a visual and audible fault signal at the control panel which shall be distinct from a fire signal.

.3 There shall be not less than two sources of power supply for the electrical equipment used in the operation of the fixed fire-detection and fire alarm system, one of which shall be an emergency source. The supply shall be provided by separate feeders reserved solely for that purpose. Such feeders shall run to an automatic change-over switch situated in or adjacent to the control panel for the fire-detection system.

.4 Detectors and manually operated call points shall be grouped into sections. The activation of any detector or manually operated call point shall initiate a visual and audible fire signal at the control panel and indicating units. If the signals have not received attention within two minutes, an audible alarm shall be automatically sounded throughout the crew accommodation and service spaces, control stations and machinery spaces. There shall be no time delay for the audible alarms in crew accommodation areas when all the control stations are unattended. The alarm sounder system need not be an integral part of the detection system.

.5 The control panel shall be located in the operating compartment or in the main fire control station.

.6 Indicating units shall, as a minimum, denote the section in which a detector or manually operated call point has operated. At least one unit shall be so located that it is easily accessible to responsible members of the crew at all times, when at sea or in port, except when the craft is out of service. One indicating unit shall be located in the operating compartment if the control panel is located in the space other than the operating compartment.

.7 Clear information shall be displayed on or adjacent to each indicating unit about the spaces covered and the location of the sections.

.8 Where the fire-detection system does not include means of remotely identifying each detector individually, no section covering more than one deck within public spaces, crew accommodation, corridors, service spaces and control stations shall normally be permitted except a section which covers an enclosed stairway. In order to avoid delay in identifying the source of fire, the number of enclosed spaces included in each section shall be limited as determined by the Administration. In no case shall more than 50 enclosed spaces be permitted in any section. If the detection system is fitted with remotely and individually identifiable fire detectors, the sections may cover several decks and serve any number of enclosed spaces.

.9 In passenger craft, if there is no fire-detection system capable of remotely and individually identifying each detector, a section of detectors shall not serve spaces on both sides of the craft nor on more than one deck and neither shall it be situated in more than one zone according to 7.11.1 except that the Administration, if it is satisfied that the protection of the craft against fire will not thereby be reduced, may permit such a section of detectors to serve both sides of the craft and more than one deck. In passenger craft fitted with individually identifiable fire detectors, a section may serve spaces on both sides of the craft and on several decks.

.10 A section of fire detectors which covers a control station, a service space, a public space, crew accommodation, corridor or stairway enclosure shall not include a machinery space of major fire hazard.

.11 Detectors shall be operated by heat, smoke or other products of combustion, flame, or any combination of these factors. Detectors operated by other factors indicative of incipient fires may be considered by the Administration provided that they are no less sensitive than such detectors. Flame detectors shall only be used in addition to smoke or heat detectors.

.12 Suitable instructions and component spares for testing and maintenance shall be provided.

.13 The function of the detection system shall be periodically tested by means of equipment producing hot air at the appropriate temperature, or smoke or aerosol particles having the appropriate range of density or particle size, or other phenomena associated with incipient fires to which the detector is designed to respond. All detectors shall be of a type such that they can be tested for correct operation and restored to normal surveillance without the renewal of any component.

.14 The fire-detection system shall not be used for any other purpose, except that closing of fire doors and similar functions may be permitted at the control panel.

.15 Fire-detection systems with a zone address identification capability shall be so arranged that:

.1 a loop cannot be damaged at more than one point by a fire;

.2 means are provided to ensure that any fault (e.g., power break; short circuit; earth) occurring in the loop shall render the whole loop ineffective;

.3 all arrangements are made to enable the initial configuration of the system to be restored in the event of failure (electrical, electronic, informatic); and

.4 the first initiated fire alarm shall not prevent any other detector to initiate further fire alarms.

7.7.1.2 Installation requirements

.1 In addition to 7.7.1, manually operated call points shall be readily accessible in the corridors of each deck such that no part of the corridor is more than 20 m from a manually operated call point.

.2 Where a fixed fire-detection and fire alarm system is required for the protection of spaces other than stairways, corridors and escape routes, at least one detector complying with 7.7.1.1.11 shall be installed in each such space.

.3 Detectors shall be located for optimum performance. Positions near beams and ventilation ducts or other positions where patterns of air flow could adversely affect performance and positions where impact or physical damage is likely shall

be avoided. In general, detectors which are located on the overhead shall be a minimum distance of 0.5 m away from bulkheads.

.4 The maximum spacing of detectors shall be in accordance with the table below:

Type of detector	Maximum floor area per detector	Maximum distance apart between centres	Maximum distance away from bulkheads
Heat	37 m^2	9 m	4.5 m
Smoke	74 m^2	11 m	5.5 m

The Administration may require or permit other spacings based upon test data which demonstrate the characteristics of the detectors.

.5 Electrical wiring which forms parts of the system shall be so arranged as to avoid machinery spaces of major fire hazard, and other enclosed spaces of major fire hazard except, where it is necessary, to provide for fire detection or fire alarm in such spaces or to connect to the appropriate power supply.

7.7.1.3 Design requirements

.1 The system and equipment shall be suitably designed to withstand supply voltage variation and transients, ambient temperature changes, vibration, humidity, shock, impact and corrosion normally encountered in ships.

.2 Smoke detectors shall be certified to operate before the smoke density exceeds 12.5 % obscuration per metre, but not until the smoke density exceeds 2% obscuration per metre. Smoke detectors to be installed in other spaces shall operate within sensitivity limits to the satisfaction of the Administration having regard to the avoidance of detector insensitivity or over-sensitivity.

.3 Heat detectors shall be certified to operate before the temperature exceeds 78°C but not until the temperature exceeds 54°C, when the temperature is raised to those limits at a rate less than 1°C per minute. At higher rates of temperature rise, the heat detector shall operate within temperature limits having regard to the avoidance to detector insensitivity or over-sensitivity.

.4 At the discretion of the Administration, the permissible temperature of operation of heat detectors may be increased to 30°C above the maximum deckhead temperature in drying rooms and similar spaces of a normal high ambient temperature.

.5 Flame detectors corresponding to 7.7.1.1.11 shall have a sensitivity sufficient to determine flame against an illuminated space background and a false signal identification system.

7.7.2 Fire detection for periodically unattended machinery spaces

A fixed fire-detection and fire alarm system for periodically unattended machinery spaces shall comply with the following requirements:

.1 The fire-detection system shall be so designed and the detectors so positioned as to detect rapidly the onset of fire in any part of those spaces and under any normal conditions of operation of the machinery and variations of ventilation as required by the possible range of ambient temperatures. Except in spaces of restricted height and where their use is specially appropriate, detection systems using only thermal detectors shall not be permitted. The detection system shall initiate audible and visual alarms distinct in both respects from the alarms of any other system not indicating fire, in sufficient places to ensure that the alarms are heard and observed on the navigating bridge and by a responsible engineer officer. When the operating compartment is unmanned the alarm shall sound in a place where a responsible member of the crew is on duty.

.2 After installation, the system shall be tested under varying conditions of engine operation and ventilation.

7.7.3 Fixed fire-extinguishing systems

7.7.3.1 Areas of major fire hazard shall be protected by an approved fixed fire-extinguishing system operable from the control position which is adequate for the fire hazard that may exist. The system shall comply with 7.7.3.2 and 7.7.3.3 or with alternative arrangements approved by the Administration taking into account the recommendations and guidelines developed by the Organization and be capable of local manual control and remote control from the continuously manned control stations.

7.7.3.2 General requirements

.1 In all craft where gas is used as the extinguishing medium, the quantity of gas shall be sufficient to provide two independent discharges. The second discharge into the space shall only be activated manually from a position outside the space being protected. Where the space has a local fire-suppression system installed, based on the guidelines developed by the Organization, to protect fuel oil, lubricating oil and hydraulic oil located near exhaust manifolds, turbo chargers or similar heated surfaces on main and auxiliary internal combustion engines, a second discharge need not be required.

.2 The use of a fire-extinguishing medium which, in the opinion of the Administration, either by itself or under expected conditions of use will adversely affect the earth's ozone layer and/or gives off toxic gases in such quantities as to endanger persons shall not be permitted.

.3 The necessary pipes for conveying fire-extinguishing medium into protected spaces shall be provided with control valves so marked as to indicate clearly the spaces to which the pipes are led. Non-return valves shall be installed in discharge lines between cylinders and manifolds. Suitable provision shall be made to prevent inadvertent admission of the medium to any space.

.4 The piping for the distribution of fire-extinguishing medium shall be arranged and discharge nozzles so positioned that a uniform distribution of medium is obtained.

.5 Means shall be provided to close all openings which may admit air to, or allow gas to escape from, a protected space.

.6 Where the volume of free air contained in air receivers in any space is such that, if released in such space in the event of fire, such release of air within that space would seriously affect the efficiency of the fixed fire-extinguishing system, the Administration shall require the provision of an additional quantity of fire-extinguishing medium.

.7 Means shall be provided for automatically giving audible warning of the release of fire-extinguishing medium into any space in which personnel normally work or to which they have access. The alarm shall operate for a suitable period before the medium is released, but not less than 20 s. Visible alarm shall be arranged in addition to the audible alarm.

.8 The means of control of any fixed gas fire-extinguishing system shall be readily accessible and simple to operate and shall be grouped together in as few locations as possible at positions not likely to be cut off by a fire in a protected space. At each location there shall be clear instructions relating to the operation of the system, having regard to the safety of personnel.

.9 Automatic release of fire-extinguishing medium shall not be permitted.

.10 Where the quantity of extinguishing medium is required to protect more than one space, the quantity of medium available need not be more than the largest quantity required for any one space so protected.

.11 Pressure containers required for the storage of fire-extinguishing medium shall be located outside protected spaces in accordance with 7.7.3.2.14. Pressure containers may be located inside the space to be protected if in the event of accidental release persons will not be endangered.

.12 Means shall be provided for the crew to safely check the quantity of medium in the containers.

.13 Containers for the storage of fire-extinguishing medium and associated pressure components shall be designed having regard to their locations and maximum ambient temperatures expected in service.

.14 When the fire-extinguishing medium is stored outside a protected space, it shall be stored in a room which shall be situated in a safe and readily accessible position and shall be effectively ventilated. Any entrance to such a storage room shall preferably be from the open deck and in any case shall be independent of the protected space. Access doors shall open outwards, and bulkheads and decks including doors and other means of closing any opening therein, which form the boundaries between such rooms and adjoining enclosed spaces, shall be gas tight. Such storage rooms shall be treated as control rooms.

.15 Spare parts for the system shall be stored on board or at a base port.

.16 If the release of a fire extinguishing medium produces significant over or under pressurisation in the protected space, means shall be provided to limit the induced pressures to acceptable limits to avoid structural damage.

7.7.3.3 Carbon dioxide systems

.1 For cargo spaces, the quantity of carbon dioxide available shall, unless otherwise provided, be sufficient to give a minimum volume of free gas equal to 30% of the gross volume of the largest cargo space so protected in the craft.

.2 For machinery spaces, the quantity of carbon dioxide carried shall be sufficient to give a minimum volume of free gas equal to the larger of the following volumes, either:

.2.1 40% of the gross volume of the largest machinery space so protected, the volume to exclude that part of the casing above the level at which the horizontal area of the casing is 40% or less of the horizontal area of the space concerned taken midway between the tank top and the lowest part of the casing; or

.2.2 35% of the gross volume of the largest machinery space protected, including the casing,

provided that the above-mentioned percentages may be reduced to 35% and 30% respectively for cargo craft of less than 2,000 gross tonnage; provided also that if two or more machinery spaces are not entirely separate they shall be considered as forming one space.

.3 For the purpose of this paragraph the volume of free carbon dioxide shall be calculated at 0.56 m^3/kg.

.4 For machinery spaces, the fixed piping system shall be such that 85% of the gas can be discharged into the space within 2 min.

.5 Two separate controls shall be provided for releasing carbon dioxide into a protected space and to ensure the activation of the alarm. One control shall be used to discharge the gas from its storage containers. A second control shall be used for opening the valve of the piping which conveys the gas into the protected spaces.

.6 The two controls shall be located inside a release box clearly identified for the particular space. If the box containing the controls is to be locked, a key to the box shall be in a break-glass type enclosure conspicuously located adjacent to the box.

7.7.4 Portable fire extinguishers

Control stations, public spaces, crew accommodation, corridors and service spaces shall be provided with portable fire extinguishers of approved type and design. At least five portable extinguishers shall be provided, and so positioned, as to be readily available for immediate use. In addition, at least one extinguisher suitable for machinery space fires shall be positioned outside each machinery space entrance.

7.7.5 Fire pumps, fire mains, hydrants and hoses

Fire pumps, and appropriate associated equipment, or alternative effective fire-extinguishing systems shall be fitted as follows:

.1 At least two independently driven pumps shall be arranged. Each pump shall have at least two-thirds the capacity of a bilge pump as determined by 10.3.5 and 10.3.6 but not less than 25 m^3/h. Each fire pump shall be able to deliver sufficient quantity and pressure of water to simultaneously operate the hydrants as required by .4.

.2 The arrangement of the pumps shall be such that in the event of a fire in any one compartment, all the fire pumps will not be put out of action.

.3 Isolating valves to separate the section of the fire main within the machinery space containing the main fire pump or pumps from the rest of the fire main shall be fitted in an easily accessible and tenable position outside the machinery spaces. The fire main shall be so arranged that when the isolating valves are shut all the hydrants on the craft, except those in the machinery space referred to above, can be supplied with water by a fire pump not located in this machinery space through pipes which do not enter this space. The spindles of manually operated valves shall be easily accessible and all valves shall be clearly marked.

.4 Hydrants shall be arranged so that any location on the craft can be reached by the water jets from two fire hoses from two different hydrants, one of the jets being from a single length of hose. Ro-ro spaces hydrants shall be located so that any location within the space can be reached by two water jets from two different hydrants, each jet being supplied from a single length of hose.

.5 Each fire hose shall be of non-perishable material and have a maximum length approved by the Administration. Fire hoses, together with any necessary fittings and tools, shall be kept ready for use in conspicuous positions near the hydrants. All fire hoses in interior locations shall be connected to the hydrants at all times. One fire hose shall be provided for each hydrant as required by .4.

.6 Each fire hose shall be provided with a nozzle of an approved dual purpose type (i.e. spray/jet type) incorporating a shutoff.

7.7.6 Protection of deep-fat cooking equipment

Where deep-fat cooking equipment is installed, all such installations shall be fitted with:

.1 an automatic or manual fixed extinguishing system tested to an appropriate standard acceptable to the Organization;

.2 a primary and back up thermostat with an alarm to alert the operator in the event of failure of either thermostat;

.3 arrangements for automatically shutting off the electrical power to the deep-fat cooking equipment upon activation of the extinguishing system;

.4 an alarm for indicating operation of the extinguishing system in the galley where the equipment is installed; and

.5 controls for manual operation of the extinguishing system which are clearly labelled for ready use by the crew.

7.8 Protection of special category spaces and ro-ro spaces

7.8.1 Structural protection

7.8.1.1 Boundaries of special category spaces shall be insulated in accordance with tables 7.4-1 and 7.4-2. The standing deck of a special category space or a ro-ro space need only be insulated on the underside if required.

7.8.1.2 Indicators shall be provided on the navigation bridge which shall indicate when any door leading to or from the special category space or ro-ro space is closed.

7.8.1.3 Fire doors in boundaries of special category spaces leading to spaces below the vehicle deck shall be arranged with coamings of a height of at least 100 mm.

7.8.2 Fixed fire-extinguishing system

Each special category space and ro-ro space shall be fitted with an approved fixed pressure water-spraying system for manual operation which shall protect all parts of any deck and vehicle platform in such space, provided that the Administration may permit the use of any other fixed fire-extinguishing system that has been shown by full-scale test in conditions simulating a flowing petrol fire in the space to be not less effective in controlling fires likely to occur in such a space.

7.8.3 Patrols and detection

7.8.3.1 A continuous fire patrol shall be maintained in special category spaces and ro-ro spaces unless a fixed fire detection and fire alarm system, complying with the requirements of 7.7.1, and a television surveillance system are provided. The fixed fire detection system shall be capable of rapidly detecting the onset of fire. The spacing and location of detectors shall be tested taking into account the effects of ventilation and other relevant factors.

7.8.3.2 Manually operated call points shall be provided as necessary throughout the special category spaces and ro-ro spaces and one shall be placed close to each exit from such spaces. Manually operated call points shall be spaced so that no part of the space shall be more than 20 m from a manually operated call point.

7.8.4 Fire-extinguishing equipment

There shall be provided in each special category space and ro-ro space:

.1 at least three water fog applicators;

.2 one portable foam applicator unit consisting of an air foam nozzle of an inductor type capable of being connected to the fire main by a fire hose, together with a portable tank containing 20 *l* of foam-making liquid and one spare tank. The nozzle shall be capable of producing effective foam suitable for extinguishing an

oil fire of at least 1.5 m^3/min. At least two portable foam applicator units shall be available in the craft for use in such space; and

.3 portable fire extinguishers of approved type and design shall be located so that no point in the space is more than approximately 15 m walking distance from an extinguisher, provided that at least one portable extinguisher is located at each access to such space.

7.8.5 Ventilation system

7.8.5.1 There shall be provided an effective power ventilation system for the special category spaces and ro-ro spaces sufficient to give at least 10 air changes per hour while navigating and 20 air changes per hour at the quayside during vehicle loading and unloading operations. The system for such spaces shall be entirely separated from other ventilation systems and shall be operating at all times when vehicles are in such spaces. Ventilation ducts serving special category spaces and ro-ro spaces capable of being effectively sealed shall be separated for each such space. The system shall be capable of being controlled from a position outside such spaces.

7.8.5.2 The ventilation shall be such as to prevent air stratification and the formation of air pockets.

7.8.5.3 Means shall be provided to indicate in the operating compartment any loss or reduction of the required ventilating capacity.

7.8.5.4 Arrangements shall be provided to permit a rapid shutdown and effective closure of the ventilation system in case of fire, taking into account the weather and sea conditions.

7.8.5.5 Ventilation ducts, including dampers, shall be made of steel or other equivalent material. Ducts lying inside the served space may be made of non-combustible or fire-restricting material.

7.8.6 Scuppers, bilge pumping and drainage

In view of the serious loss of stability which could arise due to large quantities of water accumulating on the deck or decks consequent to the operation of the fixed pressure water-spraying system, scuppers shall be fitted so as to ensure that such water is rapidly discharged directly overboard. Alternatively, pumping and drainage facility shall be provided additional to the requirements of chapter 10. When it is required to maintain watertight or weathertight integrity, as appropriate, the scuppers shall be arranged so that they can be operated from outside the space protected.

7.8.7 Precautions against ignition of flammable vapours or liquids

7.8.7.1 On any deck or platform, if fitted, on which vehicles are carried and on which explosive vapours might be expected to accumulate, except platforms with openings of sufficient size permitting penetration of petrol gases downwards, equipment which may constitute a source of ignition of flammable vapours and, in particular, electrical equipment and wiring, shall be installed at least 450 mm above the deck or platform. Electrical equipment installed at more than 450 mm above the deck or platform shall be of a type so enclosed and protected as to prevent the escape of sparks. However, if the installation of electrical equipment and wiring at less than 450 mm above the deck or platform is necessary for the safe operation of the craft, such

electrical equipment and wiring may be installed provided that it is of a type approved for use in an explosive mixture of petrol and air.

7.8.7.2 Electrical equipment and wiring, if installed in an exhaust ventilation duct, shall be of a type approved for use in explosive mixtures of petrol and air and the outlet from any exhaust duct shall be sited in a safe position, having regard to other possible sources of ignition.

7.8.7.3 If pumping and drainage arrangements are provided, it shall be ensured that:

.1 water contaminated with petrol or other flammable substances is not drained to machinery spaces or other spaces where sources of ignition may be present; and

.2 electrical equipment fitted in tanks or other components of the drainage system shall be of a type suitable for use in explosive petrol/air mixtures.

7.8.8 Open ro-ro spaces

7.8.8.1 Open ro-ro spaces shall comply with the requirements set out in 7.8.1.1, 7.8.2, 7.8.3, 7.8.4 and 7.8.6.

7.8.8.2 For those parts of a ro-ro space which are completely open from above, the requirements set out in 7.8.2, 7.8.3.1 and 7.8.6 need not be complied with. However, a continuous fire patrol or a television surveillance system shall be maintained.

7.9 Miscellaneous

7.9.1 There shall be permanently exhibited, for the guidance of the master and officers of the craft, fire control plans showing clearly for each deck the following positions: the control stations, the sections of the craft which are enclosed by fire-resisting divisions together with particulars of the fire alarms, fire detection systems, the sprinkler installations, the fixed and portable fire-extinguishing appliances, the means of access to the various compartments and decks in the craft, the ventilating system (including particulars of the master fan controls, the positions of dampers and identification numbers of the ventilating fans serving each section of the craft), the location of the international shore connection, if fitted, and the position of all means of control referred to in 7.5.3, 7.6.2, 7.7.1 and 7.7.3.1. The text of such plans shall be in the official language of the flag State. However, if the language is not English, French or Spanish, a translation into one of those languages shall be included.

7.9.2 A duplicate set of fire control plans or a booklet containing such plans shall be permanently stored in a prominently marked weathertight enclosure outside the deckhouse for the assistance of shore-side fire-fighting personnel.

7.9.3 Openings in fire-resisting divisions

7.9.3.1 Except for any hatches between cargo, special category, ro-ro, store, and baggage spaces and between such spaces and the weather decks, all openings shall be provided with permanently attached means of closing which shall be at least as effective for resisting fires as the divisions in which they are fitted.

7.9.3.2 It shall be possible for each door to be opened and closed from each side of the bulkhead by one person only.

7.9.3.3 Fire doors bounding areas of major fire hazard and stairway enclosures shall satisfy the following requirements:

.1 The doors shall be self-closing and be capable of closing with an angle of inclination of up to 3.5° opposing closure. The approximate time of closure for hinged fire doors shall be no more than 40 s and no less than 10 s from the beginning of their movement with the craft in the upright position. The approximate uniform rate of closure for sliding fire doors shall be of no more than 0.2 m/s and no less than 0.1 m/s with the craft in the upright position.

.2 Remote released sliding or power-operated doors shall be equipped with an alarm that sounds at least 5 s but no more than 10 s after the door is released from the continuously manned control station and before the door begins to move and continue sounding until the door is completely closed. Doors designed to re-open upon contacting an object in their paths shall re-open no more than 1 m from the point of contact.

.3 All doors shall be capable of remote release from a continuously manned central control station, either simultaneously or in groups, and shall be capable of release also individually from a position at both sides of the door. Indication shall be provided at the fire door indicator panel in the continuously manned control station whether each of the remote released doors is closed. The release mechanism shall be so designed that the door will automatically close in the event of disruption of the control system or main source of electrical power. Release switches shall have an on-off function to prevent automatic resetting of the system. Hold-back hooks not subject to continuously manned control station release shall be prohibited.

.4 A door closed remotely from the continuously manned control station shall be capable of being re-opened at both sides of the door by local control. After such local opening, the door shall automatically close again.

.5 Local power accumulators for power-operated doors shall be provided in the immediate vicinity of the doors to enable the doors to be operated after disruption of the control system or main source of electric power at least ten times (fully opened and closed) using the local controls.

.6 Disruption at one door of the control system or main source of electric power shall not impair the safe functioning of the other doors.

.7 Double-leaf doors equipped with a latch necessary to their fire integrity shall have a latch that is automatically activated by the operation of the doors when released by the system.

.8 Doors giving direct access to special category spaces which are power-operated and automatically closed need not be equipped with alarms and remote-release mechanisms required in .2 and .3.

.9 The components of the local control system shall be accessible for maintenance and adjusting.

.10 Power operated doors shall be provided with a control system of an approved type which shall be able to operate in case of fire, this being determined in accordance with the Fire Test Procedures Code. This system shall satisfy the following requirements:

.1 the control system shall be able to operate at a temperature of at least 200°C for at least 60 min, served by the power supply;

.2 the power supply for all other doors not subject to fire shall not impaired; and

.3 at temperatures exceeding 200°C the control system shall be automatically isolated from the power supply and shall be capable of keeping the door closed up to at least 945°C.

7.9.3.4 The requirements for integrity of fire-resisting divisions of the outer boundaries facing open spaces of a craft shall not apply to glass partitions, windows and sidescuttles. Similarly, the requirements for integrity of fire-resisting divisions facing open spaces shall not apply to exterior doors in superstructures and deck-houses.

7.9.3.5 Doors in smoke-tight divisions shall be self-closing. Doors which are normally kept open shall close automatically or by remote control from a continuously manned control station.

7.10 Firefighter's outfits

7.10.1 All craft other than category A passenger craft shall carry at least two firefighter's outfits complying with the requirements of 7.10.3.

7.10.1.1 In addition, there shall be provided in category B passenger craft for every 80 m, or part thereof, of the aggregate of the length of all passenger spaces and service spaces on the deck which carries such spaces or, if there is more than one such deck, on the deck which has the largest aggregate of such length, two firefighter's outfits and two sets of personal equipment, each comprising the items stipulated in 7.10.3.1.1 to 7.10.3.1.3.

7.10.1.2 In category B passenger craft, for each pair of breathing apparatus there shall be provided one water fog applicator, which shall be stored adjacent to such apparatus.

7.10.1.3 The Administration may require additional sets of personal equipment and breathing apparatus, having due regard to the size and type of the craft.

7.10.2 The firefighter's outfits or sets of personal equipment shall be so stored as to be easily accessible and ready for use and, where more than one firefighter's outfit or more than one set of personal equipment is carried, they shall be stored in widely separated positions.

7.10.3 A firefighter's outfit shall consist of:

.1 Personal equipment comprising:

.1.1 protective clothing of material to protect the skin from the heat radiating from the fire and from burns and scalding by steam or gases. The outer surface shall be water-resistant;

.1.2 boots and gloves of rubber or other electrically non-conductive material;

.1.3 a rigid helmet providing effective protection against impact;

.1.4 an electric safety lamp (hand lantern) of an approved type with a minimum burning period of 3 h; and

.1.5 an axe.

.2 A breathing apparatus of an approved type which may be either:

.2.1 a smoke helmet or smoke mast, which shall be provided with a suitable air pump and a length of air hose sufficient to reach from the open deck, well clear of hatch or doorway, to any part of the holds or machinery spaces. If, in order to comply with this subparagraph, an air hose exceeding 36 m in length would be necessary, a self-contained breathing apparatus shall be substituted or provided in addition, as determined by the Administration; or

.2.2 a self-contained compressed-air-operated breathing apparatus, the volume of air contained in the cylinders of which shall be at least 1,200 *l*, or other self-contained breathing apparatus, which shall be capable of functioning for at least 30 min. A number of spare charges, suitable for use with the apparatus provided, shall be available on board.

.3 For each breathing apparatus a fireproof lifeline of sufficient length and strength shall be provided capable of being attached by means of a snaphook to the harness of the apparatus or to a separate belt in order to prevent the breathing apparatus becoming detached when the lifeline is operated.

PART B - REQUIREMENTS FOR PASSENGER CRAFT

7.11 Arrangement

7.11.1 For category B craft, the public spaces shall be divided into zones according to the following:

.1 The craft shall be divided into at least two zones. The mean length of each zone shall not exceed 40 m.

.2 For the occupants of each zone there shall be an alternative safe area to which it is possible to escape in case of fire. The alternative safe area shall be separated from other passenger zones by smoke-tight divisions of non-combustible materials or fire-restricting materials extending from deck to deck. The alternative safe area can be another passenger zone. Alternative safe areas shall be dimensioned on the basis of one person per seat and 0.35 m^2 per person of the net remaining area, based on the maximum number of persons they are called to accommodate in an emergency.

.3 The alternative safe area shall, as far as practicable, be located adjacent to the passenger zone it is intended to serve. There shall be at least two exits from each passenger zone, located as far away from each other as possible, leading to the alternative safe area. Escape routes shall be provided to enable all passengers and crew to be safely evacuated from the alternative safe area.

7.11.2 Category A craft need not be divided into zones.

7.11.3 Control stations, stowage positions of life-saving appliances, escape routes and places of embarkation into survival craft shall not, as far as practicable, be located adjacent to any areas of major or moderate fire hazard.

7.12 Ventilation

Each safe zone in the public spaces shall be served by a ventilation system independent of the ventilation system of any other zone. The ventilation fans of each zone in the public spaces shall also be capable of being independently controlled from a continuously manned control station.

7.13 Fixed sprinkler system

7.13.1 Public spaces and service spaces, crew accommodation areas where sleeping berths are provided, storage rooms other than those containing flammable liquids, and similar spaces shall be protected by a fixed sprinkler system based on the standards developed by the Organization. Manually operated sprinkler systems shall be divided into sections of appropriate size and the valves for each section, start of sprinkler pump(s) and alarms shall be capable of being operated from two spaces separated as widely as possible, one of which shall be a continuously manned control station. In category B craft, no section of the system shall serve more than one of the zones required in 7.11.

7.13.2 Plans of the system shall be displayed at each operating station. Suitable arrangements shall be made for the drainage of water discharged when the system is activated.

7.13.3 Category A craft need not comply with the requirements of 7.13.1 and 7.13.2 providing that:

- smoking is not permitted;
- sales shops, galleys, service spaces, ro-ro spaces and cargo spaces are not fitted;
- the maximum number of passengers carried does not exceed 200; and
- the voyage duration at operational speed from departure port to destination when fully laden does not exceed 2 h.

PART C - REQUIREMENTS FOR CARGO CRAFT

7.14 Control stations

Control stations, life-saving appliances stowage positions, escape routes and places of embarkation into survival craft shall be located adjacent to crew accommodation areas.

7.15 Cargo spaces

Cargo spaces, except open deck areas or refrigerated holds, shall be provided with an approved automatic smoke-detection system complying with 7.7.1 to indicate at the control station the location of outbreak of a fire in all normal operating conditions of the installations and shall be protected by an approved fixed quick-acting fire-extinguishing system complying with 7.7.3.2 operable from the control station.

7.16 Fixed sprinkler system

7.16.1 Crew accommodation where sleeping berths are provided, having a total deck area greater than 50 m^2 (including corridors serving such accommodation), shall be protected by a fixed sprinkler system based on the standards developed by the Organization.

7.16.2 Plans of the system shall be displayed at each operating station. Suitable arrangements shall be made for the drainage of water discharged when the system is activated.

PART D - REQUIREMENTS FOR CRAFT AND CARGO SPACES INTENDED FOR THE CARRIAGE OF DANGEROUS GOODS

7.17 General

7.17.1 In addition to complying with the requirements of 7.15 for cargo craft and with the requirements of 7.8 for both passenger and cargo craft as appropriate, craft types and cargo spaces referred to in 7.17.2 intended for the carriage of dangerous goods shall comply with the requirements of this paragraph, as appropriate, except when carrying dangerous goods in limited quantities, unless such requirements have already been met by compliance with the requirements elsewhere in this chapter. The types of craft and modes of carriage of dangerous goods are referred to in 7.17.2 and in table 7.17-1, where the numbers appearing in 7.17.2 are referred to in the top line. Cargo craft of less than 500 gross tonnage constructed on or after 1 July 2002 shall comply with this paragraph, but the Administration of the State whose flag the craft is entitled to fly may, in consultation with the port State, reduce the requirements and such reduced requirements shall be recorded in the document of compliance referred to in 7.17.4.

7.17.2 Application of tables 7.17-1 and 7.17-2

The following craft types and cargo spaces shall govern the application of tables 7.17-1 and 7.17-2:

.1 craft and cargo spaces not specifically designed for the carriage of freight containers but intended for the carriage of dangerous goods in packaged form including goods in freight containers and portable tanks;

.2 purpose-built container craft and cargo spaces intended for the carriage of dangerous goods in freight containers and portable tanks;

.3 craft and ro-ro spaces intended for the carriage of dangerous goods; and

.4 craft and cargo spaces intended for the carriage of solid dangerous goods in bulk.

7.17.3 Requirements

Unless otherwise specified, the following requirements shall govern the application of tables 7.17-1, 7.17-2 and 7.17-3 to both "on deck" and "under deck" stowage of dangerous goods. The numbers of the following sub-sections are indicated in the first column of the above-mentioned tables.

Table 7.17-1

Application of the requirements of 7.17.3 to different modes of carriage of dangerous goods in craft and cargo spaces

Section 7.17.2 / Section 7.17.3	Weather decks .1 to .4 inclusive	7.17.2.1	7.17.2.2	7.17.2.3		7.17.2.4
		Not specifically designed	Container cargo spaces	Ro-ro spaces	Open ro-ro spaces	Solid dangerous goods in bulk
7.17.3.1.1	x	x	x	x	x	For application of requirements of Part D to different classes of dangerous goods, see table 7.17-2
7.17.3.1.2	x	x	x	x	x	
7.17.3.1.3	-	x	x	x	x	
7.17.3.1.4	-	x	x	x	x	
7.17.3.2	-	x	x	x	x	
7.17.3.3	-	x	x	x	-	
7.17.3.4.1	-	x	x [1]	x	-	
7.17.3.4.2	-	x	x [1]	x	-	
7.17.3.5	-	x	x	x	-	
7.17.3.6.1	x	x	x	x	x	
7.17.3.6.2	x	x	x	x	x	
7.17.3.7	x	x	-	-	x	
7.17.3.8.1	-	x	x	x	-	
7.17.3.8.2	-	-	-	x [2]	x	
7.17.3.9	-	-	-	x	x	
7.17.3.10	x	-	-	x	x	

NOTES:

[1] For classes 4 and 5.1 not applicable to closed freight containers.

For classes 2, 3, 6.1 and 8 when carried in closed freight containers the ventilation rate may be reduced to not less than two air changes. For the purpose of this requirement a portable tank is a closed freight container.

[2] Applies only to ro-ro spaces, not capable of being sealed.

x Wherever "x" appears in the table it means that this requirement is applicable to all classes of dangerous goods as given in the appropriate line of table 7.17-3, except as indicated by the notes.

Table 7.17-2

Application of the requirements of 7.17.3 to different classes of dangerous goods for craft and cargo spaces carrying solid dangerous goods in bulk

Class / Section	4.1	4.2	4.3 [3]	5.1	6.1	8	9
7.17.3.1.1	x	x	-	x	-	-	x
7.17.3.1.2	x	x	-	x	-	-	x
7.17.3.2	x	x [4]	x	x [5]	-	-	x [5]
7.17.3.4.1	-	x [4]	x	-	-	-	-
7.17.3.4.2	x [6]	x [4]	x	x [4, 6]	-	-	x [4, 6]
7.17.3.4.3	x	x	x	x	x	x	x
7.17.3.6	x	x	x	x	x	x	x

NOTES:

[3] The hazards of substances in this Class which may be carried in bulk are such that special consideration must be given by the Administration to the construction and equipment of the craft involved in addition to meeting the requirements enumerated in this table.

[4] Only applicable to Seedcake containing solvent extractions, to Ammonium nitrate and to Ammonium nitrate fertilizers.

[5] Only applicable to Ammonium nitrate and to Ammonium nitrate fertilizers. However, a degree of protection in accordance with standards contained in the "International Electrotechnical Commission, publication 79 - Electrical Apparatus for Explosive Gas Atmospheres", is sufficient.

[6] Only suitable wire mesh guards are required.

Table 7.17-3

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

Class / Section	1.1-1.6[8]	1.4S	2.1	2.2	2.3	3.1 3.2 liquids ≤ 23°C[11]	3.3 liquids >23°C[11] ≤ 61°C	4.1	4.2	4.3	5.1[9]	5.2	6.1 liquids	6.1 liquids ≤ 23°C[11]	6.1 liquids >23°C[11] ≤ 61°C	6.1 solids	8 liquids	8 liquids ≤ 23°C[11]	8 liquids >23°C[11] ≤ 61°C	8 solids	9
7.17.3.1.1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
7.17.3.1.2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-
7.17.3.1.3	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7.17.3.1.4	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7.17.3.2	X	-	X	-	-	X	-	-	-	-	-	-	-	X	-	-	-	X	-	-	-
7.17.3.3	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X	-
7.17.3.4.1	-	-	X	-	X	X	-	X[7]	X[7]	X	X[7]	-	-	X	X	X[7]	-	X	X	-	X[7]
7.17.3.4.2	-	-	X	-	-	X	-	-	-	-	-	-	-	X	X	-	-	X	X	-	-
7.17.3.5	-	-	-	-	-	X	-	-	-	-	-	-	X	X	X	-	-	X	-	-	-
7.17.3.6	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X[10]
7.17.3.7	-	-	-	-	-	X	X	X	X	X	X	-	-	X	X	-	-	X	X	-	-
7.17.3.8	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
7.17.3.9	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
7.17.3.10	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

NOTES:

7 When "mechanically-ventilated spaces" are required by the International Maritime Dangerous Goods Code (IMDG Code), as amended.

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

9 Refer to the International Maritime Dangerous Goods Code.

10 As appropriate to the goods being carried.

11 Refer to flashpoint.

7.17.3.1 Water supplies

7.17.3.1.1 Arrangements shall be made to ensure immediate availability of a supply of water from the fire main at the required pressure either by permanent pressurization or by suitably placed remote starting arrangements for the fire pumps.

7.17.3.1.2 The quantity of water delivered shall be capable of supplying four nozzles of a size and at a pressure as specified in 7.7.5, capable of being trained on any part of the cargo space when empty. This amount of water may be applied by equivalent means to the satisfaction of the Administration.

7.17.3.1.3 Means of effectively cooling the designated under deck cargo–space by copious quantities of water, either by a fixed arrangement of spraying nozzles, or flooding the space with water, shall be provided. Hoses may be used for this purpose in small cargo spaces and in small areas of larger cargo-spaces at the discretion of the Administration. In any event, the drainage and pumping arrangements shall be such as to prevent the build-up of free surfaces. If this is not possible, the adverse effect upon stability of the added weight and free surface of water shall be taken into account.

7.17.3.1.4 Provision to flood a designated under deck cargo-space with suitable specified media may be substituted for the requirements in 7.17.3.1.3 above.

7.17.3.2 Sources of ignition

Electrical equipment and wiring shall not be fitted in enclosed cargo spaces, unless it is essential for operational purposes. However, if electrical equipment is fitted in such spaces, it shall be of a certified safe type for use in the dangerous environments to which it may be exposed unless it is possible to completely isolate the electrical system (by removal of links in the system, other than fuses). Cable penetrations of the decks and bulkheads shall be sealed against the passage of gas or vapour. Through runs of cables and cables within the cargo spaces shall be protected against damage from impact. Any other equipment which may constitute a source of ignition of flammable vapour shall not be permitted.

7.17.3.3 Detection system

Enclosed cargo spaces shall be provided with an approved automatic smoke detection system complying with 7.7.1 or with a detection system which, in the opinion of the Administration gives equivalent protection.

7.17.3.4 Ventilation

7.17.3.4.1 Adequate power ventilation shall be provided in enclosed spaces. The arrangement shall be such as to provide for at least six air changes per hour in the cargo space based on an empty space and for removal of vapours from the upper or lower parts of the space, as appropriate.

7.17.3.4.2 The fans shall be such as to avoid the possibility of ignition of flammable gas air mixtures. Suitable wire mesh guards shall be fitted over inlet and outlet ventilation openings.

7.17.3.4.3 Natural ventilation shall be provided in enclosed spaces intended for the carriage of solid dangerous goods in bulk, where there is no provision for mechanical ventilation.

7.17.3.5 Bilge pumping

Where it is intended to carry flammable or toxic liquids in enclosed spaces, the bilge pumping system shall be designed to ensure against inadvertent pumping of such liquids through machinery space piping or pumps. Where large quantities of such liquids are carried, consideration shall be given to the provision of additional means of draining those spaces.

7.17.3.6 Personnel protection

7.17.3.6.1 Four sets of full protective clothing resistant to chemical attack shall be provided in addition to the firefighter's outfits required by 7.10. The protective clothing shall cover all skin, so that no part of the body is unprotected.

7.17.3.6.2 At least two self-contained breathing apparatus additional to those required by 7.10 shall be provided.

7.17.3.7 Portable fire extinguishers

Portable fire extinguishers with a total capacity of at least 12 kg of dry powder or equivalent shall be provided for the cargo spaces. These extinguishers shall be in addition to any portable fire extinguishers required elsewhere in this chapter.

7.17.3.8 Fixed fire extinguishing system

7.17.3.8.1 Cargo spaces, except for open decks, shall be provided with an approved fixed fire extinguishing system complying with the provisions of 7.7.3 or with a fire extinguishing system which, in the opinion of the Administration, gives equivalent protection for the cargo carried.

7.17.3.8.2 Each open ro-ro space having a deck above it and each ro-ro space not capable of being sealed shall be fitted with an approved fixed pressure water-spraying system for manual operation which shall protect all parts of any deck and vehicle platform in such space, except that the Administration may permit the use of any other fixed fire-extinguishing system that has been shown by full-scale test to be no less effective. In any event the drainage and pumping arrangements shall be such as to prevent the build-up of free surfaces. If this is not possible the adverse effect upon stability of the added weight and free surface of water shall be taken into account to the extent deemed necessary by the Administration in its approval of the stability information.

7.17.3.9 Separation between ro-ro spaces and open ro-ro spaces

A separation shall be provided between a ro-ro space and an adjacent open ro-ro space. The separation shall be such as to minimize the passage of dangerous vapours and liquids between such spaces. Alternatively, such separation need not be provided if both spaces fully comply with the requirements for ro-ro spaces in Part D.

7.17.3.10 Separation between ro-ro spaces and weather decks

A separation shall be provided between a ro-ro space and the adjacent weather deck. The separation shall be such as to minimize the passage of dangerous vapours and liquids between such spaces. Alternatively, a separation need not be provided if the ro-ro space fully complies with the requirements for ro-ro spaces in Part D. However, a separation is still required when dangerous goods carried shall be loaded on the weather deck only.

7.17.4 Document of compliance

The Administration shall provide the craft with an appropriate document as evidence of compliance of construction and equipment with the requirements of this Part D.

CHAPTER 8

LIFE-SAVING APPLIANCES AND ARRANGEMENTS

8.1 General and definitions

8.1.1 Life-saving appliances and arrangements shall enable abandonment of the craft in accordance with the requirements of 4.7 and 4.8.

8.1.2 Except where otherwise provided in this Code, the life-saving appliances and arrangements required by this chapter shall meet the detailed specifications set out in chapter III of the Convention and the LSA Code and be approved by the Administration.

8.1.3 Before giving approval to life-saving appliances and arrangements, the Administration shall ensure that such life-saving appliances and arrangements:

.1 are tested to confirm that they comply with the requirements of this chapter, in accordance with the recommendations of the Organization; or

.2 have successfully undergone, to the satisfaction of the Administration, tests which are substantially equivalent to those specified in those recommendations.

8.1.4 Before giving approval to novel life-saving appliances or arrangements, the Administration shall ensure that such appliances or arrangements:

.1 provide safety standards at least equivalent to the requirements of this chapter and have been evaluated and tested in accordance with the recommendations of the Organization; or

.2 have successfully undergone, to the satisfaction of the Administration, evaluation and tests which are substantially equivalent to those recommendations.

8.1.5 Before accepting life-saving appliances and arrangements that have not been previously approved by the Administration, the Administration shall be satisfied that life-saving appliances and arrangements comply with the requirements of this chapter.

8.1.6 Except where otherwise provided in this Code, life-saving appliances required by this chapter for which detailed specifications are not included in the LSA Code shall be to the satisfaction of the Administration.

8.1.7 The Administration shall require life-saving appliances to be subjected to such production tests as are necessary to ensure that the life-saving appliances are manufactured to the same standard as the approved prototype.

8.1.8 Procedures adopted by the Administration for approval shall also include the conditions whereby approval would continue or would be withdrawn.

8.1.9 The Administration shall determine the period of acceptability of life-saving appliances which are subject to deterioration with age. Such life-saving appliances shall be marked with a means for determining their age or the date by which they shall be replaced.

8.1.10 For the purposes of this chapter, unless expressly provided otherwise:

.1 "Detection" is the determination of the location of survivors or survival craft.

.2 "Embarkation ladder" is the ladder provided at survival craft embarkation stations to permit safe access to survival craft after launching.

.3 "Embarkation station" is the place from which a survival craft is boarded. An embarkation station may also serve as an assembly station, provided there is sufficient room, and the assembly station activities can safely take place there.

.4 "Float-free launching" is that method of launching a survival craft whereby the craft is automatically released from a sinking craft and is ready for use.

.5 "Free-fall launching" is that method of launching a survival craft whereby the craft with its complement of persons and equipment on board is released and allowed to fall into the sea without any restraining apparatus.

.6 "Immersion suit" is a protective suit which reduces the body heat-loss of a person wearing it in cold water.

.7 "Inflatable appliance" is an appliance which depends upon non-rigid, gas-filled chambers for buoyancy and which is normally kept uninflated until ready for use.

.8 "Inflated appliance" is an appliance which depends upon non-rigid, gas-filled chambers for buoyancy and which is normally kept inflated and ready for use at all times.

.9 "Launching appliance or arrangement" is a means of transferring a survival craft or rescue boat from its stowed position safely to the water.

.10 "Marine evacuation system (MES)" is an appliance designed to rapidly transfer a large number of persons from an embarkation station by means of a passage to a floating platform for subsequent embarkation into associated survival craft or directly into associated survival craft.

.11 "Novel life-saving appliance or arrangement" is a life-saving appliance or arrangement which embodies new features not fully covered by the provisions of this chapter but which provides an equal or higher standard of safety.

.12 "Rescue boat" is a boat designed to assist and rescue persons in distress and to marshal survival craft.

.13 "Retrieval" is the safe recovery of survivors.

.14 "Retro-reflective material" is a material which reflects in the opposite direction a beam of light directed on it.

.15 "Survival craft" is a craft capable of sustaining the lives of persons in distress from the time of abandoning the craft.

.16 "Thermal protective aid" is a bag or suit of waterproof material with low thermal conductance.

8.2 Communications

8.2.1 Craft shall be provided with the following radio life-saving appliances:

.1 at least three two-way VHF radiotelephone apparatus shall be provided on every passenger high-speed craft and on every cargo high-speed craft of 500 gross tonnage and upwards. Such apparatus shall conform to performance standards not inferior to those adopted by the Organization;

.2 at least one radar transponder shall be carried on each side of every passenger high-speed craft and of every cargo high-speed craft of 500 gross tonnage and upwards. Such radar transponders shall conform to performance standards not inferior to those adopted by the Organization. The radar transponders shall be stowed in such locations that they can be rapidly placed in any one of the liferafts. Alternatively, one radar transponder shall be stowed in each survival craft.

8.2.2 Craft shall be provided with the following on-board communications and alarm systems:

.1 an emergency means comprising either fixed or portable equipment or both for two-way communications between emergency control stations, assembly and embarkation stations and strategic positions on board;

.2 a general emergency alarm system complying with the requirements of paragraph 7.2.1 of the LSA Code to be used for summoning passengers and crew to assembly stations and to initiate the actions included in the muster list. The system shall be supplemented by a public address system complying with the requirements of paragraph 7.2.2 of the LSA Code, or by other suitable means of communication. The systems shall be operable from the operating compartment.

8.2.3 Signalling equipment

8.2.3.1 All craft shall be provided with a portable daylight signalling lamp which is available for use in the operating compartment at all times and which is not dependent on the craft's main source of electrical power.

8.2.3.2 Craft shall be provided with not less than 12 rocket parachute flares, complying with the requirements of paragraph 3.1 of the LSA Code, stowed in or near the operating compartment.

8.3 Personal life-saving appliances

8.3.1 Where passengers or crew have access to exposed decks under normal operating conditions, at least one lifebuoy on each side of the craft capable of quick release from the control compartment and from a position at or near where it is stowed, shall be provided with a self-igniting light and a self-activating smoke signal. The positioning and securing arrangements of the self-activating smoke signal shall be such that it cannot be released or activated solely by the accelerations produced by collisions or groundings.

8.3.2 At least one lifebuoy shall be provided adjacent to each normal exit from the craft and on each open deck to which passengers and crew have access, subject to a minimum of two being installed.

8.3.3 Lifebuoys fitted adjacent to each normal exit from the craft shall be fitted with buoyant lines of at least 30 m in length.

8.3.4 Not less than half the total number of lifebuoys shall be fitted with self-igniting lights. However, the lifebuoys provided with self-igniting lights shall not include those provided with lines in accordance with 8.3.3.

8.3.5 A lifejacket complying with the requirements of paragraph 2.2.1 or 2.2.2 of the LSA Code be provided for every person on board the craft and, in addition:

.1 a number of lifejackets suitable for children equal to at least 10% of the number of passengers on board shall be provided or such greater number as may be required to provide a lifejacket for each child;

.2 every passenger craft shall carry lifejackets for not less than 5% of the total number of persons on board. These lifejackets shall be stowed in conspicuous places on deck or at assembly stations;

.3 a sufficient number of lifejackets shall be carried for persons on watch and for use at remotely located survival craft and rescue boat stations; and

.4 all lifejackets shall be fitted with a light, which complies with the requirements of paragraph 2.2.3 of the LSA Code.

8.3.6 Lifejackets shall be so placed as to be readily accessible and their positions shall be clearly indicated.

8.3.7 An immersion suit, of an appropriate size, complying with the requirements of paragraph 2.3 of the LSA Code shall be provided for every person assigned to crew the rescue boat.

8.3.8 An immersion suit or anti-exposure suit shall be provided for each member of the crew assigned, in the muster list, to duties in an MES party for embarking passengers into survival craft. These immersion suits or anti-exposure suits need not be required if the craft is constantly engaged on voyages in warm climates where, in the opinion of the Administration, such suits are unnecessary.

8.4 Muster list, emergency instructions and manuals

8.4.1 Clear instructions to be followed in the event of an emergency shall be provided for each person on board.

8.4.2 Muster lists complying with the requirements of regulation III/37 of the Convention shall be exhibited in conspicuous places throughout the craft including the control compartment, engine-room and crew accommodation spaces.

8.4.3 Illustrations and instructions in appropriate languages shall be posted in public spaces and be conspicuously displayed at assembly stations, at other passenger spaces and near each seat to inform passengers of:

.1 their assembly station;

.2 the essential actions they must take in an emergency; and

.3 the method of donning lifejackets.

8.4.4 Every passenger craft shall have passenger assembly stations:

.1 in the vicinity of, and which provide ready access for all the passengers to, the embarkation stations unless in the same location; and

.2 which have ample room for the marshalling and instruction of passengers.

8.4.5 A training manual complying with the requirements of 18.2.3 shall be provided in each crew messroom and recreation room.

8.5 Operating instructions

Poster or signs shall be provided on or in the vicinity of survival craft and their launching controls and shall:

.1 illustrate the purpose of controls and the procedures for operating the appliance and give relevant instructions and warnings:

.2 be easily seen under emergency lighting conditions; and

.3 use symbols in accordance with the recommendations of the Organization.

8.6 Survival craft stowage

8.6.1 Survival craft shall be securely stowed outside and as close as possible to the passenger accommodation and embarkation stations. The stowage shall be such that each survival craft can be safely launched in a simple manner and remain secured to the craft during and subsequent to the launching procedure. The length of the securing lines and the arrangements of the bowsing lines shall be such as to maintain the survival craft suitably positioned for embarkation. The Administration may permit the use of adjustable securing and/or bowsing lines at exits where more than one survival craft is used. The securing arrangements for all securing and bowsing lines shall be of sufficient strength to hold the survival craft in position during the evacuation process.

8.6.2 Survival craft shall be so stowed as to permit release from their securing arrangements at or near to their stowage position on the craft and from a position at or near to the operating compartment.

8.6.3 So far as is practicable, survival craft shall be distributed in such a manner that there is an equal capacity on both sides of the craft.

8.6.4 The launching procedure for inflatable liferafts shall, where practicable, initiate inflation. Where it is not practicable to provide automatic inflation of liferafts (for example, when the liferafts are associated with an MES), the arrangement shall be such that the craft can be evacuated within the time specified in 4.8.1.

8.6.5 Survival craft shall be capable of being launched and then boarded from the designated embarkation stations in all operational conditions and also in all conditions of flooding after receiving damage to the extent prescribed in chapter 2.

8.6.6 Survival craft launching stations shall be in such positions as to ensure safe launching having particular regard to clearance from the propeller or waterjet and steeply overhanging portions of the hull.

8.6.7 During preparation and launching, the survival craft and the area of water into which it is to be launched shall be adequately illuminated by the lighting supplied from the main and emergency sources of electrical power required by chapter 12.

8.6.8 Means shall be available to prevent any discharge of water on to survival craft when launched.

8.6.9 Each survival craft shall be stowed:

.1 so that neither the survival craft nor its stowage arrangements will interfere with the operation of any other survival craft or rescue boat at any other launching station;

.2 in a state of continuous readiness;

.3 fully equipped; and

.4 as far as practicable, in a secure and sheltered position and protected from damage by fire and explosion.

8.6.10 Every liferaft shall be stowed with its painter permanently attached to the craft and with a float free arrangement complying with the requirements of paragraph 4.1.6 of the LSA Code so that, as far as practicable, the liferaft floats free and, if inflatable, inflates automatically should the high speed craft sink.

8.6.11 Rescue boats shall be stowed:

.1 in a state of continuous readiness for launching in not more than 5 min;

.2 in a position suitable for launching and recovery; and

.3 so that neither the rescue boat nor its stowage arrangements will interfere with the operation of survival craft at any other launching station.

8.6.12 Rescue boats and survival craft shall be secured and fastened to the deck so that they at least withstand the loads likely to arise due to a defined horizontal collision load for the actual craft and the vertical design load at the stowage position.

8.7 Survival craft and rescue boat embarkation and recovery arrangements

8.7.1 Embarkation stations shall be readily accessible from accommodation and work areas. If the designated assembly stations are other than the passenger spaces, the assembly stations shall be readily accessible from the passenger spaces, and the embarkation stations shall be readily accessible from the assembly stations.

8.7.2 Evacuation routes, exits and embarkation points shall comply with the requirements of 4.7.

8.7.3 Alleyways, stairways and exits giving access to the assembly and embarkation stations shall be adequately illuminated by lighting supplied from the main and emergency source of electrical power required by chapter 12.

8.7.4 Where davit-launched survival craft are not fitted, MES or equivalent means of evacuation shall be provided in order to avoid persons entering the water to board survival craft. Such MES or equivalent means of evacuation shall be so designed as to enable persons to board survival craft in all operational conditions and also in all conditions of flooding after receiving damage to the extent prescribed in chapter 2.

8.7.5 Subject to survival craft and rescue boat embarkation arrangements being effective within the environmental conditions in which the craft is permitted to operate and in all undamaged and prescribed damage conditions of trim and heel, where the freeboard between the intended embarkation position and the waterline is not more than 1.5 m, the Administration may accept a system where persons board liferafts directly.

8.7.6 Rescue boat embarkation arrangements shall be such that the rescue boat can be boarded and launched directly from the stowed position and recovered rapidly when loaded with its full complement of persons and equipment.

8.7.7 Launching systems for rescue boats on category B craft may be based on power supply from the craft's power supply under the following conditions:

.1 the davit or crane shall be supplied with power from 2 sources in each independent engine room;

.2 the davit or crane shall comply with the required launching, lowering and hoisting speeds when using only one power source; and

.3 the davit or crane is not required to be activated from a position within the rescue boat.

8.7.8 On multihull craft with a small HL_1 angle of heel and trim, the design angles in paragraph 6.1 of the LSA Code may be changed from 20°/10° to the maximum angles calculated in accordance with annex 7, including heeling lever HL_2, HTL, HL_3 or HL_4.

8.7.9 Rescue boat davits or cranes may be designed for launching and recovering the boat with 3 persons only on the condition that an additional boarding arrangement is available on each side complying with 8.7.5.

8.7.10 A safety knife shall be provided at each MES embarkation station.

8.8 Line-throwing appliance

A line-throwing appliance complying with the requirements of paragraph 7.1 of the LSA Code shall be provided.

8.9 Operational readiness, maintenance and inspections

8.9.1 Operational readiness

Before the craft leaves port and at all times during the voyage, all life-saving appliances shall be in working order and ready for immediate use.

8.9.2 Maintenance

8.9.2.1 Instructions for on-board maintenance of life-saving appliances complying with the requirements of regulation III/36 of the Convention shall be provided and maintenance shall be carried out accordingly.

8.9.2.2 The Administration may accept, in lieu of the instructions required by 8.9.2.1, a shipboard planned maintenance programme which includes the requirements of regulation III/36 of the Convention.

8.9.3 Maintenance of falls

8.9.3.1 Falls used in launching shall be turned end for end at intervals of not more than 30 months and be renewed when necessary due to deterioration of the falls or at intervals of not more than five years, whichever is the earlier.

8.9.3.2 The Administration may accept in lieu of "end for ending" required in 8.9.3.1, periodic inspection of the falls and their renewal whenever necessary due to deterioration or at intervals of not more than four years, whichever is the earlier.

8.9.4 Spares and repair equipment

Spares and repair equipment shall be provided for life-saving appliances and their components which are subject to excessive wear or consumption and need to be replaced regularly.

8.9.5 Weekly inspection

The following tests and inspections shall be carried out weekly:

.1 all survival craft, rescue boats and launching appliances shall be visually inspected to ensure that they are ready for use;

.2 all engines in rescue boats shall be run ahead and astern for a total period of not less than 3 min provided the ambient temperature is above the minimum temperature required for starting and running the engine. During this period of time, it should be demonstrated that the gearbox and gearbox train are engaging satisfactorily. If the special characteristics of an outboard motor fitted to a rescue boat would not allow it to be run other than with its propeller submerged for a

period of 3 min, it should be run for such period as prescribed in the manufacturer's handbook; and

.3 the general emergency alarm system shall be tested.

8.9.6 Monthly inspections

Inspection of the life-saving appliances, including survival craft equipment shall be carried out monthly using the checklist required by regulation III/36.1 of the Convention to ensure that they are complete and in good order. A report of the inspection shall be entered in the log-book.

8.9.7 Servicing of inflatable liferafts, inflatable lifejackets, marine evacuation systems and inflated rescue boats

Every inflatable liferaft, inflatable lifejacket and MES shall be serviced:

.1 at intervals not exceeding 12 months, provided where in any case this is impracticable, the Administration may extend this period by one month;

.2 at an approved servicing station which is competent to service them, maintains proper servicing facilities and uses only properly trained personnel.

8.9.8 Rotational deployment of marine evacuation systems

In addition to, or in conjunction with, the servicing intervals of marine evacuation systems required by 8.9.7, each marine evacuation system shall be deployed from the craft on a rotational basis at intervals to be agreed by the Administration provided that each system is to be deployed at least once every six years.

8.9.9 An Administration which approves new and novel inflatable liferaft arrangements pursuant to 8.1 may allow for extended service intervals under the following conditions:

.1 The new and novel liferaft arrangement shall maintain the same standard, as required by testing procedure, throughout the extended service intervals.

.2 The liferaft system shall be checked on board by certified personnel according to paragraph 8.9.7.

.3 Service at intervals not exceeding five years shall be carried out in accordance with recommendations of the Organization.

8.9.10 All repairs and maintenance of inflated rescue boats shall be carried out in accordance with the manufacturer's instructions. Emergency repairs may be carried out on board the craft, however, permanent repairs shall be effected at an approved servicing station.

8.9.11 An Administration which permits extension of liferaft service intervals in accordance with 8.9.9 shall notify the Organization of such action in accordance with regulation I/5(b) of the Convention.

8.9.12 Periodic servicing of hydrostatic release units

Hydrostatic release units shall be serviced:

.1 at intervals not exceeding 12 months, provided where in any case this is impracticable, the Administration may extend this period by one month;

.2 at a servicing station which is competent to service them, maintains proper servicing facilities and uses only properly trained personnel.

8.9.13 Marking of stowage locations

Containers, brackets, racks and other similar stowage locations for life-saving equipment, shall be marked with symbols in accordance with the recommendations of the Organization, indicating the devices stowed in that location for that purpose. If more than one device is stowed in that location, the number of devices shall also be indicated.

8.9.14 Periodic servicing of launching appliances

Launching appliances:

.1 shall be serviced at recommended intervals in accordance with instructions for on-board maintenance as required by regulation III/36 of the Convention;

.2 shall be subjected to a thorough examination at intervals not exceeding 5 years; and

.3 shall upon completion of the examination in .2 be subjected to a dynamic test of the winch brake in accordance with paragraph 6.1.2.5.2 of the LSA Code.

8.10 Survival craft and rescue boats

8.10.1 All craft shall carry:

.1 survival craft with sufficient capacity as will accommodate not less than 100% of the total number of persons the craft is certified to carry, subject to a minimum of two such survival craft being carried;

.2 in addition, survival craft with sufficient aggregate capacity to accommodate not less than 10% of the total number of persons the craft is certified to carry;

.3 sufficient survival craft to accommodate the total number of persons the craft is certified to carry, even in the event that all the survival craft to one side of the craft centreline and within the longitudinal extent of damage defined in 2.6.7.1 are considered lost or rendered unserviceable;

.4 at least one rescue boat for retrieving persons from the water, but not less than one such boat on each side when the craft is certified to carry more than 450 passengers;

.5 craft of less than 30 m in length may be exempted from carrying a rescue boat, provided the craft meets all of the following requirements:

.5.1 the craft is arranged to allow a helpless person to be recovered from the water;

.5.2 recovery of the helpless person can be observed from the navigation bridge; and

.5.3 the craft is sufficiently manoeuvrable to close in and recover persons in the worst intended conditions.

.6 notwithstanding the provisions of .4 and .5 above, craft shall carry sufficient rescue boats to ensure that, in providing for abandonment by the total number of persons the craft is certified to carry:

.6.1 not more than nine of the liferafts provided in accordance with 8.10.1.1 are marshalled by each rescue boat; or

.6.2 if the Administration is satisfied that the rescue boats are capable of towing a pair of such liferafts simultaneously, not more than 12 of the liferafts provided in accordance with 8.10.1.1 are marshalled by each rescue boat; and

.6.3 the craft can be evacuated within the time specified in 4.8.

8.10.2 Where the Administration considers it appropriate, in view of the sheltered nature of the voyages and the suitable climatic conditions of the intended area of operations, the Administration may permit the use of open reversible inflatable liferafts complying with annex 11 on category A craft as an alternative to liferafts complying with paragraph 4.2 or 4.3 of the LSA Code.

8.11 Helicopter pick-up areas

Craft operating on voyages having a duration of 2 h or more between each port of call shall be provided with a helicopter pick-up area approved by the Administration having regard to the recommendations adopted by the Organization.

CHAPTER 9

MACHINERY

PART A - GENERAL

9.1 General

9.1.1 The machinery, associated piping systems and fittings relating to main machinery and auxiliary power units shall be of a design and construction adequate for the service for which they are intended and shall be so installed and protected as to reduce to a minimum any danger to persons on board, due regard being paid to moving parts, hot surfaces and other hazards. The design shall have regard to materials used in construction, the purpose for which the equipment is intended, the working conditions to which it will be subjected and the environmental conditions on board.

9.1.2 All surfaces with temperatures exceeding 220°C where impingement of flammable liquids may occur as a result of a system failure shall be insulated. The insulation shall be impervious to flammable liquids and vapours.

9.1.3 Special consideration shall be given to the reliability of single essential propulsion components and a separate source of propulsion power sufficient to give the craft a navigable speed, especially in the case of unconventional arrangements, may be required.

9.1.4 Means shall be provided whereby normal operation of propulsion machinery can be sustained or restored even though one of the essential auxiliaries becomes inoperative. Special consideration shall be given to the malfunctioning of:

.1 a generating set which serves as a main source of electrical power;

.2 the fuel oil supply systems for engines;

.3 the sources of lubricating oil pressure;

.4 the sources of water pressure;

.5 an air compressor and receiver for starting or control purposes; and

.6 the hydraulic, pneumatic or electrical means for control in main propulsion machinery, including controllable-pitch propellers.

However, having regard to overall safety considerations, a partial reduction in propulsion capability from normal operation may be accepted.

9.1.5 Means shall be provided to ensure that the machinery can be brought into operation from the dead craft condition without external aid.

9.1.6 All parts of machinery, hydraulic, pneumatic and other systems and their associated fittings which are under internal pressure shall be subjected to appropriate tests including a pressure test before being put into service for the first time.

9.1.7 Provision shall be made to facilitate cleaning, inspection and maintenance of main propulsion and auxiliary machinery including boilers and pressure vessels.

9.1.8 The reliability of machinery installed in the craft shall be adequate for its intended purpose.

9.1.9 The Administration may accept machinery which does not show detailed compliance with the Code where it has been used satisfactorily in a similar application, provided that it is satisfied:

.1 that the design, construction, testing, installation and prescribed maintenance are together adequate for its use in a marine environment; and

.2 that an equivalent level of safety will be achieved.

9.1.10 A failure mode and effect analysis shall include machinery systems and their associated controls.

9.1.11 Such information as is necessary to ensure that machinery can be installed correctly regarding such factors as operating conditions and limitations shall be made available by the manufacturers.

9.1.12 Main propulsion machinery and all auxiliary machinery essential to the propulsion and the safety of the craft shall, as fitted in the craft, be designed to operate when the craft is upright and when inclined at any angle of list up to and including 15° either way under static conditions and 22.5° under dynamic conditions (rolling) either way and simultaneously inclined by dynamically (pitching) 7.5° by bow or stern. The Administration may permit deviation from these angles, taking into consideration the type, size and service conditions of the craft.

9.1.13 All boilers, and pressure vessels and associated piping systems shall be of a design and construction adequate for the purpose intended and shall be so installed and protected as to minimise danger to persons on board. In particular, attention shall be paid to the materials used in the construction and the working pressures and temperatures at which the item will operate and the need to provide an adequate margin of safety over the stresses normally produced in service. Every boiler, pressure vessel and associated piping systems shall be fitted with adequate means to prevent over-pressures in service and be subjected to a hydraulic test before being put into service, and where appropriate at subsequent specified intervals, to a pressure suitably in excess of the working pressure.

9.1.14 Arrangements shall be provided to ensure that, in the event of failure in any liquid cooling system, it is rapidly detected and alarmed (visual and audible) and means instituted to minimise the effects of such failures on machinery serviced by the system.

9.2 Engine (general)

9.2.1 The engines shall be fitted with adequate safety monitoring and control devices in respect of speed, temperature, pressure and other operational functions. Control of the machinery shall be from the craft's operating compartment. Category B craft and cargo craft shall be provided with additional machinery controls in or close to the machinery space. The machinery installation shall be suitable for operation as in an unmanned machinery space, including automatic fire detection system, bilge alarm system, remote machinery instrumentation and alarm system.

Where the space is continuously manned, this requirement may be varied in accordance with the requirements of the Administration.

9.2.2 The engines shall be protected against overspeed, loss of lubricating oil pressure, loss of cooling medium, high temperature, malfunction of moving parts and overload. Safety devices shall not cause complete engine shutdown without prior warning, except in cases where there is a risk of complete breakdown or explosion. Such safety devices shall be capable of being tested.

9.2.3 At least two independent means of stopping the engines quickly from the operating compartment under any operating conditions shall be available. Duplication of the actuator fitted to the engine shall not be required.

9.2.4 The major components of the engine shall have adequate strength to withstand the thermal and dynamic conditions of normal operation. The engine shall not be damaged by a limited operation at a speed or at temperatures exceeding the normal values but within the range of the protective devices.

9.2.5 The design of the engine shall be such as to minimise the risk of fire or explosion and to enable compliance with the fire precaution requirements of chapter 7.

9.2.6 Provision shall be made to drain all excess fuel and oil to a safe position so as to avoid a fire hazard.

9.2.7 Provision shall be made to ensure that, whenever practical, the failure of systems driven by the engine shall not unduly affect the integrity of the major components.

9.2.8 The ventilation arrangements in the machinery spaces shall be adequate under all envisaged operating conditions. Where appropriate, arrangements shall ensure that enclosed engine compartments are forcibly ventilated to the atmosphere before the engine can be started.

9.2.9 Any engines shall be so installed as to avoid excessive vibration within the craft.

9.3 Gas turbines

9.3.1 Gas turbines shall be designed to operate in the marine environment and shall be free from surge or dangerous instability throughout its operating range up to the maximum steady speed approved for use. The turbine installation shall be arranged to ensure that the turbine cannot be continuously operated within any speed range where excessive vibration, stalling, or surging may be encountered.

9.3.2 The gas turbines shall be designed and installed such that any reasonably probable shedding of compressor or turbine blades will not endanger the craft, other machinery, occupants of the craft or any other persons.

9.3.3 Requirements of 9.2.6 shall apply to gas turbines in respect of fuel which might reach the interior of the jet pipe or exhaust system after a false start or after stopping.

9.3.4 Turbines shall be safeguarded as far as practicable against the possibility of damage by ingestion of contaminants from the operating environment. Information regarding the recommended maximum concentration of contamination shall be made available. Provision shall be made for preventing the accumulation of salt deposits on the compressors and turbines and, if necessary, for preventing the air intake from icing.

9.3.5 In the event of a failure of a shaft or weak link, the broken end shall not hazard the occupants of the craft, either directly or by damaging the craft or its systems. Where necessary, guards may be fitted to achieve compliance with these requirements.

9.3.6 Each engine shall be provided with an emergency overspeed shutdown device connected, where possible, directly to each rotor shaft.

9.3.7 Where an acoustic enclosure is fitted which completely surrounds the gas generator and the high pressure oil pipes, a fire detection and extinguishing system shall be provided for the acoustic enclosure.

9.3.8 Details of the manufacturers' proposed automatic safety devices to guard against hazardous conditions arising in the event of malfunction in the turbine installation shall be provided together with the failure mode and effect analysis.

9.3.9 The manufacturers shall demonstrate the soundness of the casings. Intercoolers and heat exchangers shall be hydraulically tested on each side separately.

9.4 Diesel engines for main propulsion and essential auxiliaries

9.4.1 Any main diesel propulsion system shall have satisfactory torsional vibration and other vibrational characteristics verified by individual and combined torsional and other vibration analyses for the system and its components from power unit through to propulsor.

9.4.2 All external high-pressure fuel delivery lines between the high-pressure fuel pumps and fuel nozzles shall be protected with a jacketed tubing system capable of containing fuel from a high-pressure line failure. The jacketed tubing system shall include a means for collection of leakages and arrangements shall be provided for an alarm to be given of a fuel line failure.

9.4.3 Engines of a cylinder diameter of 200 mm or a crankcase volume of 0.6 m^3 and above shall be provided with crankcase explosion relief valves of an approved type with sufficient relief area. The relief valves shall be arranged with means to ensure that discharge from them is directed so as to minimise the possibility of injury to personnel.

9.4.4 The lubrication system and arrangements shall be efficient at all running speeds, due consideration being given to the need to maintain suction and avoid the spillage of oil in all conditions of list and trim and degree of motion of the craft.

9.4.5 Arrangements shall be provided to ensure that visual and audible alarms are activated in the event of either lubricating oil pressure or lubricating oil level falling below a safe level, considering the rate of circulation of oil in the engine. Such events shall also cause automatic reduction of engine speed to a safe level, but automatic shutdown shall only be activated by conditions leading to a complete breakdown, fire or explosion.

9.4.6 Where diesel engines are arranged to be started, reversed or controlled by compressed air, the arrangement of the air compressor, air receiver and air starting system shall be such as to minimise the risk of fire or explosion.

9.5 Transmissions

9.5.1 The transmission shall be of adequate strength and stiffness to enable it to withstand the most adverse combination of the loads expected in service without exceeding acceptable stress levels for the material concerned.

9.5.2 The design of shafting, bearings and mounts shall be such that hazardous whirling and excessive vibration could not occur at any speed up to 105% of the shaft speed attained at the designed overspeed trip setting of the prime mover.

9.5.3 The strength and fabrication of the transmission shall be such that the probability of hazardous fatigue failure under the action of the repeated loads of variable magnitude expected in service is extremely remote throughout its operational life. Compliance shall be demonstrated by suitably conducted tests, and by designing for sufficiently low stress levels, combined with the use of fatigue resistant materials and suitable detail design. Torsional vibration or oscillation likely to cause failure may be acceptable if it occurs at transmission speeds which would not be used in normal craft operation, and it is recorded in the craft operating manual as a limitation.

9.5.4 Where a clutch is fitted in the transmission, normal engagement of the clutch shall not cause excessive stresses in the transmission or driven items. Inadvertent operation of any clutch shall not produce dangerously high stresses in the transmission or driven item.

9.5.5 Provision shall be made such that a failure in any part of the transmission, or of a driven component, will not cause damage which might hazard the craft or its occupants.

9.5.6 Where failure of lubricating fluid supply or loss of lubricating fluid pressure could lead to hazardous conditions, provision shall be made to enable such failure to be indicated to the operating crew in adequate time to enable them as far as practicable to take the appropriate action before the hazardous condition arises.

9.6 Propulsion and lift devices

9.6.1 The requirements of this section are based on the premise that:

.1 Propulsion arrangements and lift arrangements may be provided by separate devices, or be integrated into a single propulsion and lift device. Propulsion devices may be air, or water propellers or water jets and the requirements apply to all types of craft.

.2 Propulsion devices are those which directly provide the propulsive thrust and include machinery items and any associated ducts, vanes, scoops and nozzles, the primary function of which is to contribute to the propulsive thrust.

.3 The lift devices, for the purposes of this section, are those items of machinery which directly raise the pressure of the air and move it for the primary purpose of providing lifting force for an air-cushion vehicle.

9.6.2 The propulsion and lift devices shall be of adequate strength and stiffness. The design data, calculations and trials, where necessary, shall establish the ability of the device to withstand the loads which can arise during the operations for which the craft is to be certificated, so that the possibility of catastrophic failure is extremely remote.

9.6.3 The design of propulsion and lift devices shall pay due regard to the effects of allowable corrosion, electrolytic action between different metals, erosion or cavitation which may result from operation in environments in which they are subjected to spray, debris, salt, sand, icing, etc.

9.6.4 The design data and testing of propulsion and lift devices shall pay due regard, as appropriate, to any pressure which could be developed as a result of a duct blockage, to steady and cyclic loadings, to loadings due to external forces and to the use of the devices in manoeuvring and reversing and to the axial location of rotating parts.

9.6.5 Appropriate arrangements shall be made to ensure that:

.1 ingestion of debris or foreign matter is minimised;

.2 the possibility of injury to personnel from shafting or rotating parts is minimised; and

.3 where necessary, inspection and removal of debris can be carried out safely in service.

PART B - REQUIREMENTS FOR PASSENGER CRAFT

9.7 Independent means of propulsion for category B craft

Category B craft shall be provided with at least two independent means of propulsion so that the failure of one engine or its support systems would not cause the failure of the other engine or engine systems and with additional machinery controls in or close to the machinery space.

9.8 Means for return to a port of refuge for category B craft

Category B craft shall be capable of maintaining the essential machinery and control so that, in the event of a fire or other casualties in any one compartment on board, the craft can return to a port of refuge under its own power.

PART C - REQUIREMENTS FOR CARGO CRAFT

9.9 Essential machinery and control

Cargo craft shall be capable of maintaining the essential machinery and control in the event of a fire or other casualties in any one compartment on board. The craft need not be able to return to a place of refuge under its own power.

CHAPTER 10

AUXILIARY SYSTEMS

PART A - GENERAL

10.1 General

10.1.1 Fluid systems shall be constructed and arranged so as to assure a safe and adequate flow of fluid at a prescribed flow rate and pressure under all conditions of craft operation. The probability of a failure or a leakage in any one fluid system, causing damage to the electrical system, a fire or an explosion hazard shall be extremely remote. Attention shall be directed to the avoidance of impingement of flammable liquid on hot surfaces in the event of leakage or fracture of the pipe.

10.1.2 The maximum allowable working pressure in any part of the fluid system shall not be greater than the design pressure, having regard to the allowable stresses in the materials. Where the maximum allowable working pressure of a system component, such as a valve or a fitting, is less than that computed for the pipe or tubing, the system pressure shall be limited to the lowest of the component maximum allowable working pressures. Every system which may be exposed to pressures higher than the system's maximum allowable working pressure shall be safeguarded by appropriate relief devices.

10.1.3 Tanks and piping shall be pressure-tested to a pressure that will assure a safety margin in excess of the working pressure of the item. The test on any storage tank or reservoir shall take into account any possible static head in the overflow condition and the dynamic forces arising from craft motions.

10.1.4 Materials used in piping systems shall be compatible with the fluid conveyed and selected giving due regard to the risk of fire. Non-metallic piping material may be permitted in certain systems provided the integrity of the hull and watertight decks and bulkheads is maintained.

10.2 Arrangement of oil fuel, lubricating oil and other flammable oil

10.2.1 The provisions of 7.1.2.2 apply to the use of oil as fuel.

10.2.2 Oil fuel, lubricating oil and other flammable oil lines shall be screened or otherwise suitably protected to avoid, as far as practicable, oil spray or oil leakages onto hot surfaces, into machinery air intakes or other sources of ignition. The number of joints in such piping systems shall be kept to a minimum. Flexible pipes carrying flammable liquids shall be of an approved type.

10.2.3 Fuel oil, lubricating oils and other flammable oils shall not be carried forward of public spaces and crew accommodation.

Oil fuel arrangements

10.2.4 In a craft in which oil fuel is used, the arrangements for the storage, distribution and utilisation of the oil fuel shall be such as to ensure the safety of the craft and persons on board and shall at least comply with the following provisions.

10.2.4.1 As far as practicable, all parts of the oil fuel system containing heated oil under pressure exceeding 0.18 N/mm^2 shall not be placed in a concealed position such that defects and leakage cannot readily be observed. The machinery spaces in way of such parts of the oil fuel system shall be adequately illuminated.

10.2.4.2 The ventilation of machinery spaces shall be sufficient under all normal conditions to prevent accumulation of oil vapour.

10.2.4.3 Location of fuel tanks shall be in accordance with 7.5.2.

10.2.4.4 No oil fuel tank shall be situated where spillage or leakage therefrom can constitute a hazard by falling on heated surfaces. Reference is made to the fire safety requirements in 7.5.

10.2.4.5 Oil fuel pipes shall be fitted with cocks or valves in accordance with 7.5.3.

10.2.4.6 Every fuel tank shall, where necessary, be provided with savealls or gutters to catch any fuel which may leak from such tanks.

10.2.4.7 Safe and efficient means of ascertaining the amount of oil fuel contained in any oil fuel tank shall be provided.

10.2.4.7.1 Where surrounding pipes are used, they shall not terminate in any space where the risk of ignition of spillage from the sounding pipe might arise. In particular, they shall not terminate in public spaces, crew accommodation or machinery spaces. Terminations shall be provided with a suitable means of closure and provision to prevent spillage during refuelling operations.

10.2.4.7.2 Other oil-level gauges may be used in place of sounding pipes. Such means are subject to the following conditions:

.1 In passenger craft, such means shall not require penetration below the top of the tank and their failure or overfilling of the tanks will not permit release of fuel.

.2 The use of cylindrical gauge glasses shall be prohibited. In cargo craft, the Administration may permit the use of oil-level gauges with flat glasses and self-closing valves between the gauges and fuel tanks. Such other means shall be acceptable to the Administration and shall be maintained in the proper condition to ensure their continued accurate functioning in service.

10.2.4.8 Provision shall be made to prevent overpressure in any oil tank or in any part of the fuel system, including the filling pipes. Any relief valves and air or overflow pipes shall discharge to a safe position and, for fuel of flashpoint less than 43°C, shall terminate with flame arresters in accordance with the standards developed by the Organization.

10.2.4.9 Oil fuel pipes and their valves and fittings shall be of steel or other approved material, except that restricted use of flexible pipes shall be permissible in positions where the Administration is satisfied that they are necessary. Such flexible pipes and end attachments shall be approved fire-resisting materials of adequate strength and shall be constructed to the satisfaction of the Administration.

Lubricating oil arrangements

10.2.5 The arrangements for the storage, distribution and utilisation of oil used in pressure lubrication systems shall be such as to ensure the safety of the craft and persons on board. The arrangements made in machinery spaces and, whenever practicable, in auxiliary machinery spaces shall at least comply with the provisions of 10.2.4.1 and 10.2.4.4 to 10.2.4.8 except that:

.1 this does not preclude the use of sight-flow glasses in lubricating systems provided they are shown by test to have a suitable degree of fire resistance;

.2 sounding pipes may be permitted in machinery spaces if fitted with appropriate means of closure; and

.3 lubricating oil storage tanks with a capacity of less than 500 *l* may be permitted without remote operated valves as required in 10.2.4.5.

Arrangements for other flammable oils

10.2.6 The arrangements for storage, distribution and utilisation of other flammable oil employed under pressure in power transmission systems, control and activating systems and heating systems shall be such as to ensure the safety of the craft and persons on board. In locations where means of ignition are present, such arrangements shall at least comply with the provisions of 10.2.4.4 and 10.2.4.7 and with the provisions of 10.2.4.8 and 10.2.4.9 in respect of strength and construction.

Arrangement within machinery spaces

10.2.7 In addition to the requirements of 10.2.1 to 10.2.6, the oil fuel and lubricating oil systems shall comply with the following:

.1 Where daily service fuel tanks are filled automatically or by remote control, means shall be provided to prevent overflow spillages.

.2 Other equipment which treats flammable liquids automatically, such as oil fuel purifiers, which, whenever practicable, should shall be installed in a special space reserved for purifiers and their heaters, shall have arrangements to prevent overflow spillages.

.3 Where daily service oil fuel tanks or settling tanks are fitted with heating arrangements, a high-temperature alarm shall be provided if the flashpoint of the oil can be reached due to failure of the thermostatic control.

10.3 Bilge pumping and drainage systems

10.3.1 Arrangements shall be made for draining any watertight compartment other than the compartments intended for permanent storage of liquid. Where, in relation to particular compartments, drainage is not considered necessary, drainage arrangements may be omitted, but it shall be demonstrated that the safety of the craft will not be impaired.

10.3.2 Bilge pumping arrangements shall be provided to allow every watertight compartment other than those intended for permanent storage of liquid to be drained. The capacity or position

of any such compartment shall be such that flooding thereof could not affect the safety of the craft.

10.3.3 The bilge pumping system shall be capable of operation under all possible values of list and trim after the craft has sustained the postulated damage in 2.6.6 to 2.6.10. The bilge pumping system shall be so designed as to prevent water flowing from one compartment to another. The necessary valves for controlling the bilge suctions shall be capable of being operated from above the datum. All distribution boxes and manually operated valves in connection with the bilge pumping arrangements shall be in positions which are accessible under ordinary circumstances. The spindles of manually operated valves shall be easily accessible and all valves shall be clearly marked.

10.3.4 The power operated self-priming bilge pumps may be used for other duties such as fire fighting or general service but not for pumping fuel or other flammable liquids.

10.3.5 Each power bilge pump shall be capable of pumping water through the required bilge pipe at a speed of not less than 2 m/s.

10.3.6 The diameter (d) of the bilge main shall be calculated according to the following formula, except that the actual internal diameter of the bilge main may be rounded off to the nearest size of a recognized standard:

$$d = 25 + 1.68(L(B + D))^{0.5}$$

where :

d is the internal diameter of the bilge main (mm);

L is the length of the craft (m) as defined in chapter 1;

B is, for monohull craft, the breadth of the craft (m) as defined in chapter 1 and, for multi-hull craft, the breadth of a hull at or below the design waterline (m); and

D is the moulded depth of the craft to the datum (m).

10.3.7 Internal diameters of suction branches shall meet the requirements of the Administration but shall not be less than 25 mm. Suction branches shall be fitted with effective strainers.

10.3.8 An emergency bilge suction shall be provided for each machinery space containing a propulsion prime mover. This suction shall be led to the largest available power pump other than a bilge pump, propulsion or oil pump. Emergency bilge suctions shall be provided for craft with common bilge pumping systems according to 10.3.6 and for craft with individual bilge pumps according to 10.3.13.

10.3.9 The spindles of the sea inlet valves shall extend well above the machinery space floor plates.

10.3.10 All bilge suction piping up to the connection to the pumps shall be independent of other piping.

10.3.11 Spaces situated above the water level in the worst anticipated damage conditions may be drained directly overboard through scuppers fitted with nonreturn valves.

10.3.12 Any unattended space for which bilge pumping arrangements are required shall be provided with a bilge alarm.

10.3.13 For craft with individual bilge pumps, the total capacity Q of the bilge pumps for each hull shall not be less than 2.4 times the capacity of the pump defined in 10.3.5 and 10.3.6.

10.3.14 In bilge pumping arrangements where a bilge main is not provided, then, with the exception of the spaces forward of public spaces and crew accommodation, at least one fixed submersible pump shall be provided for each space. In addition, at least one portable pump shall be provided supplied from the emergency supply, if electric, for use on individual spaces. The capacity of each submersible pump Q_n shall not be less than:

$Q_n = Q/(N - 1)$ tonnes/h with a minimum of 8 tonnes/h

where :

N= number of submersible pumps

Q= total capacity as defined in 10.3.13.

10.3.15 Non-return valves shall be fitted in the following components:

.1 bilge valve distribution manifolds;

.2 bilge suction hose connections where fitted directly to the pump or to the main bilge suction pipe; and

.3 direct bilge suction pipes and bilge pump connections to main bilge suction pipe.

10.4 Ballast systems

10.4.1 Water ballast shall not in general be carried in tanks intended for oil fuel. In craft in which it is not practicable to avoid putting water in oil fuel tanks, oily-water separating equipment shall be fitted, or other alternative means such as discharge to shore facilities shall be provided for disposing of the oily-water ballast. The provisions of this paragraph are without prejudice to the provisions of the International Convention for the Prevention of Pollution from Ships in force.

10.4.2 Where a fuel-transfer system is used for ballast purposes, the system shall be isolated from any water ballast system and meet the requirements for fuel systems and the International Convention for the Prevention of Pollution from Ships in force.

10.5 Cooling systems

The cooling arrangements provided shall be adequate to maintain all lubricating and hydraulic fluid temperatures within the manufacturers' recommended limits during all operations for which the craft is to be certificated.

10.6 Engine air intake systems

Arrangements shall provide sufficient air to the engine and shall give adequate protection against damage, as distinct from deterioration, due to ingress of foreign matter.

10.7 Ventilation systems

Machinery spaces shall be adequately ventilated so as to ensure that when machinery therein is operating at full power in all weather conditions, including heavy weather, an adequate supply of air is maintained to the spaces for the safety and comfort of personnel and the operation of the machinery. Auxiliary machinery spaces shall be adequately ventilated appropriate for the purpose of those spaces. The ventilation arrangements shall be adequate to ensure that the safe operation of the craft is not put at risk.

10.8 Exhaust systems

10.8.1 All engine exhaust systems shall be adequate to assure the correct functioning of the machinery and that safe operation of the craft is not put at risk.

10.8.2 Exhaust systems shall be so arranged as to minimise the intake of exhaust gases into manned spaces, air-conditioning systems, and engine intakes. Exhaust systems shall not discharge into air-cushion intakes.

10.8.3 Pipes through which exhaust gases are discharged through the hull in the vicinity of the waterline shall be fitted with erosion-/corrosion-resistant shut-off flaps or other devices on the shell or pipe end and acceptable arrangements made to prevent water flooding the space or entering the engine exhaust manifold.

10.8.4 Gas turbine engine exhausts shall be arranged so that hot exhaust gases are directed away from areas to which personnel have access, either on board the craft or in the vicinity of the craft when berthed.

PART B - REQUIREMENTS FOR PASSENGER CRAFT

10.9 Bilge pumping and drainage systems

10.9.1 For Category B craft at least three and for Category A craft at least two power bilge pumps shall be fitted connected to the bilge main, one of which may be driven by the propulsion machinery. Alternatively, the arrangement may be in accordance with the requirements of 10.3.14.

10.9.2 The arrangements shall be such that at least one power bilge pump shall be available for use in all flooding conditions which the craft is required to withstand as follows:

.1 one of the required bilge pumps shall be an emergency pump of a reliable submersible type having an emergency source of power; or

.2 the bilge pumps and their sources of power shall be so distributed throughout the length of the craft that at least one pump in an undamaged compartment will be available.

10.9.3 On multihull craft, each hull shall be provided with at least two bilge pumps.

10.9.4 Distribution boxes, cocks and valves in connection with the bilge pumping system shall be so arranged that, in the event of flooding, one of the bilge pumps may be operative in any compartment. In addition, damage to a pump or its pipe connecting to the bilge main shall not put the bilge system out of action. When, in addition to the main bilge pumping system, an emergency bilge pumping system is provided, it shall be independent of the main system and so arranged that a pump is capable of operating in any compartment under flooding conditions as specified in 10.3.3. In that case only the valves necessary for the operation of the emergency system need be capable of being operated from above the datum.

10.9.5 All cocks and valves referred to in 10.9.4 which can be operated from above the datum shall have their controls at their place of operation clearly marked and shall be provided with means to indicate whether they are open or closed.

PART C - REQUIREMENTS FOR CARGO CRAFT

10.10 Bilge pumping systems

10.10.1 At least two power pumps connected to the main bilge system shall be provided, one of which may be driven by the propulsion machinery. If the Administration is satisfied that the safety of the craft is not impaired, bilge pumping arrangements may be dispensed with in particular compartments. Alternatively, the arrangement may be in accordance with the requirements of 10.3.14.

10.10.2 On multihull craft, each hull shall be provided with at least two power pumps, unless a bilge pump in one hull is capable of pumping bilge in the other hull. At least one pump in each hull shall be an independent power pump.

CHAPTER 11

REMOTE CONTROL, ALARM AND SAFETY SYSTEMS

11.1 Definitions

11.1.1 "Remote control systems" comprise all equipment necessary to operate units from a control position where the operator cannot directly observe the effect of his actions.

11.1.2 "Back-up control systems" comprise all equipment necessary to maintain control of essential functions required for the craft's safe operation when the main control systems have failed or malfunctioned.

11.2 General

11.2.1 Failure of any remote or automatic control systems shall initiate an audible and visual alarm and shall not prevent normal manual control.

11.2.2 Manoeuvring and emergency controls shall permit the operating crew to perform the duties for which they are responsible in correct manner without difficulty, fatigue or excessive concentration.

11.2.3 Where control of propulsion or manoeuvring is provided at stations adjacent to but outside the operating compartment, the transfer of control shall only be effected from the station which takes charge of control. Two-way voice communication shall be provided between all stations from which control functions may be exercised and between each such station and the look-out position. Failure of the operating control system or of transfer of control shall bring the craft to low speed without hazarding passengers or the craft.

11.2.4 For category B and cargo craft, remote control systems for propulsion machinery and directional control shall be equipped with back-up systems controllable from the operating compartment. For cargo craft, instead of a back-up system described above, a back-up system controllable from an engine control space such as an engine control room outside the operating compartment, is acceptable.

11.3 Emergency controls

11.3.1 In all craft, the station or stations in the operating compartment from which control of craft manoeuvring and/or of its main machinery is exercised shall be provided, within easy reach of the crew member at that station, with controls for use in an emergency to:

.1 activate fixed fire-extinguishing systems;

.2 close ventilation openings and stop ventilating machinery supplying spaces covered by fixed fire-extinguishing systems, if not incorporated in .1;

.3 shut off fuel supplies to machinery in main and auxiliary machinery spaces;

.4 disconnect all electrical power sources from the normal power distribution system (the operating control shall be guarded to reduce the risk of inadvertent or careless operation); and

.5 stop main engine(s) and auxiliary machinery.

11.3.2 Where control of propulsion and manoeuvring is provided at stations outside the operating compartment, such stations shall have direct communication with the operating compartment which shall be a continuously manned control station.

11.3.3 In addition, for category B craft control of propulsion and manoeuvring as well as emergency functions referred to in 11.3.1 shall be provided in a station outside the operating compartment. Such stations shall have direct communication with the operating compartment which shall be a continuously manned control station.

11.4 Alarm system

11.4.1 Alarm systems shall be provided which announce at the craft's control position, by visual and audible means, malfunctions or unsafe conditions. Alarms shall be maintained until they are accepted and the visual indications of individual alarms shall remain until the fault has been corrected, when the alarm shall automatically reset to the normal operating condition. If an alarm has been accepted and a second fault occurs before the first is rectified, the audible and visual alarms shall operate again. Alarm systems shall incorporate a test facility.

11.4.1.1 Emergency alarms giving indication of conditions requiring immediate action shall be distinctive and in full view of crew members in the operating compartment, and shall be provided for the following:

.1 activation of a fire-detection system;

.2 total loss of normal electrical supply;

.3 overspeed of main engines; and

.4 thermal runaway of any permanently installed nickel-cadmium battery.

11.4.1.2 Alarms with a visual display distinct from that of alarms referred to in 11.4.1.1 shall indicate conditions requiring action to prevent degradation to an unsafe condition. These shall be provided for at least the following:

.1 exceeding the limiting value of any craft, machinery or system parameter other than engine overspeed;

.2 failure of normal power supply to powered directional or trim control devices;

.3 operation of any automatic bilge pump;

.4 failure of compass system;

.5 low level of a fuel tank contents;

.6 fuel oil tank overflow;

.7 extinction of side, masthead or stern navigation lights;

.8 low level of contents of any fluid reservoir the contents of which are essential for normal craft operation;

.9 failure of any connected electrical power source;

.10 failure of any ventilation fan installed for ventilating spaces in which inflammable vapours may accumulate; and

.11 diesel engine fuel line failure as required by 9.4.2.

11.4.1.3 All warnings required by 11.4.1.1 and 11.4.1.2 shall be provided at all stations at which control functions may be exercised.

11.4.2 The alarm system shall meet appropriate constructional and operational requirements for required alarms.

11.4.3 Equipment monitoring the passenger, cargo and machinery spaces for fire and flooding shall, so far as is practicable, form an integrated sub-centre incorporating monitoring and activation control for all emergency situations. This sub-centre may require feedback instrumentation to indicate that actions initiated have been fully implemented.

11.5 Safety system

Where arrangements are fitted for overriding any automatic shutdown system for the main propulsion machinery in accordance with 9.2.2, they shall be such as to preclude inadvertent operation. When a shutdown system is activated, an audible and visual alarm shall be given at the control station and means shall be provided to override the automatic shutdown except in cases where there is a risk of complete breakdown or explosion.

CHAPTER 12

ELECTRICAL INSTALLATIONS

PART A - GENERAL

12.1 General

12.1.1 Electrical installations shall be such that:

.1 all electrical auxiliary services necessary for maintaining the craft in normal operation and habitable conditions will be ensured without recourse to the emergency source of electrical power;

.2 electrical services essential for safety will be ensured under various emergency conditions; and

.3 the safety of passengers, crew and craft from electrical hazards will be ensured.

The FMEA shall include the electrical system, taking into account the effects of electrical failure on the systems being supplied. In cases where faults can occur without being detected during routine checks on the installations, the analysis shall take into account the possibility of faults occurring simultaneously or consecutively.

12.1.2 The electrical system shall be designed and installed so that the probability of the craft being at risk of failure of a service is extremely remote.

12.1.3 Where loss of particular essential service would cause serious risk to the craft, the service shall be fed by at least two independent circuits fed in such a way that no single failure in the electrical supply or distribution systems would affect both supplies.

12.1.4 The securing arrangements for heavy items, i.e. accumulator batteries, shall, as far as practicable, prevent excessive movement during the accelerations due to grounding or collision.

12.1.5 Precautions shall be taken to minimise risk of supplies to essential and emergency services being interrupted by the inadvertent or accidental opening of switches or circuit-breakers.

12.2 Main source of electrical power

12.2.1 A main source of electrical power of sufficient capacity to supply all those services mentioned in 12.1.1 shall be provided. The main source of electrical power shall consist of at least two generating sets.

12.2.2 The capacity of these generating sets shall be such that, in the event of any one generating set being stopped or failing, it will still be possible to supply those services necessary to provide the normal operational conditions of propulsion and safety. Minimum comfortable conditions of habitability shall also be ensured which include at least adequate services for cooking, heating, domestic refrigeration, mechanical ventilation, and sanitary and fresh water.

12.2.3 The arrangements of the craft's main source of electrical power shall be such that the services referred to in 12.1.1.1 can be maintained regardless of the speed and direction of the propulsion machinery or shafting.

12.2.4 In addition, the generating sets shall be such as to ensure that, with any one generator or its primary source of power out of operation, the remaining generating set shall be capable of providing the electrical services necessary to start the main propulsion plant from dead craft condition. The emergency source of electrical power may be used for the purpose of starting from a dead craft condition if its capability either alone or combined with that of any other source of electrical power is sufficient to provide at the same time those services required to be provided by 12.7.3.1 to 12.7.3.3 or 12.7.4.1 to 12.7.4.4 or 12.8.2.1 to 12.8.2.2.4.1, as appropriate.

12.2.5 Where transformers constitute an essential part of the electrical supply system required by this section, the system shall be so arranged as to ensure the same continuity of supply as is stated in 12.2.

12.2.6 A main electric lighting system which shall provide illumination throughout those parts of the craft normally accessible to and used by passengers and crew shall be supplied from the main source of electrical power.

12.2.7 The arrangement of the main electric lighting system shall be such that a fire or other casualty in spaces containing the emergency source of electrical power, associated transforming equipment, if any, the emergency switchboard and the emergency lighting switchboard will not render inoperative the main electric lighting systems required by 12.2.6.

12.2.8 The main switchboard shall be so placed relative to one main generating station that, as far as practicable, the integrity of the normal electrical supply may be affected only by a fire or other casualty in one space. An environmental enclosure for the main switchboard, such as may be provided by the machinery control room situated within the main boundaries of the space, shall not be considered as separating the switchboards from the generators.

12.2.9 The main busbars shall be subdivided into at least two parts which shall be connected by a circuit-breaker 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. For category B craft, each part of the main busbars with its associated generators shall be arranged in separate compartments.

12.3 Emergency source of electrical power

12.3.1 A self-contained emergency source of electrical power shall be provided.

12.3.2 The emergency source of electrical power, associated transforming equipment, if any, transitional source of emergency electrical power, emergency switchboard and emergency lighting switchboard shall be located above the waterline in the final condition of damage as referred to in chapter 2, operable in that condition and readily accessible.

12.3.3 The location of the emergency source of electrical power and associated transforming equipment, if any, the transitional source of emergency power, the emergency switchboard and the emergency electrical lighting switchboards in relation to the main source of electrical power, associated transforming equipment, if any, and the main switchboard shall be such as to ensure that a fire or other casualty in spaces containing the main source of electrical power, associated transforming equipment, if any, and the main switchboard or in any machinery space will not

interfere with the supply, control, and distribution of emergency electrical power. As far as practicable, the space containing the emergency source of electrical power, associated transforming equipment, if any, the transitional source of emergency electrical power and the emergency switchboard shall not be contiguous to the boundaries of the main machinery spaces or those spaces containing the main source of electrical power, associated transforming equipment, if any, or the main switchboard.

12.3.4 Provided that suitable measures are taken for safeguarding independent emergency operation under all circumstances, the emergency generator, if provided, may be used exceptionally, and for short periods, to supply non-emergency circuits.

12.3.5 Distribution systems shall be so arranged that the feeders from the main and emergency sources are separated both vertically and horizontally as widely as practicable.

12.3.6 The emergency source of electrical power may be either a generator or an accumulator battery, which shall comply with the following:

.1 Where the emergency source of electrical power is a generator, it shall be:

.1.1 driven by a suitable prime mover with an independent supply of fuel having a flashpoint which meets the requirements of 7.1.2.2;

.1.2 started automatically upon failure of the electrical supply from the main source of electrical power and shall be automatically connected to the emergency switchboard. Those services referred to in 12.7.5 or 12.8.3 shall then be transferred to the emergency generating set. The automatic starting system and the characteristic of the prime mover shall be such as to permit the emergency generator to carry its full rated load as quickly as is safe and practicable, subject to a maximum of 45 s; and

.1.3 provided with a transitional source of emergency electrical power according to 12.7.5 or 12.8.3.

.2 Where the emergency source of electrical power is an accumulator battery, it shall be capable of:

.2.1 carrying the emergency electrical load without recharging while maintaining the voltage of the battery throughout the discharge period within 12% above or below its nominal voltage;

.2.2 automatically connecting to the emergency switchboard in the event of failure of the main source of electrical power; and

.2.3 immediately supplying at least those services specified in 12.7.5 or 12.8.3.

12.3.7 The emergency switchboard shall be installed as near as is practicable to the emergency source of electrical power.

12.3.8 Where the emergency source of electrical power is a generator, the emergency switchboard shall be located in the same space unless the operation of the emergency switchboard would thereby be impaired.

12.3.9 No accumulator battery fitted in accordance with this section shall be installed in the same space as the emergency switchboard. An indicator shall be mounted in a suitable space at the craft's operating compartment to indicate when the batteries constituting either the emergency source of electrical power or the transitional source of emergency electrical power referred to in 12.3.6.1.3 are being discharged.

12.3.10 The emergency switchboard shall be supplied during normal operation from the main switchboard by an interconnector feeder which shall be adequately protected at the main switchboard against overload and short circuit and which shall be disconnected automatically at the emergency switchboard upon failure of the main source of electrical power. Where the system is arranged for feedback operation, the interconnector feeder shall also be protected at the emergency switchboard at least against short circuit. Failure of the emergency switchboard, when being used in other than an emergency, shall not put at risk the operation of the craft.

12.3.11 In order to ensure ready availability of the emergency source of electrical power, arrangements shall be made, where necessary, to disconnect automatically non-emergency circuits from the emergency switchboard to ensure that power shall be available to the emergency circuits.

12.3.12 The emergency generator and its prime mover and any emergency accumulator battery shall be so designed and arranged as to ensure that they will function at full rated power when the craft is upright and when the craft has a list or trimming accordance with 9.1.12 including any damage cases considered in chapter 2, or is in any combination of angles within those limits.

12.3.13 Where accumulator batteries are installed to supply emergency services, provisions shall be made to charge them *in situ* from a reliable on-board supply. Charging facilities shall be so designed to permit the supply of services, regardless of whether battery is on charge or not. Means shall be provided to minimise the risk of overcharging or overheating the batteries. Means for efficient air ventilation shall be provided.

12.4 Starting arrangements for emergency generating sets

12.4.1 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, provisions shall be made for heating arrangements to ensure ready starting of the generating sets.

12.4.2 Each emergency generating set shall be equipped with starting devices with a stored energy capability of at least three consecutive starts. The source of stored energy shall be protected to preclude critical depletion by the automatic starting system, unless a second independent means of starting is provided. A second source of energy shall be provided for an additional three starts within 30 min, unless manual starting can be demonstrated to be effective.

12.4.3 The stored energy shall be maintained at all times, as follows:

.1 electrical and hydraulic starting systems shall be maintained from the emergency switchboard;

.2 compressed air starting systems may be maintained by the main or auxiliary compressed air receivers through a suitable non-return valve or by an emergency air compressor which, if electrically driven, is supplied from the emergency switchboard;

.3 all of these starting, charging and energy-storing devices shall be located in the emergency generator space. These devices shall not be used for any purpose other than the operation of the emergency generating set. This does not preclude the supply to the air receiver of the emergency generating set from the main or auxiliary compresses air system through the non-return valve fitted in the emergency generator space.

12.5 Steering and stabilization

12.5.1 Where steering and/or stabilization of a craft is essentially dependent on one device as with a single rudder or pylon, which is itself dependent on the continuous availability of electric power, it shall be served by at least two independent circuits, one of which shall be fed either from the emergency source of electric power or from an independent power source located in such a position as to be unaffected by fire or flooding affecting the main source of power. Failure of either supply shall not cause any risk to the craft or passengers during switching to the alterative supply and such switching arrangements shall meet the requirements in 5.2.6. These circuits shall be provided with short-circuit protection and an overload alarm.

12.5.2 Protection against excess current may be provided, in which case it shall be for not less than twice the full load current of the motor or circuit so protected and shall be arranged to accept the appropriate starting current with a reasonable margin. Where three-phase supply is used, an alarm shall be provided in a readily observed position in the craft's operating compartment that will indicate failure of any one of the phases.

12.5.3 Where such systems are not essentially dependent on the continuous availability of electric power but at least one alternative system, not dependent on the electric supply, is installed, then the electrically powered or controlled system may be fed by a single circuit protected in accordance with 12.5.2.

12.5.4 The requirements of chapters 5 and 16 for power supply of the directional control system and stabilization system of the craft shall be met.

12.6 Precautions against shock, fire and other hazards of electrical origin

12.6.1.1 Exposed metal parts of electrical machines or equipment which are not intended to be live but which are liable under fault conditions to become live shall be earthed unless the machines or equipment are:

.1 supplied at a voltage not exceeding 50V direct current or 50V, root-mean-square between conductors; auto-transformers shall not be used for the purpose of achieving this voltage; or

.2 supplied at a voltage not exceeding 250V by safety isolating transformers supplying only one consuming device; or

.3 constructed in accordance with the principle of double insulation.

12.6.1.2 The Administration may require additional precautions for portable electrical equipment for use in confined or exceptionally damp spaces where particular risks due to conductivity may exist.

12.6.1.3 All electrical apparatus shall be constructed and so installed as not to cause injury when handled or touched in the normal manner.

12.6.2 Main and emergency switchboards shall be so arranged as to give easy access, as may be needed, to apparatus and equipment, without danger to personnel. The sides and the rear and, where necessary, the front of switchboards shall be suitably guarded. Exposed live parts having voltages to earth exceeding a voltage to be specified by the Administration shall not be installed on the front of such switchboards. Where necessary, nonconducting mats or gratings shall be provided at the front and rear of the switchboard.

12.6.3 When a distribution system, whether primary or secondary, for power, heating or lighting, with no connection to earth is used, a device capable of continuously monitoring the insulation level to earth and of giving an audible or visual indication of abnormally low insulation values shall be provided. For limited secondary distribution systems the Administration may accept a device for manual checking of the insulation level.

12.6.4 Cables and wiring

12.6.4.1 Except as permitted by the Administration in exceptional circumstances, all metal sheaths and armour of cables shall be electrically continuous and shall be earthed.

12.6.4.2 All electric cables and wiring external to equipment shall be at least of a flame-retardant type and shall be so installed as not to impair their original flame-retarding properties. Where necessary for particular applications, the Administration may permit the use of special types of cables such as radio-frequency cables, which do not comply with the foregoing.

12.6.4.3 Cables and wiring serving essential or emergency power, lighting, internal communications or signals shall, as far as practicable, be routed clear of machinery spaces and their casings and other areas of high fire risk. Where practicable, all such cables shall be run in such a manner as to preclude their being rendered unserviceable by heating of the bulkheads that may be caused by a fire in an adjacent space.

12.6.4.4 Where cables which are installed in hazardous areas introduce the risk of fire or explosion in the event of an electrical fault in such areas, special precautions against such risks shall be taken to the satisfaction of the Administration.

12.6.4.5 Cables and wiring shall be installed and supported in such manner as to avoid chafing or other damage.

12.6.4.6 Terminations and joints in all conductors shall be so made as to retain the original electrical, mechanical, flame-retarding and, where necessary, fire-resisting properties of the cable.

12.6.5.1 Each separate circuit shall be protected against short circuit and against overload, except as permitted in 12.5 or where the Administration may exceptionally otherwise permit.

12.6.5.2 The rating or appropriate setting of the overload protective device for each circuit shall be permanently indicated at the location of the protective device.

12.6.6 Lighting fittings shall be so arranged as to prevent temperature rises which could damage the cables and wiring, and to prevent surrounding material from becoming excessively hot.

12.6.7 All lighting and power circuits terminating in a bunker or cargo space shall be provided with a multiple-pole switch outside the space for disconnecting such circuits.

12.6.8.1 Accumulator batteries shall be suitably housed, and compartments used primarily for their accommodation shall be properly constructed and efficiently ventilated.

12.6.8.2 Electrical or other equipment which may constitute a source of ignition of flammable vapours shall not be permitted in these compartments except as permitted in 12.6.9.

12.6.8.3 Accumulator batteries shall not be located in crew accommodation.

12.6.9 No electrical equipment shall be installed in any space where flammable mixtures are liable to collect, including those in compartments assigned principally to accumulator batteries, in paint lockers, acetylene stores or similar spaces, unless the Administration is satisfied that such equipment is:

.1 essential for operational purposes;

.2 of a type which will not ignite the mixture concerned;

.3 appropriate to the space concerned; and

.4 appropriately certified for safe usage in the dusts, vapours or gases likely to be encountered.

12.6.10 The following additional requirements from .1 to .7 shall be met, and requirements from 8 to .13 shall be met also for non-metallic craft:

.1 The electrical distribution voltages throughout the craft may be either direct current or alternating current and shall not exceed:

.1.1 500 V for cooking, heating and other permanently connected equipment; and

.1.2 250 V for lighting, internal communications and receptacle outlets.

The Administration may accept higher voltages for propulsion purposes.

.2 For electrical power distribution, two-wire or three-wire systems shall be used. Four-wire systems with neutral solidly earthed but without hull return may also be used. Where applicable, the requirements for 7.5.6.4 or 7.5.6.5 shall also be met.

.3 Effective means shall be provided so that voltage may be cut off from each and every circuit and sub-circuit and from all apparatus as may be necessary to prevent danger.

.4 Electrical equipment shall be so designed that the possibility of accidentally touching live parts, rotating or moving parts as well as heated surfaces which might cause burns or initiate fire is minimized.

.5 Electrical equipment shall be adequately secured. The probability of fire or dangerous consequences arising from damage to electrical equipment shall be reduced to an acceptable minimum.

.6 The rating or appropriate setting of the overload protective device for each circuit shall be permanently indicated at the location of the protection device.

.7 Where it is impracticable to provide electrical protective devices for certain cables supplied from batteries, e.g., within battery compartments and in engine starting circuits, unprotected cable runs shall be kept as short as possible and special precautions shall be taken to minimize risk of faults, e.g., use of single-core cables with additional sleeve over the insulation of each core, with shrouded terminals.

.8 In order to minimize the risk of fire, structural damage, electrical shock and radio interference due to lightning strike or electrostatic discharge, all metal parts of the craft shall be bonded together, in so far as possible in consideration of galvanic corrosion between dissimilar metals, to form a continuous electrical system, suitable for the earth return of electrical equipment and to connect the craft to the water when water-borne. The bonding of isolated components inside the structure is not generally necessary, except in fuel tanks.

.9 Each pressure refuelling point shall be provided with a means of bonding the fuelling equipment to the craft.

.10 Metallic pipes capable of generating electrostatic discharges, due to the flow of liquids and gases, shall be bonded so as to be electrically continuous throughout their length and shall be adequately earthed.

.11 Primary conductors provided for lightning discharge currents shall have a minimum cross-section of 70 mm^2 in copper or equivalent surge-carrying capacity in aluminium.

.12 Secondary conductors provided for the equalization of static discharges, bonding of equipment, etc., but not for carrying lightning discharges shall have a minimum cross-section of 5 mm^2 copper of equivalent surge current carrying capacity in aluminium.

.13 The electrical resistance between bonded objects and the basic structure shall not exceed 0.02 Ohm, except where it can be demonstrated that a higher resistance will not cause a hazard. The bonding path shall have sufficient cross-sectional area to carry the maximum current likely to be imposed on it without excessive voltage drop.

PART B - REQUIREMENTS FOR PASSENGER CRAFT

12.7 General

12.7.1 Separation and duplication of electrical supply shall be provided for duplicated consumers of essential services. During normal operation the systems may be connected to the same power-bus, but facilities for easy separation shall be provided. Each system shall be able to supply all equipment necessary to maintain the control of propulsion, steering, stabilization,

navigation, lighting and ventilation, and allow starting of the largest essential electric motor at any load. Automatic load-dependent disconnection of non-essential consumers may be allowed.

12.7.2 Emergency source of electrical power

Where the main source of electrical power is located in two or more compartments which are not contiguous, each of which has its own self-contained systems, including power distribution and control systems, completely independent of each other and such that a fire or other casualty in any one of the spaces will not affect the power distribution from the others, or to the services required by 12.7.3 or 12.7.4, the requirements of 12.3.1, 12.3.2 and 12.3.4 may be considered satisfied without an additional emergency source of electrical power, provided that:

.1 there is at least one generating set, meeting the requirements of 12.3.12 and of sufficient capacity to meet the requirements of 12.7.3 or 12.7.4 in each of at least two non-contiguous spaces;

.2 the arrangements required by .1 in each such space are equivalent to those required by 12.3.6.1, 12.3.7 to 12.3.11 and 12.4 so that a source of electrical power is available at all times to the services required by 12.7.3 or 12.7.4; and

.3 the generator sets referred to in .1 and their self-contained systems are installed such that one of them remains operable after damage or flooding in any one compartment.

12.7.3 For category A craft, the emergency source of power shall be capable of supplying simultaneously the following services:

.1 for a period of 5 h emergency lighting:

.1.1 at the stowage, preparation, launching and deployed positions of survival craft and equipment for embarkation into those craft;

.1.2 at all escape routes, such as alleyways, stairways, exits from accommodation and service spaces, embarkation points, etc.;

.1.3 in the public spaces;

.1.4 in the machinery spaces and main emergency generator spaces, including their control positions;

.1.5 in control stations;

.1.6 at the stowage positions for firemen's outfits; and

.1.7 at the steering gear;

.2 for a period of 5 h;

.2.1 main navigation lights, except for "not under command" lights;

.2.2 electrical internal communication equipment for announcements for passengers and crew required during evacuation;

.2.3 fire-detection and general alarm system and manual fire alarms; and

.2.4 remote control devices of fire-extinguishing systems, if electrical;

.3 for a period of 4 h of intermittent operation:

.3.1 the daylight signalling lamps, if they have no independent supply from their own accumulator battery; and

.3.2 the craft's whistle, if electrically driven;

.4 for a period of 5 h;

.4.1 craft radio facilities and other loads as set out in 14.13.2; and

.4.2 essential electrically powered instruments and controls for propulsion machinery, if alternate sources of power are not available for such devices;

.5 for a period of 12 h, the "not under command" lights; and

.6 for a period of 10 min, power drives for directional control devices, including those required to direct thrust forward and astern, unless there is a manual alternative acceptable to the Administration as complying with 5.2.3.

12.7.4 For category B craft, the electrical power available shall be sufficient to supply all those services that are essential for safety in an emergency, due regard being paid to such services as may have to be operated simultaneously. The emergency source of electrical power shall be capable, having regard to starting currents and the transitory nature of certain loads, of supplying simultaneously at least the following services for the periods specified hereinafter, if they depend upon an electrical source for their operation:

.1 for a period of 12 h, emergency lighting:

.1.1 at the stowage, preparation, launching and deployed positions of survival craft and equipment for embarkation into those craft;

.1.2 at all escape routes, such as alleyways, stairways, exits from accommodation and service spaces, embarkation points, etc.;

.1.3 in the passenger compartments;

.1.4 in the machinery spaces and main emergency generating spaces including their control positions;

.1.5 in control stations;

.1.6 at the stowage positions for firemen's outfits; and

.1.7 at the steering gear;

.2 for a period of 12 h:

.2.1 the navigation lights, and other lights required by International Regulations for Preventing Collisions at Sea in force;

.2.2 electrical internal communication equipment for announcements for passengers and crew required during evacuation;

.2.3 fire-detection and general alarm system and manual fire alarms; and

.2.4 remote control devices of fire-extinguishing systems, if electrical;

.3 for a period of 4 h on intermittent operation:

.3.1 the daylight signalling lamps, if they have no independent supply from their own accumulator battery; and

.3.2 the craft's whistle, if electrically driven;

.4 for a period of 12 h;

.4.1 the navigational equipment as required by chapter 13. Where such provision is unreasonable or impracticable, the Administration may waive this requirement for craft of less than 5,000 gross tonnage;

.4.2 essential electrically powered instruments and controls for propulsion machinery, if alternate sources of power are not available for such devices;

.4.3 one of the fire pumps required by 7.7.5.1;

.4.4 the sprinkler pump and drencher pump, if fitted;

.4.5 the emergency bilge pump and all the equipment essential for the operation of electrically powered remote controlled bilge valves as required by chapter 10; and

.4.6 craft radio facilities and other loads as set out in 14.13.2;

.5 for a period of 30 min, any watertight doors, required by chapter 2 to be power-operated, together with their indicators and warning signals;

.6 for a period of 10 min, power drives for directional control devices including those required to direct thrust forward and astern, unless there is a manual alternative acceptable to the Administration as complying with 5.2.3.

12.7.5 Transitional source of emergency electrical power

The transitional source of emergency electrical power required by 12.3.6.1.3 may consist of an accumulator battery suitably located for use in an emergency which shall operate without recharging while maintaining the voltage of the battery throughout the discharge period within 12% above or below its nominal voltage and be of sufficient capacity and so arranged as to supply automatically in the event of failure of either the main or emergency source of

electrical power at least the following services, if they depend upon an electrical source for their operation:

.1 for a period of 30 min, the load specified in 12.7.3.1, .2 and .3, or in 12.7.4.1, .2 and .3; and

.2 with respect to the watertight doors:

.2.1 power to operate the watertight doors, but not necessarily simultaneously, unless an independent temporary source of stored energy is provided. The power source shall have sufficient capacity to operate each door at least three times, i.e. closed-open-closed, against an adverse list of 15°; and

.2.2 power to the control, indication and alarm circuits for the watertight doors for half an hour.

12.7.6 The requirements of 12.7.5 may be considered satisfied without the installation of a transitional source of emergency electrical power if each of the services required by that paragraph have independent supplies, for the period specified, from accumulator batteries suitably located for use in an emergency. The supply of emergency power to the instruments and controls of the propulsion and direction systems shall be uninterruptible.

12.7.7 In category A craft having limited public spaces, emergency lighting fittings of the type described in 12.7.9.1 as meeting the requirements of 12.7.3.1 and 12.7.5.1 may be accepted, provided that an adequate standard of safety is attained.

12.7.8 Provisions shall be made for the periodic testing of the complete emergency system, including the emergency consumers required by 12.7.3 or 12.7.4 and 12.7.5, and shall include the testing of automatic starting arrangements.

12.7.9 In addition to the emergency lighting required by paragraph 12.7.3.1, 12.7.4.1 and 12.7.5.1 on every craft with ro-ro spaces:

.1 all passenger public spaces and alleyways shall be provided with supplementary electric lighting that can operate for at least 3 h when all other sources of electric power have failed and under any condition of heel. The illumination provided shall be such that the approach to the means of escape can be readily seen. The source of power for the supplementary lighting shall consist of accumulator batteries located within the lighting units that are continuously charged, where practicable, from the emergency switchboard. Alternatively, any other means of lighting, which is at least as effective, may be accepted by the Administration.

The supplementary lighting shall be such that any failure of the lamp will be immediately apparent. Any accumulator battery provided shall be replaced at intervals having regard to the specified service life in the ambient condition that it is subject to in service; and

.2 a portable rechargeable battery-operated lamp shall be provided in every crew space alleyway, recreational space and every working space which is normally occupied unless supplementary emergency lighting, as required by .1, is provided.

12.7.10 Distribution systems shall be so arranged that fire in any main vertical zone will not interfere with services essential for safety in any other such zone. This requirement will be met if main and emergency feeders passing through any such zone are separated both vertically and horizontally as widely as is practicable.

PART C - REQUIREMENTS FOR CARGO CRAFT

12.8 General

12.8.1 Separation and duplication of electrical supply shall be provided for duplicated consumers of essential services. During normal operation these consumers may be connected to the same power-bus directly or via distribution boards or group starters, but shall be separated by removable links or other approved means. Each power-bus shall be able to supply all equipment necessary to maintain the control of propulsion, steering, stabilization, navigation, lighting and ventilation, and allow starting of the largest essential electric motor at any load. However, having regard to 12.1.2, partial reduction in the capability from normal operation may be accepted. Non-duplicated consumers of essential services connected to the emergency switchboard directly or via distribution boards may be accepted. Automatic load-dependent disconnection of non-essential consumers may be allowed.

12.8.2 Emergency source of electrical power

12.8.2.1 Where the main source of electrical power is located in two or more compartments which are not contiguous, each of which has its own self-contained systems, including power distribution and control systems, completely independent of each other and such that a fire or other casualty in any one of the spaces will not affect the power distribution from the others, or to the services required by 12.8.2.2, the requirements of 12.3.1, 12.3.2 and 12.3.4 may be considered satisfied without an additional emergency source of electrical power, provided that:

.1 there is at least one generating set, meeting the requirements of 12.3.12 and each of sufficient capacity to meet the requirements of 12.8.2.2, in each of at least two non-contiguous spaces;

.2 the arrangements required by .1 in each such space are equivalent to those required by 12.3.6.1, 12.3.7 to 12.3.11 and 12.4 so that a source of electrical power is available at all times to the services required by 12.8.2; and

.3 the generator sets referred to in .1 and their self-contained systems are installed in accordance with 12.3.2.

12.8.2.2 The electrical power available shall be sufficient to supply all those services that are essential for safety in an emergency, due regard being paid to such services as may have to be operated simultaneously. The emergency source of electrical power shall be capable, having regard to starting currents and the transitory nature of certain loads, of supplying simultaneously at least the following services for the periods specified hereinafter, if they depend upon an electrical source for their operation:

.1 for a period of 12 h, emergency lighting;

.1.1 at the stowage positions of life-saving appliances;

.1.2 at all escape routes, such as alleyways, stairways, exits from accommodation and service spaces, embarkation points, etc.;

.1.3 in public spaces, if any;

.1.4 in the machinery spaces and main emergency generator spaces including their control positions;

.1.5 in control stations;

.1.6 at the stowage positions for fire-fighter's outfits; and

.1.7 at the steering gear;

.2 for a period of 12 h;

.2.1 the navigation lights, and other lights required by the International Regulations for Preventing Collisions at Sea in force;

.2.2 electrical internal communication equipment for announcements during evacuation;

.2.3 fire-detection and general alarm system and manual fire alarms; and

.2.4 remote control devices of fire-extinguishing systems, if electrical;

.3 for a period of 4 h of intermittent operation;

.3.1 the daylight signalling lamps, if they have no independent supply from their own accumulator battery; and

.3.2 the craft's whistle, if electrically driven;

.4 for a period of 12 h;

.4.1 the navigational equipment as required by chapter 13. Where such provision is unreasonable or impracticable, the Administration may waive this requirement for craft of less than 5,000 gross tonnage;

.4.2 essential electrically powered instruments and controls for propulsion machinery, if alternate sources of power are not available for such devices;

.4.3 one of the fire pumps required by 7.7.5.1;

.4.4 the sprinkler pump and drencher pump, if fitted;

.4.5 the emergency bilge pump and all the equipment essential for the operation of electrically powered remote controlled bilge valves as required by chapter 10; and

.4.6 craft radio facilities and other loads as set out in 14.13.2;

.5 for a period of 10 min, power drives for directional control devices, including those required to direct thrust forward and astern, unless there is a manual alternative acceptable to the Administration as complying with 5.2.3.

12.8.2.3 Provision shall be made for the periodic testing of the complete emergency system, including the emergency consumers required by 12.8.2.2 and shall include the testing of automatic starting arrangements.

12.8.2.4 Where the emergency source of electrical power is a generator, a transitional source of emergency power shall be provided according to 12.8.3, unless the automatic starting system and the characteristics of the prime mover are such as to permit the emergency generator to carry its full rated load as quickly as is safe and practicable, subject to a maximum of 45 s.

12.8.3 Transitional source of emergency electrical power

The transitional source of emergency electrical power required by 12.8.2.4 may consist of an accumulator battery suitably located for use in an emergency which shall operate without recharging while maintaining the voltage of the battery throughout the discharge period within 12% above or below its nominal voltage and be of sufficient capacity and so arranged as to supply automatically, in the event of failure of either the main or emergency source of electrical power, at least the following services, if they depend upon an electrical source for their operation:

.1 for a period of 30 min, the load specified in 12.8.2.2.1, .2 and .3; and

.2 with respect to watertight doors:

.2.1 power to operate the watertight doors, but not necessarily simultaneously, unless an independent temporary source of stored energy is provided. The power source shall have sufficient capacity to operate each door at least three times, i.e. closed-open-closed, against an adverse list of 15°; and

.2.2 power to the control, indication and alarm circuits for the watertight doors for half an hour.

CHAPTER 13

SHIPBORNE NAVIGATIONAL SYSTEMS AND EQUIPMENT AND VOYAGE DATA RECORDERS

13.1 General

13.1.1 This chapter covers items of equipment which relate to the navigation of the craft as distinct from the safe functioning of the craft. The following paragraphs set out the minimum requirements.

13.1.2 The equipment and its installation shall be to the satisfaction of the Administration. The Administration shall determine to what extent the provisions of this chapter do not apply to craft below 150 gross tonnage.

13.1.3 The information provided by navigational systems and equipment shall be so displayed that the probability of misreading is reduced to a minimum. Navigational systems and equipment shall be capable of giving readings to an optimum accuracy.

13.2 Compasses

13.2.1 Craft shall be provided with a magnetic compass which is capable of operating without electrical supply, and which may be used for steering purposes. This compass shall be mounted in a suitable binnacle containing the required correcting devices and shall be suitable for the speed and motion characteristics of the craft.

13.2.2 The compass card or repeater shall be capable of being easily read from the position at which the craft is normally controlled.

13.2.3 Each magnetic compass shall be properly adjusted and its table or curve of residual deviations shall be available at all times.

13.2.4 Care shall be taken in siting a magnetic compass or magnetic sensing element so that magnetic interference is eliminated or minimized as far as is practicable.

13.2.5 Passenger craft certified to carry 100 passengers or less shall, in addition to the compass required by 13.2.1, be provided with a properly adjusted transmitting heading device, suitable for the speed and motion characteristics and area of operation of the craft, capable of transmitting a true heading reference to other equipment.

13.2.6 Passenger craft certified to carry more than 100 passengers and cargo craft shall, in addition to the compass required in 13.2.1, be provided with a gyro-compass which shall be suitable for the speed and motion characteristics and area of operation of the craft.

13.3 Speed and distance measurement

13.3.1 Craft shall be provided with a device capable of indicating speed and distance.

13.3.2 Speed- and distance-measuring devices on craft fitted with an automatic radar plotting aid (ARPA) or automatic tracking aid (ATA) shall be capable of measuring speed and distance through the water.

13.4 Echo-sounding device

Non-amphibious craft shall be provided with an echo-sounding device which will give an indication of depth of water to a sufficient degree of accuracy for use when the craft is in the displacement mode.

13.5 Radar installations

13.5.1 Craft shall be provided with at least one azimuth-stabilized radar operating on 9 GHz.

13.5.2 Craft of 500 gross tonnage and upwards or craft certified to carry more than 450 passengers shall also be provided with a 3 GHz radar or where considered appropriate by the Administration, a second 9 GHz radar or other means to determine and display the range and bearing of other surface craft, obstructions, buoys, shorelines and navigational marks to assist in navigation and in collision avoidance, which are functionally independent of those referred to in 13.5.1.

13.5.3 At least one radar shall be provided with facilities for an ARPA or ATA suitable for the motion and speed of the craft.

13.5.4 Adequate communication facilities shall be provided between the radar observer and the person in immediate charge of the craft.

13.5.5 Each radar installation provided shall be suitable for the intended craft speed, motion characteristics and commonly encountered environmental conditions.

13.5.6 Each radar installation shall be mounted so as to be as free as practicable from vibration.

13.6 Electronic positioning systems

Craft shall be provided with a receiver for a global navigation satellite system or a terrestrial radio navigation system, or other means, suitable for use at all times throughout the intended voyage to establish and update the craft's position by automatic means.

13.7 Rate-of-turn indicator and rudder angle indicator

13.7.1 Craft of 500 gross tonnage or upwards shall be provided with a rate-of-turn indicator. A rate-of-turn indicator shall be provided in craft of less than 500 gross tonnage if the test according to annex 9 shows that the turn rate can exceed safety level 1.

13.7.2 Craft shall be provided with an indicator showing the rudder angle. In craft without a rudder, the indicator shall show the direction of steering thrust.

13.8 Nautical charts and nautical publications

13.8.1 Craft shall be provided with nautical charts and nautical publications to plan and display the ship's route for the intended voyage and to plot and monitor positions throughout the voyage;

an electronic chart display and information system (ECDIS) may be accepted as meeting the chart carriage requirements of this paragraph.

13.8.2 Back-up arrangements shall be provided to meet the functional requirements of 13.8.1, if this function is partly or fully fulfilled by electronic means.

13.9 Searchlight and daylight signalling lamp

13.9.1 Craft shall be provided with at least one adequate searchlight, which shall be controllable from the operating station.

13.9.2 One portable daylight signalling lamp shall be provided and maintained ready for use in the operating compartment at all times.

13.10 Night vision equipment

When operational conditions justify the provision of night vision equipment, such equipment shall be provided.

13.11 Steering arrangement and propulsion indicator(s)

13.11.1 The steering arrangement shall be so designed that the craft turns in the same direction as that of the wheel, tiller, joystick or control lever.

13.11.2 Craft shall be provided with means to show the mode of the propulsion system(s).

13.11.3 Craft with emergency steering positions shall be provided with arrangements for supplying visual compass readings to the emergency steering position.

13.12 Automatic steering aid (automatic pilot)

13.12.1 Craft shall be provided with an automatic steering aid (automatic pilot).

13.12.2 Provision shall be made to change from the automatic to manual mode by a manual override.

13.13 Radar reflector

If practicable, craft of 150 gross tonnage or below shall be provided with a radar reflector, or other means, to assist detection by ships navigating by radar at both 9 GHz and 3 GHz.

13.14 Sound reception system

When the craft's bridge is totally enclosed and unless the Administration determines otherwise, craft shall be provided with a sound reception system, or other means, to enable the officer in charge of the navigational watch to hear sound signals and determine their direction.

13.15 Automatic identification system

13.15.1 Craft shall be provided with an automatic identification system (AIS).

13.15.2 AIS shall:

.1 provide automatically to appropriately equipped shore stations, other vessels and aircraft information, including the craft's identity, type, position, course, speed, navigational status and other safety-related information;

.2 receive automatically such information from similarly fitted vessels;

.3 monitor and track vessels; and

.4 exchange data with shore based facilities.

13.15.3 The requirements of 13.15.2 shall not apply where international agreements, rules or standards provide for the protection of navigational information.

13.15.4 AIS shall be operated taking into account the guidelines adopted by the Organization.

13.16 Voyage data recorder

13.16.1 To assist in casualty investigations, passenger craft irrespective of size and cargo craft of 3,000 gross tonnage and upwards shall be provided with a voyage data recorder (VDR).

13.16.2 The voyage data recorder system, including all sensors, shall be subjected to an annual performance test. The test shall be conducted by an approved testing or servicing facility to verify the accuracy, duration and recoverability of the recorded data. In addition, tests and inspections shall be conducted to determine the serviceability of all protective enclosures and devices fitted to aid location. A copy of the certificate of compliance issued by the testing facility, stating the date of compliance and the applicable performance standards, shall be retained on board the craft.

13.17 Approval of systems and equipment, and performance standards

13.17.1 All equipment to which this chapter applies shall be of a type approved by the Administration. Such equipment shall conform to performance standards not inferior to those adopted by the Organization.

13.17.2 The Administration shall require that manufacturers have a quality control system audited by a competent authority to ensure continuous compliance with the type approval conditions. Alternatively, the Administration may use final product verification procedures where compliance with the type approval certificate is verified by a competent authority before the product is installed on board craft.

13.17.3 Before giving approval to navigational systems or equipment embodying new features not covered by this chapter, the Administration shall ensure that such features support functions at least as effective as those required by this chapter.

13.17.4 When equipment, for which performance standards have been developed by the Organization, is carried on craft in addition to those items of equipment required by this chapter, such additional equipment shall be subject to approval and shall, as far as practicable, comply with performance standards not inferior to those adopted by the Organization.

CHAPTER 14

RADIOCOMMUNICATIONS

14.1 Application

14.1.1 Unless expressly provided otherwise, this chapter applies to all craft specified in 1.3.1 and 1.3.2.

14.1.2 This chapter does not apply to craft to which this Code would otherwise apply while such craft are being navigated within the Great Lakes of North America and their connecting and tributary waters as far east as the lower exit of the St. Lambert Lock at Montreal in the Province of Quebec, Canada.

14.1.3 No provision in this chapter shall prevent the use by any craft, survival craft or person in distress of any means at their disposal to attract attention, make known their position and obtain help.

14.2 Terms and definitions

14.2.1 For the purpose of this chapter, the following terms shall have the meanings defined below:

.1 "Bridge-to-bridge communications" means safety communications between craft and ships from the position from which the craft is normally navigated.

.2 "Continuous watch" means that the radio watch concerned shall not be interrupted other than for brief intervals when the craft's receiving capability is impaired or blocked by its own communications or when the facilities are under periodical maintenance or checks.

.3 "Digital selective calling (DSC)" means a technique using digital codes which enables a radio station to establish contact with, and transfer information to, another station or group of stations, and complying with the relevant recommendations of the International Telecommunication Union Radiocommunication Sector (ITU-R).

.4 "Direct-printing" telegraphy means automated telegraphy techniques which comply with the relevant recommendations of the International Telecommunication Union Radiocommunication Sector (ITU-R).

.5 "General radiocommunications" means operational and public correspondence traffic other than distress, urgency and safety messages, conducted by radio.

.6 "Global Maritime Distress and Safety System (GMDSS) Identities" means maritime mobile services identity, the craft's call sign, Inmarsat identities and serial number identity which may be transmitted by the craft's equipment and used to identify the craft.

.7 "Inmarsat" means the Organization established by the Convention on the International Maritime Satellite Organization (Inmarsat) adopted on 3 September 1976.

.8 "International NAVTEX" service means the co-ordinated broadcast and automatic reception on 518 kHz of maritime safety information by means of narrow-band direct-printing telegraphy using the English language.

.9 "Locating" means the finding of the ships, craft, aircraft, units or persons in distress.

.10 "Maritime safety information" means navigational and meteorological warnings, meteorological forecasts and other urgent safety-related messages broadcast to ships and craft.

.11 "Polar orbiting satellite service" means a service which is based on polar orbiting satellites which receive and relay distress alerts from satellite EPIRBs and which provides their position.

.12 "Radio Regulations" mean the Radio Regulations annexed to, or regarded as being annexed to, the most recent International Telecommunication Convention which is in force at any time.

.13 "Sea area A1" means an area within the radiotelephone coverage of at least one VHF coast station in which continuous DSC alerting is available, as may be defined by a Contracting Government to the Convention.

.14 "Sea area A2" means an area, excluding sea area Al, within the radiotelephone coverage of at least one MF coast station in which continuous DSC alerting is available, as may be defined by a Contracting Government to the Convention.

.15 "Sea area A3" means an area, excluding sea areas A1 and A2, within the coverage of an Inmarsat geostationary satellite in which continuous alerting is available.

.16 "Sea area A4" means an area outside sea areas Al, A2 and A3.

14.2.2 All other terms and abbreviations which are used in this chapter and which are defined in the Radio Regulations and in the International Convention on Maritime Search and Rescue (SAR), 1979, as it may be amended, shall have the meanings as defined in those Regulations and the SAR Convention.

14.3 Exemptions

14.3.1 It is considered highly desirable not to deviate from the requirements of this chapter; nevertheless the Administration, in conjunction with the base port State, may grant partial or conditional exemptions to individual craft from the requirements of 14.7 to 14.11 provided:

.1 such craft comply with the functional requirements of 14.5; and

.2 the Administration has taken into account the effect such exemptions may have upon the general efficiency of the service for the safety of all ships and craft.

14.3.2 An exemption may be granted under 14.3.1 only:

.1 if the conditions affecting safety are such as to render the full application of 14.7 to 14.11 unreasonable or unnecessary; or

.2 in exceptional circumstances, for a single voyage outside the sea area or sea areas for which the craft is equipped.

14.3.3 Each Administration shall submit to the Organization, as soon as possible after the first of January in each year, a report showing all exemptions granted under 14.3.1 and 14.3.2 during the previous calendar year and giving the reasons for granting such exemptions.

14.4 Global Maritime Distress and Safety System Identities

14.4.1 This section applies to all craft on all voyages.

14.4.2 Each Administration undertakes to ensure that suitable arrangements are made for registering Global Maritime Distress and Safety System (GMDSS) Identities and for making information on these identities available to Rescue Co-ordination Centres on a 24-hour basis. Where appropriate, international organizations maintaining a registry of these identities shall be notified by the Administration of these assignments.

14.5 Functional requirements

14.5.1 Every craft, while at sea, shall be capable:

.1 except as provided in 14.8.1.1 and 14.10.1.4.3, of transmitting ship-to-shore distress alerts by at least two separate and independent means, each using a different radiocommunication service;

.2 of receiving shore-to-ship distress alerts;

.3 of transmitting and receiving ship-to-ship distress alerts;

.4 of transmitting and receiving search and rescue co-ordinating communications;

.5 of transmitting and receiving on-scene communications;

.6 of transmitting and, as required by 13.5, receiving signals for locating;

.7 of transmitting and receiving maritime safety information;

.8 of transmitting and receiving general radiocommunications to and from shore-based radio systems or networks subject to 14.15.8; and

.9 of transmitting and receiving bridge-to-bridge communications.

14.6 Radio installations

14.6.1 Every craft shall be provided with radio installations capable of complying with the functional requirements prescribed by 14.5 throughout its intended voyage and, unless exempted under 14.3, complying with the requirements of 14.7 and, as appropriate for the sea area or areas

through which it will pass during its intended voyage, the requirements of either 14.8, 14.9, 14.10 or 14.11.

14.6.2 Every radio installation shall:

.1 be so located that no harmful interference of mechanical, electrical or other origin affects its proper use, and so as to ensure electromagnetic compatibility and avoidance of harmful interaction with other equipment and systems;

.2 be so located as to ensure the greatest possible degree of safety and operational availability;

.3 be protected against harmful effects of water, extremes of temperature and other adverse environmental conditions;

.4 be provided with reliable, permanently arranged electrical lighting, independent of the main sources of electrical power, for the adequate illumination of the radio controls for operating the radio installation; and

.5 be clearly marked with the call sign, the ship station identity and other codes as applicable for the use of the radio installation.

14.6.3 Control of the VHF radiotelephone channels, required for navigational safety, shall be immediately available on the navigating bridge convenient to the conning position, and, where necessary, facilities shall be available to permit radiocommunications from the wings of the navigating bridge. Portable VHF equipment may be used to meet the latter provision.

14.6.4 In passenger craft, a distress panel shall be installed at the conning position. This panel shall contain either one single button which, when pressed, initiates a distress alert using all radiocommunication installations required on board for that purpose or one button for each individual installation. The panel shall clearly and visually indicate whenever any button or buttons have been pressed. Means shall be provided to prevent inadvertent activation of the button or buttons. If the satellite EPIRB is used as the secondary means of distress alerting and is not remotely activated, it shall be acceptable to have an additional EPIRB installed in the wheelhouse near the conning position.

14.6.5 In passenger craft, information on the craft's position shall be continuously and automatically provided to all relevant radiocommunication equipment to be included in the initial distress alert when the button or buttons on the distress panel is pressed.

14.6.6 In passenger craft, a distress alert panel shall be installed at the conning position. The distress alarm panel shall provide visual and aural indication of any distress alert or alerts received on board and shall also indicate through which radiocommunication service the distress alerts have been received.

14.7 Radio equipment: general

14.7.1 Every craft shall be provided with:

.1 a VHF radio installation capable of transmitting and receiving:

.1.1 DSC on the frequency 156.525 MHz (channel 70). It shall be possible to initiate the transmission of distress alerts on channel 70 from the position from which the craft is normally navigated; and

.1.2 radiotelephony on the frequencies 156.300 MHz (channel 6), 156.650 MHz (channel 13) and 156.800 MHz (channel 16);

.2 a radio installation capable of maintaining a continuous DSC watch on VHF channel 70 which may be separate from, or combined with, that required by 14.7.1.1.1;

.3 a radar transponder capable of operating in the 9 GHz band, which:

.3.1 shall be so stowed that it can be easily utilized; and

.3.2 may be one of those required by 8.2.1.2 for a survival craft;

.4 a receiver capable of receiving International NAVTEX service broadcasts if the craft is engaged on voyages in any area in which an International NAVTEX service is provided;

.5 a radio facility for reception of maritime safety information by the Inmarsat enhanced group calling system if the craft is engaged on voyages in any area of Inmarsat coverage but in which an International NAVTEX service is not provided. However, craft engaged exclusively on voyages in areas where a HF direct printing telegraphy maritime safety information service is provided and fitted with equipment capable of receiving such service may be exempt from this requirements;

.6 subject to the provisions of 14.8.3, a satellite emergency position indicating radio beacon (satellite EPIRB) which shall be:

.6.1 capable of transmitting a distress alert either through the polar orbiting satellite service operating in the 406 MHz band or, if the craft is engaged only on voyages within Inmarsat coverage, through the Inmarsat geostationary satellite service operating in the 1.6 GHz band;

.6.2 installed in an easily accessible position;

.6.3 ready to be manually released and capable of being carried by one person into a survival craft;

.6.4 capable of floating free if the craft sinks and of being automatically activated when afloat; and

.6.5 capable of being activated manually.

14.7.2 Every passenger craft shall be provided with means for two-way on-scene radiocommunications for search and rescue purposes using the aeronautical frequencies 121.5 MHz and 123.1 MHz from the position from which the craft is normally navigated.

14.8 Radio equipment: sea area A1

14.8.1 In addition to meeting the requirements of 14.7, every craft engaged on voyages exclusively in sea area A1 shall be provided with a radio installation capable of initiating the transmission of ship-to-shore distress alerts from the position from which the craft is normally navigated, operating either:

.1 on VHF using DSC; this requirement may be fulfilled by the EPIRB prescribed by 14.8.3, either by installing the EPIRB close to, or by remote activation from, the position from which the craft is normally navigated; or

.2 through the polar orbiting satellite service on 406 MHz; this requirement may be fulfilled by the satellite EPIRB, required by 14.7.1.6, either by installing the satellite EPIRB close to, or by remote activation from, the position from which the craft is normally navigated; or

.3 if the craft is on voyages within coverage of MF coast stations equipped with DSC on MF using DSC; or

.4 on HF using DSC; or

.5 through the Inmarsat geostationary satellite service; this requirement may be fulfilled by:

.5.1 an Inmarsat ship earth station; or

.5.2 the satellite EPIRB, required by 14.7.1.6, either by installing the satellite EPIRB close to, or by remote activation from, the position from which the craft is normally navigated.

14.8.2 The VHF radio installation, required by 14.7.1.1, shall also be capable of transmitting and receiving general radiocommunications using radiotelephony.

14.8.3 Craft engaged on voyages exclusively in sea area A1 may carry, in lieu of the satellite EPIRB required by 14.7.1.6, an EPIRB which shall be:

.1 capable of transmitting a distress alert using DSC on VHF channel 70 and providing for locating by means of a radar transponder operating in the 9 GHz band;

.2 installed in an easily accessible position;

.3 ready to be manually released and capable of being carried by one person into a survival craft;

.4 capable of floating free if the craft sinks and of being automatically activated when afloat; and

.5 capable of being activated manually.

14.9 Radio equipment: sea areas A1 and A2

14.9.1 In addition to meeting the requirements of 14.7, every craft engaged on voyages beyond sea area A1, but remaining within sea area A2, shall be provided with:

.1 an MF radio installation capable of transmitting and receiving, for distress and safety purposes, on the frequencies:

.1.1 2,187.5 kHz using DSC; and

.1.2 2,182 kHz using radiotelephony;

.2 a radio installation capable of maintaining a continuous DSC watch on the frequency 2,187.5 kHz which may be separate from, or combined with, that required by 14.9.1.1.1; and

.3 means of initiating the transmission of ship-to-shore distress alerts by a radio service other than MF, operating either:

.3.1 through the polar orbiting satellite service on 406 MHz; this requirement may be fulfilled by the satellite EPIRB, required by 14.7.1.6, either by installing the satellite EPIRB close to, or by remote activation from, the position from which the craft is normally navigated; or

.3.2 on HF using DSC; or

.3.3 through the Inmarsat geostationary satellite service; this requirement may be fulfilled by:

.3.3.1 the equipment specified in 14.9.3.2; or

.3.3.2 the satellite EPIRB, required by 14.7.1.6, either by installing the satellite EPIRB close to, or by remote activation from, the position from which the craft is normally navigated.

14.9.2 It shall be possible to initiate transmission of distress alerts by the radio installations specified in 14.9.1.1 and 14.9.1.3 from the position from which the craft is normally navigated.

14.9.3 The craft shall, in addition, be capable of transmitting and receiving general radiocommunications using radiotelephony or direct-printing telegraphy by either:

.1 a radio installation operating on working frequencies in the bands between 1,605 kHz and 4,000 kHz or between 4,000 kHz and 27,500 kHz; this requirement may be fulfilled by the addition of this capability in the equipment required by 14.9.1.1; or

.2 an Inmarsat ship earth station.

14.10 Radio equipment: sea areas A1, A2 and A3

14.10.1 In addition to meeting the requirements of 14.7, every craft engaged on voyages beyond sea areas A1 and A2, but remaining within sea area A3, shall, if it does not comply with the requirements of 14.10.2, be provided with:

.1 an Inmarsat ship earth station capable of:

.1.1 transmitting and receiving distress and safety communications using direct-printing telegraphy;

.1.2 initiating and receiving distress priority calls;

.1.3 maintaining watch for shore-to-ship distress alerts, including those directed to specifically defined geographical areas; and

.1.4 transmitting and receiving general radiocommunications, using either radiotelephony or direct-printing telegraphy;

.2 an MF radio installation capable of transmitting and receiving, for distress and safety purposes, on the frequencies:

.2.1 2,187.5 kHz using DSC; and

.2.2 2,182 kHz using radiotelephony;

.3 a radio installation capable of maintaining a continuous DSC watch on the frequency 2,187.5 kHz which may be separate from, or combined with, that required by 14.10.1.2.1; and

.4 means of initiating the transmission of ship-to-shore distress alerts by a radio service operating either:

.4.1 through the polar orbiting service on 406 MHz; this requirement may be fulfilled by the satellite EPIRB, required by 14.7.1.6, either by installing the satellite EPIRB close to, or by remote activation from, the position from which the craft is normally navigated; or

.4.2 on HF using DSC; or

.4.3 through the Inmarsat geostationary satellite service, by an additional ship earth station or by the satellite EPIRB required by 14.7.1.6, either by installing the satellite EPIRB close to, or by remote activation from, the position from which the craft is normally navigated.

14.10.2 In addition to meeting the requirements of 14.7, every craft engaged on voyages beyond sea areas A1 and A2, but remaining within sea area A3, shall, if it does not comply with the requirements of 14.10.1, be provided with:

.1 an MF/HF radio installation capable of transmitting and receiving, for distress and safety purposes, on all distress and safety frequencies in the bands between 1,605 kHz and 4,000 kHz and between 4,000 kHz and 27,500 kHz:

.1.1 using DSC;

.1.2 using radiotelephony; and

.1.3 using direct-printing telegraphy;

.2 equipment capable of maintaining a DSC watch on 2,187.5 kHz, 8,414.5 kHz and on at least one of the distress and safety DSC frequencies 4,207.5 kHz, 6,312 kHz, 12,577 kHz or 1 6,804.5 kHz at any time, it shall be possible to select any of these DSC distress and safety frequencies. This equipment may be separate from, or combined with, the equipment required by 14.10.2.1;

.3 means of initiating the transmission of ship-to-shore distress alerts by a radiocommunication service other than HF operating either:

.3.1 through the polar orbiting satellite service on 406 MHz; this requirement may be fulfilled by the satellite EPIRB required by 14.7.1.6, either by installing the satellite EPIRB close to, or by remote activation from, the position from which the craft is normally navigated; or

.3.2 through the Inmarsat geostationary satellite service, this requirement may be fulfilled by:

.3.2.1 an Inmarsat ship earth station; or

.3.2.2 the satellite EPIRB, required by 14.7.1.6, either by installing the satellite EPIRB close to, or by remote activation from, the position from which the craft is normally navigated; and

.4 in addition, the craft shall be capable of transmitting and receiving general radiocommunications using radiotelephony or direct-printing telegraphy by an MF/HF radio installation operating on working frequencies in the bands between 1,605 kHz and 4,000 kHz and between 4,000 kHz and 27,500 kHz. This requirement may be fulfilled by the addition of this capability in the equipment required by 14.10.2.1.

14.10.3 It shall be possible to initiate transmission of distress alerts by the radio installations specified in 14.10.1.1, 14.10.1.2, 14.10.1.4, 14.10.2.1 and 14.10.2.3 from the position from which the craft is normally navigated.

14.11 Radio equipment: sea areas Al, A2, A3 and A4

In addition to meeting the requirements of 14.7, craft engaged on voyages in all sea areas shall be provided with the radio installations and equipment required by 14.10.2, except that the equipment required by 14.10.2.3.2 shall not be accepted as an alternative to that required by 14.10.2.3.1, which shall always be provided. In addition, craft engaged on voyages in all sea areas shall comply with the requirements of 14.10.3.

14.12 Watches

14.12.1 Every craft, while at sea, shall maintain a continuous watch:

.1 on VHF DSC channel 70, if the craft, in accordance with the requirements of 14.7.1.2, is fitted with a VHF radio installation;

.2 on the distress and safety DSC frequency 2,187.5 kHz, if the craft, in accordance with the requirements of 14.9.1.2 or 14.10.1.3, is fitted with an MF radio installation;

.3 on the distress and safety DSC frequencies 2,187.5 kHz and 8,414.5 kHz and also on at least one of the distress and safety DSC frequencies 4,207.5 kHz, 6,312 kHz, 12,577 kHz or 16,804.5 kHz, appropriate to the time of day and the geographical position of the craft, if the craft, in accordance with the requirements of 14.10.2.2 or 14.11, is fitted with an MF/HF radio installation. This watch may be kept by means of a scanning receiver; and

.4 for satellite shore-to-ship distress alerts, if the craft, in accordance with the requirements of 14.10.1.1, is fitted with an Inmarsat ship earth station.

14.12.2 Every craft, while at sea, shall maintain a radio watch for broadcasts of maritime safety information on the appropriate frequency or frequencies on which such information is broadcast for the area in which the craft is navigating.

14.12.3 Until 1 February 2005, every craft, while at sea shall continue to maintain, when practicable, a continuous listening watch on VHF channel 16. This watch shall be kept at the position from which the craft is normally navigated.

14.13 Sources of energy

14.13.1 There shall be available at all times, while the craft is at sea, a supply of electrical energy sufficient to operate the radio installations and to charge any batteries used as part of a reserve source of energy for the radio installations.

14.13.2 Reserve and emergency sources of energy shall be provided on every craft to supply radio installations, for the purpose of conducting distress and safety radiocommunications, in the event of failure of the craft's main and emergency sources of electrical power. The reserve source of energy shall be capable of simultaneously operating the VHF radio installation required by 14.7.1.1 and, as appropriate for the sea area or sea areas for which the craft is equipped, either the MF radio installation required by 14.9.1.1, the MF/HF radio installation required by 14.10.2.1 or 14.11 or the Inmarsat ship earth station required by 14.10.1.1 and any of the additional loads mentioned in 14.13.5 and 14.13.8 for a period of at least 1 h.

14.13.3 The reserve source of energy shall be independent of the propelling power of the craft and the craft's electrical system.

14.13.4 Where, in addition to the VHF radio installation, two or more of the other radio installations referred to in 14.13.2 can be connected to the reserve source or sources of energy, they shall be capable of simultaneously supplying, for the period specified in 14.13.2, the VHF radio installation and:

.1 all other radio installations which can be connected to the reserve source of energy at the same time; or

.2 whichever of the radio installations will consume the most power, if only one of the other radio installations can be connected to the reserve source of energy at the same time as the VHF radio installation.

14.13.5 The reserve source of energy may be used to supply the electrical lighting required by 14.6.2.4.

14.13.6 Where a reserve source of energy consists of a rechargeable accumulator battery or batteries:

.1 a means of automatically charging such batteries shall be provided which shall be capable of recharging them to minimum capacity requirements within 10 h; and

.2 the capacity of the battery or batteries shall be checked, using an appropriate method at intervals not exceeding 12 months, when the craft is not at sea.

14.13.7 The siting and installation of accumulator batteries which provide a reserve source of energy shall be such as to ensure:

.1 the highest degree of service;

.2 a reasonable lifetime;

.3 reasonable safety;

.4 that the battery temperatures remain within the manufacturer's specifications whether under charge or idle; and

.5 that when fully charged, the batteries will provide at least the minimum required hours of operation under all weather conditions.

14.13.8 If an uninterrupted input of information from the craft's navigational or other equipment to a radio installation required by this chapter is needed to ensure its proper performance, including the navigation receiver referred to in 14.18, means shall be provided to ensure the continuous supply of such information in the event of failure of the craft's main or emergency source of electrical power.

14.14 Performance standards

14.14.1 All equipment to which this chapter applies shall be of a type approved by the Administration. Such equipment shall conform to appropriate performance standards not inferior to those adopted by the Organization.

14.15 Maintenance requirements

14.15.1 Equipment shall be so designed that the main units can be replaced readily without elaborate recalibration or readjustment.

14.15.2 Where applicable, equipment shall be so constructed and installed that it is readily accessible for inspection and on-board maintenance purposes.

14.15.3 Adequate information shall be provided to enable the equipment to be properly operated and maintained, taking into account the recommendations of the Organization.

14.15.4 Adequate tools and spares shall be provided to enable equipment to be maintained.

14.15.5 The Administration shall ensure that radio equipment required by this chapter is maintained to provide the availability of the functional requirements specified in 14.5 and to meet the recommended performance standards of such equipment.

14.15.6 On craft engaged on voyages in sea areas Al and A2, the availability shall be ensured by using such methods as duplication of equipment, shore-based maintenance or at-sea electronic maintenance capability, or a combination of these, as may be approved by the Administration.

14.15.7 On craft engaged on voyages in sea areas A3 and A4, the availability shall be ensured by using a combination of at least two methods, such as duplication of equipment, shore-based maintenance or at-sea electronic maintenance capability, as may be approved by the Administration, taking into account the recommendations of the Organization.

14.15.8 However, for craft operating solely between ports where adequate facilities for shore-based maintenance of the radio installations are available and provided no journey between two such ports exceeds 6 h, then the Administration may exempt such craft from the requirement to use at least two maintenance methods. For such craft, at least one maintenance method shall be used.

14.15.9 While all reasonable steps shall be taken to maintain the equipment in efficient working order to ensure compliance with all the functional requirements specified in 14.5, malfunction of the equipment for providing the general radiocommunications, required by 14.8, shall not be considered as making a craft unseaworthy or as a reason for delaying the craft in ports where repair facilities are not readily available, provided the craft is capable of performing all distress and safety functions.

14.15.10 Satellite EPIRBs shall be tested at intervals not exceeding 12 months for all aspects of operational efficiency with particular emphasis on frequency stability, signal strength and coding. However, in cases where it appears proper and reasonable, the Administration may extend this period to 17 months. The test may be conducted on board the ship or at an approved testing or servicing station.

14.16 Radio personnel

14.16.1 Every craft shall carry personnel qualified for distress and safety radiocommunication purposes to the satisfaction of the Administration. The personnel shall be holders of certificates specified in the Radio Regulations as appropriate, any one of whom shall be designated to have primary responsibility for radiocommunications during distress incidents.

14.16.2 In passenger craft, at least one person qualified in accordance with 14.16.1 shall be assigned to perform only radiocommunication duties during distress incidents.

14.17 Radio records

A record shall be kept, to the satisfaction of the Administration and as required by the Radio Regulations, of all incidents connected with the radiocommunication service which appear to be of importance to safety of life at sea.

14.18 Position-updating

All two-way communication equipment carried on board craft to which this chapter applies which is capable of automatically including the craft's position in the distress alert shall be automatically provided with this information from an internal or external navigation receiver, if either is installed. If such a receiver is not installed, the craft's position and the time that position was correct shall be manually updated at intervals not exceeding 4 h, while the craft is underway, so that it is always ready for transmission by the equipment.

CHAPTER 15

OPERATING COMPARTMENT LAYOUT

15.1 Definitions

15.1.1 "Operating area" is the operating compartment and those parts of the craft on both sides of, and close to, the operating compartment which extend to the craft's side.

15.1.2 "Workstation" is a position at which one or several tasks constituting a particular activity are carried out.

15.1.3 "Docking workstation" is a place equipped with necessary means for docking the craft.

15.1.4 "Primary controls" are all control equipment necessary for the safe operation of the craft when it is under way, including those required in an emergency situation.

15.2 General

The design and layout of the compartment from which the crew operate the craft shall be such as to permit operating crew members to perform their duties in a correct manner without unreasonable difficulty, fatigue or concentration, and to minimize the likelihood of injury to operating crew members in both normal and emergency conditions.

15.3 Field of vision from the operating compartment

15.3.1 The operating station shall be placed above all other superstructures so that the operating crew are able to gain a view all round the horizon from the navigating workstation. Where it is impractical to meet the requirements of this paragraph from a single navigating workstation, the operating station shall be designed so that an all-round view of the horizon is obtained by using two navigating workstations combined or by any other means to the satisfaction of the Administration.

15.3.2 Blind sectors shall be as few and as small as possible, and not adversely affect the keeping of a safe look-out from the operating station. If stiffeners between windows are to be covered, this shall not cause further obstruction inside the wheelhouse.

15.3.3 The total arc of blind sectors from right ahead to 22.5° abaft the beam on either side shall not exceed 20°. Each individual blind sector shall not exceed 5°. The clear sector between two blind sectors shall not be less than 10°.

15.3.4 Where it is considered necessary by the Administration, the field of vision from the navigating workstation shall permit the navigators from this position to utilize leading marks astern of the craft for track monitoring.

15.3.5 The view of the sea surface from the operating station, when the navigators are seated, shall not be obscured by more than one craft length forward of the bow to 90° on either side irrespective of the craft's draught, trim and deck cargo.

15.3.6 The field of vision from the docking workstation, if remote from the operating station, shall permit one navigator to safely manoeuvre the craft to a berth.

15.4 Operating compartment

15.4.1 The design and arrangement of the operating compartment, including location and layout of the individual workstations, shall ensure the required field of vision for each function.

15.4.2 The craft's operating compartment shall not be used for purposes other than navigation, communications and other functions essential to the safe operation of the craft, its engines, passengers and cargo.

15.4.3 The operating compartment shall be provided with an integrated operating station for command, navigation, manoeuvring and communication and so arranged that it can accommodate those persons required to navigate the craft safely.

15.4.4 The arrangement of equipment and means for navigation, manoeuvring, control, communication and other essential instruments shall be located sufficiently close together to enable both the officer in charge and any assisting officer to receive all necessary information and to use the equipment and controls, as required, while they are seated. If necessary, the equipment and means serving these functions shall be duplicated.

15.4.5 If a separate workstation for supervision of engine performance is placed in the operating compartment, the location and use of this workstation shall not interfere with the primary functions to be performed in the operating station.

15.4.6 The location of the radio equipment shall not interfere with the primary navigational functions in the operating station.

15.4.7 The design and layout of the compartment from which the crew operate the craft and the relative positions of the primary controls shall be assessed against the essential operational manning level. Where minimum manning levels are proposed, the design and layout of the primary and communication controls shall form an integrated operational and emergency control centre from which the craft can be controlled under all operational and emergency events by the operating crew without the necessity for any crew member to vacate the compartment.

15.4.8 The relative positions of the primary controls and the seats shall be such that each operating crew member, with the seat suitably adjusted and without prejudicing compliance with 15.2, can:

.1 without interference, produce full and unrestricted movement of each control both separately and with all practical combinations of movement of other controls; and

.2 at all workstations, exert adequate control forces for the operation to be performed.

15.4.9 When a seat at a station from which the craft may be operated has been adjusted so as to suit the occupant, subsequent change of seat position to operate any control shall not be acceptable.

15.4.10 In craft where the Administration considers the provision of a safety belt necessary for use by the operating crew, it shall be possible for those operating crew members, with their safety belts correctly worn, to comply with 15.4.4 except in respect of controls which it can be shown will only be required on very rare occasions and which are not associated with the need for safety restraint.

15.4.11 The integrated operating station shall contain equipment which provides relevant information to enable the officer in charge and any assisting officer to carry out navigational and safety functions safely and efficiently.

15.4.12 Adequate arrangements shall be made to prevent passengers from distracting the attention of the operating crew.

15.5 Instruments and chart table

15.5.1 Instruments, instrument panels and controls shall be permanently mounted in consoles or other appropriate places, taking into account operation, maintenance and environmental conditions. However, this shall not prevent the use of new control or display techniques, provided the facilities offered are not inferior to recognized standards.

15.5.2 All instruments shall be logically grouped according to their functions. In order to reduce to a minimum the risk of confusion, instruments shall not be rationalized by sharing functions or by inter-switching.

15.5.3 Instruments required for use by any member of the operating crew shall be plainly visible and easily read:

.1 with minimum practicable deviation from his normal seating position and line of vision; and

.2 with the minimum risk of confusion under all likely operating conditions.

15.5.4 Instruments essential for the safe operation of the craft shall be clearly marked with any limitation if this information is not otherwise clearly presented to the operating crew. The instrument panels forming the emergency control for the launching of liferafts and the monitoring of the fire-fighting systems shall be in separate and clearly defined positions within the operating area.

15.5.5 The instruments and controls shall be provided with means for screening and dimming in order to minimize glare and reflections and prevent them being obscured by strong light.

15.5.6 The surfaces of console tops and instruments shall have dark glare-free colours.

15.5.7 Instruments and displays providing visual information to more than one person shall be located for easy viewing by all users concurrently. If this is not possible, the instrument or display shall be duplicated.

15.5.8 If considered necessary by the Administration, the operating compartment shall be provided with a suitable table for chart work. There shall be facilities for lighting the chart. Chart-table lighting shall be screened.

15.6 Lighting

15.6.1 A satisfactory level of lighting shall be available to enable the operating personnel to adequately perform all their tasks both at sea and in port, by day and night. There shall be only a limited reduction in the illumination of essential instruments and controls under likely system fault conditions.

15.6.2 Care shall be taken to avoid glare and stray image reflection in the operating area environment. High contrast in brightness between work area and surroundings shall be avoided. Non-reflective or matt surfaces shall be used to reduce indirect glare to a minimum.

15.6.3 A satisfactory degree of flexibility within the lighting system shall be available to enable the operating personnel to adjust the lighting intensity and direction as required in the different areas of the operating compartment and at individual instruments and controls.

15.6.4 Red light shall be used to maintain dark adaptation whenever possible in areas or on items of equipment requiring illumination in the operational mode, other than the chart table.

15.6.5 During hours of darkness, it shall be possible to discern displayed information and control devices.

15.6.6 Reference is made to additional requirements on lighting in 12.7 and 12.8.

15.7 Windows

15.7.1 Divisions between windows, located in the front, on the sides and in the doors, shall be kept to a minimum. No division shall be installed immediately forward of the operating stations.

15.7.2 Administrations shall be satisfied that a clear view through the operating compartment windows is provided at all times regardless of weather conditions. The means provided for maintaining the windows in a clear condition shall be so arranged that no reasonably probable single failure can result in a reduction of the cleared field of vision such as to interfere seriously with the ability of the operating crew to continue the operation and bring the craft to rest.

15.7.3 Arrangements shall be provided so that the forward view from operating stations is not adversely affected by solar glare. Neither polarized nor tinted window glass shall be fitted.

15.7.4 Operating compartment windows shall be angled to reduce unwanted reflection.

15.7.5 The windows shall be made of material which will not break into dangerous fragments if fractured.

15.8 Communication facilities

15.8.1 Such means as are necessary shall be provided to enable the crew to communicate between, and have access to, each other and with other occupants of the craft in both normal and emergency conditions.

15.8.2 Means to communicate between the operating compartment and spaces containing essential machinery, including any emergency steering position, irrespective of whether the machinery is remotely or locally controlled, shall be provided.

15.8.3 Means for making public address and safety announcements from control stations to all areas to which passengers and crew have access shall be provided.

15.8.4 Provisions shall be made for means to monitor, receive and transmit radio safety messages at the operating compartment.

15.9 Temperature and ventilation

The operating compartment shall be equipped with adequate temperature and ventilation control systems.

15.10 Colours

The surface materials inside the operating compartment shall have a suitable colour and finish to avoid reflections.

15.11 Safety measures

The operating area shall be free of physical hazard to the operating personnel and have non-skid flooring in dry and wet conditions and adequate handrails. Doors shall be fitted with devices to prevent them moving, whether they are open or closed.

CHAPTER 16

STABILIZATION SYSTEMS

16.1 Definitions

16.1.1 "Stabilization control system" is a system intended to stabilize the main parameters of the craft's attitude: heel, trim, course and height and control the craft's motions: roll, pitch, yaw and heave. This term excludes devices not associated with the safe operation of the craft, e.g. motion-reduction or ride-control systems.

The main elements of a stabilization control system may include the following:

.1 devices such as rudders, foils, flaps, skirts, fans, water jets, tilting and steerable propellers, pumps for moving fluids;

.2 power drives actuating stabilization devices; and

.3 stabilization equipment for accumulating and processing data for making decisions and giving commands such as sensors, logic processors and automatic safety control.

16.1.2 "Self-stabilization" of the craft is stabilization ensured solely by the craft's inherent characteristics.

16.1.3 "Forced stabilization" of the craft is stabilization achieved by:

.1 an automatic control system; or

.2 a manually assisted control system; or

.3 a combined system incorporating elements of both automatic and manually assisted control systems.

16.1.4 "Augmented stabilization" is a combination of self-stabilization and forced stabilization.

16.1.5 "Stabilization device" means a device as enumerated in 16.1.1.1 with the aid of which forces for controlling the craft's position are generated.

16.1.6 "Automatic safety control" is a logic unit for processing data and making decisions to put the craft into the displacement or other safe mode if a condition impairing safety arises.

16.2 General requirements

16.2.1 Stabilization systems shall be so designed that, in case of failure or malfunctioning of any one of the stabilization devices or equipment, it would be possible either to ensure maintaining the main parameters of the craft's motion within safe limits with the aid of working stabilization devices or to put the craft into the displacement or other safe mode.

16.2.2 In case of failure of any automatic equipment or stabilization device, or of its power drive, the parameters of craft motion shall remain within safe limits.

16.2.3 Craft fitted with an automatic stabilization system shall be provided with an automatic safety control unless the redundancy in the system provides equivalent safety. Where an automatic safety control is fitted, provision shall be made to override it and to cancel the override from the main operating station.

16.2.4 The parameters and the levels at which any automatic safety control gives the command to decrease speed and put the craft safely in the displacement or other safe mode shall take account of the safe values of heel, trim, yaw and combination of trim and draught appropriate to the particular craft and service; also to the possible consequences of power failure for propulsion, lift or stabilization devices.

16.2.5 The parameters and the degree of stabilization of the craft provided by the automatic stabilization system shall be satisfactory, having regard to the purpose and service conditions of the craft.

16.2.6 Failure mode and effect analysis shall include the stabilization system.

16.3 Lateral and height control systems

16.3.1 Craft fitted with an automatic control system shall be provided with an automatic safety control. Probable malfunctions shall have only minor effects on automatic control system operation and shall be capable of being readily counteracted by the operating crew.

16.3.2 The parameters and levels at which any automatic control system gives the command to decrease speed and put the craft safely into the displacement or other safe mode shall take account of the safety levels as given in section 2.4 of annex 3 and of the safe values of motions appropriate to the particular craft and service.

16.4 Demonstrations

16.4.1 The limits of safe use of any of the stabilization control system devices shall be based on demonstrations and a verification process in accordance with annex 9.

16.4.2 Demonstration in accordance with annex 9 shall determine any adverse effects upon safe operation of the craft in the event of an uncontrollable total deflection of any one control device. Any limitation on the operation of the craft as may be necessary to ensure that the redundancy or safeguards in the systems provide equivalent safety shall be included in the craft operating manual.

CHAPTER 17

HANDLING, CONTROLLABILITY AND PERFORMANCE

17.1 General

The operational safety of the craft in normal service conditions and in equipment failure situations of a craft to which this Code applies shall be documented and verified by full-scale tests, supplemented by model tests where appropriate, of the prototype craft. The objective of tests is to determine information to be included in the craft operating manual in relation to:

.1 operating limitations;

.2 procedures for operation of the craft within the limitations;

.3 actions to be taken in the event of prescribed failure; and

.4 limitations to be observed for safe operation subsequent to prescribed failures.

Operational information shall be available on board for guidance, or the craft shall have an instrument system for on-line check of operational performance which shall be approved by the Administration taking into account the standards for the processing and presentation of measurements developed by the Organization. As a minimum, the system shall measure accelerations in three axes close to the craft longitudinal centre of gravity.

17.2 Proof of compliance

17.2.1 The information on controllability and manoeuvrability which shall be contained in the craft operating manual shall include the characteristics under 17.5 as applicable, the list of parameters of the worst intended conditions affecting the controllability and manoeuvrability according to 17.6, information on safe maximum speeds as described in 17.9 and the performance data verified in accordance with annex 9.

17.2.2 The information on operating limitations which shall be contained in the route operational manual shall include the characteristics under 17.2.1, 17.5.4.1 and 17.5.4.2.

17.3 Weight and centre of gravity

Compliance with each of the handling, controllability and performance requirements shall be established for all combinations of weight and centre of gravity position significant for the operational safety in the range of weights up to the maximum permissible weight.

17.4 Effect of failures

The effect of any likely failure in handling and control devices, services or components (e.g. power operation, power assistance, trimming and stability augmentation) shall be assessed in order that a safe level of craft operation can be maintained. Effects of failure identified as being critical according to annex 4 shall be verified in accordance with annex 9.

17.5 Controllability and manoeuvrability

17.5.1 Instructions to crew members shall be provided in the craft operating manual regarding required actions and craft limitations subsequent to prescribed failures.

17.5.2 It is necessary to ensure that the effort required to operate the controls in the worst intended conditions is not such that the person at the control will be unduly fatigued or distracted by the effort necessary to maintain the safe operation of the craft.

17.5.3 The craft shall be controllable and be capable of performing those manoeuvres essential to its safe operation up to the critical design conditions.

17.5.4.1 When determining the operating limitations of a craft, particular attention shall be paid to the following aspects during normal operation and during failures and subsequent to failures:

.1 yawing;

.2 turning;

.3 automatic pilot and steering performance;

.4 stopping in normal and emergency conditions;

.5 stability in the non-displacement mode about three axes and in heave;

.6 trim;

.7 roll;

.8 plough in;

.9 lift power limitations;

.10 broaching;

.11 slamming; and

.12 bow diving.

17.5.4.2 The terms in 17.5.4.1.2, .6, .7 and .11 are defined as follows:

.1 "Turning" is the rate of change of direction of a craft at its normal maximum operating speed in specified wind and sea conditions.

.2 "Plough in" is an involuntary motion involving sustained increase in drag of an air-cushion vehicle at speed, usually associated with partial collapse of the cushion system.

.3 "Lift power limitations" are those limitations imposed upon the machinery and components which provide the lift.

.4 "Slamming" is the water impact on the underside of the hull in the bow area of the craft.

17.6 Change of operating surface and mode

There shall be no unsafe change in the stability, controllability or attitude of the craft during transition from one type of operating surface or mode to another. Information on change in the behaviour characteristics of the craft during transition shall be available to the master.

17.7 Surface irregularities

Factors which limit the ability of the craft to operate over sloping ground and steps or discontinuities shall be determined, as applicable, and made available to the master.

17.8 Acceleration and deceleration

The Administration shall be satisfied that the worst likely acceleration or deceleration of the craft, due to any likely failure, emergency stopping procedures or other likely causes, would not hazard the persons on the craft.

17.9 Speeds

Safe maximum speeds shall be determined, taking account of the limitations from 4.3.1, modes of operation, wind force and direction and the effects of possible failures of any one lift or propulsion system over calm water, rough water and over other surfaces, as appropriate to the craft.

17.10 Minimum depth of water

The minimum depth of water and other appropriate information required for operations in all modes shall be determined.

17.11 Hard structure clearance

For amphibious craft, when cushion-borne, clearance of the lowest point of the hard structure above a hard flat surface shall be determined.

17.12 Night operation

The schedule of tests shall include sufficient operation to evaluate the adequacy of internal and external lighting and visibility under conditions of normal and emergency electrical power supply during service, cruising and docking manoeuvres.

CHAPTER 18

OPERATIONAL REQUIREMENTS

PART A - GENERAL

18.1 Craft operational control

18.1.1 The High-Speed Craft Safety Certificate, the Permit to Operate High-Speed Craft or certified copies thereof, and copies of the route operational manual, craft operating manual, and a copy of such elements of the maintenance manual as the Administration may require shall be carried on board.

18.1.2 The craft shall not be intentionally operated outside the worst intended conditions and limitations specified in the Permit to Operate High-Speed Craft, in the High-Speed Craft Safety Certificate, or in documents referred to therein.

18.1.3 The Administration shall issue a Permit to Operate High-Speed Craft when it is satisfied that the operator has made adequate provisions from the point of view of safety generally, including the following matters specifically, and shall revoke the Permit to Operate if such provisions are not maintained to its satisfaction:

.1 the suitability of the craft for the service intended, having regard to the safety limitations and information contained in the route operational manual;

.2 the suitability of the operating conditions in the route operational manual;

.3 the arrangements for obtaining weather information on the basis of which the commencement of a voyage may be authorized;

.4 provision in the area of operation of a base port fitted with facilities in accordance with 18.1.4;

.5 the designation of the person responsible for decisions to cancel or delay a particular voyage, e.g. in the light of the weather information available;

.6 sufficient crew complement required for operating the craft, deploying and manning survival craft, the supervision of passengers, vehicles and cargo in both normal and emergency conditions as defined in the Permit to Operate. The crew complement shall be such that two officers are on duty in the operating compartment when the craft is under way, one of whom may be the master;

.7 crew qualifications and training, including competence in relation to the particular type of craft and service intended, and their instructions in regard to safe operational procedures;

.8 restrictions with regard to working hours, rostering of crews and any other arrangements to prevent fatigue, including adequate rest periods;

.9 the training of crew in craft operation and emergency procedures;

.10 the maintenance of crew competence in regard to operation and emergency procedures;

.11 safety arrangements at terminals and compliance with any existing safety arrangements, as appropriate;

.12 traffic control arrangements and compliance with any existing traffic control, as appropriate;

.13 restrictions and/or provisions relating to position fixing and to operation by night or in restricted visibility, including the use of radar and/or other electronic aids to navigation, as appropriate;

.14 additional equipment which may be required, due to the specific characteristics of the service intended, for example, night operation;

.15 communication arrangements between craft, coast radio stations, base ports radio stations, emergency services and other ships, including radio frequencies to be used and watch to be kept;

.16 the keeping of records to enable the Administration to verify:

.16.1 that the craft is operated within the specified parameters,

.16.2 the observance of emergency and safety drills/procedures;

.16.3 the hours worked by the operating crew;

.16.4 the number of passengers on board;

.16.5 compliance with any law to which the craft is subject;

.16.6 craft operations; and

.16.7 maintenance of the craft and its machinery in accordance with approved schedules;

.17 arrangements to ensure that equipment is maintained in compliance with the Administration's requirements, and to ensure co-ordination of information as to the serviceability of the craft and equipment between the operating and maintenance elements of the operator's organization;

.18 the existence and use of adequate instructions regarding:

.18.1 loading of the craft so that weight and centre of gravity limitations can be effectively observed and cargo is, when necessary, adequately secured;

.18.2 the provision of adequate fuel reserves;

.18.3 action in the event of reasonable foreseeable emergencies; and

.19 provision of contingency plans by operators for foreseeable incidents including all land-based activities for each scenario. The plans shall provide operating crews with information regarding search and rescue (SAR) authorities and local administrations and organizations which may complement the tasks undertaken by crews with the equipment available to them.

18.1.4 The Administration shall determine the maximum allowable distance from a base port or place of refuge after assessing the provisions made under 18.1.3.

18.1.5 The master shall ensure that an effective system of supervision and reporting of the closing and opening of accesses referred to in 2.2.4.2 and 2.2.4.3 is implemented.

18.2 Craft documentation

The company shall ensure that the craft is provided with adequate information and guidance in the form of technical manual(s) to enable the craft to be operated and maintained safely. The technical manual(s) shall consist of a route operational manual, craft operating manual, training manual, maintenance manual and servicing schedule. Arrangements shall be made for such information to be updated as necessary.

18.2.1 Craft operating manual

The craft operating manual shall contain at least the following information:

.1 leading particulars of the craft;

.2 description of the craft and its equipment;

.3 procedures for checking the integrity of buoyancy compartments;

.4 details arising from compliance with the requirements of chapter 2 likely to be of direct practical use to the crew in an emergency;

.5 damage control procedures (e.g., information in a damage control plan required by regulation II-1/23 or II-1/25-8.2 of the Convention, as appropriate);

.6 description and operation of machinery systems;

.7 description and operation of auxiliary systems;

.8 description and operation of remote control and warning systems;

.9 description and operation of electrical equipment;

.10 loading procedures and limitations, including maximum operational weight, centre of gravity position and distribution of load, including any cargo or car securing arrangement and procedures depending on operational restrictions or damaged conditions. Such arrangement and procedures shall not be included as a separate Cargo Securing Manual as required by chapter VI of the Convention;

.11 description and operation of fire-detection and fire-extinguishing equipment;

.12 drawings indicating the structural fire protection arrangements;

.13 description and operation of radio equipment and navigational aids;

.14 information regarding the handling of the craft as determined in accordance with chapter 17;

.15 maximum permissible towing speeds and towing loads, where applicable;

.16 procedure for dry-docking or lifting, including limitations;

.17 in particular, the manual shall provide information, in clearly defined chapters , relating to:

.17.1 indication of emergency situations or malfunctions jeopardizing safety, required actions to be taken and any consequential restrictions on operation of the craft or its machinery;

.17.2 evacuation procedures;

.17.3 the worst intended conditions;

.17.4 limiting values of all machinery parameters requiring compliance for safe operation.

In regard to information on machinery or system failures, data shall take into account the results of any FMEA reports developed during the craft design.

18.2.2 Route operational manual

The route operational manual shall include at least the following information:

.1 evacuation procedures;

.2 operating limitations, including the worst intended conditions;

.3 procedures for operation of the craft within the limitations of .2;

.4 the elements of applicable contingency plans for primary and secondary rescue assistance in the case of foreseeable incidents, including land-based arrangements and activities for each incident;

.5 arrangements for obtaining weather information;

.6 identification of the "base port(s)";

.7 identification of the person responsible for decisions to cancel or delay voyages;

.8 identification of crew complement, functions and qualifications;

.9 restrictions on working hours of crew;

.10 safety arrangements at terminals;

.11 traffic control arrangements and limitations, as appropriate;

.12 specific route conditions or requirements relating to position fixing, operations by night and in restricted visibility, including the use of radar or other electronic aids to navigation; and

.13 communication arrangements between craft, coast radio stations, base ports radio stations, emergency services and other ships, including radio frequencies to be used and watch to be kept.

18.2.3 Training manual

The training manual, which may comprise several volumes, shall contain instructions and information, in easily understood terms, illustrated wherever possible, on evacuation, fire and damage control appliances and systems and on the best methods of survival. Any part of such information may be provided in the form of audio-visual aids in lieu of the manual. Where appropriate, the contents of the training manual may be included in the craft operating manual. The following shall be explained in detail:

.1 donning lifejackets and immersion suits, as appropriate;

.2 muster at the assigned stations;

.3 boarding, launching and clearing the survival craft and rescue boats;

.4 method of launching from within the survival craft;

.5 release from launching appliances;

.6 methods and use of devices for protection in launching areas, where appropriate;

.7 illumination in launching areas;

.8 use of all survival equipment;

.9 use of all detection equipment;

.10 with the assistance of illustrations, the use of radio life-saving appliances;

.11 use of drogues;

.12 use of engine and accessories;

.13 recovery of survival craft and rescue boats, including stowage and securing;

.14 hazards of exposure and the need for warm clothing;

.15 best use of the survival craft facilities in order to survive;

.16 methods of retrieval, including the use of helicopter rescue gear (slings, baskets, stretchers), breeches-buoy and shore life-saving apparatus and craft's line-throwing apparatus;

.17 all other functions contained in the muster list and emergency instructions;

.18 instructions for emergency repair of the life-saving appliances;

.19 instructions in the use of fire protection and fire-extinguishing appliances and systems;

.20 guidelines for use of firefighter's outfit in a fire, if fitted;

.21 use of alarms and communications associated with fire safety;

.22 methods for surveying damage;

.23 use of damage control appliances and systems, including operation of watertight doors and bilge pumps; and

.24 for passenger craft, control of and communication with passengers in an emergency.

18.2.4 Maintenance and servicing manual/system

The craft maintenance and servicing manual/system shall contain as a minimum:

.1 detailed, illustrated description of all craft structure, machinery installations and all installed equipment and systems required for safe operation of the craft;

.2 specifications and quantities of all replenishable fluids and of structural materials which may be required for repairs;

.3 operational limitations of machinery in terms of values of parameters, vibration and consumption of replenished fluids;

.4 limitations of wear of structure or machinery components, including lives of components requiring calendar or operating time replacement;

.5 detailed description of procedures, including any safety precautions to be taken or special equipment required, to remove and install main and auxiliary machinery, transmissions, propulsion and lift devices and flexible structure components;

.6 test procedures to be followed subsequent to replacement of machinery or system components or for malfunction diagnosis;

.7 procedure for lifting or dry-docking the craft, including any weight or attitude limitations;

.8 procedure for weighing the craft and establishing the position of longitudinal centre of gravity (LCG);

.9 where craft may be dismantled for transportation, instructions shall be provided for dismantling, transport and re-assembly;

.10 a servicing schedule, included in the maintenance manual or published separately, detailing the routine servicing and maintenance operations required to maintain the operational safety of the craft and its machinery and systems.

18.2.5 Information on passengers

18.2.5.1 All persons on board passenger craft shall be counted prior to departure.

18.2.5.2 Details of persons who have declared a need for special care or assistance in emergency situations shall be recorded and communicated to the master prior to departure.

18.2.5.3 The names and gender of all persons on board, distinguished between adults, children and infants shall be recorded for search and rescue purposes.

18.2.5.4 The information required by 18.2.5.1, 18.2.5.2 and 18.2.5.3 shall be kept ashore and made readily available to search and rescue services when needed.

18.2.5.5 The Administration may exempt from the requirements of 18.2.5.3 passenger craft operating on voyages having a duration of 2 h or less between each port of call.

18.3 Training and qualifications

18.3.1 The level of competence and the training considered necessary in respect of the master and each crew member shall be laid down and demonstrated in the light of the following guidelines to the satisfaction of the company in respect of the particular type and model of craft concerned and the service intended. More than one crew member shall be trained to perform all essential operational tasks in both normal and emergency situations.

18.3.2 The Administration shall specify an appropriate period of operational training for the master and each member of the crew and, if necessary, the periods at which appropriate retraining shall be carried out.

18.3.3 The Administration shall issue a type rating certificate to the master and all officers having an operational role following an appropriate period of operational/simulator training and on the conclusion of an examination including practical test commensurate with the operational tasks on board the particular type and model of craft concerned and the route followed. The type rating training shall cover at least the following items:

.1 knowledge of all on-board propulsion and control systems, including communication and navigational equipment, steering, electrical, hydraulic and pneumatic systems and bilge and fire pumping;

.2 the failure mode of the control, steering and propulsion systems and proper response to such failures;

.3 handling characteristics of the craft and the limiting operational conditions;

.4 bridge communication and navigation procedures;

.5 intact and damage stability and survivability of the craft in damage condition;

.6 location and use of the craft's life-saving appliances, including survival craft equipment;

.7 location and use of escapes in the craft and the evacuation of passengers;

.8 location and use of fire protection and fire-extinguishing appliances and systems in the event of fire on board;

.9 location and use of damage control appliances and systems, including operation of watertight doors and bilge pumps;

.10 cargo and vehicle stowage and securing systems;

.11 methods for control of and communication with passengers in an emergency; and

.12 location and use of all other items listed in the training manual.

18.3.4 The type rating certificate for a particular type and model of craft should only be valid for service on the route to be followed when it is so endorsed by the Administration following the completion of a practical test over that route.

18.3.5 The type rating certificate shall be re-validated every two years and the Administration shall lay down the procedures for re-validation.

18.3.6 All crew members shall receive instructions and training, as specified in 18.3.3.6 to 18.3.3.12.

18.3.7 The Administration shall specify standards of physical fitness and frequency of medical examinations, having regard to the route and craft concerned.

18.3.8 The Administration of the country in which the craft is to operate, if other than the flag State, shall be satisfied with the training, experience and qualifications of the master and each crew member. A valid certificate of competency or a valid license appropriately endorsed, in accordance with the provisions of the International Convention on Standards of Training, Certification and Watchkeeping (STCW), 1978, as amended, held by the master or crew member, shall be acceptable as evidence of satisfactory training and qualification to the Administration of the country in which the craft is to operate.

18.4 Manning of survival craft and supervision

The company and the master shall ensure that:

.1 a sufficient number of trained persons are on board for mustering and assisting untrained persons;

.2 a sufficient number of crew members, who may be deck officers or certificated persons, are on board for operating the survival craft, rescue boats and launching arrangements required for abandonment by the total number of persons on board;

.3 a deck officer or certificated person is placed in charge of each survival craft to be used recognizing, however, that the Administration, having due regard to the nature of the voyage, the number of persons on board and the characteristics of the craft, may permit a deck officer, certificated person or persons practised in the handling and operation of liferafts to be placed in charge of each liferaft or group of liferafts;

.4 the person in charge of survival craft has a list of the survival craft crew and sees that those crew members are acquainted with their duties;

.5 every rescue boat and lifeboat has a person assigned who is capable of operating the engine and carrying out minor adjustments; and

.6 the persons referred to in .1 to .3 are equitably distributed among the craft's survival craft.

18.5 Emergency instructions and drills

18.5.1 The company shall ensure that the emergency instructions and drills referred to in 18.5.1 to 18.5.10 are implemented, and the master shall be responsible for the enforcement of these instructions and drills on board. On or before departure, passengers shall be instructed in the use of lifejackets and the action to be taken in an emergency. The attention of the passengers shall be drawn to the emergency instructions required by 8.4.1 and 8.4.3.

18.5.2 Emergency fire and evacuation drills for the crew shall be held on board the craft at intervals not exceeding one week for passenger craft and one month for cargo craft.

18.5.3 Each member of each crew shall participate in at least one evacuation, fire and damage control drill per month.

18.5.4 On-board drills shall, as far as practicable, be conducted to simulate an actual emergency. Such simulations shall include instruction and operation of the craft's evacuation, fire and damage control appliances and systems.

18.5.5 On-board instruction and operation of the craft's evacuation, fire and damage control appliances and systems shall include appropriate cross-training of crew members.

18.5.6 Emergency instructions including a general diagram of the craft showing the location of all exits, routes of evacuation, assigned assembly stations, emergency equipment, life-saving equipment and appliances and illustration of lifejacket donning shall be available to each passenger and crew member in appropriate languages. It shall be placed near each passenger and crew seat and conspicuously displayed at assembly stations and other passenger spaces.

18.5.7 Records

18.5.7.1 The date when musters are held, details of abandon craft drills and fire drills, drills of other life-saving appliances and on-board training shall be recorded in such log-book as may be prescribed by the Administration. If a full muster, drill or training session is not held at the appointed time, an entry shall be made in the log-book stating the circumstances and the extent of the muster, drill or training session held. A copy of such information shall be forwarded to the operator's management.

18.5.7.2 The master shall ensure, before the craft leaves the berth on any voyage, that a record is made of the time of the last closing of the accesses referred to 2.2.4.2 and 2.2.4.3.

18.5.8 Evacuation drills

18.5.8.1 Evacuation drill scenarios shall vary each week so that different emergency conditions are simulated.

18.5.8.2 Each evacuation craft drill shall include:

.1 summoning of crew to assembly stations with the alarm required by 8.2.2.2 and ensuring that they are made aware of the order to abandon craft specified in the muster list;

.2 reporting to stations and preparing for the duties described in the muster list;

.3 checking that crew are suitably dressed;

.4 checking that lifejackets are correctly donned;

.5 operation of davits if any used for launching liferafts;

.6 donning of immersion suits or thermal protective clothing by appropriate crew members;

.7 testing of emergency lighting for mustering and abandonment; and

.8 giving instructions in the use of the craft's life-saving appliances and in survival at sea.

18.5.8.3 Rescue boat drill

.1 As far as is reasonable and practicable, rescue boats shall be launched each month as part of the evacuation drill, with their assigned crew aboard, and manoeuvred in the water. In all cases this requirement shall be complied with at least once every three months.

.2 If rescue boat launching drills are carried out with the craft making headway, such drills shall, because of the dangers involved, be practised in sheltered waters only and under the supervision of an officer experienced in such drills.

18.5.8.4 Individual instructions may cover different parts of the craft's life-saving system, but all the craft's life-saving equipment and appliances shall be covered within any period of one month on passenger craft and two months on cargo craft. Each member of the crew shall be given instructions which shall include but not necessarily be limited to:

.1 operation and use of the craft's inflatable liferafts;

.2 problems of hypothermia, first-aid treatment of hypothermia and other appropriate first-aid procedures; and

.3 special instructions necessary for use of the craft's life-saving appliances in severe weather and severe sea conditions.

18.5.8.5 On-board training in the use of davit-launched liferafts shall take place at intervals of not more than four months on every craft fitted with such appliances. Whenever practicable, this shall include the inflation and lowering of a liferaft. This liferaft may be a special liferaft intended for training purposes only, which is not part of the craft's life-saving equipment. Such a special liferaft shall be conspicuously marked.

18.5.9 Fire drills

18.5.9.1 Fire drill scenarios shall vary each week so that emergency conditions are simulated for different craft compartments.

18.5.9.2 Each fire drill shall include:

.1 summoning of crew to fire stations;

.2 reporting to stations and preparing for the duties described in the muster list;

.3 donning of firefighter's outfits;

.4 operation of fire doors and fire dampers;

.5 operation of fire pumps and fire-fighting equipment;

.6 operation of communication equipment, emergency signals and general alarm;

.7 operation of fire-detection system; and

.8 instruction in the use of the craft's fire-fighting equipment and sprinkler and drencher systems, if fitted.

18.5.10 Damage control drills

18.5.10.1 Damage control drill scenarios shall vary each week so that emergency conditions are simulated for different damage conditions.

18.5.10.2 Each damage control drill shall include:

.1 summoning of crew to damage control stations;

.2 reporting to stations and preparing for the duties described in the muster list;

.3 operation of watertight doors and other watertight closures;

.4 operation of bilge pumps and testing of bilge alarms and automatic bilge pump starting systems; and

.5 instruction in damage survey, use of the craft damage control systems and passenger control in the event of an emergency.

PART B - REQUIREMENTS FOR PASSENGER CRAFT

18.6 Type rating training

18.6.1 The company shall ensure that the type rating training is implemented. For all crew members, the type rating training shall cover the control and evacuation of passengers additionally to 18.3.5.

18.6.2 When a craft carries cargoes, the craft shall comply with the requirements of part C of this chapter in addition to this part.

18.7 Emergency instructions and drills

The company shall ensure that the emergency instructions are implemented, and the master shall be responsible for communicating the provisions of the emergency instructions to passengers upon boarding.

PART C - REQUIREMENTS FOR CARGO CRAFT

18.8 Type rating training

The company shall ensure that type rating training is implemented as provided in 18.3. For all crew members, the type rating training shall cover knowledge of cargo and vehicles storage area securement systems.

CHAPTER 19

INSPECTION AND MAINTENANCE REQUIREMENTS

19.1 The Administration shall be satisfied with the operator's organization or any organization on which he may call in the maintenance of his craft and shall specify the scope of the duties which any part of the organization may carry out, having regard to the number and competence of its staff, facilities available, arrangements for calling on specialist assistance should it be necessary, record-keeping, communication and allocation of responsibilities.

19.2 The craft and equipment shall be maintained to the satisfaction of the Administration; in particular:

.1 routine preventive inspection and maintenance shall be performed to a schedule approved by the Administration, which shall have regard at least in the first instance to the manufacturer's schedule;

.2 in the performance of maintenance tasks, due regard shall be paid to maintenance manuals, service bulletins acceptable to the Administration and to any additional instructions of the Administration in this respect;

.3 all modifications shall be recorded and their safety aspects investigated. Where it could have any effect on safety, the modification, together with its installation, shall be to the satisfaction of the Administration;

.4 appropriate arrangements shall be provided for informing the master of the serviceability state of his craft and its equipment;

.5 the duties of the operating crew in respect of maintenance and repairs and the procedure for obtaining assistance with repairs when the craft is away from the base port shall be clearly defined;

.6 the master shall report to the maintenance organization any defects and repairs which are known to have occurred during operations; and

.7 records of defects and their correction shall be maintained and those defects of recurrent nature, or those which adversely affect craft or personal safety, shall be reported to the Administration.

19.3 The Administration shall be satisfied that arrangements are provided for ensuring adequate inspection, maintenance and recording of all life-saving appliances and distress signals carried.

ANNEX 1

FORM OF HIGH-SPEED CRAFT SAFETY CERTIFICATE AND RECORD OF EQUIPMENT

HIGH-SPEED CRAFT SAFETY CERTIFICATE

This Certificate shall be supplemented by a Record of Equipment

(Official seal) *(State)*

Issued under the provisions of the

INTERNATIONAL CODE OF SAFETY FOR HIGH-SPEED CRAFT, 2000
(resolution MSC.97(73))

under the authority of the Government of

.....
(full designation of the State)

by .....
(full official designation of the competent person or organization authorized by the Administration)

Particulars of craft[*]

Name of craft .....

Manufacturer's model and hull number .....

Distinctive number or letters .....

IMO number[**] .....

Port of registry .....

Gross tonnage .....

Sea areas in which the craft is certified to operate (paragraph 14.2.1) .....

Design waterline corresponding to a height of ..... below the reference line at the longitudinal centre of flotation, and draughts at the draught marks of ..... forward and ..... aft.

---

* Alternatively, the particulars of the craft may be placed horizontally in boxes.

** In accordance with the IMO ship identification number scheme, adopted by the Organization by resolution A.600(15).

The upper edge of the reference line is..... at (..... mm below uppermost deck at side)* (..... mm above the underside of keel)* at longitudinal centre of flotation.

Category: category A passenger craft/category B passenger craft/cargo craft*

Craft type: air-cushion vehicle/surface-effect ship/hydrofoil/monohull/multihull/other (give detail .....)*

Date on which keel was laid or craft was at a similar stage of construction or on which a major conversion was commenced .....

THIS IS TO CERTIFY:

1 That the above-mentioned craft has been duly surveyed in accordance with the applicable provisions of the International Code of Safety for High-Speed Craft, 2000.

2 That the survey showed that the structure, equipment, fittings, radio station arrangements and materials of the craft and the condition thereof are in all respects satisfactory and that the craft complies with the relevant provisions of the Code.

3 That the life-saving appliances are provided for a total number of ..... persons and no more as follows:

.....

....

4 That, in accordance with 1.11 of the Code, the following equivalents have been granted in respect of the craft:

paragraph ..... equivalent arrangement .....

....

This certificate is valid until** .....

Issued at .....

(Place of issue of certificate)

....

(Date of issue) *(Signature of authorized official issuing the certificate)*

.....

(Seal or stamp of the issuing authority, as appropriate)

---

* Delete as appropriate.

** Insert the date of expiry as specified by the Administration in accordance with 1.8.4 of the Code. The day and the month of this date correspond to the anniversary date as defined in 1.4.3 of the Code, unless amended in accordance with 1.8.12.1 of the Code.

Endorsement for periodical surveys

This is to certify that, at a survey required by 1.5 of the Code, this craft was found to comply with the relevant provisions of the Code.

Periodical survey:

Signed: .....
(Signature of authorized official)
Place: .....
Date: .....

.....
(Seal or stamp of authority, as appropriate)

Periodical survey:

Signed: .....
(Signature of authorized official)
Place: .....
Date: .....

.....
(Seal or stamp of authority, as appropriate)

Periodical survey:

Signed: .....
(Signature of authorized official)
Place: .....
Date: .....

.....
(Seal or stamp of authority, as appropriate)

Periodical survey:

Signed: .....
(Signature of authorized official)
Place: .....
Date: .....

.....
(Seal or stamp of authority, as appropriate)

Endorsement to extend the Certificate if valid for less than 5 years where 1.8.8 of the Code applies

This craft complies with the relevant requirements of the Code, and this Certificate shall, in accordance with 1.8.8 of the Code, be accepted as valid until .....

Signed: .....
(Signature of authorized official)
Place: .....
Date: .....

.....
(Seal or stamp of authority, as appropriate)

Endorsement where the renewal survey has been completed and 1.8.9 of the Code applies

This craft complies with the relevant requirements of the Code, and this Certificate shall, in accordance with 1.8.9 of the Code, be accepted as valid until .....

Signed: .....
(Signature of authorized official)
Place: .....
Date: .....

.....
(Seal or stamp of authority, as appropriate)

Endorsement to extend the validity of the Certificate until reaching the port of survey where 1.8.10 of the Code applies

This Certificate shall, in accordance with 1.8.10 of the Code, be accepted as valid until .....

Signed: .....
(Signature of authorized official)
Place: .....
Date: .....

.....
(Seal or stamp of authority, as appropriate)

Endorsement for the advancement of the anniversary date where 1.8.12 of the Code applies

In accordance with 1.8.12 of the Code, the new anniversary date is .....

Signed: .....
(Signature of authorized official)
Place: .....
Date: .....

.....
(Seal or stamp of authority, as appropriate)

In accordance with 1.8.12 of the Code, the new anniversary date is .....

Signed: .....
(Signature of authorized official)
Place: .....
Date: .....

.....
(Seal or stamp of authority, as appropriate)

RECORD OF EQUIPMENT FOR HIGH-SPEED CRAFT SAFETY CERTIFICATE

This Record shall be permanently attached to the High-Speed Craft Safety Certificate

RECORD OF EQUIPMENT FOR COMPLIANCE WITH THE INTERNATIONAL CODE OF SAFETY FOR HIGH-SPEED CRAFT, 2000

1 Particulars of craft

Name of craft .....

Manufacturer's model and hull number .....

Distinctive number or letters .....

IMO number* .....

Category: category A passenger craft/category B passenger craft/cargo craft**

Craft type: air-cushion vehicle, surface-effect ship, hydrofoil, monohull, multihull, other (give detail .....)**

Number of passengers for which certified .....

Minimum number of persons with required qualifications to operate the radio installations .....

---

* In accordance with the IMO ship identification number scheme adopted by the Organization by resolution A.600(15).

** Delete as appropriate.

2 Details of life-saving appliances

1	Total number of persons for which life-saving appliances are provided	.....
2	Total number of lifeboats	.....
2.1	Total number of persons accommodated by them	.....
2.2	Number of partially enclosed lifeboats complying with section 4.5 of the LSA Code	.....
2.3	Number of totally enclosed lifeboats complying with sections 4.6 and 4.7 of the LSA Code	.....
2.4	Other lifeboats	.....
2.4.1	Number	.....
2.4.2	Type	.....
3	Number of rescue boats	.....
3.1	Number of rescue boats which are included in the total lifeboats shown above	.....
4	Liferafts complying with sections 4.1 to 4.3 of the LSA Code for which suitable means of launching are provided	.....
4.1	Number of liferafts	.....
4.2	Number of persons accommodated by them	.....
5	Open reversible liferafts (Annex 11 of the Code)	.....
5.1	Number of liferafts	.....
5.2	Number of persons accommodated by them	.....

6	Number of Marine Evacuation System (MES)	.....
6.1	Number of persons served by them	.....
7	Number of lifebuoys	.....
8	Number of lifejackets	.....
8.1	Number suitable for adults	.....
8.2	Number suitable for children	.....
9	Immersion suits	.....
9.1	Total number	.....
9.2	Number of suits complying with the requirements for lifejackets	.....
10	Number of anti-exposure suits	.....
10.1	Total number	.....
10.2	Number of suits complying with the requirements for lifejackets	.....
11	Radio installations used in life-saving appliances	.....
11.1	Number of radar transponders	.....
11.2	Number of two-way VHF radiotelephone apparatus	.....

3 Details of navigational systems and equipment

1.1	Magnetic compass	.....
1.2	Transmitting heading device (THD)	.....
1.3	Gyro-compass	.....
2	Speed and distance measuring device	.....
3	Echo-sounding device	.....
4.1	9 GHz radar	.....
4.2	Second radar (3 GHz/9 GHz*)	.....
4.3	Automatic radar plotting aid (ARPA)/Automatic tracking aid (ATA)*	.....
5	Receiver for global navigation satellite system/ Terrestrial navigation system/ Other means of position fixing*,**	.....
6.1	Rate of turn indicator	.....
6.2	Rudder angle indicator/Direction of steering thrust indicator*	.....
7.1	Nautical charts/Electronic Chart Display and Information System (ECDIS)*	.....
7.2	Back-up arrangements for ECDIS	.....
7.3	Nautical publications	.....
7.4	Back-up arrangement for nautical publications	.....
8	Search light	.....
9	Daylight signalling lamp	.....
10	Night vision equipment	.....
11	Means to show the mode of the propulsion systems	.....
12	Automatic steering aid (Automatic pilot)	.....
13	Radar reflector/ Other means*, **	.....
14	Sound reception system	.....
15	Automatic identification system (AIS)	.....
16	Voyage data recorder (VDR)	.....

* Delete as appropriate

** In case of "other means" they shall be specified

4 Details of radio facilities

	Item	Actual Provision
1	Primary systems	.....
1.1	VHF radio installation:	.....
1.1.1	DSC encoder	.....
1.1.2	DSC watch receiver	.....
1.1.3	Radiotelephony	.....
1.2	MF radio installation:	.....
1.2.1	DSC encoder	.....
1.2.2	DSC watch receiver	.....
1.2.3	Radiotelephony	.....
1.3	MF/HF radio installation:	.....
1.3.1	DSC encoder	.....
1.3.2	DSC watch receiver	.....
1.3.3	Radiotelephony	.....
1.3.4	Direct-printing radiotelegraphy	.....
1.4	Inmarsat ship earth station	.....
2	Secondary means of alerting	.....
3	Facilities for reception of maritime safety information	.....
3.1	NAVTEX receiver	.....
3.2	EGC receiver	.....
3.3	HF direct-printing radiotelegraph receiver	.....
4	Satellite EPIRB	.....
4.1	COSPAS-SARSAT	.....
4.2	Inmarsat	.....
5	VHF EPIRB	.....
6	Ship's radar transponder	.....

5 Methods used to ensure availability of radio facilities (paragraphs 14.15.6, 14.15.7 and 14.15.8 of the Code)

5.1 Duplication of equipment .....

5.2 Shore-based maintenance .....

5.3 At-sea maintenance capability .....

THIS IS TO CERTIFY that this Record is correct in all respects

Issued at .....
(Place of issue of the Record)

....
(Date of issue) *(Signature of duly authorized official issuing the Record)*

.....
(Seal or stamp of the issuing authority, as appropriate)

ANNEX 2

FORM OF PERMIT TO OPERATE HIGH-SPEED CRAFT

PERMIT TO OPERATE HIGH-SPEED CRAFT

Issued under the provisions of the

INTERNATIONAL CODE OF SAFETY FOR HIGH-SPEED CRAFT, 2000
(resolution MSC.97(73))

1 Name of craft .....

2 Manufacturer's model and hull number .....

3 Distinctive number or letters .....

4 IMO number* .....

5 Port of registry .....

6 Category of craft: category A passenger craft/category B passenger craft/cargo craft**

7 Name of operator .....
.....

8 Areas or routes of operation .....
.....
.....

9 Base port(s) .....

10 Maximum distance from place of refuge .....
.....

11 Number of:

.1 passengers maximum permitted .....

.2 manning scale required .....

---

* In accordance with the IMO ship identification number scheme, adopted by the Organization by resolution A.600(15).

** Delete as appropriate.

12 Worst intended conditions .....
.....
.....

13 Other operational restrictions .....
.....
.....

This permit confirms that the service mentioned above has been found to be in accordance with the general requirements of 1.2.2 to 1.2.7 of the Code.

THIS PERMIT is issued under the authority of the Government of .....
.....

THIS PERMIT is valid until .....
subject to the High-Speed Craft Safety Certificate remaining valid.

Issued at .....
(Place of issue of the Permit)

....
(Date of issue) *(Signature of duly authorized official issuing the Permit)*

.....
(Seal or stamp of the issuing authority, as appropriate)

ANNEX 3

USE OF PROBABILITY CONCEPT

1 General

1.1 Absolute safety cannot be achieved in any human activity. Naturally, this fact shall be taken into account in developing safety requirements, which means that requirements shall not imply that safety is absolute. In the case of traditional craft, it has frequently been possible to specify certain aspects of design or construction in some detail, in a way which was consistent with some level of risk which had over the years been intuitively accepted without having to be defined.

1.2 For high-speed craft, however, it would often be too restrictive to include engineering specifications into the Code. Requirements therefore need to be written (where this question arises) in the sense of "... the Administration shall be satisfied on the basis of tests, investigations and past experience that the probability of --- is (acceptably low)". Since different undesirable events may be regarded as having different general orders of acceptable probability (e.g. temporary impairment of propulsion as compared with an uncontrollable fire), it is convenient to agree on a series of standardized expressions which can be used to convey the relative acceptable probabilities of various incidents, i.e. to perform a qualitative ranking process. A vocabulary is given below which is intended to ensure consistency between various requirements, where it is necessary to describe the level of risk which shall not be exceeded.

2 Terms associated with probabilities

Different undesirable events may have different orders of acceptable probability. In connection with this, it is convenient to agree on standardized expressions to be used to convey the relatively acceptable probabilities of various occurrences, i.e. to perform a qualitative ranking process.

2.1 Occurrences

2.1.1 "Occurrence" is a condition involving a potential lowering of the level of safety.

2.1.2 "Failure" is an occurrence in which a part, or parts, of the craft fail or malfunction, e.g. runaway. A failure includes:

.1 a single failure;

.2 independent failures in combination within a system;

.3 independent failures in combinations involving more than one system, taking into account:

.3.1 any undetected failure that is already present;

.3.2 such further failures* as would be reasonably expected to follow the failure under consideration; and

---

* In assessing the further failures which follow, account shall be taken of any resulting more severe operating conditions for items that have not up to that time failed.

.4 common cause failure (failure of more than one component or system due to the same cause).

2.1.3 "Event" is an occurrence which has its origin outside the craft (e.g. waves).

2.1.4 "Error" is an occurrence arising as a result of incorrect action by the operating crew or maintenance personnel.

2.2 Probability of occurrences

2.2.1 "Frequent" is one which is likely to occur often during the operational life of a particular craft.

2.2.2 "Reasonably probable" is one which is unlikely to occur often but which may occur several times during the total operational life of a particular craft.

2.2.3 "Recurrent" is a term embracing the total range of frequent and reasonably probable.

2.2.4 "Remote" is one which is unlikely to occur to every craft but may occur to a few craft of a type over the total operational life of a number of craft of the same type.

2.2.5 "Extremely remote" is one which is unlikely to occur when considering the total operational life of a number of craft of the type, but nevertheless shall be considered as being possible.

2.2.6 "Extremely improbable" is one which is so extremely remote that it shall not be considered as possible to occur.

2.3 Effects

2.3.1 "Effect" is a situation arising as a result of an occurrence.

2.3.2 "Minor effect" is an effect which may arise from a failure, an event, or an error, as defined in 2.1.2, 2.1.3, 2.1.4, which can be readily compensated for by the operating crew. It may involve:

.1 a small increase in the operational duties of the crew or in their difficulty in performing their duties; or

.2 a moderate degradation in handling characteristics; or

.3 slight modification of the permissible operating conditions.

2.3.3 "Major effect" is an effect which produces:

.1 a significant increase in the operational duties of the crew or in their difficulty in performing their duties which by itself shall not be outside the capability of a competent crew provided that another major effect does not occur at the same time; or

.2 significant degradation in handling characteristics; or

.3 significant modification of the permissible operating conditions, but will not remove the capability to complete a safe journey without demanding more than normal skill on the part of the operating crew.

2.3.4 "Hazardous effect" is an effect which produces:

.1 a dangerous increase in the operational duties of the crew or in their difficulty in performing their duties of such magnitude that they cannot reasonably be expected to cope with them and will probably require outside assistance; or

.2 dangerous degradation of handling characteristics; or

.3 dangerous degradation of the strength of the craft; or

.4 marginal conditions for, or injury to, occupants; or

.5 an essential need for outside rescue operations.

2.3.5 "Catastrophic effect" is an effect which results in the loss of the craft and/or in fatalities.

2.4 Safety level

"Safety level" is a numerical value characterizing the relationship between craft performance represented as horizontal single-amplitude acceleration (g) and the severity of acceleration-load effects on standing and sitting humans.

The safety levels and the corresponding severity of effects on passengers and safety criteria for craft performance shall be as defined in table 1.

3 Numerical values

Where numerical probabilities are used in assessing compliance with requirements using the terms similar to those given above, the following approximate values may be used as guidelines to assist in providing a common point of reference. The probabilities quoted shall be on an hourly or per-journey basis, depending on which is more appropriate to the assessment in question.

Frequent	More than 10^{-3}
Reasonably probable	10^{-3} to 10^{-5}
Remote	10^{-5} to 10^{-7}
Extremely remote	10^{-7} to 10^{-9}
Extremely improbable	Whilst no approximate numerical probability is given for this, the figures used shall be substantially less than 10^{-9}

Note: Different occurrences may have different acceptable probabilities, according to the severity of their consequences (see table 2).

Table 1

EFFECT	CRITERIA NOT TO BE EXCEEDED		COMMENTS
	Type of load	**Value**	
LEVEL 1 MINOR EFFECT Moderate degradation of safety	Maximum acceleration measured horizontally[1]	0.20g[2]	0.08g: Elderly person will keep balance when holding. 0.15g: Mean person will keep balance when holding. 0.15g: Sitting person will start holding.
LEVEL 2 MAJOR EFFECT Significant degradation of safety	Maximum acceleration measured horizontally[1]	0.35g	0.25g: Maximum load for mean person keeping balance when holding. 0.45g: Mean person falls out of seat when not wearing seat belts.
LEVEL 3 HAZ ARDOUS EFFECT Major degradation of safety	Collision design condition calculated Maximum structural design load, based on vertical acceleration at centre of gravity	Ref. 4.3.3 Ref. 4.3.1	Risk of injury to passengers; safe emergency operation after collision. 1.0g: Degradation of passenger safety
LEVEL 4 CATASTROPHIC EFFECT			Loss of craft or/and fatalities.

1 The accelerometers used shall have an accuracy of at least 5% full scale and shall not have a frequency response of less than 20 Hz. The sampling frequency should not be less than 5 times the maximum frequency response. Anti-aliasing filters, if used, should have a passband equal to the frequency response.

2 g = gravity acceleration (9.81 m/s^2).

Table 2

SAFETY LEVEL	1	1	1	2	3	4
EFFECT ON CRAFT AND OCCUPANTS	Normal	Nuisance	Operating limitations	Emergency procedures; significant reduction in safety margins; difficult for crew to cope with adverse conditions; passenger injuries.	Large reduction in safety margins; crew over-burden because of workload or environmental conditions; serious injury to a small number of occupants.	Deaths, usually with loss of craft
F.A.R.[1] PROBABILITY (reference only)	← PROBABLE →			← IMPROBABLE →		EXTREMELY IMPROBABLE →
JAR-25[2] PROBABILITY	← PROBABLE →			← IMPROBABLE →		EXTREMELY IMPROBABLE →
	← FREQUENT →		REASONABLY PROBABLE →	← REMOTE →	EXTREMELY REMOTE →	
	10^{-0} 10^{-1} 10^{-2}		10^{-3} 10^{-4}	10^{-5} 10^{-6}	10^{-7} 10^{-8}	10^{-9}
CATEGORY OF EFFECT	← MINOR →			← MAJOR →	← HAZARDOUS →	CATASTROPHIC

---

1 United States Federal Aviation Regulations.

2 European Joint Airworthiness Regulations.

ANNEX 4

PROCEDURES FOR FAILURE MODE AND EFFECTS ANALYSIS

1 Introduction

1.1 In the case of traditional craft, it has been possible to specify certain aspects of design or construction in some level of detail, in a way which was consistent with some level of risk which had over the years been intuitively accepted without having to be defined.

1.2 With the development of large high-speed craft, this required experience has not been widely available. However, with the now broad acceptance of the probabilistic approach to safety assessments within industry as a whole, it is proposed that an analysis of failure performance may be used to assist in the assessment of the safety of operation of high-speed craft.

1.3 A practical, realistic and documented assessment of the failure characteristics of the craft and its component systems shall be undertaken with the aim of defining and studying the important failure conditions that may exist.

1.4 This annex describes a failure mode and effects analysis (FMEA) and gives guidance as to how it may be applied by:

.1 explaining basic principles;

.2 providing the procedural steps necessary to perform an analysis;

.3 identifying appropriate terms, assumptions, measures and failure modes; and

.4 providing examples of the necessary worksheets.

1.5 FMEA for high-speed craft is based on a single-failure concept under which each system at various levels of a system's functional hierarchy is assumed to fail by one probable cause at a time. The effects of the postulated failure are analysed and classified according to their severity. Such effects may include secondary failures (or multiple failures) at other level(s). Any failure mode which may cause a catastrophic effect to the craft shall be guarded against by system or equipment redundancy unless the probability of such failure is extremely improbable (refer to section 13). For failure modes causing hazardous effects, corrective measures may be accepted in lieu. A test programme shall be drawn to confirm the conclusions of FMEA.

1.6 Whilst FMEA is suggested as one of the most flexible analysis techniques, it is accepted that there are other methods which may be used and which in certain circumstances may offer an equally comprehensive insight into particular failure characteristics.

2 Objectives

2.1 The primary objective of FMEA is to provide a comprehensive, systematic and documented investigation which establishes the important failure conditions of the craft and

assesses their significance with regard to the safety of the craft, its occupants and the environment.

2.2 The main aims of undertaking the analysis are to:

.1 provide the Administration with the results of a study into the craft's failure characteristics so as to assist in an assessment of the levels of safety proposed for the craft's operation;

.2 provide craft operators with data to generate comprehensive training, operational and maintenance programmes and documentation; and

.3 provide craft and system designers with data to audit their proposed designs.

3 Scope of application

3.1 FMEA shall be conducted for each high-speed craft, before its entry into service, in respect of the systems as required under the provisions of 5.2, 9.1.10, 12.1.1 and 16.2.6 of this Code.

3.2 For craft of the same design and having the same equipment, one FMEA on the lead craft will be sufficient, but each of the craft shall be subject to the same FMEA conclusion trials.

4 System failure mode and effects analysis

4.1 Before proceeding with a detailed FMEA into the effects of the failure of the system elements on the system functional output it is necessary to perform a functional failure analysis of the craft's important systems. In this way only systems which fail the functional failure analysis need to be investigated by a more detailed FMEA.

4.2 When conducting a system FMEA the following typical operational modes within the normal design environmental conditions of the craft shall be considered:

.1 normal seagoing conditions at full speed;

.2 maximum permitted operating speed in congested waters; and

.3 manoeuvring alongside.

4.3 The functional interdependence of these systems shall also be described in either block diagrams or fault-tree diagrams or in a narrative format to enable the failure effects to be understood. As far as applicable, each of the systems to be analysed is assumed to fail in the following failure modes:

.1 complete loss of function;

.2 rapid change to maximum or minimum output;

.3 uncontrolled or varying output;

.4 premature operation;

.5 failure to operate at a prescribed time; and

.6 failure to cease operation at a prescribed time.

Depending on the system under consideration, other failure modes may have to be taken into account.

4.4 If a system can fail without any hazardous or catastrophic effect, there is no need to conduct a detailed FMEA into the system architecture. For systems whose individual failure can cause hazardous or catastrophic effects and where a redundant system is not provided, a detailed FMEA as described in the following paragraphs shall be followed. Results of the system functional failure analysis shall be documented and confirmed by a practical test programme drawn up from the analysis.

4.5 Where a system, the failure of which may cause a hazardous or catastrophic effect, is provided with a redundant system, a detailed FMEA may not be required provided that:

.1 the redundant system can be put into operation or can take over the failed system within the time-limit dictated by the most onerous operational mode in 4.2 without hazarding the craft;

.2 the redundant system is completely independent from the system and does not share any common system element the failure of which would cause failure of both the system and the redundant system. Common system element may be acceptable if the probability of failure complies with section 13; and

.3 the redundant system may share the same power source as the system. In such case, an alternative power source shall be readily available with regard to the requirement of .1.

The probability and effects of operator error to bring in the redundant system shall also be considered.

5 Equipment failure mode and effects analysis

The systems to be subject to a more detailed FMEA investigation at this stage shall include all those that have failed the system FMEA and may include those that have a very important influence on the safety of the craft and its occupants and which require an investigation at a deeper level than that undertaken in the system functional failure analysis. These systems are often those which have been specifically designed or adapted for the craft, such as the craft's electrical and hydraulic systems.

6 Procedures

The following steps are necessary to perform FMEA:

.1 to define the system to be analysed;

.2 to illustrate the interrelationships of functional elements of the system by means of block diagrams;

.3 to identify all potential failure modes and their causes;

.4 to evaluate the effects on the system of each failure mode;

.5 to identify failure detection methods;

.6 to identify corrective measures for failure modes;

.7 to assess the probability of failures causing hazardous or catastrophic effects, where applicable;

.8 to document the analysis;

.9 to develop a test programme; and

.10 to prepare the FMEA report.

7 System definition

The first step in an FMEA study is a detailed study of the system to be analysed through the use of drawings and equipment manuals. A narrative description of the system and its functional requirements shall be drawn up including the following information:

.1 general description of system operation and structure;

.2 functional relationship among the system elements;

.3 acceptable functional performance limits of the system and its constituent elements in each of the typical operational modes; and

.4 system constraints.

8 Development of system block diagrams

8.1 The next step is to develop block diagram(s) showing the functional flow sequence of the system, both for technical understanding of the functions and operation of the system and for the subsequent analysis. As a minimum the block diagram shall contain:

.1 breakdown of the system into major sub-systems or equipment;

.2 all appropriate labelled inputs and outputs and identification numbers by which each sub-system is consistently referenced; and

.3 all redundancies, alternative signal paths and other engineering features which provide "fail-safe" measures.

An example of a system block diagram is given at appendix 1.

8.2 It may be necessary to have a different set of block diagrams prepared for each operational mode.

9 Identification of failure modes, causes and effects

9.1 Failure mode is the manner by which a failure is observed. It generally describes the way the failure occurs and its impact on the equipment or system. As an example, a list of failure modes is given in table 1. The failure modes listed in table 1 can describe the failure of any system element in sufficiently specific terms. When used in conjunction with performance specifications governing the inputs and outputs on the system block diagram, all potential failure modes can be thus identified and described. Thus, for example, a power supply may have a failure mode described as "loss of output" (29), and a failure cause "open (electrical)" (31).

9.2 A failure mode in a system element could also be the failure cause of a system failure. For example, the hydraulic line of a steering gear system might have a failure mode of "external leakage" (10). This failure mode of the hydraulic line could become a failure cause of the steering gear system's failure mode "loss of output" (29).

9.3 Each system shall be considered in a top-down approach, starting from the system's functional output, and failure shall be assumed by one possible cause at a time. Since a failure mode may have more than one cause, all potential independent causes for each failure mode shall be identified.

9.4 If major systems can fail without any adverse effect, there is no need to consider them further unless the failure can go undetected by an operator. To decide that there is no adverse effect does not mean just the identification of system redundancy. The redundancy shall be shown to be immediately effective or brought on line with negligible time lag. In addition, if the sequence is:

"failure - alarm - operator action - start of back up - back up in service",

the effects of delay shall be considered.

10 Failure effects

10.1 The consequence of a failure mode on the operation, function, or status of an equipment or a system is called a 'failure effect'. Failure effects on a specific sub-system or equipment under consideration are called local failure effects". The evaluation of local failure effects will help to determine the effectiveness of any redundant equipment or corrective action at that system level. In certain instances, there may not be a local effect beyond the failure mode itself.

10.2 The impact of an equipment or sub-system failure on the system output (system function) is called an "end effect". End effects shall be evaluated and their severity classified in accordance with the following categories:

.1 catastrophic;

.2 hazardous;

.3 major; and

.4 minor.

The definitions of these four categories of failure effects are given in 2.3 of annex 3 of this Code.

10.3 If the end effect of a failure is classified as hazardous or catastrophic, back-up equipment is usually required to prevent or minimize such effect. For hazardous failure effects corrective operational procedures may be accepted.

11 Failure detection

11.1 The FMEA study in general only analyses failure effects based on a single failure in the system and therefore a failure detection means, such as visual or audible warning devices, automatic sensing devices, sensing instrumentation or other unique indications shall be identified.

11.2 Where the system element failure is non-detectable (i.e. a hidden fault or any failure which does not give any visual or audible indication to the operator) and the system can continue with its specific operation, the analysis shall be extended to determine the effects of a second failure, which in combination with the first undetectable failure may result in a more severe failure effect, e.g., hazardous or catastrophic effect.

12 Corrective measures

12.1 The response of any back-up equipment, or any corrective action initiated at a given system level to prevent or reduce the effect of the failure mode of a system element or equipment, shall also be identified and evaluated.

12.2 Provisions which are features of the design at any system level to nullify the effects of a malfunction or failure, such as controlling or deactivating system elements to halt generation or propagation of failure effects, or activating back-up or standby items or systems, shall be described. Corrective design provisions include:

.1 redundancies that allow continued and safe operation;

.2 safety devices, monitoring or alarm provisions, which permit restricted operation or limit damage; and

.3 alternative modes of operation.

12.3 Provisions which require operator action to circumvent or mitigate the effects of the postulated failure shall be described. The possibility and effect of operator error shall be considered, if the corrective action or the initiation of the redundancy requires operator input, when evaluating the means to eliminate the local failure effects.

12.4 It shall be noted that corrective responses acceptable in one operational mode may not be acceptable at another, e.g., a redundant system element with considerable time lag to be brought into line, while meeting the operational mode "normal seagoing conditions at full speed" may result in a catastrophic effect in another operational mode, e.g., "maximum permitted operating speed in congested water".

13 Use of probability concept

13.1 If corrective measures or redundancy as described in preceding paragraphs are not provided for any failure, as an alternative the probability of occurrence of such failure shall meet the following criteria of acceptance:

.1 a failure mode which results in a catastrophic effect shall be assessed to be extremely improbable;

.2 a failure mode assessed as extremely remote shall not result in worse than hazardous effects; and

.3 a failure mode assessed as either frequent or reasonably probable shall not result in worse than minor effects.

13.2 Numerical values for various levels of probabilities are laid down in section 3 of annex 3 of this Code. In areas where there are no data from craft to determine the level of probabilities of failure other sources can be used such as:

.1 workshop test; or

.2 history of reliability used in other areas under similar operating conditions; or

.3 mathematical model, if applicable.

14 Documentation

14.1 It is helpful to perform FMEA on worksheet(s) as shown in appendix 2.

14.2 The worksheet(s) shall be organized to first display the highest system level and then proceed down through decreasing system levels.

15 Test programme

15.1 An FMEA test programme shall be drawn up to prove the conclusions of FMEA. It is recommended that the test programme shall include all systems or system elements whose failure would lead to:

.1 major or more severe effects;

.2 restricted operations; and

.3 any other corrective action.

For equipment where failure cannot be easily simulated on the craft, the results of other tests can be used to determine the effects and influences on the systems and craft.

15.2 The trials shall also include investigations into:

.1 the layout of control stations with particular regard to the relative positioning of switches and other control devices to ensure a low potential for inadvertent and incorrect crew action, particularly during emergencies, and the provision of interlocks to prevent inadvertent operation for important system operation;

.2 the existence and quality of the craft's operational documentation with particular regard to the pre-voyage checklists. It is essential that these checks account for any unrevealed failure modes identified in the failure analysis; and

.3 the effects of the main failure modes as prescribed in the theoretical analysis.

15.3 The FMEA tests on board shall be conducted in conjunction with provisions specified in 5.3, 16.4 and 17.4 of this Code, before the craft enters into service.

16 FMEA report

The FMEA report shall be a self-contained document with a full description of the craft, its systems and their functions and the proposed operation and environmental conditions for the failure modes, causes and effects to be understood without any need to refer to other plans and documents not in the report. The analysis assumptions and system block diagrams shall be included, where appropriate. The report shall contain a summary of conclusions and recommendations for each of the systems analysed in the system failure analysis and the equipment failure analysis. It shall also list all probable failures and their probability of failure, where applicable, the corrective actions or operational restrictions for each system in each of the operational modes under analysis. The report shall contain the test programme, reference any other test reports and the FMEA trials.

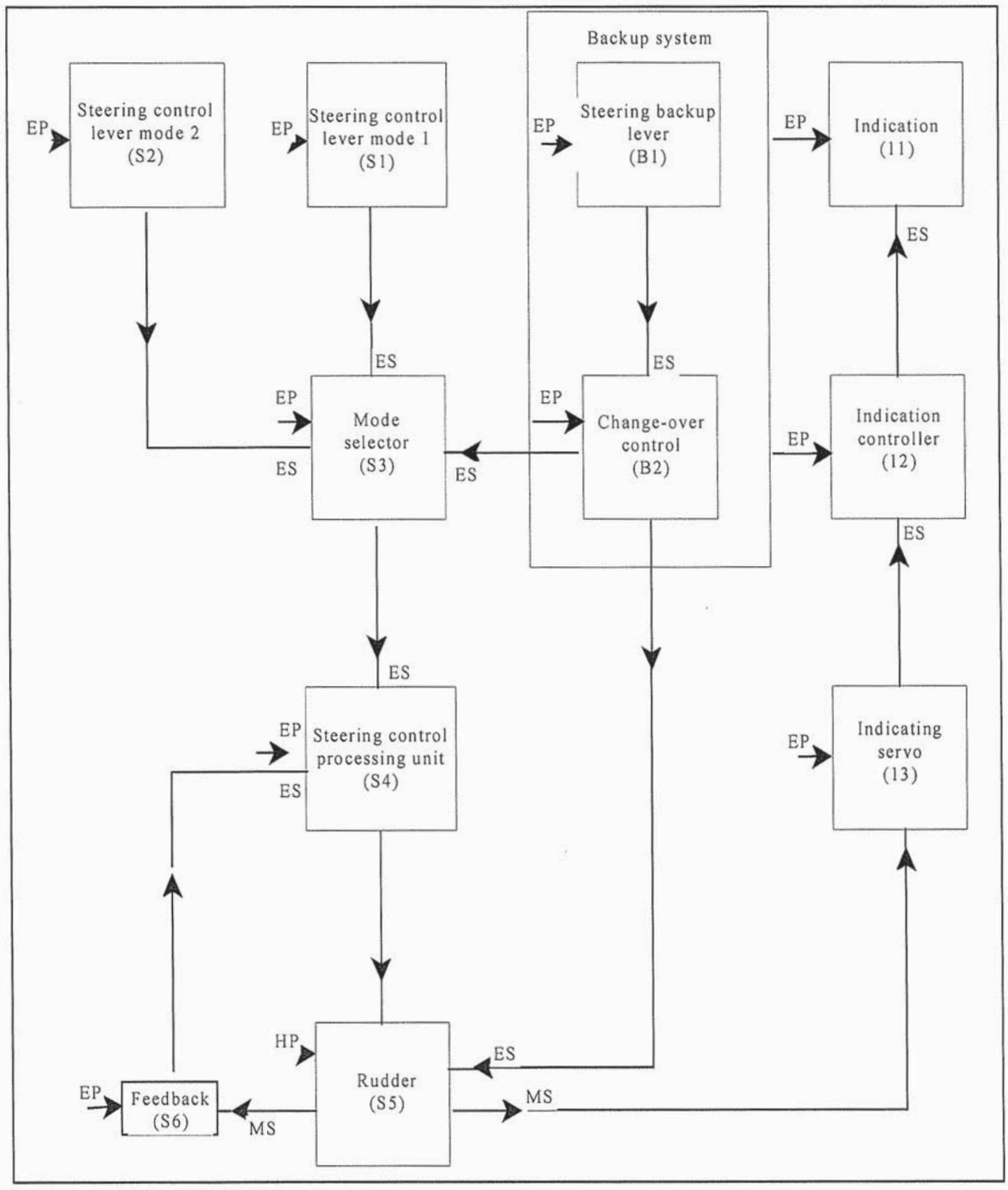
Appendix 1

Example of a system block diagram

Steering control system

Date .....

Analyst .....



where:

EP - electric power
HP - hydraulic power
ES - electric signal
MS - mechanical signal

Table 1

Example of a set of failure modes

1	Structural failure (rupture)	18	False actuation
2	Physical binding or jamming	19	Fails to stop
3	Vibration	20	Fails to start
4	Fails to remain (in position)	21	Fails to switch
5	Fails to open	22	Premature operation
6	Fails to close	23	Delayed operation
7	Fails open	24	Erroneous input (increased)
8	Fails closed	25	Erroneous input (decreased)
9	Internal leakage	26	Erroneous output (increased)
10	External leakage	27	Erroneous output (decreased)
11	Fails out of tolerance (high)	28	Loss of input
12	Fails out of tolerance (low)	29	Loss of output
13	Inadvertent operation	30	Shorted (electrical)
14	Intermittent operation	31	Open (electrical)
15	Erratic operation	32	Leakage (electrical)
16	Erroneous indication	33	Other unique failure conditions as applicable to the system characteristics, requirements and operational constraints
17	Restricted flow		

Refer to IEC Publication: IEC 812 (1985), Analysis techniques for system reliability - procedure for failure mode and effects analysis (FMEA).

Appendix 2

FMEA worksheet

Name of system .....
Mode of operation .....
Sheet No .....
Date .....
Name of analyst.....

References .....
System block diagrams .....
.....
.....
Drawings .....

Equipment name or number	Function	Ident. No.	Failure mode	Failure cause	Failure effect		Failure detection	Corrective action	Severity of failure effect	Probability of failure (if applicable)	Remarks
					Local effect	End effect					

ANNEX 5

ICE ACCRETION APPLICABLE TO ALL TYPES OF CRAFT

1 Icing allowances

1.1 For craft operating in areas where ice accretion is likely to occur, the following icing allowance shall be made in the stability calculations:

.1 30 kg/m^2 on exposed weather decks and gangways;

.2 7.5 kg/m^2 for projected lateral area of each side of the craft above the waterplane;

.3 the projected lateral area of discontinuous surfaces of rail, sundry booms, spars (except masts) and rigging and the projected lateral area of other small objects shall be computed by increasing the total projected area of continuous surfaces by 5% and the static moments of this area by 10%;

.4 reduction of stability due to asymmetric ice accumulations in cross-structure.

1.2 For craft operating in areas where ice accretion may be expected:

.1 Within the areas defined in 2.1, 2.3, 2.4 and 2.5 known to have icing conditions significantly different from those in 1.1, ice accretion requirements of one half to twice the required allowance may be applied.

.2 Within the area defined in 2.2, where ice accretion in excess of twice the allowance required by 1.1 may be expected, more severe requirements than those given in 1.1 may be applied.

1.3 Information shall be provided in respect of the assumptions made in calculating the condition of the craft in each of the circumstances set out in this annex for the following:

.1 duration of the voyage in terms of the period spent in reaching the destination and returning to port; and

.2 consumption rates during the voyage for fuel, water, stores and other consumables.

2 Areas of icing conditions

In the application of 1, the following icing areas shall apply:

.1 The area north of latitude 65°30'N, between longitude 28°W and the west coast of Iceland; north of the north coast of Iceland; north of the rhumb line running from latitude 66°N, longitude 15°W to latitude 73°30' N, longitude 15°E, north of latitude 73°30' N between longitude 15°E and 35°E, and east of longitude 35°E, as well as north of latitude 56°N in the Baltic Sea.

.2 The area north of latitude 43°N bounded in the west by the North American coast and the east by the rhumb line running from latitude 43°N, longitude 48°W to latitude 63°N, longitude 28°W and thence along longitude 28°W.

.3 All sea areas north of the North American continent, west of the areas defined in .1 and .2.

.4 The Bering and Okhotsk Seas and the Tartary Strait during the icing season.

.5 South of latitude 60°S.

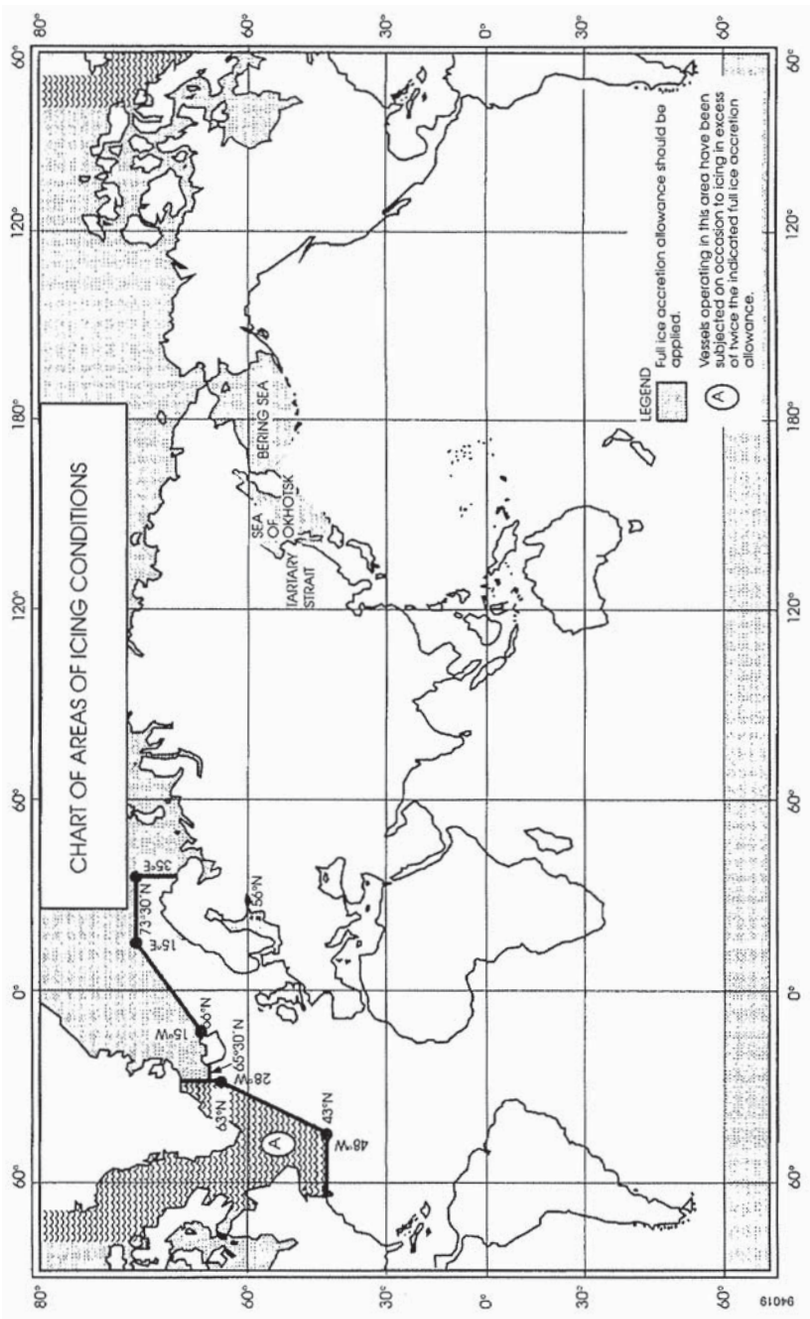
A chart to illustrate the areas is attached.

3 Special requirements

Craft intended for operation in areas where ice accretion is known to occur shall be:

.1 designed to minimize the accretion of ice; and

.2 equipped with such means for removing ice as the Administration may require.


CHART OF AREAS OF ICING CONDITIONS
LEGEND
Full ice accretion allowance should be applied.
Vessels operating in this area have been subjected on occasion to icing in excess of twice the indicated full ice accretion allowance.
A
BERING SEA
SEA OF OKHOTSK
IARIARY STRAIT
35°E
73°30'N
15°E
56°N
15°W
69°30'N
28°W
63°N
43°N
48°W
80°
60°
30°
0°
120°
180°
9419

ANNEX 6

STABILITY OF HYDROFOIL CRAFT

The stability of these craft shall be considered in the hull-borne, transitional and foil-borne modes. The stability investigation shall also take into account the effects of external forces. The following procedures are outlined for guidance in dealing with stability.

1 Surface-piercing hydrofoils

1.1 Hull-borne mode

1.1.1 The stability shall be sufficient to satisfy the provisions of 2.3, 2.4 and 2.6 of this Code.

1.1.2 Heeling moment due to turning

The heeling moment developed during manoeuvring of the craft in the displacement mode may be derived from the following formula:

$$M_R = 0.196 \frac{V_o^2}{L} \cdot \Delta \cdot \mathrm{KG} \qquad \text{(kNm)}$$

where:

M_R = moment of heeling;

V_o = speed of the craft in the turn (m/s);

Δ = displacement (t);

L = length of the craft on the waterline (m);

KG = height of the centre of gravity above keel (m).

This formula is applicable when the ratio of the radius of the turning circle to the length of the craft is 2 to 4.

1.1.3 Relationship between the capsizing moment and heeling moment to satisfy the weather criterion

The stability of a hydrofoil boat in the displacement mode can be checked for compliance with the weather criterion *K* as follows:

$$K = \frac{M_c}{M_v} \geq 1$$

where:

M_c = minimum capsizing moment as determined when account is taken of rolling;
M_v = dynamically applied heeling moment due to the wind pressure.

1.1.4 Heeling moment due to wind pressure

The heeling moment M_V shall be taken as constant during the whole range of heel angles and calculated by the following expression:

$$M_V = 0.001\ P_V\ A_V\ Z \quad \text{(kNm)}$$

where :

P_V = wind pressure = $750\ (V_W / 26)^2$ (N/m^2)

A_V = windage area including the projections of the lateral surfaces of the hull, superstructure and various structures above the waterline (m^2)

Z = windage area lever (m) = the vertical distance to the geometrical centre of the windage area from the waterline

V_W = the wind speed corresponding to the worst intended conditions (m/s).

1.1.5 Evaluation of the minimum capsizing moment M_c in the displacement mode

The minimum capsizing moment is determined from the static and dynamic stability curves taking rolling into account.

.1 When the static stability curve is used, M_c is determined by equating the areas under the curves of the capsizing and righting moments (or levers) taking rolling into account, as indicated by figure 1, where θ_z is the amplitude of roll and MK is a line drawn parallel to the abscissa axis such that the shaded areas S_1 and S_2 are equal.

M_c = OM, if the scale of ordinates represents moments,

M_c = OM x displacement, if the scale of ordinates represents levers.

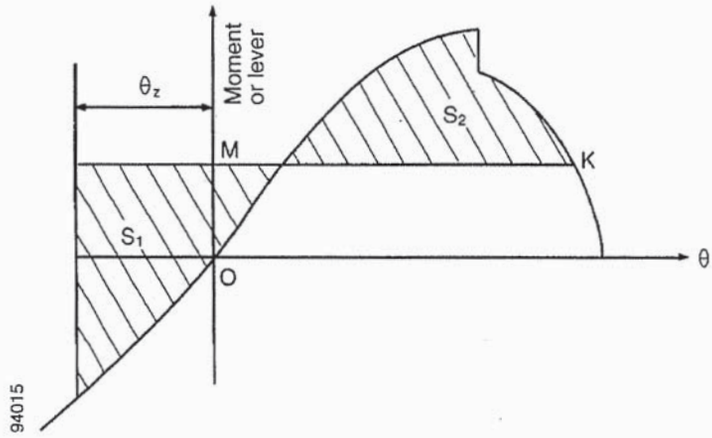


Figure 1 – Static stability curve

.2 When the dynamic stability curve is used, first an auxiliary point A shall be determined. For this purpose the amplitude of heeling is plotted to the right along the abscissa axis and a point A' is found (see figure 2). A line AA' is drawn parallel to the abscissa axis equal to the double amplitude of heeling ($AA' = 2\theta_z$) and the required auxiliary point A is found. A tangent AC to the dynamic stability curve is drawn. From the point A the line AB is drawn parallel to the abscissa axis and equal to 1 radian (57.3°). From the point B a perpendicular is drawn to intersect with the tangent in point E. The distance $\overline{BE}$ is equal to the capsizing moment if measured along the ordinate axis of the dynamic stability curve. If, however, the dynamic stability levers are plotted along this axis, $\overline{BE}$ is then the capsizing lever, and in this case the capsizing moment M_c is determined by multiplication of ordinate $\overline{BE}$ (in metres) by the corresponding displacement in tonnes

$$M_c = 9.81\Delta\ \overline{BE} \qquad \text{(kNm)}$$

.3 The amplitude of rolling θ_z is determined by means of model and full-scale tests in irregular seas as a maximum amplitude of rolling of 50 oscillations of a craft travelling at 90° to the wave direction in sea state for the worst design condition. If such data are lacking the amplitude is assumed to be equal to 15°.

.4 The effectiveness of the stability curves shall be limited to the angle of flooding.

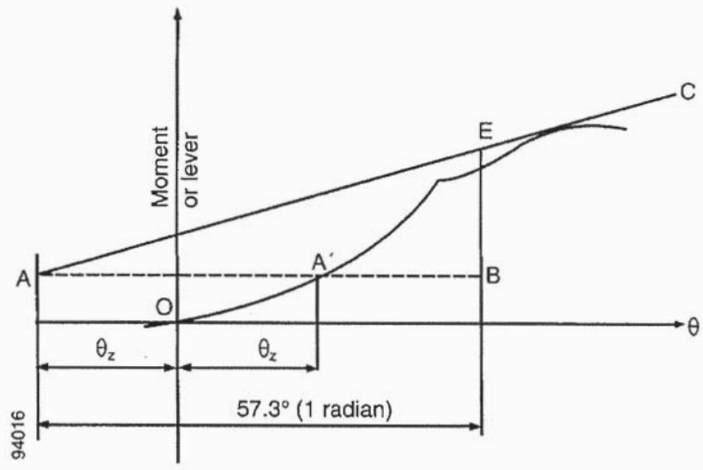


Figure 2 - Dynamic stability curve

1.2 Transitional and foil-borne modes

1.2.1 The stability shall satisfy the provisions of 2.4 and 2.5 of this Code.

1.2.2.1 The stability in the transitional and foil-borne modes shall be checked for all cases of loading for the intended service of the craft.

1.2.2.2 The stability in the transitional and foil-borne modes may be determined either by calculation or on the basis of data obtained from model experiments and shall be verified by full-scale tests by imposition of a series of known heeling moments by off-centre ballast weights, and recording the heeling angles produced by these moments. When taken in the hull-borne, take-off, steady foil-borne and settling to hull-borne modes, these results will provide an indication of the values of the stability in the various situations of the craft during the transitional condition.

1.2.2.3 The angle of heel in the foil-borne mode caused by the concentration of passengers at one side shall not exceed 8°. During the transitional mode the angle of heel due to the concentration of passengers on one side shall not exceed 12°. The concentration of passengers shall be determined by the Administration, having regard to the guidance given at annex 7 to this Code.

1.2.3 One of the possible methods of assessing foil-borne metacentric height (GM) in the design stage for a particular foil configuration is given in figure 3.

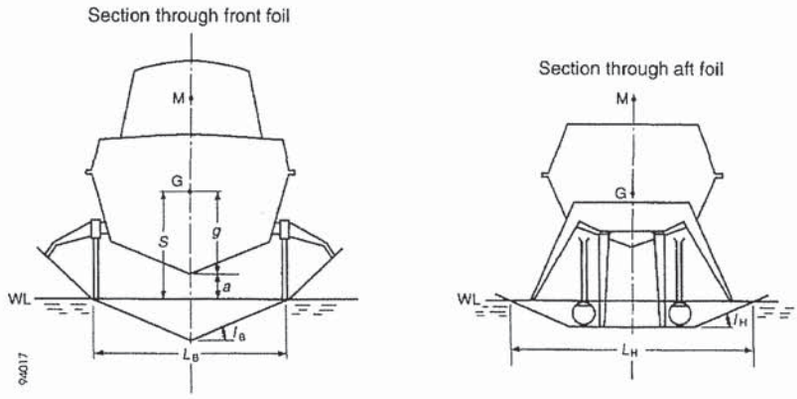


Figure 3

$$GM = n_B\left(\frac{L_B}{2\tan I_B} - S\right) + n_H\left(\frac{L_H}{2\tan I_H} - S\right)$$

where:

n_B = percentage of hydrofoil load borne by front foil
n_H = percentage of hydrofoil load borne by aft foil
L_B = clearance width of front foil
L_H = clearance width of aft foil
a = clearance between bottom of keel and water
g = height of centre of gravity above bottom of keel
I_B = angle at which front foil is inclined to horizontal
I_H = angle at which aft foil is inclined to horizontal
S = height of centre of gravity above water

2 Fully submerged hydrofoils

2.1 Hull-borne mode

2.1.1 The stability in the hull-borne mode shall be sufficient to satisfy the provisions of 2.3 and 2.6 of this Code.

2.1.2 Paragraphs 1.1.2 to 1.1.5 of this annex are appropriate to this type of craft in the hull-borne mode.

2.2 Transitional mode

2.2.1 The stability shall be examined by the use of verified computer simulations to evaluate the craft's motions, behaviour and responses under the normal conditions and limits of operation and under the influence of any malfunction.

2.2.2 The stability conditions resulting from any potential failures in the systems or operational procedures during the transitional stage which could prove hazardous to the craft's watertight integrity and stability shall be examined.

2.3 Foil-borne mode

The stability of the craft in the foil-borne mode shall be in compliance with the provisions of 2.4 of this Code. The provisions of paragraph 2.2 of this annex shall also apply.

2.4 Paragraphs 1.2.2.1, 1.2.2.2 and 1.2.2.3 of this annex shall be applied to this type of craft as appropriate and any computer simulations or design calculations shall be verified by full-scale tests.

ANNEX 7

STABILITY OF MULTIHULL CRAFT

1 Stability criteria in the intact condition

A multihull craft, in the intact condition, shall have sufficient stability when rolling in a seaway to successfully withstand the effect of either passenger crowding or high-speed turning as described in 1.4. The craft's stability shall be considered to be sufficient provided compliance with this paragraph is achieved.

1.1 Area under the GZ curve

The area (A_1) under the GZ curve up to an angle θ shall be at least:

$A_1 = 0.055 \times 30°/\theta$ (m.rad)

where θ is the least of the following angles:

.1 the downflooding angle;

.2 the angle at which the maximum GZ occurs; and

.3 30°.

1.2 Maximum GZ

The maximum GZ value shall occur at an angle of at least 10°.

1.3 Heeling due to wind

The wind heeling lever shall be assumed constant at all angles of inclination and shall be calculated as follows:

$$HL_1 = \frac{P_i . A . Z}{9800\Delta} \quad \text{(m)}$$

$HL_2 = 1.5\ HL_1$ (m) (see figure 1)

where:

$P_i = 500\ (V_W / 26)^2$ (N/m^2)

V_W = wind speed corresponding to the worst intended conditions (m/s)

A = projected lateral area of the portion of the craft above the lightest service waterline (m^2)

Z = vertical distance from the centre of A to a point one half the lightest service draught (m)

Δ = displacement (t).

1.4 Heeling due to passenger crowding or high-speed turning

Heeling due to the crowding of passengers on one side of the craft or to high-speed turning, whichever is the greater, shall be applied in combination with the heeling lever due to wind (HL_2).

1.4.1 Heeling due to passenger crowding

When calculating the magnitude of the heel due to passenger crowding, a passenger crowding lever shall be developed using the assumptions stipulated in 2.10 of this Code.

1.4.2 Heeling due to high-speed turning

When calculating the magnitude of the heel due to the effects of high-speed turning, a high-speed turning lever shall be developed using either the following formula or an equivalent method specifically developed for the type of craft under consideration, or trials or model test data:

$$TL = \frac{I}{g}\frac{V_o^2}{R}\left(KG - \frac{d}{2}\right) \quad (m)$$

where:

TL = turning lever (m)

V_o = speed of craft in the turn (m/s)

R = turning radius (m)

KG = height of vertical centre of gravity above keel (m)

d = mean draught (m)

g = acceleration due to gravity.

1.5 Rolling in waves (figure 1)

The effect of rolling in a seaway upon the craft's stability shall be demonstrated mathematically. In doing so, the residual area under the GZ curve (A_2), i.e. beyond the angle of heel (θ_h), shall be at least equal to 0.028 m.rad up to the angle of roll θ_r. In the absence of model test or other data, θ_r shall be taken as 15° or an angle of (θ_d - θ_h), whichever is less.

2 Criteria for residual stability after damage

2.1 The method of application of criteria to the residual stability curve is similar to that for intact stability except that the craft in the final condition after damage shall be considered to have an adequate standard of residual stability provided:

.1 the required area A_2 shall be not less than 0.028 m.rad (figure 2 refers); and

.2 there is no requirement regarding the angle at which the maximum GZ value shall occur.

2.2 The wind heeling lever for application on the residual stability curve shall be assumed constant at all angles of inclination and shall be calculated as follows:

$$HL_3 = \frac{P_d . A . Z}{9800\Delta}$$

where:

$P_d = 120\ (V_W / 26)^2$ (N/m^2)

V_W = wind speed corresponding to the worst intended conditions (m/s)

A = projected lateral area of the portion of the ship above the lightest service waterline (m^2)

Z = vertical distance from the centre of A to a point one half of the lightest service draught (m)

Δ = displacement (t).

2.3 The same values of roll angle shall be used as for the intact stability.

2.4 The downflooding point is important and is regarded as terminating the residual stability curve. The area A_2 shall therefore be truncated at the downflooding angle.

2.5 The stability of the craft in the final condition after damage shall be examined and shown to satisfy the criteria, when damaged as stipulated in 2.6 of this Code.

2.6 In the intermediate stages of flooding, the maximum righting lever shall be at least 0.05 m and the range of positive righting lever shall be at least 7°. In all cases, only one breach in the hull and only one free surface need to be assumed.

3 Application of heeling levers

3.1 In applying the heeling levers to the intact and damaged curves, the following shall be considered:

.1 for intact condition:

.1.1 wind heeling lever (including gusting effect) (HL_2); and

.1.2 wind heeling lever (including gusting effect) plus either the passenger crowding or speed turning levers whichever is the greater (HTL);

.2 for damage condition:

.2.1 wind heeling lever - steady wind (HL_3); and

.2.2 wind heeling lever plus heeling lever due to passenger crowding (HL_4).

3.2 Angles of heel due to steady wind

3.2.1 The angle of heel due to a wind gust when the heeling lever HL_2, obtained as in 1.3, is applied to the intact stability curve shall not exceed 10°.

3.2.2 The angle of heel due to a steady wind when the heeling lever HL_3, obtained as in 2.2, is applied to the residual stability curve after damage, shall not exceed 15° for passenger craft and 20° for cargo craft.

MULTIHULL CRAFT CRITERIA

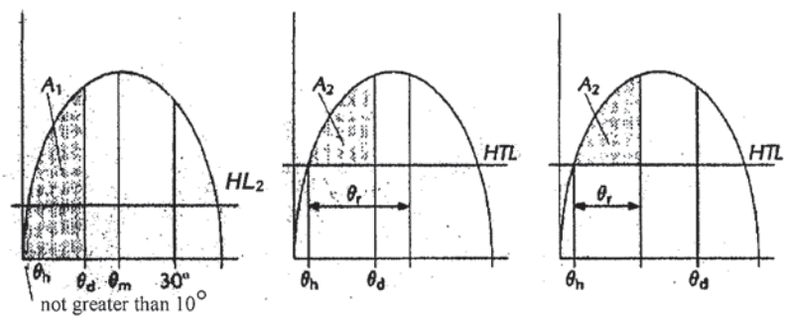


Figure 1 - Intact stability

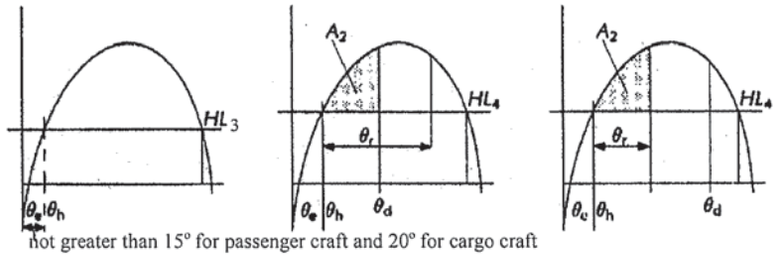


Figure 2 - Damage stability

Abbreviations used in figures 1 and 2

HL_2 = Heeling lever due to wind + gusting
HTL = Heeling lever due to wind + gusting + (passenger crowding or turning)
HL_3 = Heeling lever due to wind
HL_4 = Heeling lever due to wind + passenger crowding
θ_m = Angle of maximum GZ
θ_d = Angle of downflooding
θ_r = Angle of roll
θ_e = Angle of equilibrium, assuming no wind, passenger crowding or turning effects
θ_h = Angle of heel due to heeling lever HL_2, HTL, HL_3 or HL_4
A_1 $\geq$ Area required by 1.1
A_2 $\geq$ 0.028 m.rad

ANNEX 8

STABILITY OF MONOHULL CRAFT

1 Stability criteria in the intact condition

1.1 The weather criterion contained in paragraph 3.2 of the Intact Stability Code shall apply. In applying the weather criterion the value of wind pressure P (N/m^2) shall be taken as ($500\{V_W / 26\}^2$), where V_W = wind speed (m/s) corresponding to the worst intended conditions. In applying the weather criterion account shall also be taken of the roll damping characteristics of individual craft in assessing the assumed roll angle θ_1, which may alternatively be derived from model or full-scale tests. Hulls with features which greatly increase damping, such as immersed sidehulls, substantial arrays of foils, or flexible skirts or seals, are likely to experience significantly smaller magnitudes of roll angle. For such craft, therefore, the roll angle shall be derived from model or full-scale tests or in the absence of such data shall be taken as 15°.

1.2 The area under the righting lever curve (GZ curve) up to an angle θ shall not be less than 0.07m.rad up to θ=15° when the maximum righting lever (GZ) occurs at θ=15°, and 0.055m.rad up to θ=30° when the maximum righting lever occurs at θ=30° or above. Where the maximum righting lever occurs at angles of between θ=15° and θ=30°, the corresponding area under the righting lever curve shall be:

$$A = 0.055 + 0.001\ (30° - \theta_{max})\ (m.rad)$$

where:

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

1.3 The area under the righting lever curve between θ = 30° and θ = 40° or between θ = 30° and the angle of flooding θ_F* if this angle is less than 40°, shall not be less than 0.03 m.rad.

1.4 The righting lever GZ shall be at least 0.2 m at an angle of heel equal to or greater than 30°.

1.5 The maximum righting lever shall occur at an angle of heel not less than 15°.

1.6 The initial metacentric height GM_T shall not be less than 0.15 m.

2 Criteria for residual stability after damage

2.1 The stability required in the final condition after damage, and after equalization where provided, shall be determined as specified in 2.1.1 to 2.1.4.

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* In applying this criterion, small openings through which progressive flooding cannot take place need not be considered as open.

2.1.1 The positive residual righting lever curve shall have a minimum range of 15° beyond the angle of equilibrium. This range may be reduced to a minimum of 10°, in the case where the area under the righting lever curve is that specified in 2.1.2, increased by the ratio:

$$\frac{15}{\text{range}}$$

where the range is expressed in degrees.

2.1.2 The area under the righting lever curve shall be at least 0.015 m.rad, measured from the angle of equilibrium to the lesser of:

.1 the angle at which progressive flooding occurs; and

.2 27° measured from the upright.

2.1.3 A residual righting lever shall be obtained within the range of positive stability, taking into account the greatest of the following heeling moments:

.1 the crowding of all passengers towards one side;

.2 the launching of all fully loaded davit-launched survival craft on one side; and

.3 due to wind pressure,

as calculated by the formula:

$$GZ = \frac{\text{heeling moment}}{\text{displacement}} + 0.04\,(\text{m})$$

However, in no case, this righting lever shall be less than 0.1 m.

2.1.4 For the purpose of calculating the heeling moments referred to in 2.1.3, the following assumptions shall be made:

.1 Moments due to crowding of passengers. This should be calculated in accordance with 2.10 of the Code.

.2 Moments due to launching of all fully loaded davit-launched survival craft on one side:

.2.1 all lifeboats and rescue boats fitted on the side to which the craft has heeled after having sustained damage shall be assumed to be swung out fully loaded and ready for lowering;

.2.2 for lifeboats which are arranged to be launched fully loaded from the stowed position, the maximum heeling moment during launching shall be taken;

.2.3 a fully loaded davit-launched liferaft attached to each davit on the side to which the craft has heeled after having sustained damage shall be assumed to be swung out ready for lowering;

.2.4 persons not in the life-saving appliances which are swung out shall not provide either additional heeling or righting moment; and

.2.5 life-saving appliances on the side of the craft opposite to the side to which the craft has heeled shall be assumed to be in a stowed position.

.3 Moments due to wind pressure:

.3.1 the wind pressure shall be taken as $(120\ \{V_W/26\}^2)\ (N/m^2)$, where V_W = wind speed (m/s), corresponding to the worst intended condition;

.3.2 the area applicable shall be the projected lateral area of the craft above the waterline corresponding to the intact condition; and

.3.3 the moment arm shall be the vertical distance from a point at one half of the mean draught corresponding to the intact condition to the centre of gravity of the lateral area.

2.2 In intermediate stages of flooding, the maximum righting lever shall be at least 0.05 m and the range of positive righting levers shall be at least 7°. In all cases, only one breach in the hull and only one free surface need be assumed.

ANNEX 9

DEFINITIONS, REQUIREMENTS AND COMPLIANCE CRITERIA RELATED TO OPERATIONAL AND SAFETY PERFORMANCE

This annex applies to all types of craft. Tests to evaluate operational safety shall be conducted on the prototype craft of a new design or of a design incorporating new features which may modify the results of a previous testing. The tests shall be carried out to a schedule agreed between the Administration and the manufacturer. Where conditions of service warrant additional testing (e.g., low temperature), the Administration or base port State authorities, as appropriate, may require further demonstrations. Functional descriptions, technical and system specifications relevant to the understanding and evaluation of craft performance shall be available.

The objective of these tests is to provide essential information and guidance to enable the craft to be operated safely under normal and emergency conditions within the design speed and environmental envelope.

The following procedures are outlined as requirements in dealing with verification of craft performance.

1 Performance

1.1 General

1.1.1 The craft shall meet the applicable operational requirements in chapter 17 of this Code and this annex for all extremes of passenger and load configurations for which certification is required. The limiting sea state related to the different modes of operation shall be verified by tests and analyses of a craft of the type for which certification is requested.

1.1.2 Operational control of the craft shall be in accordance with procedures established by the applicant for operation in service. Procedures to be established shall be start procedure, cruise procedures, normal and emergency stop and manoeuvre procedures.

1.1.3 The procedures established under 1.1.2 shall:

.1 demonstrate that normal manoeuvres and craft responses to failures are consistent in performance;

.2 use methods or devices that are safe and reliable; and

.3 include allowance for any time lag in the execution of procedures that may reasonably be expected in service.

1.1.4 Procedures required by this annex shall be conducted over water of sufficient depth such that craft performance will not be affected.

1.1.5 Tests shall be conducted at minimum practicable weight and additional testing shall be conducted at maximum weight sufficient to establish the need for additional restrictions and for testing to examine the effect of weight.

2 Stopping

2.1 This test is to establish the acceleration experienced when stopping the craft in calm water with no passenger load or cargo load during the following conditions:

.1 normal stop for maximum operational speed;

.2 emergency stop for maximum operational speed; and

.3 crash stop from maximum operational speed and from any transitional mode speed.

2.2 The tests referred to in 2.1.1 and 2.1.2 shall document that the accelerations do not exceed safety level 1 in annex 3 when control levers are used in accordance to written procedures as given in the craft operating manual or in an automatic mode. Should safety level 1 be exceeded during normal stop, control systems shall be modified in order to avoid exceedance or passengers shall be required to be seated during normal stop. Should safety level 1 be exceeded during emergency stop, then written procedures in the craft operating manual shall include detailed information of how to avoid exceedance or the control system shall be modified to avoid exceedance.

2.3 The test referred to in 2.1.3 shall document that the accelerations do not exceed safety level 2 in annex 3 when control levers of automatic modes are used in a manner which will give the highest accelerations. If safety level 2 is exceeded then the craft operating manual shall include a warning that it is a risk to passengers being injured, if a crash stop is performed.

2.4 Other tests shall be repeated during craft turning to establish the need or otherwise to impose any speed-related restrictions during manoeuvres.

3 Cruise performance

3.1 This test is to establish the craft performance and accelerations experienced during cruise modes with no passenger load or cargo load during the following conditions:

.1 normal operation conditions are those in which the craft will safely cruise at any heading while manually operated, auto-pilot assisted operated or operated with any automatic control system in normal mode; and

.2 worst intended conditions, referred to in 1.4.57 of this Code, are those in which it shall be possible to maintain safe cruise without exceptional piloting skill. However, operations at all headings relative to the wind and sea may not be possible. For type of craft having a higher performance standard in non-displacement mode, the performance and accelerations shall also be established at displacement mode during operation in the worst intended condition.

3.2 Operation levels, as defined in 3.1, shall be established and documented by full-scale tests in at least two relevant sea conditions and in head, beam and following seas. It shall be shown that the period of every test (run) and the number of series are sufficient for achieving reliable measurements. In every sea state tested, the aggregate time in each direction shall not be less

than 15 min. Model tests and mathematical simulations could be used to verify the performance in the worst intended conditions.

Limits for normal operation condition shall be documented by measurements of craft speed, heading to the wave and interpolation of measurements of maximum horizontal accelerations in accordance with 2.4 of annex 3. Measurement of wave height and period shall be made to the maximum extent practicable.

Limits for worst intended condition shall be documented by measurements of craft speed, wave height and period, heading to the wave and by root mean square (RMS) values of horizontal accelerations in accordance with 2.4 of annex 3 and of vertical accelerations close to the craft longitudinal centre of gravity. RMS values could be used for extrapolation of peak values. To obtain the expected peak values related to structural design load and safety levels (one per 5-min exceedance), multiply the RMS values by 3.0 or

$$C = \sqrt{2 \ln N}$$

where:

N is the number of successive amplitudes within the relevant period.

If not otherwise verified by model tests or by mathematical calculations, it might be assumed a linear relation between wave height and accelerations based on measurements in the two sea conditions. Limits for worst intended condition shall be documented both related to passenger safety in accordance with 2.4 of annex 3 and related to the actual structural design load of the craft.

3.3 The tests and verification process shall document the limiting seas for safe operation of the craft:

.1 in normal operation at maximum operational speed the accelerations shall not exceed safety level 1 in annex 3 with an average of one per 5-min period. The craft operating manual shall include detailed description of the effects of speed reduction or change of heading to the waves in order to prevent exceedance;

.2 in the worst intended conditions, with reduced speed as necessary, the accelerations shall not exceed safety level 2 in annex 3 with an average of one per 5-min period, nor shall any other craft characteristic motion as pitch, roll and yaw exceed levels that could impede the safety of passengers. In worst intended conditions, with reduced speed as necessary, craft shall be safely manoeuvrable and provide adequate stability in order that the craft can continue safe operation to the nearest place of refuge, provided caution is exercised in handling. Passengers shall be required to be seated when safety level 1 in annex 3 is exceeded; and

.3 within the actual structural design load for the craft, with reduced speed and change of heading, as necessary.

3.4 Turning and manoeuvrability

The craft shall be safely controllable and manoeuvrable during:

.1 hull-borne operation;

.2 operation in non-displacement mode;

.3 take-off, landing;

.4 any intermediate or transition modes, as applicable; and

.5 berthing operations, as applicable.

4 Effects of failures or malfunction

4.1 General

The limits of safe operation, special handling procedures and any operational restrictions shall be examined and developed as a result of full-scale trials conducted by simulating possible equipment failures.

The failures to be examined shall be those leading to major or more severe effects as determined from evaluation of FMEA or similar analysis.

Failures to be examined shall be agreed between the craft manufacturer and the Administration and each single failure shall be examined in a progressive manner.

4.2 Objects of tests

Examination of each failure shall result in:

.1 determining safe limits of craft operation at the time of failure, beyond which the failure will result in degradation beyond safety level 2 from safety level 1;

.2 determining crew member's actions, if any, to minimize or counter the effect of the failure; and

.3 determining craft or machinery restrictions to be observed to enable the craft to proceed to a place of refuge with the failure present.

4.3 Failures to be examined

Equipment failures shall include, but not be limited to, the following:

.1 total loss of propulsion power;

.2 total loss of lift power (for ACV and SES);

.3 total failure of control of one propulsion system;

.4 involuntary application of full propulsion thrust (positive or negative) on one system;

.5 failure of control of one directional control system;

.6 involuntary full deflection of one directional control system;

.7 failure of control of trim control system;

.8 involuntary full deflection of one trim control system element; and

.9 total loss of electrical power.

Failures shall be fully representative of service conditions and shall be simulated as accurately as possible in the most critical craft manoeuvre where the failure will have maximum impact.

4.4 "Dead ship" test

In order to establish craft motions and direction of laying to wind and waves, for the purposes of determining the conditions of a craft evacuation, the craft shall be stopped and all main machinery shut down for sufficient time that the craft's heading relative to wind and waves has stabilized. This test shall be carried out on an opportunity basis to establish patterns of the design's "dead ship" behaviour under a variety of wind and sea states.

ANNEX 10

CRITERIA FOR TESTING AND EVALUATION OF REVENUE AND CREW SEATS

1 Purpose and scope

The purpose of these criteria is to provide requirements for revenue and crew seats, seat anchorage and seat accessories and their installation to minimize occupant injury and/or disruption of egress/ingress if the craft suffers a collision.

2 Static seat tests

2.1 The requirements of this section are applicable to all crew and revenue seats .

2.2 All seats to which this paragraph applies, along with their supports and deck attachments, shall be designed to withstand at least the following static forces applied in the direction of the craft:

.1 forward direction: a force of 2.25 kN;

.2 after direction: a force of 1.5 kN;

.3 transverse direction: a force of 1.5 kN;

.4 vertically downward: a force of 2.25 kN; and

.5 vertically upward: a force of 1.5 kN.

A seat shall comprise a frame, bottom and back. Forces applied in the fore or aft direction of the seat shall be applied horizontally to the seat back 350 mm above the seat bottom. Forces applied in the transverse seat direction shall be applied horizontally to the seat bottom. Vertical upward forces shall be evenly distributed to the corners of the seat bottom frame. Vertical downward forces shall be uniformly distributed over the seat bottom.

If a seating unit consists of more than one seating position, these forces shall be applied at each seating position concurrently during the tests.

2.3 When the forces are applied to a seat, consideration shall be given to the direction in which the seat is to face in the craft. For example, if the seat faces sideways, the transverse craft force would be applied fore and aft on the seat and the forward craft force would be applied transversely on the seat.

2.4 Each seating unit to be tested shall be attached to the support structure similar to the manner in which it will be attached to the deck structure in the craft. Although a rigid support structure can be used for these tests, a support structure, having the same strength and stiffness as the support structure in the craft, is preferred.

2.5 The forces described in 2.2.1 to 2.2.3 shall be applied to the seat through a cylindrical surface having a radius of 80 mm and a width at least equal to the width of the seat. The surface shall be equipped with at least one force transducer able to measure the forces applied.

2.6 The seat shall be considered acceptable if:

.1 under the influence of the forces referred to in 2.2.1 to 2.2.3, the permanent displacement measured at the point of application of the force is not more than 400 mm;

.2 no part of the seat, the seat mountings or the accessories become completely detached during the tests;

.3 the seat remains firmly held, even if one or more of the anchorages is partly detached;

.4 all of the locking systems remain locked during the entire test but the adjustment and locking systems need not be operational after the tests; and

.5 rigid parts of the seat with which the occupant may come into contact shall present a curved surface with a radius of at least 5 mm.

2.7 The requirements of section 3 may be used in lieu of the requirements of this section provided that the accelerations used for the tests are at least 3g.

3 Dynamic seat tests

3.1 The requirements of this section are applicable in addition to those in 2.1 for crew and revenue seats in craft having a design collision load of 3g or greater.

3.2 All seats for which this section applies, the seat supporting structure, the attachment to the deck structure, the lap belt, if installed, and shoulder harness, if installed, shall be designed to withstand the maximum acceleration force that can be imposed upon them during a design collision. Consideration shall be given to the orientation of the seat relative to the acceleration force (i.e. whether the seat is forward-, aft-, or side-facing).

3.3 The acceleration pulse to which the seat is subjected shall be representative of the collision time-history of the craft. If the collision time-history is not known, or cannot be simulated, the acceleration time-history envelope shown in the figure can be used.

3.4 In the test frame, each seat unit and its accessories (e.g., lap belts and shoulder harnesses) shall be attached to the support structure similar to the manner in which it will be attached in the craft. The support structure can be a rigid surface; however, a support structure having the same strength and stiffness as the support structure in the craft is preferred. Other seats and/or tables with which an occupant may come in contact during a collision shall be included in the test frame in an orientation and with a method of attachment typical of that in the craft.

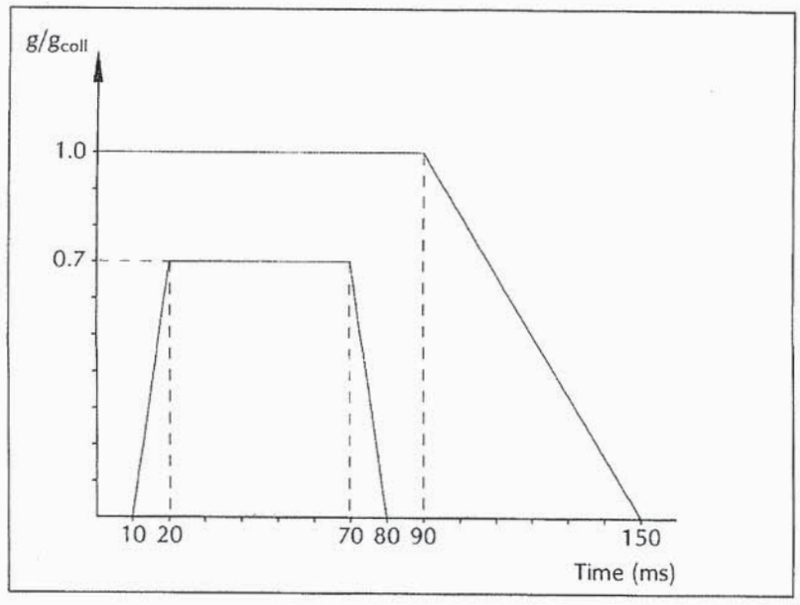


Figure - Acceleration time-history envelope

3.5 During the dynamic seat test, a fiftieth percentile anthropomorphic test dummy, suitable for the test being conducted, shall be placed in the seat in an upright seating position. If a typical seating unit is composed of more than one occupant seat, a test dummy shall be placed in each occupant seat in the unit. The dummy, or dummies, shall be secured in the seat unit in accordance with procedures of recognized national standards and be secured using only the lap belt and shoulder harness if they are installed. Tray tables and other such devices shall be placed in the position that would cause the greatest potential for an occupant to become injured.

3.6 The test dummy shall be instrumented and calibrated, in accordance with the requirements of a recognized national standard, so as to permit, as a minimum, calculation of the head injury criterion, calculation of the thoracic trauma index, measurement of force in the femur, and measurement, if possible, of extension and flexion of the neck.

3.7 If more than one dummy is used in the tests, the dummy located in the seat having the highest potential for an occupant to be injured shall be the one instrumented. The other dummy or dummies need not be instrumented.

3.8 The tests shall be conducted and the instrumentation shall be sampled at a rate sufficient to reliably show response of the dummy in accordance with the requirements of a recognized national standard.

3.9 The seat unit tested in accordance with the requirements of this section shall be considered acceptable if:

.1 the seat unit and tables installed in the seat unit or area do not become dislodged from the supporting deck structure and do not deform in a manner that would cause the occupant to become trapped or injured;

.2 the lap belt, if installed, remains attached and on the test dummy's pelvis during the impact. The shoulder harness, if installed, remains attached and in the immediate vicinity of the test dummy's shoulder during the impact. After the impact, the release mechanisms of any installed lap belt and shoulder harness shall be operative;

.3 the following acceptability criteria are met:

.3.1 the head injury criterion (HIC), calculated in accordance with the formula, does not exceed 500

$$HIC = (t_2 - t_1)\left[\frac{1}{t_2 - t_1}\int_{t_1}^{t_2} a(t)\,dt\right]^{2.5}$$

where:

t_1 and t_2 are the beginning and ending times (in seconds) of the interval in which the HIC is a maximum. The term $a(t)$ is the resultant measured acceleration in the head of the dummy in g;

.3.2 the thoracic trauma index (TTI), calculated in accordance with the formula, does not exceed 30g except for periods totalling less than 3 ms

$$TTI = \frac{g_R + g_{LS}}{2}$$ or acceleration at the centre of gravity

where:

g_R is the acceleration in g of either the upper or lower rib;

g_{LS} is the acceleration in g of the lower spine; and

.3.3 the force in the femur does not exceed 10 kN except that it cannot exceed 8 kN for periods totalling more than 20 ms; and

.4 loads on the upper torso harness straps do not exceed 7.8 kN or a total of 8.9 kN if dual straps are used.

ANNEX 11

OPEN REVERSIBLE LIFERAFTS

1 General

1.1 All open reversible liferafts shall :

.1 be constructed with proper workmanship and materials;

.2 not be damaged in stowage throughout the air temperature range of -18°C to +65°C;

.3 be capable of operating throughout an air temperature range of -18°C to +65°C and a seawater temperature range of -1°C to +30°C;

.4 be rot-proof, corrosion-resistant and not be unduly affected by seawater, oil or fungal attack;

.5 be stable and maintain their shape when inflated and fully laden; and

.6 be fitted with retro-reflective material, where it will assist in detection, and in accordance with the recommendations adopted by the Organization.

2 Construction

2.1 The open reversible liferaft shall be so constructed that when it is dropped into the water in its container from a height of 10 m, the liferaft and its equipment will operate satisfactorily. If the open reversible liferaft is to be stowed at a height of more than 10 m above the waterline in the lightest seagoing condition, it shall be of a type which has been satisfactorily drop-tested from at least that height.

2.2 The open reversible floating liferaft shall be capable of withstanding repeated jumps on to it from a height of at least 4.5 m.

2.3 The open reversible liferaft and its fittings shall be so constructed as to enable it to be towed at a speed of 3 knots in calm water when loaded with its full complement of persons and equipment, with the sea-anchor deployed.

2.4 The open reversible liferaft when fully inflated shall be capable of being boarded from the water whichever way up it inflates.

2.5 The main buoyancy chamber shall be divided into:

.1 not less than two separate compartments, each inflated through a non-return inflation valve on each compartment; and

.2 the buoyancy chambers shall be so arranged that in the event of one of the compartments being damaged or failing to inflate, the intact compartment shall be

able to support, with positive freeboard over the open reversible liferaft's entire periphery, the number of persons which the liferaft is permitted to accommodate, each having a mass of 75 kg and seated in their normal positions.

2.6 The floor of the open reversible liferaft shall be waterproof.

2.7 The open reversible liferaft shall be inflated with a non-toxic gas by an inflation system complying with the requirements of paragraph 4.2.2 of the LSA Code. Inflation shall be completed within the period of 1 min at an ambient temperature of between 18°C and 20°C and within a period of 3 min at an ambient temperature of -18°C. After inflation the open reversible liferaft shall maintain its form when loaded with its full complement of persons and equipment.

2.8 Each inflatable compartment shall be capable of withstanding a pressure equal to at least three times the working pressure and shall be prevented from reaching a pressure exceeding twice the working pressure either by means of relief valves or by a limited gas supply. Means shall be provided for fitting the topping-up pump or bellows.

2.9 The surface of the buoyancy tubes shall be of non-slip material. At least 25% of these tubes shall be of a highly visible colour.

2.10 The number of persons which an open reversible liferaft shall be permitted to accommodate shall be equal to the lesser of:

.1 the greatest whole number obtained by dividing by 0.096 the volume, measured in cubic metres, of the main buoyancy tubes (which for this purpose shall not include the thwarts, if fitted) when inflated; or

.2 the greatest whole number obtained by dividing by 0.372 the inner horizontal cross-sectional area of the open reversible liferaft measured in square metres (which for this purpose may include the thwart or thwarts, if fitted) measured to the innermost edge of the buoyancy tubes; or

.3 the number of persons having an average mass of 75 kg, all wearing lifejackets, that can be seated inboard of the buoyancy tubes without interfering with the operation of any of the liferaft's equipment.

3 Open reversible liferaft fittings

3.1 Lifelines shall be securely becketed around the inside and outside of the open reversible liferaft.

3.2 The open reversible liferaft shall be fitted with an efficient painter of a length suitable for automatic inflation on reaching the water. For open reversible liferafts accommodating more than 30 persons an additional bowsing-in line shall be fitted.

3.3 The breaking strength of the painter system, including its means of attachment to the open reversible liferaft, except the weak link required by paragraph 4.1.6.2 of the LSA Code, shall be:

.1 7.5 kN for open reversible liferafts accommodating up to 8 persons;

.2 10 kN for open reversible liferafts accommodating 9 to 30 persons; and

.3 15 kN for open reversible liferafts accommodating more than 30 persons.

3.4 The open reversible liferaft shall be fitted with at least the following number of inflated ramps to assist boarding from the sea whichever way up the raft inflates:

.1 one boarding ramp for open reversible liferafts accommodating up to 30 persons; or

.2 two boarding ramps for open reversible liferafts accommodating more than 30 persons; such boarding ramps shall be 180° apart.

3.5 The open reversible liferaft shall be fitted with water pockets complying with the following requirements:

.1 the cross-sectional area of the pockets shall be in the shape of an isosceles triangle with the base of the triangle attached to the buoyancy tubes of the open reversible liferaft;

.2 the design shall be such that the pockets fill to approximately 60% of capacity within 15 s to 25 s of deployment;

.3 the pockets attached to each buoyancy tube shall normally have aggregate capacity of between 125 *l* and 150 *l* for inflatable open reversible liferafts up to and including the 10-person size;

.4 the pockets to be fitted to each buoyancy tube on liferafts certified to carry more than 10 persons shall have, as far as practicable, an aggregate capacity of 12 *N* litres, where *N* is the number of persons carried;

.5 each pocket on a buoyancy tube shall be attached so that when the pocket is in the deployed position it is attached along the full length of its upper edges to, or close to, the lowest part of the lower buoyancy tube; and

.6 the pockets shall be distributed symmetrically round the circumference of the liferaft with sufficient separation between each pocket to enable air to escape readily.

3.6 At least one manually controlled lamp complying with the requirements shall be fitted on the upper and lower surfaces of the buoyancy tubes.

3.7 Suitable automatic drain arrangements shall be provided on each side of the floor of the liferaft in the following manner:

.1 one for open reversible liferafts accommodating up to 30 persons; or

.2 two for open reversible liferafts accommodating more than 30 persons.

3.8 The equipment of every open reversible liferaft shall consist of:

.1 one buoyant rescue quoit, attached to not less than 30 m of buoyant line with a breaking strength of at least 1 kN;

.2 two safety knives of the non-folding type, having a buoyant handle, shall be fitted attached to open reversible liferaft by light lines. They shall be stowed in pockets so that, irrespective of the way in which the open reversible liferaft inflates, one will be readily available on the top surface of the upper buoyancy tube in a suitable position to enable the painter to be readily cut;

.3 one buoyant bailer;

.4 two sponges;

.5 one sea-anchor permanently attached to the open reversible liferaft in such a way as to be readily deployable when the open reversible liferaft inflates. The position of the sea-anchor shall be clearly marked on both buoyancy tubes;

.6 two buoyant paddles;

.7 one first-aid outfit in a waterproof case capable of being closed tightly after use;

.8 one whistle or equivalent sound signal;

.9 two hand flares;

.10 one waterproof electric torch suitable for Morse signalling together with one spare set of batteries and one spare bulb in a waterproof container;

.11 one repair outfit for repairing punctures in buoyancy compartments; and

.12 one topping-up pump or bellows.

3.9 The equipment specified in 3.8 is designated an HSC Pack.

3.10 Where appropriate, the equipment shall be stowed in a container which, if it is not an integral part of, or permanently attached to, the open reversible liferaft, shall be stowed and secured to the open reversible liferaft and be capable of floating in water for at least 30 min without damage to its contents. Irrespective of whether the equipment container is an integral part of, or is permanently attached to, the open reversible liferaft, the equipment shall be readily accessible irrespective of which way up the open reversible liferaft inflates. The line which secures the equipment container to the open reversible liferaft shall have a breaking strength of 2 kN or a breaking strength of 3:1 based on the mass of the complete equipment pack, whichever is the greater.

4 Containers for open reversible inflatable liferafts

4.1 The open reversible liferafts shall be packed in a container that is:

.1 so constructed as to withstand conditions encountered at sea;

.2 of sufficient inherent buoyancy, when packed with the liferaft and its equipment, to pull the painter from within and to operate the inflation mechanism should the craft sink; and

.3 as far as practicable, watertight, except for drain holes in the container bottom.

4.2 The container shall be marked with:

.1 maker's name or trademark;

.2 serial number;

.3 the number of persons it is permitted to carry;

.4 non-SOLAS reversible;

.5 type of emergency pack enclosed;

.6 date when last serviced;

.7 length of painter;

.8 maximum permitted height of stowage above waterline (depending on drop-test height); and

.9 launching instructions.

5 Markings on open reversible inflatable liferafts

The open reversible liferafts shall be marked with:

.1 maker's name or trademark;

.2 serial number;

.3 date of manufacture (month and year);

.4 name and place of service station where it was last serviced; and

.5 number of persons it is permitted to accommodate on the top of each buoyancy tube, in characters not less than 100 mm in height and of a colour contrasting with that of the tube.

6 Instructions and information

Instructions and information required for inclusion in the craft's training manual and in the instructions for on-board maintenance shall be in a form suitable for inclusion in such training manual and instructions for on-board maintenance. Instructions and information shall be in a clear and concise form and shall include, as appropriate, the following:

.1 general description of the open reversible liferaft and its equipment;

.2 installation arrangements;

.3 operational instructions, including use of associated survival equipment; and

.4 servicing requirements.

7 Testing of open reversible inflatable liferafts

When testing open reversible liferafts in accordance with the recommendations of resolution MSC.81(70), part 1:

.1 tests No. 5.5, 5.12, 5.16, 5.17.2, 5.17.10, 5.17.11, 5.17.12, 5.18 and 5.20 may be omitted;

.2 the part of test No. 5.8 regarding closing arrangement may be omitted;

.3 the temperature -30°C in tests No. 5.17.3 and 5.17.5 may be substituted with -18°C; and

.4 the drop height of 18 m in test No. 5.1.2 may be substituted with 10 m.

Omittances and substitution, as described above, shall be reflected in the type approval certificate.

第 125/2015 號行政長官公告

中華人民共和國於一九九九年十二月十三日以照會通知聯合國秘書長，經修訂的《1974年國際海上人命安全公約》（下稱“公約”）自一九九九年十二月二十日起適用於澳門特別行政區；

國際海事組織海上安全委員會於二零零六年十二月八日透過第MSC.216（82）號決議通過了經修正的公約的修正案，該修正案於下列日期適用於澳門特別行政區：

——附件1所載的修正案，自二零零八年七月一日起；

——附件2所載的修正案，自二零零九年一月一日起；及

——附件3所載的修正案，自二零一零年七月一日起；

基於此，行政長官根據第3/1999號法律《法規的公佈與格式》第六條第一款的規定，命令公佈包含上指修正案的第MSC.216（82）號決議的中文及英文文本。

二零一五年十一月十七日發佈。

行政長官　崔世安

Aviso do Chefe do Executivo n.º 125/2015

Considerando que a República Popular da China, por nota datada de 13 de Dezembro de 1999, notificou o Secretário-Geral das Nações Unidas sobre a aplicação da Convenção Internacional para a Salvaguarda da Vida Humana no Mar de 1974, adiante designada por Convenção, tal como emendada, na Região Administrativa Especial de Macau a partir de 20 de Dezembro de 1999;

Considerando igualmente que, em 8 de Dezembro de 2006, o Comité de Segurança Marítima da Organização Marítima Internacional, através da resolução MSC.216(82), adoptou emendas à Convenção, tal como emendada, e que tais emendas são aplicáveis na Região Administrativa Especial de Macau como se segue:

— as emendas constantes do anexo 1, desde 1 de Julho de 2008;

— as emendas constantes do anexo 2, desde 1 de Janeiro de 2009; e

— as emendas constantes do anexo 3, desde 1 de Julho de 2010.

O Chefe do Executivo manda publicar, nos termos do n.º 1 do artigo 6.º da Lei n.º 3/1999 (Publicação e formulário dos diplomas), a resolução MSC.216(82), que contém as referidas emendas, nos seus textos em línguas chinesa e inglesa.

Promulgado em 17 de Novembro de 2015.

O Chefe do Executivo, *Chui Sai On*.

第 MSC.216（82）號決議

（2006 年 12 月 8 日通過）

《經修正的 1974 年國際海上人命安全公約》的修正案

海上安全委員會，

憶及《國際海事組織公約》關於本委員會職能的第 28（b）條，

進一步憶及《1974 年國際海上人命安全公約》（SOLAS）（以下簡稱“公約”）關於附則除第 I 章規定以外的適用修正程序的第 VIII（b）條，

在其第八十二屆會議上，**審議了**根據公約第 VIII（b）（i）條建議和散發的《公約》修正案，

1. 根據公約第 VIII（b）（iv）條，**通過**《公約》的修正案，其正文列於本決議之附件 1、2 和 3；

2. 按照《公約》第 VIII（b）（vi）（2）（bb）條，**決定**：

（a） 載於附件 1 的所述修正案將於 2008 年 1 月 1 日視為已被接受；

（b） 載於附件 2 的所述修正案將於 2008 年 7 月 1 日視為已被接受；以及

（c） 載於附件 3 的所述修正案將於 2010 年 1 月 1 日視為已被接受，

除非在此日期之前，超過三分之一的《公約》締約政府或其合計商船隊總噸位不少於世界商船隊總噸位 50%的締約政府通知反對該修正案；

3. **請**締約政府注意，根據《公約》第 VIII（b）（vii）（2）條，在按照上述第 2 段被接受後：

（a） 載於附件 1 的修正案將於 2008 年 7 月 1 日生效；

（b） 載於附件 2 的修正案將於 2009 年 1 月 1 日生效；及

（c） 載於附件 3 的修正案將於 2010 年 7 月 1 日生效，

4. **要求**秘書長遵照《公約》第 VIII（b）（v）條，將本決議和附件所載修正案文本的核證無誤副本送發《公約》的所有締約政府；

5. **進一步要求**秘書長將本決議及其附件的副本送發非《公約》締約政府的本組織會員。

附件 1

《經修正的 1974 年國際海上人命安全公約》的修正案

第 II-1 章

構造－結構、分艙及穩性、機電設備

A-1 部分

船舶結構

第 3-2 條 油船和散貨船海水壓載艙的防腐

1 用以下文字取代第 3-2 條的現有文字和標題：

“所有類型船舶專用海水壓載艙及散貨船雙舷側處所的保護塗層

1 本條第 2 和第 4 款須適用於不小於 500 總噸的下列船舶：

.1 2008 年 7 月 1 日及之後簽訂造船合同；或

.2 如無造船合同，2009 年 1 月 1 日及之後安放龍骨或處於類似建造階段；或

.3 交船日期為 2012 年 7 月 1 日或之後的船舶。

2 船上配置的所有專用海水壓載艙和 150 米及以上長度散貨船的雙舷側處所，須在建造時按照《所有類型船舶專用海水壓載艙及散貨船雙舷側處所的保護塗層性能標準》塗裝塗層。該標準由海上安全委員會以第 MSC.215（82）號決議通過，並可由本組織修正，但這樣的修正案要按照本公約第 VIII 條關於附則除第 I 章外的適用修正程序的規定通過、滿足生效條件和發生效力。

3 1998 年 7 月 1 日及之後建造的油船和散貨船上配置的第 2 款不適用的所有專用海水壓載艙，須符合第 MSC.47（66）號決議通過的第 II-1/3-2 條的要求。

4 保護塗層系統的保養須列入全船保養機制。在船舶的壽命中，保護塗層系統的效能須由主管機關或經主管機關認可的組織根據本組織制定的指南加以驗證。”

第 II-2 章

構造－防火、探火及滅火

第 1 條 適用範圍

2 在第 2.2.3 款中，刪去第二次出現的“和”字。

3 在第 2.2.4 款中，“。”改為“；和”。

4 在第 2.2 款中，在現有第.4 項之後加上下列新的第.5 項：

“5 第 5.3.1.3.2 和 5.3.4 條對客船不遲於 2008 年 7 月 1 日之後的第一次檢驗日期。”

第 3 條 定義

5 在現有第 52 款之後加上下列新的第 53 款：

“53 *客房陽臺*是單獨一個客房的住客專用的開敞甲板處所，並有該客房的直接入口。”

第 4 條 着火可能性

6 在第 5.2.3 款的末尾加上下列文字：

“但對第 9.2.4.2.5 條所規定的限度之外的窗戶和舷窗，可接受“A-0”級標準。”

7 在第 4.4 款中，在“站”和“須”之間，加上“或如適用於 2008 年 7 月 1 日及之後建造的客船的客房陽臺。”

第 5 條 火勢增大的潛勢

8 在第 3.1.2.1 款中，刪去最後一句。

9 加入下列新的第 3.1.3 款：

“3.1.3 *客船上的局部艙壁和甲板*

3.1.3.1 為實用或藝術處理而分隔處所所使用的局部艙壁或甲板須為不可燃材料。

3.1.3.2 用於屏隔或分隔相鄰客房陽臺的襯板，天花板和半隔艙壁或甲板須為不可燃材料。2008 年 7 月 1 日之前建造的客船上的客房陽臺須在 2008 年 7 月 1 日之後的第一次檢驗之前符合本款的要求。”

10 在第 3.2.1.1 款第一句中，在“處所”和“其”之間加入“及客房陽臺”，並在該款末尾加上下列新的一句：

“但是，第 3.2.3 款的規定毋須適用於客房陽臺。”

11 在現有第 3.2.4.1 款中，加上下列新的第.3 項：

“3 暴露的客房陽臺表面，天然硬木甲板系統除外。”

12 在現有第 3.3 款之後，加上下列新的第 3.4 款：

“3.4 客船客房陽臺上的家具和陳設

客船上客房陽臺的家具和陳設須符合第 3.40.1、3.40.2、3.40.3、3.40.6 和 3.40.7 條，除非陽臺在符合第 7.10 和 10.6.1.3

條的固定式壓力噴水和固定式探火和失火報警系統的保護之下。2008 年 7 月 1 日之前建造的客船須在 2008 年 7 月 1 日之後的第一次檢驗之前符合本款的要求。”

第 6 條 發煙潛勢和毒性

13 現有第 2 款重新編為第 2.1 款。

14 在新編的第 2.1 款之後加上下列新的第 2.2 款：

“2.2 在 2008 年 7 月 1 日或之後建造的客船上，客房陽臺除天然硬木甲板系統之外的暴露表面上所用的油漆、清漆、及其他表層塗飾須不能產生過量的煙氣和有毒產物。這要按照《耐火試驗規則》加以確定。”

15 現有第 3 款重新編為第 3.1 款。

16 在新編第 3.1 款之後，加上下列新的第 3.2 款：

“3.2 在 2008 年 7 月 1 日或之後建造的客船上，客房陽臺的甲板底層敷料不得在溫度升高時產生煙氣、毒性或爆炸性危險。這要按照《耐火試驗規則》加以確定。”

第 7 條 探火與報警

17 在現有第 9.4 款之後加上下列新的第 10 款：

“10 客船上客房陽臺的保護

在第 5.3.4 條所適用船舶的客房陽臺上，如其家具與陳設不是第 3.40.1、3.40.2、3.40.3、3.40.6 及 3.40.7 條所界定者，須安裝符合《消防安全系統規則》要求的固定式探火和失火報警系統。”

第 9 條 控火

18 在現有第 2.2.5.2 款之後加上下列新的第 2.2.6 款：

“2.2.6 *客房陽臺的佈置*

在 2008 年 7 月 1 日或之後建造的客船上，分隔相鄰陽臺的非承重局部艙壁須能夠由船員從每一側打開以便滅火。”

第 10 條 消防

19 第 6.1 款的標題由下列文字取代：

“6.1 *客船上的灑水和噴水系統*”

20 在現有第 6.1.2 款之後加上下列新的第 6.1.3 款：

“6.1.3 在第 5.3.4 條所適用船舶的客房陽臺上，如其家具與陳設不是第 3.40.1、3.40.2、3.40.3、3.40.6 及 3.40.7 條所界定者，須安裝符合《消防安全系統規則》要求的固定式壓力噴水滅火系統。”

第 III 章

救生設備與佈置

第 6 條 通訊

21 第 4.3 款由下列文字取代：

“4.3 通用應急警報系統須在所有起居處所和船員一般工作處所均可聽到。在客船上，該系統須在所有開敞甲板上均可聽到。”

第 11 條 救生艇筏集合及登乘佈置

22 在第 7 款的第 1 句中，“不利的”一詞由“所有”一詞取代，並在“10”和“20”之後加入單位“°”。

第 14 條 救助艇的存放

23 在第.1 項的末尾加上“，及如為充氣式，隨時保持充足氣狀態”。

第 19 條 應急訓練及演習

24 第 3.3.4 款由下列文字取代：

“3.3.4 如救生艇被佈置為自由降落降放，則至少每三個月一次在棄船演習時，船員須登上該救生艇，各自正確繫固在其座位上並開始降放程序直至但不包括實際釋放救生艇（即：不得鬆開釋放鉤）時為止。之後，該救生艇或者僅帶所需操作船員自由降落降放，或者用第二降放手段帶着或不帶操作船員降至水中。之後，在兩種情況下均須由操作船員在水中操縱。在不超過六個月的間隔裏，該艇須或者僅載有操作船員自由降落降放，或者按照本組織制定的指南進行模擬降放。”

第 20 條 隨時可操作狀態、保養及檢查

25 第 4.1 和 4.2 款由下列文字取代：

“降放用吊艇索須定期檢查，要特別注意穿過滑輪的部分，並在因受損而必要時或間隔不超過五年時更換，以較早者為準。”

26 在第 6.2 款第三句中，用“可配備適當的供水”取代“其運轉應按製造商的手冊規定的時間進行”。

27 第 8 款的標題由下列文字取代：

“8 氣脹式救生筏、氣脹式救生衣、海上撤離系統的檢修及充氣式救助艇的保養和維修”

28 第 11.1.3 款的第二句由下列文字取代：

“所加負荷須為救生艇或救助艇無乘員時的質量，但在不超過五年的間隔裏，須用相等於救生艇或救助艇及其全部定員和設備重量 1.1 倍的驗證負荷進行試驗。”

29 第 11.2 款的引言由下列文字取代：

“11.2 救生艇或救助艇的帶負荷釋放裝置，包括自由降落救生艇的釋放系統須：”

30 在第 11.2.3 款的第一句中，將“救生艇”改為“艇”。

31 本條中加上下列新的第 11.3 款：

“11.3 吊艇架降放的救生筏自動釋放鉤須：

.1 按照第 36 條所要求的船上保養說明進行保養；

.2 在進行第 I/7 和 I/8 條所要求的年度檢驗時，由經過適當培訓並熟悉該系統的人員進行徹底檢查和操作測試；及

.3 每次自動釋放鉤大修後，用該救生筏及其全部定員和設備總質量 1.1 倍的負荷進行運作試驗。此大修及試驗須至少每五年進行一次。”

第 21 條 救生艇筏及救助艇

32 第 1.2 款的引言由下列文字取代：

“.1.2 從事短途國際航行的客船須帶有：”

33 刪除第 1.3 款，其餘各款相應地重新編號。

34 在第 1.4 款中，在末尾加上“在全體人員集合並穿妥救生衣之後”。

35 第 2.3 款由下列文字取代：

“2.3 以救生艇作為救助艇亦可接受，但該艇及其降放和回收佈置亦須符合對救助艇的要求。”

36 在第 3.2 款中，刪去“並符合第 II-1/6.5 條規定得特殊分艙標準”。

第 26 條 對滾裝船的補充要求

37 在第 3.1 款中，用“符合《規則》第 5.1.4 節”取代“經主管機關參照本組織核准的建議案予以認可的”。

38 在第 3.2 款中，用“符合《規則》第 6.1.7 節”取代“設備”一詞之後的所有文字。

第 31 條 救生艇筏及救助艇

39 第 1.1 款第.2 項由下列文字取代：

“.2 此外，一個或多個符合《規則》第 4.2 或 4.3 節要求的氣脹式或剛性救生筏，其質量小於 185 千克，存放於在單一開敞甲板層上易於舷到舷轉移之處，其總計容量可容納船上人員的總和。如所述一個或多個救生筏的質量不小於 185 千克，且並非存放於在單一開敞甲板層上易於舷到舷轉移之處，則每一邊的總計容量須足以容納船上人員的總和。”

40 第 1.3 款第.2 項由下列文字取代：

“.2 除非第 1.3.1 款要求的救生筏質量小於 185 千克，並存放於在單一開敞甲板層上易於艏到艏轉移之處，否則須加配救生筏，以使每一艏的總計容量能夠容納船上人員總和的 150%；”

41 第 1.3 款第.4 項由下列文字取代：

“.4 在任何一個救生艇筏滅失或無法使用的情況下，每一艏仍須有足夠的救生艇筏可供使用，這包括任何質量小於 185 千克、並存放於在單一開敞甲板層上易於艏到艏轉移之處的救生艇筏，以容納船上人員的總和。”

42 第 2 款的第二句由下列文字取代：

“以救生艇作為救助艇亦可接受，但該艇及其降放和回收佈置亦須符合對救助艇的要求。”

第 32 條 個人救生設備

43 在第 3.2 款的第一句中，在“服”和“符合”兩詞之間加入“尺寸適宜的”。

44 在第 3.3 款中，在“存放”和“另外”兩詞之間加入“包括按照第 31.1.4 條所載位於邊遠位置的救生艇筏”及在“服”和“須”之間加入“尺寸適宜的”。

第 35 條 訓練手冊和船上訓練輔具

45 在現有第 4 款之後，加上下列新的第 5 款：

“5 訓練手冊需用船上工作語言撰寫。”

第 XII 章

散貨船附加安全措施

第 6 條 散貨船結構及其他要求

46 刪去現有第 3 款並將現有第 4 和第 5 款重新編為第 3 和第 4 款。

第 12 條 貨艙、壓載艙和乾燥處所進水警報

47 在第 1.2 款中，所提“第 II-1/11 條”改為“第 II-1/12 條”。

第 13 條 泵系的有效性

48 在第 1 款中，所提“第 II-1/11.4 條”改為“第 II-1/12 條”。

附 錄

證 書

49 在客船安全證書、貨船構造安全證書和貨船安全證書中，“安放龍骨或處於類似建造階段的日期，或重大改裝或改建或改造開始之日期”這一短語，由下列文字取代：

“建造日期：

— 建造合同日期.....

— 安放龍骨或處於類似建造階段的日期.....

— 交船日期.....

— 重大改裝或改建或改造開始的日期.....

所有適用日期均須填寫。”

客船安全證書設備記錄（格式 P）

50 在客船安全證書設備記錄（格式 P）中，在第 5 節第 4 項之後加入下列新的第 4.2 項：

“4.2 遠距識別與跟蹤系統”，

並將第 4 項（自動識別系統（AIS））重新編為第 4.1 項。

貨船設備安全證書設備記錄（格式 E）

51 在貨船設備安全證書設備記錄（格式 E）中，在第 3 節第 4 項之後加入下列新的第 4.2 項：

“4.2 遠距識別與跟蹤系統”，

並將第 4 項（自動識別系統（AIS））重新編為第 4.1 項。

貨船安全證書設備紀錄（格式 C）

52 貨船安全證書設備紀錄（格式 C）中，在第 5 節第 4 項之後加入下列新的第 4.2 項：

“4.2 遠距識別與跟蹤系統”，

並將第 4 項（自動識別系統（AIS））重新編為第 4.1 項。

核能客船安全證書格式

53 第 2.1.3 段的表格中，在以“**茲證明：**”一詞開始的一節中，所提及的“第 II-1/13 條”改為“第 II-1/18 條”。

附件 2

《經修正的 1974 年國際海上人命安全公約》的修正案

第 II-1 章

構造－結構、分艙及穩性、機電設備

1 現有 A、B 和 B-1 部分的條文由下列條文取代：

"A 部分

通則

第 1 條 適用範圍

1.1 除另有明文規定外，本章適用於 2009 年 1 月 1 日或之後安放龍骨或處於類似建造階段的船舶。

1.2 就本章而言，*相似建造階段*係指在這樣一個階段：

.1 可辨認出某一具體船舶的建造已經開始；和

.2 該船已開始的裝配量至少為 50 噸，或為所有結構材料估算量的 1%，取較小者。

1.3 就本章而言：

.1 *建造的船舶*係指已安放龍骨或處於相似建造階段的船舶；

.2 *所有船舶*係指 2009 年 1 月 1 日之前或當日或之後建造的船舶；

.3 無論何時建造的貨船，一經改裝成客船後，須被視為於開始改裝之日建造的客船；

.4 *重大改建和改造*的表述，對於貨船分艙和穩性而言，意味着對影響該船分艙水平的結構作出的任何改變。如果貨船經過如此改造，必須證明為改造後的該船計算的 *A/R* 比率不小於為改造之前的船舶計算的 *A/R* 比率。但在船舶的改造前 *A/R* 比率等於或大於一的情形裏，只需要改造後船舶的 *A* 值不小於為改造後船舶計算的 *R* 值。

2 除另有明文規定外，對於 2009 年 1 月 1 日之前建造的船舶，主管機關須確保其符合根據海安會第 MSC.1（XLV）號、第 MSC.6（48）號、第 MSC.11（55）號、第 MSC.12（56）號、第 MSC.13（57）號、第 MSC.19（58）號、第 MSC.26（60）號、第 MSC.27（61）號、1995 年《安全公約》大會第 1 號、第 MSC.47（66）號、第 MSC.57（67）號、第 MSC.65（68）號、第 MSC.69（69）號、第 MSC.99（73）號、第 MSC.134（76）號、第 MSC.151（78）號和第 MSC.170（79）號決議修正後的《1974 年國際海上人命安全公約》第 II-1 章適用的要求。

3 所有船舶在進行修理、改建、改造以及配備有關艏裝時，須繼續至少符合原先適用於這些船舶的要求。上述船舶如果是在相關修正案生效之日前建造，在符合對該日或之後建造船舶的要求方面，通常須至少達到該船修理、改建、改造和艏裝之前的同等程度。重大修理、改建和改造以及相關艏裝，須在主管機關認為合理可行的範圍內，滿足對任何相關修正案生效之日或之後建造的船舶的要求。

4 如果考慮到航程的遮蔽性及航行的條件，一國的主管機關認為適用本章的某些特定要求為不合理或不必要時，可對懸掛其國旗並在其航程中距最近陸地不超過 20 海里的個別船舶或某些類型船舶免除這些要求。

5 在客船用於運載大量特殊乘客（如朝覲乘客）的特種業務時，若這些船舶的船旗國主管機關認為適用本章的要求為不切實際的，它可對這些船舶免除那些要求，但它們必須完全符合下列規定：

.1 《1971 年特種業務客船協定》所附的規則；和

.2 《1973 年特種業務客船艙室要求議定書》所附的規則。

第 2 條 定義

除另有明文規定外，就本章而言：

1 船舶*分艙長度（Ls）*係指在最深分艙吃水處限制垂直進水範圍的一層或多層甲板或以下的那部分船舶的凸出的最大型長。

2 *中間長度*係指船舶分艙長度的中點。

3 *艉端*係指船舶分艙長度的尾極限。

4 *艏端*係指船舶分艙長度的首極限。

5 *長度（L）*係指現行的《國際載重線公約》中界定的長度。

6 *乾舷甲板*係指現行的《國際載重線公約》中界定的甲板。

7 *艏垂線*係指現行的《國際載重線公約》中界定的首垂線。

8 *船寬（B）*係指在最深分艙吃水或以下的船舶最大型寬。

9 *吃水（d）*係指在船長中點從龍骨線至所述水線的垂直距離。

10 *最深分艙吃水（d_s）*係指相當於船舶夏季載重線吃水的水線。

11 *空載吃水（d_1）*係指相應於最輕預期裝載量和相關艙容的營運吃水，但包括可能為了穩性和（或）浸水的壓載吃水。客船應包括所有額定旅客和船員全部登船。

12 *部分分艙吃水（d_p）*係指空載吃水加上空載吃水與最深分艙吃水之間差異的 60%。

13 *縱傾*係指艏吃水和艉吃水之間的差異，這種吃水分別是從首部和尾部量得，不考慮龍骨的任何傾斜。

14 某一處所的*滲透率（μ）*係指該處所能被水佔去的浸沒容積的比例。

15 *機器處所*係指裝有主輔推進機械，包括鍋爐、發電機和主要用於推進的電動機的處所的水密邊界圍成的空間。對於異常佈置的船舶，主管機關可以確定機器處所的界限。

16 *風雨密*係指在任何海況下水都不會滲入船舶。

17 *水密*係指船材尺度和佈置能夠防止水在完整和破損情況中可能出現的水壓下從任何方向通過。在破損的情況下，水的壓頭是按最壞的平衡狀態來考慮，包括中間進水階段。

18 *設計壓力*係指根據設計，在完整和破損穩性中假定為水密的每一結構和設備都能承受的靜水壓力。

19 客船中的*艙壁甲板*係指在分艙長度（*Ls*）任何一點上，主艙壁和船殼板保持水密的最高甲板，以及在本章第 8 條和 B-2 部分中界定的破損情況下，旅客和船員的撤離在任何進水階段亦不會受水阻礙的最低甲板。艙壁甲板可以是階形甲板。在貨船中，乾舷甲板可作為艙壁甲板。

20 *載重量*係指船舶在比重為 1.025 的水中，相應於所勘劃的夏季載重線的排水量與該船空船排水量之差，用噸表示。

21 *空載量*係指船舶艙內沒有貨物、燃料、潤滑油、壓載水、淡水、水箱給水、消耗品以及乘客和船員及其物件時的排水量，用噸表示。

22 *油船*係指《經 1978 年相關議定書修訂的 1973 年國際防止船舶造成污染公約》附則 I 第 1 條界定的油船。

23 *滾裝客船*係指具有第 II-2/3 條界定的滾裝處所或特種處所的客船。

24 *散貨船*係指第 XII/1.1 條界定的散貨船。

25 *龍骨線*係指在以下位置穿越船舯、與龍骨斜坡平行的一條線：

.1 在有金屬外殼的船上，中線上龍骨頂部，或如果一條方龍骨延伸至該線之下，船殼板內側與龍骨的切線上龍骨的頂部；或

.2 在木質和合成材料的船上，從龍骨鑲口的下緣量得的距離。當在船舯截面的較低部分形成空洞或安裝有厚的護板時，則該距離得量自船舶內延平底線與船舯的中心線相交處。

26 *船舯*係指長度（*L*）的中間點。

第 3 條 有關 C、D 和 E 部分的定義

除另有明文規定外，就 C、D 和 E 部分而言：

1 *操舵裝置控制*系統係指用以將舵令由駕駛室傳至操舵動力裝置的設備。操舵裝置控制系統由發送器、接收器、液壓控制泵及其電動機、電動機控制器、管系和電纜組成。

2 *主操舵裝置*係指在正常情況下為操縱船舶而使舵產生動作所必需的機械、舵執行器、操舵動力設備（如設有的話）以及附屬設備和對舵杆施加扭矩的設施（如舵柄或舵扇）。

3 *操舵裝置動力設備*：

.1 如為電動操舵裝置，係指電動機及有關的電氣設備；

.2 如為電動液壓操舵裝置，係指電動機及其有關的電氣設備和與之相連接的泵；或

.3 如為其他液壓操舵裝置，係指驅動機及與之相連接的泵。

4 *輔助操舵裝置*係指在主操舵裝置失效時操縱船舶所必須的設備，它不屬於主操舵裝置的任何部分，但不包括舵柄、舵扇或作同樣用途的部件。

5 *正常操作和居住條件*係指這樣的一種狀態，即船舶作為一個整體，為推進力、操舵能力、安全航行、消防和防浸安全、內外通訊和信號、脫險通道和應急救生艇絞車、以及所設計的舒適居住條件提供保證的機器、設施與輔助設備均工作正常並發揮着效用。

6 *緊急狀態*係指由於主電源發生故障以致正常操作和居住條件所需的設施均工作失常的狀態。

7 *主電源*係指向主配電板供電以向保持船舶正常操作和居住條件所必需的一切設施配電的電源。

8 *癱船狀態*係指由於失去動力，致使主推進裝置、鍋爐和輔機不能運轉的狀態。

9 *主發電站*係指主電源所在的處所。

10 *主配電板*係指由主電源直接供電並將電能分配給船上各種設施的配電板。

11 *應急配電板*係指在主電源供電系統發生故障的情況下，由應急電源或臨時應急電源直接供電，並將電能分配給應急設施的配電板。

12 *應急電源*係指在主電源供電發生故障的情況下，用來向應急配電板供電的電源。

13 *動力執行系統*係指提供動力以轉動舵杆的液壓設備，由一個或多個操舵裝置動力設備，連同有關的管系和附件以及舵執行器組成。各個動力執行系統可共用某些機械部件，即舵柄、舵扇和舵杆，或共用相同用途的部件。

14 *最大營運前進航速*係指船舶在最大航海吃水情況下保持海上營運的最大設計航速。

15 *最大後退速度*係指船舶在最大航海吃水情況下用設計的最大倒退功率估計能夠達到的速度。

16 *機器處所*係指一切 A 類機器處所和其他所有裝設推進裝置、鍋爐、燃油裝置、蒸汽機和內燃機、發電機和主要電動機械、加油站、製冷機、防搖裝置、通風機和空調機的處所以及類似處所，和通往這些處所的圍壁通道。

17 *A 類機器處所*係指裝有下列設備的處所和通往這些處所的圍壁通道：

.1 用於主推進的內燃機；或

.2 用於非主推進的合計總輸出功率不小於 375kW 的內燃機；或

.3 任何燃油鍋爐或燃油裝置。

18 *控制站*係指船舶無線電設備或主要導航設備或應急電源所在的處所，或火災記錄器或火災控制設備集中的處所。

19 *化學品液貨船*係指經建造或改建用於散裝運輸下述兩規則章節之一所列的任何一種液體貨品的貨船：

.1 海安會以第 MSC.4（48）號決議通過、並可能由本組織修正的《散裝運輸危險化學品船舶構造和設備國際規則》（以下簡稱《國際散化規則》）第 17 章；或

.2 本組織大會以第 A.212（VII）號決議通過、並已經或可能由本組織修正的《散裝運輸危險化學品船舶構造和設備規則》（以下簡稱《散化規則》）第 VI 章，

以適用者為準。

20 *氣體運輸船*係指經建造或改建用於散裝運輸下述兩規則章節之一所列的任何液化氣體或其他產品的貨船：

.1 海安會以第 MSC.5（48）決議通過、並可能由本組織修正的《散裝運輸液化氣體船舶構造和設備國際規則》（以下簡稱《國際氣體運輸船規則》）第 19 章；或

.2 本組織以大會第 A.328（IX）決議通過、並已經或可能由本組織修正的《散裝運輸液化氣體船舶構造和設備規則》（以下簡稱《氣體運輸船規則》）第 XIX 章，

以適用者為準。

B 部分

分艙與穩性

第 4 條 通則

1 B-1 至 B-4 部分的破損穩性要求須適用於長度（*L*）為 80m 及以上的貨船和任何長度的所有客船，但須排除表明符合本組織制定的其他文書中有關分艙和破損穩性規則的那些貨船。

2 對具體一艘或一組船舶，如主管機關認為已至少達到等同於這些條款規定的安全程度，可以接受替代方法。任何主管機關允許採用替代方法，須將有關細節通報本組織。

3 在考慮到船舶預定用途的性質的情況下，對船舶須儘可能有效地進行分艙。分艙程度須因船舶的分艙長度（*Ls*）和營運業務而異，分艙方法為，最高等級的分艙適合具有最大分艙長度的、主要從事旅客運輸的船舶。

4 若建議配置有足夠水密性的甲板、內殼板或縱向艙壁以嚴格限制水流，則須令主管機關滿意地認為，在計算中已對此類結構的有利或不利影響給與適當考慮。

B-1 部分

穩 性

第 5 條 完整穩性資料

1 不管大小的每艘客船和長度（L）為 24 米及以上的每艘貨船，須在完工後進行傾斜試驗，並確定其穩性要素。

2 主管機關可允許對某一艘貨船免除傾斜試驗，但須具有其姊妹船所做傾斜試驗的基本穩性數據，且使主管機關滿意地認為可從這些基本數據中獲得第 5-1 條要求的被免除船舶的可靠穩性資料。在船舶完工時須進行空船測驗，如與從姊妹船獲得的數據相比，長度為 160 米或以上船舶的空船排水量偏差超過 1%，長度為 50 米或以下和通過線性內插法確定的中間長度的船舶空船排水量偏差超過 2%，或發現空船縱向穩心高度偏差超過 Ls 的 0.5%，則須進行傾斜試驗。

3 如果參考相似船舶的已有數據，能夠明確表明由於船舶的尺寸比例及佈置，在所有可能的裝載條件下，均具有大於足夠的初穩性高度，主管機關也可以允許對專門為運載散裝液體或礦砂設計的某一艘或某一類船舶免除傾斜試驗。

4 如果船舶經過任何改建，以致在實質上影響到提供給船長的穩性資料，則須提供經修改的穩性資料。必要時，須重新進行船舶傾斜試驗。如果預期偏差超出第 5 款規定的數值之一，則須重新進行船舶傾斜試驗。

5 所有客船均須定期進行空船檢驗，間隔期不得超過五年，以驗證空船排水量和縱向重心高度的任何變化。當與經核准的穩性資料相比，發現或預計空船排水量偏差超過 2%或縱向重心高度偏差超過 *Ls* 的 1%時，須重新進行傾斜試驗。

6 每艘船舶均須在船首和船尾標有清晰的吃水刻度。在吃水標誌不在容易讀到的位置或特種運輸的操作限制使它難以讀到的情況下，船舶須安裝能確定船首和船尾吃水的可靠吃水指示系統。

第 5-1 條 提供給船長的穩性資料

1 為使船長能以迅速和簡便的程序就不同營運狀態下的船舶穩性獲得有關準確指導，須向他提供令主管機關滿意的所需資料。須將穩性資料的一份副本提供給主管機關。

2 這些資料應包括：

.1 保證符合有關完整和破損穩性要求的最小營運穩心高度（GM）與吃水的關係曲線或表格，或者相應的最大允許重心高度（KG）與吃水的關係曲線或表格，或者這些曲線之一的等效物；

.2 有關橫傾調整裝置的操作說明；和

.3 為保持所要求的完整穩性和破損後穩性而可能需要的其他數據和輔助措施。

3 穩性資料須表明在作業縱傾範圍超過 *Ls* 的 +/− 0.5% 的情況下各種縱傾的影響。

4 對於須滿足 B-1 部分穩性要求的船舶，第 2 款所述的資料應按照下述方式通過分艙指數有關的考慮確定：與 d_s、d_p 和 d_1 三種吃水對應的最小要求 GM（或最大許用重心高度 KG）等於用來計算生存因數 *Si* 的相應裝載情況下的 GM（或 KG 值）。對於中間吃水，須分別通過最深分艙吃水和部分分艙吃水之間以及部分載重線吃水和空船營運吃水之間的 GM 值的線性內插法獲得所採用數值。通過保留每一吃水的最小要求 GM 值的最大值或最大許用 KG 值的最小值，來計入完整穩性衡準。如果對不同縱傾計算分艙指數，將以相同方式確定所要求的若干 GM 曲線。

5 當最小營運穩心高度（GM）與吃水的關係曲線或表格不恰當時，船長應確保營運狀態不會偏離經研究的裝載條件，或通過計算核驗這種裝載條件的穩性衡準可以得到滿足。

第 6 條 要求的分艙指數 *R*

1 如果按照第 7 條確定的達到的分艙指數 *A* 不低於按照本條計算所得的要求分艙指數 R，此外如果局部指數 A_s、A_p 和 A_l 就客船而言不低於 0.9*R*、就貨船而言不低於 0.5*R*，則船舶分艙可視為足夠。

2 對於適用本章破損穩性要求的所有船舶，提供的分艙程度由下述所要求的分艙指數 R 來確定：

.1 對於船長（L_s）在 100 米以上的貨船：

$$R = 1 - \frac{128}{Ls + 152}$$

.2 對於船長（L_s）在 80 米及以上但不超過 100 米的貨船：

$$R = 1 - [1/(1 + \frac{Ls}{100} \times \frac{Ro}{1-Ro})]$$

式中：R_0 等於按照第.1 項的公式計算所得的 *R* 值。

.3 對於客船：

$$R = 1 - \frac{5,000}{Ls + 2.5N + 15,225}]$$

式中：

$N = N_1 + 2N_2$

N_1 = 需要提供救生艇的人數

N_2 = 允許船舶載運的超出 N_1 的人數（包括高級船員和普通船員）。

.4 若因營運條件而難以在 $N = N_1 + 2N_2$ 基礎上符合本條第 2.3 款，和若主管機關認為存在的危險程度適當降低，則可以採用一較小的 N 值，但無論如何不得小於 $N = N_1 + N_2$。

第 7 條 達到的分艙指數 *A*

1 達到的分艙指數 A 通過對第 2 條定義的吃水 d_s、d_p、d_l 的計算所得的局部指數 A_s、A_p、A_l 的相加（加權如所示）總和得出，按下式計算：

$$A = 0.4A_s + 0.4A_p + 0.2A_l$$

每一局部指數是對考慮的所有破損情況的影響的總和，應按下式計算：

$$A = \Sigma\ Pi\ Si$$

式中：

i 代表所考慮的每艙或艙組，

Pi 表示只有所考慮的艙或艙組可能浸水的概率，不考慮第 7-1 條界定的任何水平分艙，

Si 表示所考慮的艙或艙組浸水後的倖存概率，包括第 7-2 條界定的任何水平分艙的影響。

2 在計算 *A* 時，最深分艙吃水和局部分艙吃水須採用水平縱傾。空船營運吃水須採用實際營運縱傾。若在任何營運條件下，與計算所得的縱傾相比較，縱傾變量大於分艙長度 *Ls* 的 0.5%，則需要對同一吃水但不同的縱傾進行一次或以上 *A* 的額外計算，以使在所有營運條件下，與用於一次計算的參考縱傾相比較縱傾的差異將小於 *Ls* 的 0.5%。

3 在確定剩餘穩性曲線的正復原力臂（*GZ*）時，應採用完整條件下的排水，即採用恆量排水計算方法。

4 上述公式所表示的總和須計及整個船舶分艙長度（*Ls*）範圍內單個艙或兩個或更多相鄰艙的所有浸水情況。在不對稱佈置的情況下，計算得出的 A 值應是對兩邊計算值的平均值，或是明顯得出最不利結果的那邊的值。

5 若設有邊艙，涉及邊艙的所有浸水情況均須加入公式所表示的總和中。此外，一個或一組邊艙和其相鄰的一個或一組內側艙同時浸水的所有情況也可加入總和，但是不包括破損的橫向範圍大於一半船寬 *B* 的情況。就本條而言，橫向範圍的測量從船舶內側正交量至最深分艙吃水水平面中心線。

6 在按照各規則進行的浸水計算時，僅需假定船殼一處破損和一個自由液面。假定的破損垂直範圍為從基線向上擴展至水線之上或更高的任一水密水平分艙。但是，如果一個較小範圍的破損將產生更為嚴重的後果，則應假定為該範圍。

7 如在假定破損範圍內設有管子、導管或軸隧，其佈置應做到保證繼續浸水不會擴展到那些假定浸水的艙室以外的其他艙室。

但是，如果證實繼續浸水的影響能容易地得到控制並且不妨礙船舶安全，則主管機關可允許較小的連續浸水。

第 7-1 條 因數 *Pi* 的計算

1 艙或艙組的因數 *Pi* 須採用下列表示法按照第 1.1 款和第 1.2 款計算：

j ＝破損波及的最末端破損區域號，從船尾 1 號開始；

n ＝破損波及的相鄰破損區域的數量；

k ＝從船殼向中心線算起的作為破損區域內阻斷橫向穿透的某一特定縱向艙壁的編號。船殼為 *k*=0；

*x*1 ＝從 *Ls* 的後端點至所考慮的區域後端的距離；

*x*2 ＝從 *Ls* 的後端點到所考慮的區域前端的距離；

b ＝在最深分艙載重線處與中線成直角的、船殼板至假定垂直平面之間的平均橫向距離（米），該垂直平面介於計算 *Pi* 因數所用的縱向極限之間，並與所考慮的縱艙壁離中心最遠部分的全部或部分相切或相同。該垂直平面的定位方式須是：至船殼板的橫向平均距離為最大值，但不超過平面至船殼板最小距離的兩倍。如果縱艙壁的上部分在最深分艙載重線以下，則可假定用於確定 *b* 的垂直平面向上延伸至最深分艙水線。無論如何，所取的 *b* 不得大於 *B*/2。

若破損僅涉及單一區域：

$$Pi = p\,(x1_j,\ x2_j) \cdot [r\,(x1_j,\ x2_j,\ b_k) - r\,(x1_j,\ x2_j,\ b_{k-1})]$$

若破損涉及兩個相鄰區域：

$$Pi=p(x1_j,x2_{j+1})\cdot[r(x1_j,x2_{j+1},b_k)-r(x1_j,x2_{j+1},b_{k-1})]$$
$$-p(x1_j,x2j)\cdot[r(x1_j,x2_j,b_k)-r(x1_j,x2_j,b_{k-1})]$$
$$-p(x1_{j+1},x2_{j+1})\cdot[r(x1_{j+1},x2_{j+1},b_k)-r(x1_{j+1},$$
$$x2_{j+1},b_{k-1})]$$

若破損涉及三個或三個以上相鄰區域：

$$Pi=p(x1_j,x2_{j+n-1})\cdot[r(x1_j,x2_{j+n-1},b_k)-r(x1_j,x2_{j+n-1},b_{k-1})]$$
$$-p(x1_j,x2_{j+n-2})\cdot[r(x1_j,x2_{j+n-2},b_k)-r(x1_j,x2_{j+n-2},$$
$$b_{k-1})]-p(x1_{j+1},x2_{j+n-1})\cdot[r(x1_{j+1},x2_{j+n-1},b_k)-r(x1_j$$
$$_{+1},x2_{j+n-1},b_{k-1})]+p(x1_{j+1},x2_{j+n-2})\cdot[r(x1_{j+1},x2_{j+n-2},$$
$$b_k)-r(x1_{j+1},x2_{j+n-2},b_{k-1})]$$

且式中 $r(x1,x2,b_0)=0$

1.1 因數 $p(x1,x2)$ 應按照下列公式計算：

總的規範最大破損長度：	J_{max}	=	10/33
分佈中的肘接點：	J_{kn}	=	5/33
Jkn 的累計概率：	P_k	=	11/12
最大絕對破損長度：	l_{max}	=	60m
在正常分佈末端的長度：	L^*	=	260m

在 $J=0$ 時概率密度：

$$b_0 = 2\left(\frac{P_k}{J_{kn}} - \frac{1-P_k}{J_{max}-J_{kn}}\right)$$

當 $Ls \le L^*$時：

$$I_m = min\left\{J_{max}\ ,\ \frac{l_{max}}{L_s}\right\}$$

$$I_k = \frac{J_m}{2} + \frac{1-\sqrt{1+(1-2p_k)b_0 J_m + \frac{1}{4}b_0^2 J_m^2}}{b_0}$$

$$b_{12} = b_0$$

當 $Ls > L^*$時：

$$I_m{}^* = min\left\{J_{max}\ ,\ \frac{l_{max}}{L^*}\right\}$$

$$I_k{}^* = \frac{J_m{}^*}{2} + \frac{1-\sqrt{1+(1-2P_k)b_0 J_m{}^* + \frac{1}{4}b_0{}^2 J_m{}^{*2}}}{b_0}$$

$$I_m = \frac{J_m{}^* \cdot L^*}{L_s}$$

$$I_k = \frac{J_k{}^* \cdot L^*}{L_s}$$

$$b_{12} = 2\left(\frac{P_k}{J_k} - \frac{1-P_k}{J_m - J_k}\right)$$

$$b_{11} = 4\frac{1-P_k}{(J_m - J_k)J_k} - 2\frac{P_k}{J_k^2}$$

$$b_{21} = -2\frac{1-P_k}{(J_m - J_k)^2}$$

$$b_{22} = -b_{21}J_m$$

無量綱破損長度：

$$J = \frac{(x2-x1)}{L_s}$$

艙或艙組的規範長度：

J_n 應以 J 和 Jm 小者計入

1.1.1 若所考慮的艙或艙組的界限均不與後端點或前端點相重合：

$J \leq Jk$:

$$p\ (x1\ ,\ x2\ ) = p_1 = \frac{1}{6}J^2\ (\ b_{11}J + 3b_{12}\ )$$

$J > Jk$:

$$p\ (x1\ ,\ x2\ ) = p_2 =$$

$$-\frac{1}{3}b_{11}J_k^3 + \frac{1}{2}(b_{11}J + b_{12})J_k^2 + b_{12}JJ_k - \frac{1}{3}b_{21}(J_n^3 -$$

$$J_k^3) + \frac{1}{2}(b_{21}J - b_{22})\ (J_n^2 - J_k^2) + b_{22}J\ (J_n - J_k)$$

1.1.2 若所考慮的艙或艙組的後界限與後端點相重合，或者所考慮的艙或艙組前界限與前端點相重合：

$J \leq Jk$:

$$P\ (x1\ ,\ x2\ ) = \frac{1}{2}\ (P_1 + J)$$

$J > Jk$:

$$P\ (x1\ ,\ x2\ ) = \frac{1}{2}\ (P_2 + J)$$

1.1.3 若所考慮的艙或艙組延伸超過整個分艙長度（Ls）：

$$P\ (x1\ ,\ x2\ ) = 1$$

1.2 因數 r（x1，x2，b）須由下列公式確定：

$$r\ (x1\ ,\ x2\ ,\ b) = 1 - (1 - C)\left[1 - \frac{G}{p(x1,\ x2)}\right]$$

式中：

C＝$12J_b$（$-45J_b + 4$），其中

$$J_b = \frac{b}{15 \cdot B}$$

1.2.1 若所考慮的艙或艙組延伸超過整個分艙長度（Ls）：

$$G = G_1 = \frac{1}{2} b_{11} J_b^2 + b_{12} J_b$$

1.2.2 若所考慮的艙或艙組的界限均不與後端點或前端點相重合：

$$G = G_2 = -\frac{1}{3}b_{11}J_0^3 + \frac{1}{2}(b_{11}J - b_{12})J_0^2 + b_{12}JJ_0$$，其中

$$J_0 = \min\ (J\ ,\ J_b)$$

1.2.3 若所考慮的艙或艙組的後界限與後端點相重合，或者所考慮的艙或艙組的前界限與前端點相重合：

$$G = \frac{1}{2}\ (G_2 + G_1 J)$$

第 7-2 條 因數 *Si* 的計算

1 艙或艙組的假定浸水的每種情況的因數 s_i 須按照下列表示法和本條有關規定來確定。

θ_e 係指在任何浸水階段的平衡傾斜角（度）；

θv 係指在任何浸水階段復原力臂變為負數的角度，或者一不能被關閉成風雨密的開口被淹沒的角度；

GZ_{max} 係指至 θv 角的最大正復原力臂（米）；

*範圍*係指從 θ_e 角測量的正復原力臂的範圍（度）。正範圍應直至 θv 角；

*浸水階段*係指在達到最後平衡前的浸水過程中的任何間斷步

驟，包括在任何均衡之前的階段。

1.1 因數 s_i，對於在初始裝載狀況的任一破損情況，d_i，須從下列公式中取得：

$$s_i = \text{minimum}\{s_{intermediate,i} \text{ 或 } s_{final,i} \cdot s_{mom,i}\}$$

式中：

$s_{intermediate,i}$ 係指在最後平衡階段前所有中間浸水階段的倖存概率，並應按照第 2 款計算；

$s_{final,i}$ 係指在最後平衡浸水階段的倖存概率，它應按照第 3 款計算；

$s_{mom,i}$ 係指對傾斜力矩的倖存概率，應按照第 4 款計算。

2 因數 "$s_{intermediate,i}$" 只適用於客船（對於貨船因數 "$s_{intermediate,i}$" 應為一）且須為包括任何均衡之前的階段在內的所有浸水階段所得到的最小 s 因數，並應按下述計算：

$$s_{intermediate,i} = \left[\frac{GZ_{max}}{0.05} \cdot \frac{Range}{7}\right]^{\frac{1}{4}}$$

其中，GZ_{max}不得大於 0.05 米且範圍（range）不得超過 7°。如果中間橫傾角超過 15°，則 $s_{intermediate,i} = 0$。若需要橫貫浸水裝置，則均衡的所需時間不得超過 10 分鐘。

3 因數 $s_{final,i}$ 須從下述公式取得：

$$s_{final,i} = K\left[\frac{GZ_{max}}{0.12} \frac{Range}{16}\right]^{\frac{1}{4}}:$$

式中：

GZ_{max}不得大於 0.12 米；

範圍不得大於 16°；

K＝1　　如果 $\theta_e \leq \theta min$

K＝0　　如果 $\theta_e \geq \theta max$

否則，$K = \sqrt{\frac{\theta_{max} - \theta_e}{\theta_{max} - \theta_{min}}}$ ；

式中：

θ_{min}對客船為 7°，對貨船為 25°，且

θ_{max}對客船為 15°，對貨船為 30°。

4　因數 $S_{mom,i}$只適用於客船（對貨船而言因數“$S_{mom,i}$”須取為一）且須在最終平衡狀態下從下列公式計算得出：

$$S_{mom,i} = \frac{(GZ_{max} - 0.04).Displacement}{M_{heel}}$$

式中：

Displacement 係指在分艙吃水的完整排水；

M_{heel}係指按照第 4.1 款計算所得的最大假定橫傾力矩；和

$S_{mom,i} \leq 1$

4.1 橫傾力矩 “M_{heel}” 應按下列計算：

M_{heel} = maximum{$M_{passenger}$ 或 M_{wind} 或 $M_{survivalcraft}$}

4.1.1 $M_{passenger}$ 係指乘客移動所導致的最大假定橫傾力矩；並按下列取得：

$M_{passenger} = (0.075 \cdot N_p) \cdot (0.45 \cdot B) \cdot (tm)$

式中：

Np 是與所考慮的最深分艙吃水相對應的營運條件下，船上所允許運載的最大乘客數；和

B 係指船舶的橫樑。

或者，為計算橫傾力矩，假定乘客按照每平米 4 人分佈在各層甲板的集合站所處一舷可供站立的甲板區域，並產生最不利的橫傾力矩。如此計算時，應假定每一乘客的重量為 75kg。

4.1.2 M_{wind} 係指在破損情況下所作用的最大假定風力。

$M_{wind} = (P \cdot A \cdot Z) / 9{,}806 \ (tm)$

式中：

$P = 120 N/m^2$；

A = 水線以上投射側面；

Z = 水線以上投射側面中間至 $T/2$ 的距離；和

T = 船舶吃水，d_i。

4.1.3 $M_{survivalcraft}$ 係指在船舶一舷降放所有滿載的吊架降放式救生艇筏時所產生的最大假定橫傾力矩。應採用下述假設來計算：

.1 假定船舶破損後位於船舶傾斜一舷的所有救生艇和救助艇，均滿載懸掛於舷外並準備降放；

.2 對於佈置為從存放位置滿載降放的救生艇，應以在降放過程中的最大橫傾力矩計算；

.3 假定船舶破損後位於傾斜一舷的每個吊架上均吊有滿載的吊架降落式救生筏，救生筏已懸掛於舷外並準備降放；

.4 不在懸掛於舷外的救生設備內的人員不增加傾側力矩或復原力矩；

.5 位於船舶傾斜相反一舷的救生設備假定為處於存放位置。

5 應使不對稱浸水降至與有效佈置相一致的最小程度。如需要校正大橫傾角，所採用的方法應儘可能是自動的；但在設有均衡裝置控制設備的任何情形裏，此項設備須能在艙壁甲板以上操作。這些裝置連同其控制設備須為主管機關可接受者。關於使用均衡裝置的相關資料須提供給船長。

5.1 均衡所用的液艙和艙室應設置具有充足橫截面的空氣管或等效裝置以確保不會延遲水流入均衡艙室的進程。

5.2 在任何情況下，在考慮到下沉、橫傾和縱傾以後，若最終水線浸沒以下部位，則 s_i 應取值為 0：

.1 某些開口的下緣，通過該開口可能發生連續浸水，且這些浸水並未在計算 s_i 因數時計入。這些開口須包括空氣管、通風筒和以風雨密門或艙口蓋關閉的開口；和

.2 根據第 II-2 章被認為是水平撤離路線的客船艙壁甲板的任何部分。

5.3 若在考慮到下沉、橫傾和縱傾以後，在任何中間浸水階段或最終浸水階段中發生任一下列情況，則 s_i 應取值為 0：

.1 擬符合第 II-2 章的艙壁甲板上任何垂直逃生艙口被浸沒；

.2 擬從艙壁甲板上方對用以保持水密艙壁完整性的水密門、均衡裝置、管子或通風管的閥門進行操縱的任何控制裝置變得無法接近或無法操作；

.3 穿過位於造成達到的指數 A 的破損情形裏任一艙室中水密界限的管子或通風管的任何部分被浸沒，若沒在每一界限裝設水密關閉裝置的話。

5.4 但是，若假定由於連續浸水而浸水的艙室被計入破損穩性計算中，則為計算 $S_{\text{intermediate},i}$ 的多項值可以假設在額外浸水階段為均衡。

5.5 除第 5.3.1 款規定者外，用水密人孔蓋和平面艙蓋關閉的開口、小型水密艙口蓋、遙控操作的滑動水密門、非打開型舷窗以及按要求在海上航行中保持關閉的水密出入門和艙口蓋，可以不必考慮。

6 若水平水密界限設在所考慮的水線以上，則對水線以下的艙或艙組其 s 值須以第 1.1 款確定的值按照第 6.1 款乘以表示水平分艙以上處所不浸水的概率的縮減因數 *Vm* 求得。

6.1 因數 *Vm* 須按下列公式求得：

$$v_m = v\ (Hj, n, m, d) - v\ (Hj, n, m-1, d)$$

式中：

$H_{j,n,m}$ 係指基線以上的最小高度（米），並處於第 m^{th} 水平界限的 $X_{1(j)} \ldots X_{2(j+n-1)}$ 的縱向範圍內，假設該界限是限制所考慮的破損艙室的浸水垂直範圍；

$H_{j,n,m-1}$ 係指基線以上的最小高度（米），並處於第 $(m-1)^{th}$ 水平界限的 $X_{1(j)} \ldots X_{2(j+n-1)}$ 的縱向範圍內，假設該界限是限制所考慮的破損艙室的浸水垂直範圍；

j 表示所考慮的破損艙室的後端點；

m 表示從所考慮的水線向上數的每一個水平界限；

d 係指第 2 條定義的當前吃水；和

*x*1 和 *x*2 表示第 7-1 條所考慮的艙或艙組的端點。

6.1.1 因數 $v(H_{j,n,m}, d)$ 和 $v(H_{j,n,m-1}, d)$ 須從下列公式取得：

如果（H_m-d）小於或等於 7.8 米，$v(H, d) = 0.8\frac{(H-d)}{7.8}$；

在所有其他情況下，$v(H, d) = 0.8 + 0.2[\frac{(H-d)-7.8}{4.7}]$，

式中：

$v(H_{j,n,m,d})$ 應取值為 1，如果 H_m 在（$x_{1(j)} \ldots x2_{(j+n-1)}$）範圍內與船舶最上層的水密界限重合，及

$v(H_{j,n,0,d})$ 應取值為 0。

無論如何，Vm 取值不應小於 0 或大於 1。

6.2 一般而言，每一指數 A 的輔助 dA 在水平分隔的情況下由下列公式取得：

$$dA=\text{pi}[v_1.s_{min1}+(v2-v1).s_{min2}+\ldots\ldots+(1-v_{m-1}).s_{min\,m}]$$

式中：

V_m ＝按照第 6.1 款計算出的 V 值；

S_{min}＝當假定破損從假定破損高度 Hm 向下延伸時所取得的破損各種組合的最小因數 s。

第 7-3 條 滲透率

1 就各條款中的分艙和破損穩性計算而言，每一通常艙室或某艙室的一部分的滲透率須如下表：

處所	滲透率
儲物處所	0.60
起居處所	0.95
機器處所	0.85
空艙處所	0.95
液體處所	0 或 0.95[1]

[1] 取其導致更加嚴格要求者。

2 就各條款中的分艙和破損穩性計算而言，每一貨物艙室或某

一艙室部分的滲透率須如下表：

處所	吃水 *ds* 處的滲透率	吃水 *dp* 處的滲透率	吃水 d_1 處的滲透率
乾貨處所	0.70	0.80	0.95
集裝箱處所	0.70	0.80	0.95
滾裝處所	0.90	0.90	0.95
液體貨處所	0.70	0.80	0.95

3 如果有計算支持也可以使用其他滲透率數字。

第 8 條 客船穩性的特殊要求

1 擬載運 400 名或以上乘客的客船須具備防撞艙壁後水密分艙，以便在計算分艙指數所基於的三種裝載條件下及發生從首垂線量起 $0.08L$ 以內的所有艙室的破損時，S_i=1。

2 擬載運 36 名或以上乘客的客船須能夠承受沿着船側板至第 3 款所述範圍內的破損。通過證明在計算分艙指數所基於的三種裝載條件下，第 7-2 條界定的 Si 不小於 0.9，即認為符合本條規定。

3 若證明符合第 2 款，假定的破損程度將同時取決於第 6 條界定的 N 和第 2 條界定的 L_s，以致：

.1 垂直破損範圍從船舶的型基線延伸至第 2 條界定的最深分艙吃水位置以上達 12.5 米的位置，除非較小的垂直破損範圍給出一個較低的 Si 值，在這種情況下，可以採用該減小的程度；

.2 若載運 400 名或以上乘客，則須在沿着船側板任何位置假設 $0.03L_s$、但不小於 3 米的破損長度，連同最深分艙吃水水平面中心線的直角距離 $0.1B$、但是從船內側量起至不

小於 0.75 米的向內穿透；

.3 若載運 400 名以下乘客，則須在沿着橫向水密艙壁之間的船殼板的任何位置假設破損長度，但條件是兩個相鄰橫向水密艙壁之間的距離不小於假設的破損長度。若兩個相鄰橫向水密艙壁之間的距離小於假設的破損長度，則就證明符合第 2 款規定而言，只有一個這樣的艙壁可被視為有效；

.4 如載運 36 名乘客，則可假設 $0.015L_s$、但不小於 3 米的破損長度，連同 $0.05B$、但不小於 0.75 米的向內穿透；以及

.5 若載運 36 名以上 400 名以下乘客，則用於確定假設破損範圍的破損長度和向內穿透的值，須通過對第.4 項和第.2 項所述適用於載運 36 名乘客及 400 名乘客的破損長度和穿透值之間線性插值法取得。

第 8-1 條 客船進水事故後的系統能力

1 適用範圍

本條適用於 2010 年 7 月 1 日之後建造的、第 II-2/21 條所適用的客船。

2 發生進水破損時關鍵系統的有效性

客船應如此設計，使第 II-2/21.4 條所列明的系統在船舶任一單個水密艙室進水時仍可運行。

B-2 部分

分艙、水密和風雨密完整性

第 9 條 客船和除液貨船以外的貨船的雙層底

1 雙層底的設置須在適合船舶設計及船舶正常作業要求的情況下儘量自防撞艙壁延伸至尾尖艙艙壁。

2 如需要設置雙層底，其內底須如此延伸至船舶兩側，以致保護船底至舭部彎曲處。此項保護如能使內底在任何部分都不低於平行於龍骨線的平面，且其位於距龍骨線量起不小於 h 垂直距離處，即認為滿意。垂直距離 h 由下列公式計算得到：

$h = B/20$。

但是，無論如何 h 值不得小於 760mm，也無需大於 2,000mm。

3 設於雙層底內且與貨艙排水裝置連接的小阱等，不得向下延伸至超過所需的深度，但可以准許軸隧後端的阱延伸至外底。其他的阱（如主機下的潤滑油阱），如其佈置具有等效於本條要求的雙層底的保護作用，則經主管機關同意可予設置。無論如何，此阱阱底至與龍骨線重合的平面的垂直距離不得小於 500mm。

4 對於包括大小適度的乾艙在內的水密艙，當該船的船底或船側破損時不妨礙船舶的安全時，可不設雙層底。

5 適用第 1.5 條規定且在第 III/3.22 條界定的短程國際航行範圍內從事定期運輸的客船，如主管機關認為在該部分設置雙層底將與船舶設計和船舶正常作業不相適應時，可允許免設雙層底。

6 根據本條第 1 款、第 4 款或第 5 款設有設置雙層底的客船或貨船的任何部分須能夠承受在船舶該部分發生的如第 8 款所述的船底破損。

7 對於客船或貨船的特殊船底佈置，須證明該船能夠承受第 8 款所述的船底破損。

8 證明滿足第 6 款或第 7 款的方法是：若沿着船底的任何位置出現船底艙破損，且船舶受影響部分的破損範圍如第.2 項所述，按照第 7-2 條計算出的 *Si* 在所有營運情況下不小於 1.0：

.1 這些處所的浸水不得使該船其他部分的應急電源、照明、內部通訊、信號或其他應急裝置癱瘓。

.2 假設的破損範圍如下：

	距船舶首垂線的 0.3*L* 處	船舶任何其他部分
縱向範圍	$1/3L^{2/3}$ 或 14.5 米，取小者	$1/3L^{2/3}$ 或 14.5 米，取小者
橫向範圍	*B*/6 或 10 米，取小者	*B*/6 或 5 米，取小者
從龍骨線量起的垂直範圍	*B*/20 或 2 米，取小者	*B*/20 或 2 米，取小者

.3 如果小於第.2 項所述最大破損範圍的任何破損將會導致更加嚴重的狀況，則此破損應予以考慮。

9 對於客船的大底艙，主管機關可以要求增加雙層底高度，但從龍骨線量起不超過 B/10 或 3 米，取小者。或者，可按照第 8 款對這些區域進行船底破損計算，但假設更大的垂直範圍。

第 10 條 水密艙壁的構造

1 每一水密分艙艙壁，無論橫向或縱向，其構造須具有第 2.17

條所述的船材尺度。在任何情況下，水密分艙艙壁須至少能夠支持高達艙壁甲板的水頭壓力。

2 水密艙壁上的階層及凹壁均須與其所在地方的艙壁具有同等強度。

第 11 條 水密艙壁等的初次試驗

1 對非擬用於裝載液體的水密處所和擬用於裝載壓載水的貨艙，灌水試驗並非強制。若不進行灌水試驗，則須儘可能進行沖水試驗。此項試驗須在船舶舾裝工作的最後階段進行。若由於對機械、電子設備絕緣或舾裝設備的可能損壞而使沖水試驗不可行，則可代之以對焊連接做仔細的目視檢查，必要時輔之以染色滲透試驗、聲納滲漏試驗或等效試驗等方法。無論如何，均須對水密艙壁進行徹底的檢查。

2 首尖艙、雙層底（包括箱形龍骨）及內側殼板均須以相當於第 10.1 條要求的水頭作試驗。

3 擬裝載液體並作為船舶水密分艙組成部分的艙櫃，須以相當於其設計壓力的水頭作密閉性和結構強度的試驗。在任何情況下，水頭不得低於空氣管頂部或該艙頂以上 2.4 米的高度，取其大者。

4 本條第 2 款和第 3 款所述的試驗，其目的是確保分艙結構佈置的水密性，並不應被視作是該艙用於儲藏燃油或其他特殊用途的適用性試驗。對此項儲藏或特殊用途，可按照液體進入艙內或其連接部分的高度，要求作較嚴格的試驗。

第 12 條 尖艙及機器處所的艙壁、軸隧等

1 船舶須設有水密高達艙壁甲板的防撞艙壁。此艙壁距首垂線的距離不得小於 0.05*L* 或 10 米處（取小者）；且除非經主管機關許可，不得大於 0.08*L* 或 0.05*L* 加 3 米（取大者）。

2 如船舶水線以下的任何部分自首垂線向前延伸，例如球鼻首，則須從下列任一點來測量第 1 款所規定的距離：

.1 此類延伸的長度中點；

.2 首垂線前方距離 0.015*L* 處；或

.3 首垂線前方距離 3 米處；

取最小者。

3 艙壁可以有階層或凹壁，但它們須在第 1 款或第 2 款規定的範圍內。

4 在艙壁甲板以下的防撞艙壁中不得設置門、人孔、通道開口、通風管或任何其他開口。

5.1 除第 5.2 款規定者外，防撞艙壁在艙壁甲板以下僅可穿過 1 根管子來處理首尖艙內的液體，但是該管子應裝設有能在艙壁甲板以上操作的螺旋閥，其閥體應設於首尖艙內的防撞艙壁上。如果閥位於在所有營運情況下均可到達之處，且其所位於的處所不是貨物處所，則主管機關可以允許該閥設於防撞艙壁的後側。所有閥須用鋼、青銅或其他經認可的韌性材料製成。不得採用普通鑄鐵或類似材質的閥。

5.2 如果首尖艙被分隔用來裝載兩種不同的液體，主管機關可允許防撞艙壁在艙壁甲板以下穿過 2 根管子，每根管子均應按照第

5.1 款的要求進行設置，但應使主管機關確信除裝設第二根管子外別無其他切實可行辦法，及慮及首尖艙內增加的分艙，仍可保證船舶安全。

6 如果船舶設有長的前部上層建築，則防撞艙壁須風雨密地延伸至艙壁甲板的上一層甲板。此延伸部分不必直接設於下面艙壁之上，但它須位於第 1 款或第 2 款規定的範圍內（第 7 款允許的情況除外），且形成階層的甲板部分應有效地風雨密。此延伸部分的佈置須避免在首門發生破損或脫落時，對其造成損壞的可能性。

7 當設有首門且裝貨斜坡道形成艙壁甲板以上的防撞艙壁的延伸部分時，坡道全長範圍內均須風雨密。就貨船而言，高出艙壁甲板 2.3 米的坡道部分可超出第 1 款或第 2 款規定的範圍界限向前延伸。不符合上述要求的坡道不得視為防撞艙壁的延伸。

8 乾舷甲板以上防撞艙壁延伸處的開口數量，須在適合船舶設計和正常作業的情況下減至最少。所有這類開口須能夠關閉成風雨密。

9 為將機器處所與前後貨物和居住處所隔開，須設置艙壁，並使其水密延伸至艙壁甲板。就客船而言，還須設置尾尖艙艙壁，並使其水密延伸至艙壁甲板。但是，只要不降低船舶分艙的安全程度，尾尖艙艙壁可在艙壁甲板下方做成階層。

10 在任何情況下，尾管須封閉在適當容積的水密處所內。就客船而言，尾填料函壓蓋須裝設在水密軸隧內或與尾管艙室分開的其他水密處所內，且該處所具如此容積，以至在尾填料函壓蓋滲

漏而浸水時，將不淹沒艙壁甲板。就貨船而言，經主管機關酌定可以採取其他措施，使在尾管佈置受損的情況下向船內滲水的危險降到最低程度。

第 13 條 客船艙壁甲板以下水密艙壁上的開口

1 水密艙壁上的開口數量須在適合船舶設計和正常作業的情況下減至最少，這些開口均須備有可靠的關閉設備。

2.1 凡管子、排水管和電纜等穿過水密艙壁時，須設有保證艙壁水密完整性的裝置。

2.2 不構成管系組成部分的閥門不得設在水密艙壁上。

2.3 鉛或其他易熔材料不得用於穿過水密艙壁的管系上，因為發生火災時這種管系的損壞將會破壞艙壁的水密完整性。

3 分隔相鄰貨艙之間的水密橫艙壁上不得設有門、人孔和出入口，但本條第 9.1 款和第 14 條規定者除外。

4 在第 10 款規定之下，在主、輔推進機械，包括推進所需鍋爐的處所內，其每一水密艙壁上，除通往軸隧的門外，只准設置 1 扇門。如裝有 2 根或更多的軸，其軸隧之間應設有一個互通的連接通道。若裝設 2 根軸，在機器處所與軸隧間僅准設 1 扇門；如裝設 2 根軸以上者，則只准設 2 扇門。所有這類門均須為滑動式，且須位於可儘量高設其門檻之處。艙壁甲板上方操縱這些門的手柄應設置在機器處所之外。

5.1 除本條第 9.1 款和第 14 條規定者外，水密門須為符合本條第 7 款規定的動力式滑動門，當船舶正浮時，須能從駕駛室的總控

制台於 60 秒內同時關閉這些門。

5.2 任何動力式滑動水密門的操縱裝置，無論是動力式還是手動式，均能夠在船舶向任一舷橫傾至 15 度的情況下將門關閉。還須考慮當水從開口處湧入時，在門的任一側受到一個相當於在門的中心線處門檻以上至少 1 米高度的靜水壓頭的作用力。

5.3 水密門的操縱裝置，包括液壓管路和電纜，須儘可能靠近裝設該門的艙壁，以儘量減少當船舶遭受破損時此類裝置也被損壞的可能性。水密門與其操縱裝置須如此定位，若船舶在按照第 2 條界定的船寬的 1/5 範圍內遭受破損，位於船舶破損部分以外的水密門的操縱不得受妨礙，該距離在最深分艙吃水平面上與中心線成直角量計。

6 所有動力式滑動水密門須配備指示器，它們在所有的遙控操縱位置上顯示出這些門的開啟或關閉。遙控操縱位置只能位於本條第 7.1.5 款要求的駕駛室內和本條第 7.1.4 款要求的艙壁甲板上方的手動操縱位置處。

7.1 每一動力式滑動水密門：

.1 須為豎動式或橫動式；

.2 在本條第 10 款規定下，最大淨開口寬度一般須限於 1.2 米。只有在認為船舶有效操作需要時，主管機關方可允許設更寬的門，但須考慮到其他安全措施，包括下列措施在內：

.1 須特別考慮到門的強度及其關閉設備，以防滲漏；以及

.2 門須位於 B/5 的破損區域以內；

.3 須配置必要的設備，使用電力、液壓或主管機關可接受的其他形式的動力開啟和關閉門；

.4 須配備一套獨立的手動機械裝置。它須能從門的任一側用手開啟和關閉；此外，還能在艙壁甲板上方可到達之處，用全周旋轉搖柄轉動或主管機關認為具有同樣安全程度的其他動作關閉該門。旋轉的方向或其他動作的方向應在所有操縱位置上清楚地予以標明。當船舶正浮時，用手動裝置操作將門完全關閉所需的時間不得超過 90 秒鐘；

.5 須設置從門的兩側用動力開啟和關閉門的控制裝置；還須設置從駕駛室總控制台用動力關閉該門的控制裝置；

.6 須設置一個與該區域內其他警報器不同的聲音警報，當該門用動力遙控關閉時，該警報器在門開始移動前至少 5 秒但不超過 10 秒鐘報警，且連續報警直至該門完全關閉。在手動遙控操作的情況下，只要當門移動時聲響警報器能發出聲響即可。此外，在旅客區域和高環境噪聲區域，主管機關可以要求為聲音報警器增配一個裝在門上的間歇發光信號器；和

.7 用動力關閉門時，關閉速率須大致均勻。當船舶正浮時，從門開始移動至門完全關閉的時間，在任何情況下不得少於 20 秒，但也不得大於 40 秒。

7.2 動力式滑動水密門所需的電力須由應急配電板直接供給，或由位於艙壁甲板上方的專用配電板供給。有關的控制裝置、指示

器和報警電路也須由應急配電板直接供電或由位於艙壁甲板上方的專用配電板供電，且當主電源或應急電源發生故障時，能自動地由第 42.3.1.3 款要求的臨時應急電源供電。

7.3 動力式滑動水密門須具有：

.1 一個配備兩套獨立動力源的集中液壓系統，每一動力源由一台能同時關閉所有門的馬達和泵組成。此外，整個裝置的液壓蓄能器須有足夠的能量，在不利的 15 度橫傾時至少能操作所有的門 3 次，即關閉－開啟－關閉。這個操作循環須能夠在蓄能器處於泵啟動壓力下時進行。選擇所用液體時須考慮到該裝置工作中可能遇到的溫度。該動力操作系統的設計須使液壓管路中由單一故障而影響 1 扇以上門的操作的可能性減至最小。該液壓系統須配有用於動力操作系統儲液箱的低液位報警器和低氣壓報警器或其他能監測液壓儲能器內能量損失的有效裝置。這些報警器須是聲響的或燈光報警器，並且須裝在駕駛室內的集中控制台上；或者

.2 用於每扇門的一套獨立液壓系統，該系統具有能開啟和關閉該門的馬達和泵組成的動力源。此外，還應設有一個有足夠能量的液壓儲能器，在不利的 15 度橫傾時至少能操作該門 3 次，即關閉－開啟－關閉。這個操作循環須能夠在儲能器處於泵啟動壓力下時進行。選擇所用液體時須考慮到該裝置工作中可能遇到的溫度。在駕駛室的集中控制台上須設置一組低氣壓報警器或其他能監測液壓儲能器內能量損失的有效裝置。在每個局部操作位置處也須設置

儲藏能量損失的顯示器；或者

.3 用於每扇門的一套獨立電力系統和馬達，該系統具有一台能開啟和關閉該門的馬達組成的動力源。該動力源在主電源或應急電源發生故障時須能自動地由第 42.4.2 款要求的臨時應急電源供電，且具有足夠的能量，在不利的 15 度橫傾時至少能操作該門 3 次，即關閉－開啟－關閉。

對於第 7.3.1 款、第 7.3.2 款和第 7.3.3 款所規定的系統，應配置如下：

動力式水密滑動門的動力系統須和任何其他動力系統分開。電力或液壓動力操作系統（不包括液壓執行器）中的某一故障須不妨礙任何門的手動操作。

7.4 控制手柄須裝設在艙壁的兩側地板以上至少 1.6 米的高處，並且其佈置須使通過該門的人員能將兩側的手柄把定在開啟位置，而不致意外地啟動動力關閉裝置。開啟和關閉門時手柄的運動方向須與門移動的方向一致，並且須清楚地予以標明。

7.5 水密門的電器設備和部件須儘可能設置於艙壁甲板以上及危險區域和處所之外。

7.6 必須裝設在艙壁甲板以下的電器部件須設有適宜的防進水保護。

7.7 電源、控制器、指示器和報警器電路須如此設置防故障保護，某一扇門的電路中的故障不致引起任何其他門的電路發生故障。一扇門的報警器或指示器電路的短路或其他故障不得導致該門動力操作失靈。其佈置須使位於艙壁甲板以下的電器設備一旦

受到水的滲入也不會導致門的開啟。

7.8 動力式滑動水密門的動力操作系統或控制系統中的單一電器故障不得導致一扇關閉的門被開啟。應在電路中儘可能靠近第 7.3 款要求的每一台電機的一點上連續監視電源供電的有效性。任何此種供電失效時，應在駕駛室的集中控制台上發出聲響和燈光報警。

8.1 駕駛室內的集中控制台須有一個“控制模式”開關，它具有兩套控制模式：一套是“就地控制”模式，它須允許任何門不經使用自動關閉裝置而能被就地開啟和在使用後沒自動關閉時就地關閉；另一套是“關閉門”模式，它須自動關閉任何開啟着的門。該“關閉門”模式須自動關閉開啟着的門。該“關閉門”模式須准許門被就地開啟，而當脫開就地控制機械時應能自動重新關閉該門。“控制模式”開關一般應採用“就地控制”模式。“關閉門”模式須僅在緊急情況下或為試驗的目的才使用。須特別重視“控制模式”開關的可靠性。

8.2 駕駛室內的總控制台須設有指明每扇門位置的圖，並附有發光指示器以顯示出每扇門是開啟的還是關閉的。紅燈須表示為一扇門完全開着，而綠燈須表示一扇門完全關閉。當門被遙控關閉時，紅燈須以閃光表示門處於中間的位置。指示器電路須與每扇門的控制電路相互獨立。

8.3 任何一扇門都不得有可能從總控制台遙控開啟。

9.1 如果主管機關認為至關重要，則可在甲板處所之間分隔貨物的水密艙壁上裝設適當構造的水密門。此類門可以是鉸鏈式、滾

動式或滑動式，但不能是遙控的。它們須裝在最高處並須儘可能遠離船殼板，但無論如何其垂直外緣的位置與船殼板的距離不得小於第 2 條界定的船寬的 1/5 處，此距離在最深分艙吃水水平面上與中心線成直量計。

9.2 如果在航行中可以通達此類門，則它須配備裝置，以防止被擅自開啟。如擬裝設此類門，其數量及佈置均須經主管機關特別考慮。

10 可移式平板門不允許裝在艙壁上，但在機器處所內除外。主管機關可以允許在每一個水密艙壁上設一扇寬度超過第 7.1.2 款規定的動力式滑動水密門取代這些可移動式平板門，但這些門在航行中應保持關閉，但在緊急情況下船長酌定必需者除外。此類門不需滿足第 7.1.4 款關於在 90 秒之內用手動操作裝置完全關閉門的要求。

11.1 凡由船員居住艙室通至鍋爐艙的圍壁通道或隧道，或用於管子或任何其他用途的圍壁通道或隧道，如穿過水密艙壁，則須為水密，並須符合第 16-1 條的要求。在航行中用作通路的每一圍壁通道或隧道，至少其一端的出口須通過保持水密到足夠高度的圍壁使其能由艙壁甲板以上出入。圍壁通道或隧道的另一端出入口，可經過一水密門，其類型按其所在位置決定。此類圍壁通道或隧道不得通過在防撞艙壁後的第一個分艙艙壁。

11.2 凡擬裝設穿過水密艙壁的隧道時，須經主管機關的特殊考慮。

11.3 如果連接冷藏貨物處所和通風設備的圍壁通道或強力通風

圍壁穿過一道以上水密艙壁時，此類開口的關閉裝置須由動力操作，且能從位於艙壁甲板以上的集中控制位置處將其關閉。

第 13-1 條 貨船水密艙壁和內部甲板上的開口

1 水密分艙上的開口數量應在適合船舶設計和船舶正常作業的情況下減至最少數量。凡出入口通道、管子、通風管道、電纜等需要穿過水密艙壁和內部甲板時，應做出保持水密完整性的佈置。主管機關可以允許放鬆對乾舷甲板以上開口的水密性要求，但應證明可以容易地控制任何連續浸水且不會妨礙船舶安全。

2 在航行中使用的、旨在保證內部開口水密完整性的門應為滑動水密門，它們能夠從駕駛室遙控關閉，也能從艙壁每側就地操作。在控制位置應設置指示器顯示門開啟或關閉狀態，且在門關閉時提供聲響報警。在主電源發生故障時，電源、控制和指示器應維持工作狀態。特別要注意將控制系統故障的影響減至最低程度。每扇動力操作的滑動水密門須配備一單獨的手動操作機械裝置。門須可以從其兩側手動開啟或關閉。

3 通常在海上保持關閉的、旨在保證內部開口水密完整性的通道門和通道艙口蓋須就地和在駕駛室配備指示裝置，表明這些門或艙口蓋是否開啟或關閉。每扇這樣的門或艙口蓋應附貼一個通告牌，說明其不得敞開。

4 如主管機關認為水密門或坡道為必須者，則可以設置適當構造的此類門或坡道，以便對大的貨物處所進行內部分艙。這些門或坡道可採用鉸鏈式、滾動式或滑動式，但不得採用遙控式。這些門或坡道如果在航程中是可以到達的，則須裝有裝置防止未經

授權的開啟。

5 為保證內部開口水密完整性而在海上保持永久關閉的其他關閉裝置，須在每個裝置上附貼一個告示牌，說明其必須保持關閉。對裝有緊密螺栓蓋子的人孔則無需如此標明。

第 14 條 載運貨車和隨車人員的客船

1 本條適用於為載運貨車和隨車人員而設計或改建的客船。

2 若這些船上包括隨車人員在內的旅客總數不超過 $12 + A_d/25$，其中 A_d 等於用來裝載貨車處所的甲板總面積（平方米），而且裝載車輛處和這類處所入口的淨高不低於 4 米，則關於水密門的第 13.9.1 條和第 13.9.2 條的規定須適用，但這些門可以設置在分隔裝貨處所的水密艙壁的任何高度上。此外，要求在駕駛室設置指示器，在每扇門關閉時及所有門閂已扣緊時自動顯示。

3 如果根據本條規定設置了水密門，則船舶不得核准搭載比第 2 款假定人數更多的旅客。

第 15 條 客船艙壁甲板和貨船乾舷甲板以下船殼板上的開口

1 船殼板上的開口數量須在適合船舶設計及船舶正常作業的情況下減至最少數量。

2 船殼板開口的關閉設備的佈置及效用須與其預定用途及設置的位置相適應，且一般須令主管機關滿意。

3.1 除非根據現行《國際載重線公約》的要求，舷窗的佈置須使舷窗窗檻不得低於平行於艙壁甲板的邊線，且其最低點在最深分

艙吃水以上 2.5%船寬處或 500 毫米，取其大者。

3.2 凡第 3.1 款允許的、窗檻在客船艙壁甲板和貨船乾舷甲板以下的舷窗，其構造須能有效地防止任何人未經船長許可而予開啟。

4 所有舷窗均須裝設有效的內部鉸鏈舷窗蓋，其佈置應能便利和有效地關閉和緊固成水密，但在距首垂線 1/8 船長以後，且在平行於艙壁甲板邊線，其最低點在最深分艙吃水以上 3.7 米加 2.5%船寬所繪的線以上者，則除統艙外的乘客艙室的舷窗蓋可為可移式的，但按照現行《國際載重線公約》要求需固定在相應位置者除外。這些可移式舷窗蓋須存放於其所屬的舷窗附近。

5.1 凡專供載貨或裝煤的處所內不得設置舷窗。

5.2 供交替載貨或載客的處所，可設置舷窗。但是其構造須能有效地防止任何人未經船長許可而打開舷窗或舷窗蓋。

6 未經主管機關特准，不得在客船艙壁甲板和貨船乾舷甲板以下的船殼板上設置自動通風舷窗。

7 船殼板上的排水孔、衛生排泄口和其他類似開口，須採取每個排水口供儘可能多的衛生水管及其他管道共用或以其他適當的辦法減至最少數量。

8.1 船殼板上的所有進水孔和排水孔均須裝設防止海水意外進入船內的有效並可到達的裝置。

8.2.1 除非根據現行《國際載重線公約》的要求，且除第 8.3 款規定外，凡客船艙壁甲板和貨船乾舷甲板以下處所穿過船殼板的每

一獨立排水孔，須設有一個自動止回閥，此閥須具有從艙壁甲板以上將其關閉的可靠裝置，或者代以兩個無此項關閉裝置的自動止回閥，但內側一閥須設置在最深分艙吃水以上且能在營運狀態下隨時可接近以便達查驗。如果設置具有可靠關閉裝置的閥，其在艙壁甲板以上的操作位置應隨時易於接近，並須備有表明閥門開啟或關閉的顯示裝置。

8.2.2 現行《國際載重線公約》的要求須適用於從客船艙壁甲板和貨船乾舷甲板以上處所穿過船殼板的排水孔。

8.3 機器處所和與機械運行相關的主、輔海水進水孔及排水孔，須在管系與船殼板之間或管系與附着於船殼板的組合箱之間設置易於接近的閥門。在有人的機器處所內，閥門可以就地控制，並須配有表明其開啟或關閉的顯示器。

8.4 穿過最深分艙吃水以下船殼板的移動部件須裝設主管機關認可的水密封閉裝置。內側函壓蓋須位於如此容積的水密處所內，即使該處所浸水，艙壁甲板也不會被淹沒。主管機關可以要求，若此類艙室浸水，在船舶其他部分的關鍵或應急電源和照明、內部通訊、信號或其他應急裝置須仍可用。

8.5 本條規定的所有船殼板裝置和閥門均須用鋼、青銅或其他經認可的延性材料製造。不得使用普通鑄鐵或類似材料的閥門。本條所述的所有管系須用鋼或主管機關同意的其他等效材料製成。

9 設置於客船艙壁甲板和貨船乾舷甲板以下的舷門、裝貨口和加燃油口應為水密，且其設置在任何情況下均不得使其最低點低於最深分艙吃水。

10.1 每一出灰管、垃圾管等的內側開口須裝有有效的蓋子。

10.2 如內側開口位於客船艙壁甲板和貨船乾舷甲板以下，此蓋須為水密，此外須在管內最深分艙吃水以上易於到達的位置裝設一自動止回閥。

第 15-1 條 貨船上的外部開口

1 通向在破損分析中假定為完整的、且位於最終破損水線以下的艙室的所有外部開口，均要求是水密的。

2 根據第 1 款要求為水密的外部開口，除貨艙蓋外，須在駕駛室設有指示器。

3 在限制垂向破損範圍的甲板以下船殼板上的開口，如果在航程中可以接近，則須設置防止擅自開啟的裝置。

4 為保證外部開口水密完整性而在海上保持永久關閉的其他關閉裝置，須在每個裝置上附貼一個告示牌，說明其必須保持關閉。對裝有緊密螺栓蓋子的人孔則無需如此標明。

第 16 條 水密門、舷窗等的構造和初次試驗

1 在所有船舶上：

.1 這些條款所述的一切水密門、舷窗、舷門、裝貨口、閥門、管子、出灰管和垃圾管的設計、材料和構造均須令主管機關滿意；

.2 此類閥門、門和機器須作適當標識，以確保正當使用以提供最大限度的安全；和

.3 豎動式水密門的門框，其底部不得有可能積聚污穢的槽，以免妨礙門的正常關閉。

2 對客船和貨船的水密門須按其在最後或中間浸水階段可能承受的水頭進行水壓試驗。如果由於絕緣或舾裝設備可能損壞而沒有對個別門進行試驗，可用至少相應於預定位置所要求的試驗壓力對每種類別和尺寸的門進行原型試驗，取代對每一扇門的試驗。原型試驗須在安裝門之前進行。在船上設置門的安裝方法和程序應與原型試驗相符。每一扇門在船上設置後，應對艙壁、門框和門之間的恰當位置予以核查。

第 16-1 條 水密甲板、圍壁通道等的構造和初次試驗

1 水密甲板、圍壁通道、隧道、箱形龍骨及通風管道，均須與在同一高度的水密艙壁具有同等的強度。做成水密的措施以及關閉其開口所用的裝置，須令主管機關滿意。水密通風管道及圍壁通道須至少向上延伸至客船的艙壁甲板和貨船的乾舷甲板。

2 如穿過某一結構的通風管道穿過艙壁甲板，在根據第 7－2 條計入各中間浸水階段許用的最大橫傾角後，該通風管道須能承受可能出現於其中的水壓。

3 如果艙壁甲板的穿透結構全部或部分位於主滾裝甲板上，該通風管道須能夠承受滾裝甲板積水的內部水運動（晃動）引起的衝擊壓力。

4 在完工以後，水密甲板須作沖水或灌水試驗，而水密圍壁通道、隧道和通風管道則作沖水試驗。

第 17 條 艙壁甲板以上的客船內部水密完整性

1 主管機關可要求採取一切合理和可行的措施，以限制海水在艙壁甲板以上的進入及漫流。此類措施可包括裝設局部艙壁或腹板。當局部水密艙壁和腹板裝於艙壁甲板上水密艙壁上方或緊鄰之處時，須與船殼板和艙壁甲板水密連接，以使在船舶破損傾斜的情況下限制海水沿甲板漫流。如局部水密艙壁與其下方的艙壁錯開，則兩者間的艙壁甲板須做成有效的水密。若開口、管子、排水口、電纜等經過局部水密艙壁或艙壁甲板浸沒部分的甲板時，須作出佈置以確保艙壁甲板以上結構的水密完整性。

2 露天甲板上的所有開口須設有足夠高度和強度的圍板，並須設有能迅速關閉成風雨密的有效設備。須按需要裝設流水口、敞式欄杆和排水孔，以便能在任何氣候情況下迅速排除露天甲板上的積水。

3 在上層建築內終止的空氣管開口端須在船舶橫傾至15度或至各中間浸水階段的最大橫傾角時（由直接計算確定，取其大者）至少高出水線1米。或者，除油艙以外的其他艙櫃的空氣管可通過上層建築的側面排氣。本款的規定不妨礙現行《國際載重線公約》的規定。

4 在艙壁甲板以上船殼板上的舷窗、舷門、裝貨門和加油門及其關閉開口的其他裝置，須就其所裝設的處所及其相對於最深分艙吃水的位置，進行有效設計和構造，並須具有足夠的強度。

5 在艙壁甲板以上的第一層甲板以下處所內的所有舷窗，須備有有效的內側舷窗蓋，其佈置須能易於有效地關閉，並緊固成水密。

第 17-1 條 滾裝客船的船體與上層建築的完整性、破損預防和控制

1.1 除非根據第 1.2 款和第 1.3 款的規定，所有通向艙壁甲板以下處所的通道口的最低點至少須高出艙壁甲板 2.5 米。

1.2 如設有通至艙壁甲板以下處所的車輛坡道，則其開口的關閉須能夠保持風雨密，以防止下面進水，並能向駕駛室作出報警和顯示。

1.3 如船上的某些重要工作（如機器和儲藏品的移動）有此必要，主管機關可以允許設置通向艙壁甲板以下處所的特別通道，但是該通道應做成水密，並能在駕駛室發出報警和顯示。

2 駕駛室內須配備所有舷門、裝貨門和主管機關認為在未加關閉和正確繫固時會導致特種處所或滾裝處所浸水的其他關閉設施的指示器。指示器系統須按故障保險原則設計，如果門未完全關閉或任何繫固裝置未就位或未完全鎖閉，則以燈光報警顯示；如果此種門或關閉設備成開啟狀態或繫固裝置鬆開，指示器應以聲響報警指示。在駕駛室的指示器板上應設有“港口／海上航行”模式選擇功能，並如此佈置：在船舶離港時首門、內門、尾坡道或任何其他舷側門未關閉或任何關閉裝置沒有位於正確位置，則會在駕駛室發出聲響報警。指示器系統的電源應獨立於操作和繫固門的供電。

3 為向駕駛室與機艙控制站顯示經內外首門、尾門或任何其他可能導致特種處所或滾裝處所浸水的舷門的任何漏水信息，須設有電視監視與漏水探測系統。

B-3 部分

客船分艙載重線的勘定

第 18 條 客船分艙載重線的勘定、繪劃與記載

1 為了保持所要求的分艙程度，須在船舶兩舷勘定並繪劃對應於所核准的分艙吃水的載重線。若船舶用於交替營運模式，如船舶所有人請求，可以勘定和繪劃一個或數個與主管機關核准的交替營運模式的分艙吃水相對應的附加載重線。每一核准的業務構型須符合本章 B-1 部分的要求，獨立於其他營運模式下取得的結果。

2 所勘定和繪劃的分艙載重線須載入客船安全證書，並以 P1 表示主要載客構型和 P2、P3 等分別表示交替構型。主要載客構型須被視作所要求的分艙指數 R 將達到最高值的營運模式。

3 對應於每一載重線的乾舷，須按照現行的《國際載重線公約》確定的乾舷在同一位置上並從同一甲板進行測量。

4 對應於每一經核准的分艙載重線及經核准的營運條件的乾舷，均須清楚地記載在客船安全證書中。

5 在任何情況下，任何分艙載重線均不得繪劃在按照船舶強度或現行《國際載重線公約》所確定的海水中最深載重線以上。

6 不論分艙載重線標誌的位置如何，船舶的裝載均不得使按照現行《國際載重線公約》所確定的適合於所處季節和區域的載重線標誌淹沒於水中。

7 在任何情況下，船舶的裝載概不得使船舶在海水中時將適合

於該特定航次和營運狀態的分艙載重線淹沒於水中。

B-4 部分

穩性管理

第 19 條 破損控制資料

1 在駕駛臺上須長期地展示或隨時提供清晰地表明各層甲板及貨艙的水密艙室界限、其中的開口及其關閉裝置和控制裝置的位置以及用來校正浸水傾斜的裝置的平面圖，以便為值班高級船員提供指導。此外，還須給船上高級船員提供載有上述資料的小冊子。

2 客船在航行中允許敞開的水密門須在船舶穩性資料中予以清楚記載。

3 所包括的一般預防措施須由主管機關認為在正常船舶操作情況下保持水密完整性所必需的設備、狀態和操作程序清單構成。

4 所包括的具體預防措施須由主管機關認為對船舶、旅客和船員生存至關重要的要素（如關閉裝置、貨物繫固、警報聲響等）清單構成。

5 對於 B-1 部分的破損穩性要求所適用的船舶，破損穩性資料須為船長提供在一種簡單易懂的、評估船舶一艙室或一組艙室破損的所有情況下的倖存能力的方法。

第 20 條 客船裝載

1 在船舶完成裝載並在其啟航之前，船長須確定船舶的縱傾和穩性，並核實和記錄船舶符合相關規定的穩性標準。始終須通過計算確定船舶的穩性。主管機關可以接受使用電子裝載和穩性計

算機或這方面的等效裝置。

2 壓載水原則上不應裝載在燃油艙內。對於不能避免在燃油艙裝水的船舶，則須設置令主管機關滿意的油水分離設備，或者須提供主管機關可接受的處理含油壓載水的其他替代手段，如排放到岸上設施。

3 本條規定不妨礙現行《國際防止船舶造成污染公約》的規定。

第 21 條 客船水密門等的定期操作和檢查

1 水密門、舷窗、閥門以及排水孔、出灰管和垃圾管的關閉機構的操作演習，須每周進行一次。對航程超過一周的船舶，在離港前須進行一次全面的演習，此後在航行中至少每周進行一次。

2 水密艙壁上的一切水密門，無論是鉸鏈操作還是動力操作，凡需在航行中使用者，須每天進行操作。

3 水密門及其連接的所有機構和指示器、為使艙室水密而必須關閉的一切閥門及為破損控制橫貫連通所必須操作的一切閥門，須在航行中定期檢查，每周至少一次。

4 本條要求的所有演習和檢查的記錄均須記入航海日誌，並明確記載所發現的任何缺陷。

第 22 條 防止和控制進水等

1 所有水密門須在航行途中保持關閉，但本條第 3 款和第 4 款所規定的在航行中可以開啟的情況除外。第 13 條第 10 款所允許的機艙處所內寬度大於 1.2 米的水密門僅在該款所述的情況下才可以開啟。任何按照本款開啟的門須可以隨時迅速關閉。

2 船舶在海上航行時，位於艙壁甲板以下、最大淨開口寬度大於 1.2 米的水密門須保持關閉，但是在經主管機關確定的絕對必要有限時段除外。

3 在航行途中為准許旅客或船員通行，或因為在緊靠門的附近作業而必需時，可以開啟水密門。在穿過該門的通行已結束或必須開啟門的作業已完成時，須立即關閉該門。

4 只有在認為絕對必要時，即確認開啟某些水密門為船舶機械的安全和有效操作所必需者，或為准許旅客正常不受限制地出入旅客區域所必需者，則可以允許這些水密門在航行途中開啟。這樣的決定須由主管機關仔細考慮了對船舶操作和倖存性的影響之後作出。准許保持這樣開啟的水密門須清楚地記載於船舶穩性資料中，並須處於可隨時迅速關閉的狀態。

5 艙壁上的可移動板無論如何須在船舶離港前就位，並在航行中不得被移走，在緊急情況下船長認為必須者除外。為保證接縫水密，在把它們回復原處時，須採取必要的預防措施。根據第 13.10 條准許設在機艙處所內的動力操作滑動水密門須在船舶離港前關閉，並須在航行中保持關閉，但在緊急情況下船長認為必需者除外。

6 按照第 13.9.1 條設置在分隔甲板處所之間的貨物的水密艙壁上的水密門須在啟航前關閉，並在航行中保持關閉；在港口開啟這些門和在船舶離港前關閉這些門的時間，均應記錄在航海日誌中。

7 設置在艙壁甲板以下的舷門、裝貨門和加燃油門須在船舶離

港前有效關閉，並緊固成水密，且在航行途中保持關閉。

8 位於艙壁甲板以上的下列門，須在船舶進行任何航行之前關閉並鎖緊，且在船舶到達下一個泊位之前須保持關閉並鎖緊：

.1 船殼板上或封閉的上層建築圍壁上的裝貨門；

.2 裝在本條第 8.1 款所述位置上的罩式船首門；

.3 防撞艙壁上的裝貨門；和

.4 作為包括本條第 8.1 款至第 8.3 款界定的門的替代關閉的坡道。

9 如果某個門不能在船舶靠泊時開啟或關閉，則在該船靠近或拖離泊位時，該門可以開啟或保持開敞，但僅限於必需時，以使該門可迅速操作。在任何情況下，船首內側門必須保持關閉。

10 儘管有本條第 8.1 款和第 8.4 款的要求，當船舶位於安全錨地時，若其安全不受妨礙，如因為船舶操作或旅客上下船特殊情況的需要，主管機關可以授權船長酌定開啟特定的門。

11 船長須保證對本條第 8 款所述門的關閉和開啟實施有效的監督和報告制度。

12 船舶進行任何航行之前，船長須確保把本條第 13 款所述門的最後關閉時間和按照本條第 14 款開啟特定門的時間記錄在航海日誌中。

13 這些條款要求在航行途中保持關閉的鉸鏈式門、可移動式平板門、舷窗、舷門、裝貨門、加燃油門和其他開口，須在船舶離港前關閉。關閉和開啟（如果這些條款允許的話）這些開口的時

間須記錄在主管機關所規定的航海日誌中。

14 如在甲板夾層中，第 15.3.2 條所述的任何舷窗的窗檻低於平行於艙壁甲板邊線所繪的線且其最低點在船舶離港前水面以上 1.4 米加 2.5%船寬，則在該甲板夾層的所有舷窗須在船舶離港之前關閉成水密並鎖緊，且在船舶到達下一港口前不得開啟。在適用本款規定時，可視情對淡水吃水留出適當的餘量。

.1 在港口開啟這些舷窗的時間和在船舶離港前關閉並鎖緊它們的時間須記錄在主管機關規定的航海日誌中。

.2 如任何船舶在浮於其最深分艙吃水時有一個或數個舷窗位置適用第 14 款要求，主管機關可指明其限制平均吃水，在此吃水時這些舷窗窗檻將高於平行於艙壁甲板邊線所繪的線，其最低點在對應於限制平均吃水的水線以上 1.4 米加 2.5%船寬，而且在此吃水時，准許該船離港而不必事先將這類舷窗關閉和鎖緊，在開往下一港口的航程中在海上開啟這些舷窗由船長負責。在現行《國際載重線公約》所定義的熱帶地區內，該限制吃水可增加 0.3 米。

15 在航行時不能接近的舷窗及其舷窗蓋須在船舶離港前關閉並扣牢。

16 如在第 15.5.2 條提及的處所裝載貨物，舷窗及其舷窗蓋須在裝貨前關閉成水密並鎖緊，此項關閉和鎖緊須記錄在主管機關規定的航海日誌中。

17 在不使用出灰管等時，第 15.10.2 條要求的蓋子和閥門須保持關閉並扣緊。

第 22-1 條 2010 年 7 月 1 日及之後建造的載運 36 名及以上人員的客船的進水探測系統

艙壁甲板以下的水密處所須按照本組織擬訂的指南設有進水探測系統。

第 23 條 滾裝客船的特殊要求

1 對特種處所和滾裝貨物處所，須不斷地進行巡查或用有效手段（如電視監視）進行連續監控，以在船舶航行期間能夠發現車輛在惡劣氣候條件下的任何移動和旅客的擅自進入。

2 關閉和繫固所有舷門、裝貨門和主管機關認為在未關閉或未作適當繫固的情況下可能導致特種處所或滾裝貨物處所浸水的其他關閉裝置的書面操作程序，須隨船攜帶並張貼在適當的地方。

3 從滾裝甲板和車輛坡道通向艙壁甲板以下處所的所有通道，在船舶每次離開泊位啟航前，均須關閉，並在船舶抵達下一泊位之前保持關閉。

4 船長須保證對第 3 款所述開口的關閉和開啟實施有效的監督和報告制度。

5 在船舶每次離開泊位啟航前，船長須確保把最後關閉第 3 款所述開口的時間，按照第 22.13 條記錄在航海日誌中。

6 儘管有第 3 款的要求，主管機關可允許在航行期間開啟某些開口，但開啟時間僅限於通行和船舶關鍵性工作所需要的時間。

7 所有能有效控制滾裝甲板上積聚的海水的橫艙壁或縱艙壁在

船舶離開泊位前須就位並固定，並保持到船舶抵達下一個泊位。

8 儘管有第 7 款的要求，主管機關仍可允許在航行期間開啟此種艙壁的一些開口，但開啟時間僅限於通行和船舶關鍵性工作所需要的時間。

9 在所有滾裝客船上，船長或指定的高級船員須確保當船舶在航行時，任何旅客未經其明確同意，不得進入封閉的滾裝甲板。

第 24 條 貨船上防止和控制進水等

1 在海上時，位於限制垂直破損範圍的甲板之下的船殼板上的開口須長期關閉。

2 儘管有第 3 款的要求，若船舶安全不受妨礙，因為船舶操作的需要，主管機關可以授權船長酌定開啟特定的門。

3 為內部分隔寬大貨物處所而設置的水密門或車輛坡道須在啟航前關閉，並在航行途中保持關閉；在港口開啟這些門的時間和在船舶離港前關閉它們的時間須記錄在航海日誌中。

4 使用擬用於確保內部開口水密完整性的通道門和艙口蓋，須得到值班高級船員的許可。

第 25 條 散貨船以外的單一艙貨船上的水位探測器

1 2007 年 1 月 1 日以前建造的散貨船以外的單一艙貨船須在不晚於 2009 年 12 月 31 日符合本條的要求。

2 長度不足 80 米或 1998 年 7 月 1 日以前建造長度不足 100 米及乾舷甲板以下單一貨艙或在乾舷甲板以下的貨艙不被至少一堵使該甲板水密的艙壁隔開的船舶，須在此類處所裝配水位探測

器。

3 第 2 款要求的水位探測器須：

.1 在貨艙內底上方的水位高度達到不小於 0.3m 時，在駕駛臺上發出聲光報警，並在水位高度達到不小於貨艙平均深度的 15%時，再次在駕駛臺上發出聲光報警；和

.2 安裝在貨艙的尾端，或安裝在不與設計水線相平行的內底最低部分的上方。如腹板或部分水密艙壁裝設於內底的上方，主管機關可要求安裝附加的探測器。

4 在符合第 XII/12 條規定的船上，或在貨艙每側具有至少自內底板垂直延伸至乾舷甲板的、整個貨艙長度的水密邊艙的船上，第 2 款要求的水位探測器不必安裝。”

附件 3

《經修正的 1974 年國際海上人命安全公約》的修正案

第 II-1 章

構造－結構、分艙及穩性、機電設備

D 部分

電器設備

第 41 條 主電源及照明系統

1 將下列新的第 6 款加在現有第 5 款之後：

“6 在客船上，所有艙室均須設有輔助照明，以清楚地示明出口，使旅客能夠找到通向門的通道。輔助照明可與應急電源相連，或在每一艙室中配有自備電源，在艙室正常照明失去電源時自動點亮，並延續至少 30 分鐘。”

2 將下列新的 F 部分加在現有第 54 條之後：

“F 部分

替代設計與佈置

第 55 條 替代設計與佈置

1 目的

本條的目的是提供機電設備替代佈置與設計的方法。

2 通則

2.1 如其替代設計與佈置能滿足有關要求的意圖並能提供和本章同等的安全水平，機電設備的設計與佈置可以偏離 C、D 和 E 部分中的要求。

2.2 當替代設計與佈置偏離 C、D 和 E 部分的要求時，須按照本條規定對該設計與佈置進行工程分析、評估與認可。

3 工程分析

工程分析須按本組織制定的指南準備並向主管機關提交，並須至少包含下列內容：

.1 確定船舶類型、輪機、電氣設備及有關處所；

.2 找出該輪機和電器設備將滿足不了的條文要求；

.3 找出擬議設計不滿足該條文要求的理由，並以符合其他公認的工程或工業標準為證據；

.4 確定有關條文要求所闡明的關於該船舶、輪機、電氣設備或處所的性能標準：

.1 性能標準所提供的安全水平須不低於 C、D 和 E 部分中相關條文要求；及

.2 性能標準須能量化並能衡量；

.5 替代設計和佈置的詳細描述，包括列明設計中所使用的假設及任何建議的操作限制或條件；

.6 證明替代設計和佈置達到安全性能標準的技術證據；及

.7 查明該建議的有關潛在不足和危險後所做的風險評估。

4 替代設計與佈置的評估

4.1 主管機關須參照本組織制定的指南對第 3 款所要求的工程分析加以評估及認可。

4.2 船上須帶有經主管機關認可的證明替代設計與佈置符合本條規定的文件的副本。

5 交換資料

主管機關須向本組織通報其所認可的有關替代設計與佈置的相關資料，以向所有締約政府轉發。

6 條件變化後的重新評估

如替代設計與佈置中規定的假設和操作限制出現變化，須按照變化後的條件進行工程評估，並獲得主管機關的認可。”

第 II-2 章

構造－消防、探火及滅火

第 3 條 定義

3 將下列新的第 51 和 52 款加在現有第 50 款之後：

“51 *事故中的安全區*係指從可居住性的角度而言，任何未進水的或發生火災的主豎區之外的區域，其中可安全地容納船上所有人員，使其不受生命或健康威脅，並向其提供基本服務。

52 *安全中心*係指專用於管理緊急情況的控制站。對安全系統的運作，控制和（或）監測是該安全中心的組成部分。”

第 7 條 探測和報警

4 將下列新的第 2.4 款加在現有第 2.3 款之後：

“2.4 客船固定試探火和失火報警系統須能夠遠距離單獨識別每一個探測器及手動報警點。”

5 將下列新的案文加在第 5.2 和 5.3.1 款末尾：

“安裝在艙室中的探測器在被觸發時，須能夠在其所在處所中發出或引發聲響警報。”

第 8 條 控制煙氣傳播

6 將下列新的句子加在第 2 款末尾：

“安全中心的通風系統可為駕駛室通風系統的分支，但位於相鄰主豎區者除外。”

第 9 條 火情控制

7 從第 2.2.3.2.2（7）款中刪去“小賣部”。

8 在第 2.2.3.2.2（8）款中加上“小賣部”。

9 在列表 9.3 和 9.4 的註解中，將下列句子加在註腳“c”末尾：

“當安全中心位於駕駛室之中時，駕駛室和安全中心之間的隔斷不需要耐火等級。”

10 將下列新的第 2.2.7 款加在第 2.2.6 款之後：

“2.2.7 *中庭的保護*

2.2.7.1 中庭須位於“A”級分隔結構的圍壁之中。其圍壁的耐火等級按照所適用的列表 9.2 和 9.4 確定。

2.2.7.2 分隔中庭內處所的甲板，其耐火等級須按照所適用的列表 9.2 和 9.4 確定。”

11 將現有第 7.5.1 款重新編為第 7.5.1.1 款，並將下列新的第 7.5.1.2 款加在該款之後：

“7.5.1.2 安裝在開敞甲板上的炊事設備爐灶的排風道，在穿過居住處所或具有可燃物質的處所時，須符合第 7.5.1.1 款中的適用要求。”

12 將下列新的第 7.6 款加在現有第 7.5.2.1 款之後：

“7.6 *載有 36 名以上旅客的客船上的主洗衣房通風系統*

主洗衣房的排風道須裝有：

.1 易於拆下清洗的過濾器；

.2 位於風道下端可自動和遙控操作的阻火器；

.3 從該處所內部關閉排風扇和進風扇及操縱第 7.6.2 款所述阻火器的遙控裝置；及

.4 位置適當的有蓋開口以供檢查和清洗之用。”

第 10 條 滅火

13 在第 6.4 款的第一句話中，於“設備”和“須”之間，加入“安裝在圍壁處所中或開敞甲板上”。

第 13 條 逃生手段

14 在第 3.2.3 款中，刪去第三句中“公共處所”一詞並在第四句之前加入下列新的句子：

“公共處所亦可具有直通樓梯間的通道，但劇場後臺除外。”

15 將下列新的第 3.2.5.3 款加在現有第 3.2.5.2 款之後：

“3.2.5.3 如獲主管機關根據本組織制定的指南所給與的認可，亦可接受替代撤離導向系統以取代第 3.2.5.1 款所要求的逃生路徑照明系統。”

16 將下列新的第 21、22 和 23 條加在現有第 20 條之後：

“第 21 條 事故門限、安全返港及安全區

1 適用範圍

2010 年 7 月 1 日及以後建造、按照第 II-1/2.5 條的定義長度為 120 米及以上，或具有三個及以上主豎區的客船須符合本條的規定。

2 目的

本條款的目的是確定設計標準，使船舶在發生未超出第 3 款所規定門限的事故後，依靠自身動力安全返港；本條款還提出了安全區的功能性要求和性能標準。

3 事故門限

就失火而言，事故門限包括：

.1 失去原發處所直至最近的“A”級邊界，如該原發處所受固定式滅火系統保護，該邊界可以是原發處所的一部分；或

.2 失去原發處所以及相鄰處所直至最近的“A”級邊界，該邊界並非原發處所的一部分。

4 安全返港

當火損未超出第 3 款所界定的門限時，船舶須能夠返港，同時提供第 3.51 條所界定的安全區。為被視為有能力返港，在船上未受失火影響部分的下列系統須維持運轉：

.1 推進系統；

.2 操舵系統和操舵－控制系統；

.3 導航系統；

.4 燃油注入、轉輸和服務系統；

.5 駕駛台、輪機處所、安全中心、滅火隊及控損隊之間的內部通訊系統、以及通知和集合旅客和船員所需的內部通訊系統；

.6 對外通訊系統；

.7 消防總管系統；

.8 固定式滅火系統；

.9 火、煙探測系統；

.10 艙底水及壓載系統；

.11 動力操作的水密和半水密門；

.12 預計支持第 5.1.2 款所述“安全區”的系統；

.13 進水探測系統；及

.14 主管機關認定的對控損努力至關重要的其他系統。

5 安全區

5.1 ***功能性要求*****：**

.1 安全區一般須為內部處所，但主管機關在考慮到運營區域的任何限制和有關預期環境狀況後，亦可允許將某外部處所用作安全區；

.2 安全區須向所有居住者提供下列基本服務，以確保旅客和船員的健康得以維持：

.1 衛生設施；

.2 水；

.3 食物；

.4 後備醫療處所；

.5 風雨遮蔽；

.6 防暑防寒設施；

.7 照明；及

.8 通風；

.3 通風設計須減少可能影響安全區使用的煙和熱氣風險；及

.4 定為或用作安全區的每一區域須設有通往救生設備的通道，並要考慮到某一主豎區可能無法從內部穿行。

5.2 *後備醫療處所*

後備醫療處所須符合主管機關認可的標準。

第 22 條 在失火事故後維持運行的系統的設計標準

1 適用範圍

2010 年 7 月 1 日及之後建造，按照 II-1/2.2 條的定義長度為 120 米及以上，或具有三個及以上主豎區的客船須符合本條的規定。

2 目的

本規定的目的是為在超出第 21.3 款界定的事故門限後，為支持有序撤離及棄船而需要維持運行的系統定出設計標準。

3 系統

3.1 一旦任何一個主豎區因失火而無法使用，下列系統的佈置與分隔須能確保維持運行：

.1 消防總管；

.2 內部通訊（支援通知和集合旅客和船員所需要的滅火工作）；

.3 對外通訊手段；

.4 排除滅火用水的艙底水系統；

.5 逃生通道沿線、集中站和救生設備登乘站的照明；及

.6 須設有撤離導向系統。

3.2 上述系統，在假設無法使用的主豎區之外無損壞的情況下，須能運行至少 3 小時。這些系統毋須在無法使用的主豎區內維持運行。

3.3 就 3.1 款而言，在按照“A-60”標準建造的圍阱之內穿過無法使用的主豎區的電纜和管線須被視為完好及可用。主管機關可認可同等程度的電纜及管線保護。

第 23 條 客船上的安全中心

1 適用範圍

2010 年 7 月 1 日及之後建造的客船須在船上設有符合本條要求的安全中心。

2 目的

本條旨在為協助管理緊急情況的處所作出規定。

3 位置與佈置

安全中心須為駕駛室的一部分或者位於與駕駛室相鄰的處所但有直通駕駛室的入口，以使對緊急情況的管理不致影響到當班駕駛員的駕駛職責。

4 佈局和人機工程設計

安全中心的佈局和人機工程設計須酌情考慮到本組織制定的指南。

5 通訊

安全中心、中央控制站、駕駛室、機艙控制室、消防系統儲藏室和消防設備儲藏間之間須設有通訊手段。

6 安全系統的控制與監測

儘管公約中有其他要求，安全中心須具有下列安全系統的全部功能（操作、控制、監測或所需要的任何組合）：

.1 所有動力通風系統；

.2 防火門；

.3 總緊急報警系統；

.4 公共廣播系統；

.5 電動撤離導向系統；

.6 水密和半水密門；

.7 船殼門、裝貨門和其他關閉裝置的顯示器；

.8 內（外）首門、尾門及任何其他船殼門的漏水；

.9 電視監視系統；

.10 探火及報警系統；

.11 固定式局部滅火系統；

.12 灑水和同類系統；

.13 機器處所的水基滅火系統；

.14 召集船員用的警報系統；

.15 中庭排煙系統；

.16 進水探測系統；及

.17 消防泵及應急消防泵。”

第 III 章

救生設備與佈置

第 4 條 救生設備與佈置的評估、測試和認可

17 第 3 款由下列文字取代：

“3 在認可新穎救生設備或佈置之前，主管機關須確保：

.1 此設備所達到的安全標準至少與本章和《規則》的要求相等，並已根據本組織制定的指南加以評估及測試；或

.2 此佈置已按照第 38 條成功地進行了工程分析、評估與認可。”

18 將下列新的 C 部分加在現有第 37 條之後：

“C 部分

替代設計與佈置

第 38 條 替代設計與佈置

1 目的

本條旨在為救生設備與佈置提供替代設計與佈置的方法。

2 通則

2.1 如其替代設計與佈置能滿足有關要求的意圖並能提供和本章同等的安全水平，救生設備與佈置可以偏離 B 部分中的要求。

2.2 當替代設計與佈置偏離於 B 部分中的條文要求時，須按照本條規定對該設計與佈置進行工程分析、評估與認可。

3 工程分析

工程分析須按本組織制定的指南準備並向主管機關提交，並須至少包含下列內容：

.1 確定船舶類型和有關救生設備與佈置；

.2 給出該救生設備與佈置將滿足不了的條文要求；

.3 給出擬議設計不滿足該條文要求的理由並以符合其他公認的工程或工業標準為證據；

.4 確定有關條文要求所闡明的關於該船舶和救生設備與佈置的性能標準：

.4.1 性能標準所達到的安全水平須不低於 B 部分中相關條文要求；及

.4.2 性能標準須能量化並能衡量；

.5 替代設計和佈置的詳細描述，包括列明設計中所使用的假設及任何建議的操作限制或條件；

.6 證明替代設計和佈置達到安全性能標準的技術證據；及

.7 查明該建議的有關潛在不足和危險後所做的風險評估。

4 替代設計與佈置的評估

4.1 主管機關須參照本組織制定的指南對第 3 款所要求的工程分析加以評估及認可。

4.2 船上須帶有經主管機關認可的證明替代設計與佈置符合本條規定的文件的副本。

5 交換資料

主管機關須向本組織通報其認可的有關替代設計與佈置的相關資料，以向所有締約政府轉發。

6 條件變化後的重新評估

如替代設計與佈置中規定的假設和操作限制出現變化，須按照變化後的條件進行工程評估，並獲得主管機關的認可。”

RESOLUTION MSC.216(82)

(adopted on 8 December 2006)

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

THE MARITIME SAFETY COMMITTEE,

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

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

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

1. ADOPTS, in accordance with article VIII(b)(iv) of the Convention, amendments to the Convention, the text of which is set out in Annexes 1, 2 and 3 to the present resolution;

2. DETERMINES, in accordance with article VIII(b)(vi)(2)(bb) of the Convention, that:

(a) the said amendments, set out in Annex 1, shall be deemed to have been accepted on 1 January 2008;

(b) the said amendments, set out in Annex 2, shall be deemed to have been accepted on 1 July 2008; and

(c) the said amendments, set out in Annex 3, shall be deemed to have been accepted on 1 January 2010,

unless, prior to those dates, more than one third of the Contracting Governments to the Convention or Contracting Governments the combined merchant fleets of which constitute not less than 50% of the gross tonnage of the world's merchant fleet, have notified their objections to the amendments;

3. INVITES SOLAS Contracting Governments to note that, in accordance with article VIII(b)(vii)(2) of the Convention:

(a) the amendments, set out in Annex 1, shall enter into force on 1 July 2008;

(b) the amendments, set out in Annex 2, shall enter into force on 1 January 2009; and

(c) the amendments, set out in Annex 3, shall enter into force on 1 July 2010,

upon their acceptance in accordance with paragraph 2 above;

4. REQUESTS the Secretary-General, in conformity with article VIII(b)(v) of the Convention, to transmit certified copies of the present resolution and the text of the amendments contained in Annexes 1, 2 and 3 to all Contracting Governments to the Convention;

5. FURTHER REQUESTS the Secretary-General to transmit copies of this resolution and its Annexes 1, 2 and 3 to Members of the Organization, which are not Contracting Governments to the Convention.

ANNEX 1

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

CHAPTER II-1
CONSTRUCTION – STRUCTURE, SUBDIVISION AND STABILITY, MACHINERY AND ELECTRICAL INSTALLATIONS

PART A-1
STRUCTURE OF SHIPS

Regulation 3-2 – Corrosion prevention of seawater ballast tanks in oil tankers and bulk carriers

1 The existing text and the heading of regulation 3-2 are replaced by the following:

"Protective coatings of dedicated seawater ballast tanks in all types of ships and double-side skin spaces of bulk carriers

1 Paragraphs 2 and 4 of this regulation shall apply to ships of not less than 500 gross tonnage:

.1 for which the building contract is placed on or after 1 July 2008; 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 January 2009; or

.3 the delivery of which is on or after 1 July 2012.

2 All dedicated seawater ballast tanks arranged in ships and double-side skin spaces arranged in bulk carriers of 150 m in length and upwards shall be coated during construction in accordance with the Performance standard for protective coatings for dedicated seawater ballast tanks in all types of ships and double-side skin spaces of bulk carriers, adopted by the Maritime Safety Committee by resolution MSC.215(82), as may be amended by the Organization, provided that such amendments are adopted, brought into force and take effect in accordance with the provisions of article VIII of the present Convention concerning the amendment procedures applicable to the Annex other than chapter I.

3 All dedicated seawater ballast tanks arranged in oil tankers and bulk carriers constructed on or after 1 July 1998, for which paragraph 2 is not applicable, shall comply with the requirements of regulation II-1/3-2 adopted by resolution MSC.47(66).

4 Maintenance of the protective coating system shall be included in the overall ship's maintenance scheme. The effectiveness of the protective coating system shall be verified during the life of a ship by the Administration or an organization recognized by the Administration, based on the guidelines developed by the Organization."

CHAPTER II-2
CONSTRUCTION – FIRE PROTECTION, FIRE DETECTION AND FIRE EXTINCTION

Regulation 1 – Application

2 In paragraph 2.2.3, the second occurrence of the word "and" is deleted.

3 In paragraph 2.2.4, "." is replaced by "; and".

4 In paragraph 2.2, the following new subparagraph .5 is added after the existing subparagraph .4:

".5 regulations 5.3.1.3.2 and 5.3.4 to passenger ships not later than the date of the first survey after 1 July 2008."

Regulation 3 – Definitions

5 The following new paragraph 53 is added after the existing paragraph 52:

"53 *Cabin balcony* is an open deck space which is provided for the exclusive use of the occupants of a single cabin and has direct access from such a cabin."

Regulation 4 – Probability of ignition

6 The following text is added at the end of paragraph 5.2.3:

"except that "A-0" class standard is acceptable for windows and sidescuttles outside the limit specified in regulation 9.2.4.2.5."

7 In paragraph 4.4, the words "or if applied on cabin balconies of passenger ships constructed on or after 1 July 2008," are added between the words "stations" and "shall".

Regulation 5 – Fire growth potential

8 In paragraph 3.1.2.1, the last sentence is deleted.

9 The following new paragraph 3.1.3 is inserted:

"3.1.3 *Partial bulkheads and decks on passenger ships*

3.1.3.1 Partial bulkheads or decks used to subdivide a space for utility or artistic treatment shall be of non-combustible materials.

3.1.3.2 Linings, ceilings and partial bulkheads or decks used to screen or to separate adjacent cabin balconies shall be of non-combustible materials. Cabin balconies on passenger ships constructed before 1 July 2008 shall comply with the requirements of this paragraph by the first survey after 1 July 2008."

10 In the first sentence of paragraph 3.2.1.1, the words "and cabin balconies" are added between the words "spaces" and "which", and the following new sentence is added at the end of the paragraph:

"However, the provisions of paragraph 3.2.3 need not be applied to cabin balconies."

11 The following new subparagraph .3 is added to the existing paragraph 3.2.4.1:

".3 exposed surfaces of cabin balconies, except for natural hard wood decking systems."

12 The following new paragraph 3.4 is added after the existing paragraph 3.3:

"3.4 *Furniture and furnishings on cabin balconies of passenger ships*

On passenger ships, furniture and furnishings on cabin balconies shall comply with regulations 3.40.1, 3.40.2, 3.40.3, 3.40.6 and 3.40.7 unless such balconies are protected by a fixed pressure water-spraying and fixed fire detection and fire alarm systems complying with regulations 7.10 and 10.6.1.3. Passenger ships constructed before 1 July 2008 shall comply with the requirements of this paragraph by the first survey after 1 July 2008."

Regulation 6 – Smoke generation potential and toxicity

13 The existing paragraph 2 is renumbered as paragraph 2.1.

14 The following new paragraph 2.2 is added after the renumbered paragraph 2.1:

"2.2 On passenger ships constructed on or after 1 July 2008, paints, varnishes and other finishes used on exposed surfaces of cabin balconies, excluding natural hard wood decking systems, shall not be capable of producing excessive quantities of smoke and toxic products, this being determined in accordance with the Fire Test Procedures Code."

15 The existing paragraph 3 is renumbered as paragraph 3.1.

16 The following new paragraph 3.2 is added after the renumbered paragraph 3.1:

"3.2 On passenger ships constructed on or after 1 July 2008, primary deck coverings on cabin balconies shall not give rise to smoke, toxic or explosive hazards at elevated temperatures, this being determined in accordance with the Fire Test Procedures Code."

Regulation 7 – Detection and alarm

17 The following new paragraph 10 is added after the existing paragraph 9.4:

"**10 Protection of cabin balconies on passenger ships**

A fixed fire detection and fire alarm system complying with the provisions of the Fire Safety Systems Code shall be installed on cabin balconies of ships to which regulation 5.3.4 applies, when furniture and furnishings on such balconies are not as defined in regulations 3.40.1, 3.40.2, 3.40.3, 3.40.6 and 3.40.7."

Regulation 9 – Containment of fire

18 The following new paragraph 2.2.6 is added after the existing paragraph 2.2.5.2:

"2.2.6 *Arrangement of cabin balconies*

On passenger ships constructed on or after 1 July 2008, non-load bearing partial bulkheads which separate adjacent cabin balconies shall be capable of being opened by the crew from each side for the purpose of fighting fires."

Regulation 10 – Fire fighting

19 The heading of paragraph 6.1 is replaced by the following:

"6.1 *Sprinkler and water-spraying systems in passenger ships*"

20 The following new paragraph 6.1.3 is added after the existing paragraph 6.1.2:

"6.1.3 A fixed pressure water-spraying fire-extinguishing system complying with the provisions of the Fire Safety Systems Code shall be installed on cabin balconies of ships to which regulation 5.3.4 applies, where furniture and furnishings on such balconies are not as defined in regulations 3.40.1, 3.40.2, 3.40.3, 3.40.6 and 3.40.7."

CHAPTER III
LIFE-SAVING APPLIANCES AND ARRANGEMENTS

Regulation 6 – Communications

21 Paragraph 4.3 is replaced by the following:

"4.3 The general emergency alarm system shall be audible throughout all the accommodation and normal crew working spaces. On passenger ships, the system shall also be audible on all open decks."

Regulation 11 – Survival craft muster and embarkation arrangements

22 In the first sentence of paragraph 7, the word "unfavourable" is replaced by the word "all" and the unit "°" is inserted after the terms "10" and "20".

Regulation 14 – Stowage of rescue boats

23 The words ", and if the inflated type, in a fully inflated condition at all times" are added at the end of subparagraph .1.

Regulation 19 – Emergency training and drills

24 Paragraph 3.3.4 is replaced by the following:

"3.3.4 In the case of a lifeboat arranged for free-fall launching, at least once every three months during an abandon ship drill, the crew shall board the lifeboat, properly secure themselves in their seats and commence launch procedures up to, but not including, the actual release of the lifeboat (i.e., the release hook shall not be released). The lifeboat shall then either be free-fall launched with only the required operating crew on board, or lowered into the water by means of the secondary means of launching with or without the

operating crew on board. In both cases, the lifeboat shall thereafter be manoeuvred in the water by the operating crew. At intervals of not more than six months, the lifeboat shall either be launched by free-fall with only the operating crew on board, or simulated launching shall be carried out in accordance with the guidelines developed by the Organization."

Regulation 20 – Operational readiness, maintenance and inspections

25 Paragraphs 4.1 and 4.2 are replaced by the following:

"Falls used in launching shall be inspected periodically with special regard for areas passing through sheaves, and renewed when necessary due to deterioration of the falls or at intervals of not more than 5 years, whichever is the earlier."

26 In the third sentence of paragraph 6.2, the words "it should be run for such period as prescribed in the manufacturer's handbook" are replaced by the words "a suitable water supply may be provided".

27 The heading of paragraph 8 is replaced by the following:

"8 Servicing of inflatable liferafts, inflatable lifejackets, marine evacuation systems and maintenance and repair of inflated rescue boats"

28 The second sentence of paragraph 11.1.3 is replaced by the following:

"The load to be applied shall be the mass of the survival craft or rescue boat without persons on board, except that, at intervals not exceeding five years, the test shall be carried out with a proof load equal to 1.1 times the weight of the survival craft or rescue boat and its full complement of persons and equipment."

29 The chapeau of paragraph 11.2 is replaced by the following:

"11.2 Lifeboat or rescue boat on-load release gear, including free-fall lifeboat release systems, shall be:"

30 In the first sentence of paragraph 11.2.3, the word "lifeboat" is replaced by the word "boat".

31 The following new paragraph 11.3 is added to the regulation:

"11.3 Davit-launched liferaft automatic release hooks shall be:

.1 maintained in accordance with instructions for on-board maintenance as required by regulation 36;

.2 subject to a thorough examination and operational test during the annual surveys required by regulations I/7 and I/8 by properly trained personnel familiar with the system; and

.3 operationally tested under a load of 1.1 times the total mass of the liferaft when loaded with its full complement of persons and equipment whenever the automatic release hook is overhauled. Such over-hauling and test shall be carried out at least once every five years."

Regulation 21 – Survival craft and rescue boats

32 The chapeau of paragraph 1.2 is replaced by the following:

"1.2 Passenger ships engaged on short international voyages shall carry:"

33 Paragraph 1.3 is deleted and the remaining paragraphs are renumbered accordingly.

34 In paragraph 1.4, the words "after all persons have been assembled, with lifejackets donned" are added at the end of the paragraph.

35 Paragraph 2.3 is replaced by the following:

"2.3 A lifeboat may be accepted as a rescue boat provided that it and its launching and recovery arrangements also comply with the requirements for a rescue boat."

36 In paragraph 3.2, the words "and complying with the special standards of subdivision prescribed by regulation II-1/6.5" are deleted.

Regulation 26 – Additional requirements for ro-ro passenger ships

37 In paragraph 3.1, the words "approved by the Administration having regard for the recommendations approved by the Organization" are replaced by the words "complying with section 5.1.4 of the Code".

38 In paragraph 3.2, all the words after the word "appliance" are replaced by the words "complying with section 6.1.7 of the Code".

Regulation 31 – Survival craft and rescue boats

39 Subparagraph .2 of paragraph 1.1 is replaced by the following:

".2 in addition, one or more inflatable or rigid liferafts, complying with the requirements of section 4.2 or 4.3 of the Code, of a mass of less than 185 kg and stowed in a position providing for easy side-to-side transfer at a single open deck level, and of such aggregate capacity as will accommodate the total number of persons on board. If the liferaft or liferafts are not of a mass of less than 185 kg and stowed in a position providing for easy side-to-side transfer at a single open deck level, the total capacity available on each side shall be sufficient to accommodate the total number of persons on board."

40 Subparagraph .2 of paragraph 1.3 is replaced by the following:

".2 unless the liferafts required by paragraph 1.3.1 are of a mass of less than 185 kg and stowed in a position providing for easy side-to-side transfer at a single open deck level, additional liferafts shall be provided so that the total capacity available on each side will accommodate 150% of the total number of persons on board;"

41 Subparagraph .4 of paragraph 1.3 is replaced by the following:

".4 in the event of any one survival craft being lost or rendered unserviceable, there shall be sufficient survival craft available for use on each side, including any which are of a mass of less than 185 kg and stowed in a position providing for easy side-to-side transfer at a single open deck level, to accommodate the total number of persons on board."

42 The second sentence of paragraph 2 is replaced by the following:

"A lifeboat may be accepted as a rescue boat, provided that it and its launching and recovery arrangements also comply with the requirements for a rescue boat."

Regulation 32 – Personal life-saving appliances

43 In the first sentence of paragraph 3.2, the words "of an appropriate size," are inserted between the words "suit" and "complying".

44 In paragraph 3.3, the words "including remotely located survival craft carried in accordance with regulation 31.1.4", are inserted between the words "stowed," and "additional" and the words "of an appropriate size" are inserted between the words "suits" and "shall".

Regulation 35 – Training manual and on-board training aids

45 The following new paragraph 5 is added after the existing paragraph 4:

"5 The training manual shall be written in the working language of the ship."

CHAPTER XII
ADDITIONAL SAFETY MEASURES FOR BULK CARRIERS

Regulation 6 – Structural and other requirements for bulk carriers

46 The existing paragraph 3 is deleted and the existing paragraphs 4 and 5 are renumbered as paragraphs 3 and 4.

Regulation 12 – Hold, ballast and dry space water ingress alarms

47 In paragraph 1.2, the reference to "regulation II-1/11" is replaced by the reference to "regulation II-1/12".

Regulation 13 – Availability of pumping systems

48 In paragraph 1, the reference to "regulation II-1/11.4" is replaced by the reference to "regulation II-1/12".

APPENDIX
CERTIFICATES

49 In the Passenger Ship Safety Certificate, Cargo Ship Safety Construction Certificate and Cargo Ship Safety Certificate, the phrase "Date on which keel was laid or ship was at a similar stage of construction or, where applicable, date on which work for a conversion or an alteration or modification of a major character was commenced ....." is replaced by the following:

"Date of build:

– Date of building contract .....

– Date on which keel was laid or ship was at similar stage of construction .....

– Date of delivery .....

– Date on which work for a conversion or an alteration or modification of a major character was commenced (where applicable) .....

All applicable dates shall be completed."

Record of Equipment for the Passenger Ship Safety Certificate (Form P)

50 In the Record of Equipment for the Passenger Ship Safety Certificate (Form P), the following new item 4.2 is inserted in section 5 after item 4:

"4.2 Long-range identification and tracking system",

and item 4 (Automatic identification system (AIS)) is renumbered as item 4.1.

Record of Equipment for the Cargo Ship Safety Equipment Certificate (Form E)

51 In the Record of Equipment for the Cargo Ship Safety Equipment Certificate (Form E), the following new item 4.2 is inserted in section 3 after item 4:

"4.2 Long-range identification and tracking system",

and item 4 (Automatic identification system (AIS)) is renumbered as item 4.1.

Record of Equipment for the Cargo Ship Safety Certificate (Form C)

52 In the Record of Equipment for the Cargo Ship Safety Certificate (Form C), the following new item 4.2 is inserted in section 5 after item 4:

"4.2 Long-range identification and tracking system",

and item 4 (Automatic identification system (AIS)) is renumbered as item 4.1.

Form of Safety Certificate for Nuclear Passenger Ships

53 In the table of paragraph 2.1.3, in the section commencing with the words "THIS IS TO CERTIFY:", the reference to "regulation II-1/13" is replaced by the reference to "regulation II-1/18".

ANNEX 2

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

CHAPTER II-1
CONSTRUCTION – STRUCTURE, SUBDIVISION AND STABILITY, MACHINERY AND ELECTRICAL INSTALLATIONS

1 The existing text of parts A, B and B-1 of the chapter is replaced by the following:

"PART A
GENERAL

Regulation 1
Application

1.1 Unless expressly provided otherwise, this chapter shall apply to ships the keels of which are laid or which are at a similar stage of construction on or after 1 January 2009.

1.2 For the purpose of this chapter, the term *a similar stage of construction* means the stage at which:

.1 construction identifiable with a specific ship begins; and

.2 assembly of that ship has commenced comprising at least 50 tonnes or one per cent of the estimated mass of all structural material, whichever is less.

1.3 For the purpose of this chapter:

.1 the expression *ships constructed* means ships the keels of which are laid or which are at a similar stage of construction;

.2 the expression *all ships* means ships constructed before, on or after 1 January 2009;

.3 a cargo ship, whenever built, which is converted to a passenger ship shall be treated as a passenger ship constructed on the date on which such a conversion commences;

.4 the expression *alterations and modifications of a major character* means, in the context of cargo ship subdivision and stability, any modification to the construction which affects the level of subdivision of that ship. Where a cargo ship is subject to such modification, it shall be demonstrated that the *A*/*R* ratio calculated for the ship after such modifications is not less than the *A*/*R* ratio calculated for the ship before the modification. However, in those cases where the ship's *A*/*R* ratio before modification is equal to or greater than unity, it is only necessary that the ship after modification has an *A* value which is not less than *R*, calculated for the modified ship.

2 Unless expressly provided otherwise, for ships constructed before 1 January 2009, the Administration shall ensure that the requirements which are applicable under chapter II-1 of the International Convention for the Safety of Life at Sea, 1974, as amended by resolutions MSC.1(XLV), MSC.6(48), MSC.11(55), MSC.12(56), MSC.13(57), MSC.19(58), MSC.26(60), MSC.27(61), Resolution 1 of the 1995 SOLAS Conference, MSC.47(66), MSC.57(67), MSC.65(68), MSC.69(69), MSC.99(73), MSC.134(76), MSC.151(78) and MSC.170(79) are complied with.

3 All ships which undergo repairs, alterations, modifications and outfitting related thereto shall continue to comply with at least the requirements previously applicable to these ships. Such ships, if constructed before the date on which any relevant amendments enter into force, shall, as a rule, comply with the requirements for ships constructed on or after that date to at least the same extent as they did before undergoing such repairs, alterations, modifications or outfitting. Repairs, alterations and modifications of a major character and outfitting related thereto shall meet the requirements for ships constructed on or after the date on which any relevant amendments enter into force, in so far as the Administration deems reasonable and practicable.

4 The Administration of a State may, if it considers that the sheltered nature and conditions of the voyage are such as to render the application of any specific requirements of this chapter unreasonable or unnecessary, exempt from those requirements individual ships or classes of ships entitled to fly the flag of that State which, in the course of their voyage, do not proceed more than 20 miles from the nearest land.

5 In the case of passenger ships which are employed in special trades for the carriage of large numbers of special trade passengers, such as the pilgrim trade, the Administration of the State whose flag such ships are entitled to fly, if satisfied that it is impracticable to enforce compliance with the requirements of this chapter, may exempt such ships from those requirements, provided that they comply fully with the provisions of:

.1 the rules annexed to the Special Trade Passenger Ships Agreement, 1971; and

.2 the rules annexed to the Protocol on Space Requirements for Special Trade Passenger Ships, 1973.

Regulation 2
Definitions

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

1 *Subdivision length (L_s)* of the ship is the greatest projected moulded length of that part of the ship at or below deck or decks limiting the vertical extent of flooding with the ship at the deepest subdivision draught.

2 *Mid-length* is the mid-point of the subdivision length of the ship.

3 *Aft terminal* is the aft limit of the subdivision length.

4 *Forward terminal* is the forward limit of the subdivision length.

5 *Length (L)* is the length as defined in the International Convention on Load Lines in force.

6 *Freeboard deck* is the deck as defined in the International Convention on Load Lines in force.

7 *Forward perpendicular* is the forward perpendicular as defined in the International Convention on Load Lines in force.

8 *Breadth (B)* is the greatest moulded breadth of the ship at or below the deepest subdivision draught.

9 *Draught (d)* is the vertical distance from the keel line at mid-length to the waterline in question.

10 *Deepest subdivision draught (d_s)* is the waterline which corresponds to the summer load line draught of the ship.

11 *Light service draught (d_l)* is the service draught corresponding to the lightest anticipated loading and associated tankage, including, however, such ballast as may be necessary for stability and/or immersion. Passenger ships should include the full complement of passengers and crew on board.

12 *Partial subdivision draught (d_p)* is the light service draught plus 60% of the difference between the light service draught and the deepest subdivision draught.

13 *Trim* is the difference between the draught forward and the draught aft, where the draughts are measured at the forward and aft terminals respectively, disregarding any rake of keel.

14 *Permeability (μ)* of a space is the proportion of the immersed volume of that space which can be occupied by water.

15 *Machinery spaces* are spaces between the watertight boundaries of a space containing the main and auxiliary propulsion machinery, including boilers, generators and electric motors primarily intended for propulsion. In the case of unusual arrangements, the Administration may define the limits of the machinery spaces.

16 *Weathertight* means that in any sea conditions water will not penetrate into the ship.

17 *Watertight* means having scantlings and arrangements capable of preventing the passage of water in any direction under the head of water likely to occur in intact and damaged conditions. In the damaged condition, the head of water is to be considered in the worst situation at equilibrium, including intermediate stages of flooding.

18 *Design pressure* means the hydrostatic pressure for which each structure or appliance assumed watertight in the intact and damage stability calculations is designed to withstand.

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

20 *Deadweight* is the difference in tonnes between the displacement of a ship in water of a specific gravity of 1.025 at the draught corresponding to the assigned summer freeboard and the lightweight of the ship.

21 *Lightweight* is the displacement of a ship in tonnes without cargo, fuel, lubricating oil, ballast water, fresh water and feedwater in tanks, consumable stores, and passengers and crew and their effects.

22 *Oil tanker* is the oil tanker defined in regulation 1 of Annex I of the Protocol of 1978 relating to the International Convention for the Prevention of Pollution from Ships, 1973.

23 *Ro-ro passenger ship* means a passenger ship with ro-ro spaces or special category spaces as defined in regulation II-2/3.

24 *Bulk carrier* means a bulk carrier as defined in regulation XII/1.1.

25 *Keel line* is a line parallel to the slope of the keel passing amidships through:

.1 the top of the keel at centreline or line of intersection of the inside of shell plating with the keel if a bar keel extends below that line, on a ship with a metal shell; or

.2 in wood and composite ships, the distance is measured from the lower edge of the keel rabbet. When the form at the lower part of the midship section is of a hollow character, or where thick garboards are fitted, the distance is measured from the point where the line of the flat of the bottom continued inward intersects the centreline amidships.

26 *Amidship* is at the middle of the length (*L*).

Regulation 3
Definitions relating to parts C, D and E

For the purpose of parts C, D and E, unless expressly provided otherwise:

1 *Steering gear control system* is the equipment by which orders are transmitted from the navigating bridge to the steering gear power units. Steering gear control systems comprise transmitters, receivers, hydraulic control pumps and their associated motors, motor controllers, piping and cables.

2 *Main steering gear* is the machinery, rudder actuators, steering gear, power units, if any, and ancillary equipment and the means of applying torque to the rudder stock (e.g., tiller or quadrant) necessary for effecting movement of the rudder for the purpose of steering the ship under normal service conditions.

3 *Steering gear power unit* is:

.1 in the case of electric steering gear, an electric motor and its associated electrical equipment;

.2 in the case of electrohydraulic steering gear, an electric motor and its associated electrical equipment and connected pump; or

.3 in the case of other hydraulic steering gear, a driving engine and connected pump.

4 *Auxiliary steering gear* is the equipment other than any part of the main steering gear necessary to steer the ship in the event of failure of the main steering gear but not including the tiller, quadrant or components serving the same purpose.

5 *Normal operational and habitable condition* is a condition under which the ship as a whole, the machinery, services, means and aids ensuring propulsion, ability to steer, safe navigation, fire and flooding safety, internal and external communications and signals, means of escape, and emergency boat winches, as well as the designed comfortable conditions of habitability are in working order and functioning normally.

6 *Emergency condition* is a condition under which any services needed for normal operational and habitable conditions are not in working order due to failure of the main source of electrical power.

7 *Main source of electrical power* is a source intended to supply electrical power to the main switchboard for distribution to all services necessary for maintaining the ship in normal operational and habitable conditions.

8 *Dead ship condition* is the condition under which the main propulsion plant, boilers and auxiliaries are not in operation due to the absence of power.

9 *Main generating station* is the space in which the main source of electrical power is situated.

10 *Main switchboard* is a switchboard which is directly supplied by the main source of electrical power and is intended to distribute electrical energy to the ship's services.

11 *Emergency switchboard* is a switchboard which in the event of failure of the main electrical power supply system is directly supplied by the emergency source of electrical power or the transitional source of emergency power and is intended to distribute electrical energy to the emergency services.

12 *Emergency source of electrical power* is a source of electrical power, intended to supply the emergency switchboard in the event of a failure of the supply from the main source of electrical power.

13 *Power actuating system* is the hydraulic equipment provided for supplying power to turn the rudder stock, comprising a steering gear power unit or units, together with the associated pipes and fittings, and a rudder actuator. The power actuating systems may share common mechanical components (i.e. tiller, quadrant and rudder stock) or components serving the same purpose.

14 *Maximum ahead service speed* is the greatest speed which the ship is designed to maintain in service at sea at the deepest seagoing draught.

15 *Maximum astern speed* is the speed which it is estimated the ship can attain at the designed maximum astern power at the deepest seagoing draught.

16 *Machinery spaces* are all machinery spaces of category A and all other spaces containing propelling machinery, boilers, oil fuel units, steam and internal combustion engines, generators and major electrical machinery, oil filling stations, refrigerating, stabilizing, ventilation and air conditioning machinery, and similar spaces, and trunks to such spaces.

17 *Machinery spaces of category A* are those spaces and trunks to such spaces which contain:

.1 internal combustion machinery used for main propulsion;

.2 internal combustion machinery used for purposes other than main propulsion where such machinery has in the aggregate a total power output of not less than 375 kW; or

.3 any oil-fired boiler or oil fuel unit.

18 *Control stations* are those spaces in which the ship's radio or main navigating equipment or the emergency source of power is located or where the fire recording or fire control equipment is centralized.

19 *Chemical tanker* is a cargo ship constructed or adapted and used for the carriage in bulk of any liquid product listed in either:

.1 chapter 17 of the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk adopted by the Maritime Safety Committee by resolution MSC.4(48), hereinafter referred to as "the International Bulk Chemical Code", as may be amended by the Organization; or

.2 chapter VI of the Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk adopted by the Assembly of the Organization by resolution A.212(VII), hereinafter referred to as "the Bulk Chemical Code", as has been or may be amended by the Organization,

whichever is applicable.

20 *Gas carrier* is a cargo ship constructed or adapted and used for the carriage in bulk of any liquefied gas or other products listed in either:

.1 chapter 19 of the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk adopted by the Maritime Safety Committee by resolution MSC.5(48), hereinafter referred to as "the International Gas Carrier Code", as may be amended by the Organization; or

.2 chapter XIX of the Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk adopted by the Organization by resolution A.328(IX), hereinafter referred to as "the Gas Carrier Code", as has been or may be amended by the Organization,

whichever is applicable.

PART B
SUBDIVISION AND STABILITY

Regulation 4
General

1 The damage stability requirements in parts B-1 through B-4 shall apply to cargo ships of 80 m in length (L) and upwards and to all passenger ships regardless of length but shall exclude those cargo ships which are shown to comply with subdivision and damage stability regulations in other instruments developed by the Organization.

2 The Administration may, for a particular ship or group of ships, accept alternative methodologies if it is satisfied that at least the same degree of safety as represented by these regulations is achieved. Any Administration which allows such alternative methodologies shall communicate to the Organization particulars thereof.

3 Ships shall be as efficiently subdivided as is possible having regard to the nature of the service for which they are intended. The degree of subdivision shall vary with the subdivision length (L_s) of the ship and with the service, in such manner that the highest degree of subdivision corresponds with the ships of greatest subdivision length (L_s), primarily engaged in the carriage of passengers.

4 Where it is proposed to fit decks, inner skins or longitudinal bulkheads of sufficient tightness to seriously restrict the flow of water, the Administration shall be satisfied that proper consideration is given to beneficial or adverse effects of such structures in the calculations.

PART B-1
STABILITY

Regulation 5
Intact stability information

1 Every passenger ship regardless of size and every cargo ship having a length (L) of 24 m and upwards, shall be inclined upon its completion and the elements of its stability determined.

2 The Administration may allow the inclining test of an individual cargo ship to be dispensed with provided basic stability data are available from the inclining test of a sister ship and it is shown to the satisfaction of the Administration that reliable stability information for the exempted ship can be obtained from such basic data, as required by regulation 5-1. A weight survey shall be carried out upon completion and the ship shall be inclined whenever in comparison with the data derived from the sister ship, a deviation from the lightship displacement exceeding 1% for ships of 160 m or more in length and 2% for ships of 50 m or less in length and as determined by linear interpolation for intermediate lengths or a deviation from the lightship longitudinal centre of gravity exceeding 0.5% of L_s is found.

3 The Administration may also allow the inclining test of an individual ship or class of ships especially designed for the carriage of liquids or ore in bulk to be dispensed with when reference to existing data for similar ships clearly indicates that due to the ship's proportions and arrangements more than sufficient metacentric height will be available in all probable loading conditions.

4 Where any alterations are made to a ship so as to materially affect the stability information supplied to the master, amended stability information shall be provided. If necessary the ship shall be re-inclined. The ship shall be re-inclined if anticipated deviations exceed one of the values specified in paragraph 5.

5 At periodical intervals not exceeding five years, a lightweight survey shall be carried out on all passenger ships to verify any changes in lightship displacement and longitudinal centre of gravity. The ship shall be re-inclined whenever, in comparison with the approved stability information, a deviation from the lightship displacement exceeding 2% or a deviation of the longitudinal centre of gravity exceeding 1% of L_s is found or anticipated.

6 Every ship shall have scales of draughts marked clearly at the bow and stern. In the case where the draught marks are not located where they are easily readable, or operational constraints for a particular trade make it difficult to read the draught marks, then the ship shall also be fitted with a reliable draught indicating system by which the bow and stern draughts can be determined.

Regulation 5-1
Stability information to be supplied to the master

1 The master shall be supplied with such information satisfactory to the Administration as is necessary to enable him by rapid and simple processes to obtain accurate guidance as to the stability of the ship under varying conditions of service. A copy of the stability information shall be furnished to the Administration.

2 The information should include:

.1 curves or tables of minimum operational metacentric height (*GM*) versus draught which assures compliance with the relevant intact and damage stability requirements, alternatively corresponding curves or tables of the maximum allowable vertical centre of gravity (*KG*) versus draught, or with the equivalents of either of these curves;

.2 instructions concerning the operation of cross-flooding arrangements; and

.3 all other data and aids which might be necessary to maintain the required intact stability and stability after damage.

3 The stability information shall show the influence of various trims in cases where the operational trim range exceeds +/- 0.5% of L_s.

4 For ships which have to fulfil the stability requirements of part B-1, information referred to in paragraph 2 are determined from considerations related to the subdivision index, in the following manner: Minimum required *GM* (or maximum permissible vertical position of centre of gravity *KG*) for the three draughts d_s, d_p and d_l are equal to the *GM* (or *KG* values) of corresponding loading cases used for the calculation of survival factor s_l. For intermediate draughts, values to be used shall be obtained by linear interpolation applied to the *GM* value only between the deepest subdivision draught and the partial subdivision draught and between the partial load line and the light service draught respectively. Intact stability criteria will also be taken into account by retaining for each draft the maximum among minimum required *GM* values or the minimum of maximum permissible *KG* values for both criteria. If the subdivision index is calculated for different trims, several required *GM* curves will be established in the same way.

5 When curves or tables of minimum operational metacentric height (*GM*) versus draught are not appropriate, the master should ensure that the operating condition does not deviate from a studied loading condition, or verify by calculation that the stability criteria are satisfied for this loading condition.

Regulation 6
Required subdivision index *R*

1 The subdivision of a ship is considered sufficient if the attained subdivision index A, determined in accordance with regulation 7, is not less than the required subdivision index R calculated in accordance with this regulation and if, in addition, the partial indices A_s, A_p and A_l are not less than $0.9R$ for passenger ships and $0.5R$ for cargo ships.

2 For all ships to which the damage stability requirements of this chapter apply, the degree of subdivision to be provided shall be determined by the required subdivision index R, as follows:

.1 In the case of cargo ships greater than 100 m in length (L_s):

$$R = 1 - \frac{128}{L_s + 152}$$

.2 In the case of cargo ships not less than 80 m in length (L_s) and not greater than 100 m in length (L_s):

$$R = 1 - [1/(1 + \frac{L_s}{100} \times \frac{R_o}{1 - R_o})]$$

where R_o is the value R as calculated in accordance with the formula in subparagraph .1.

.3 In the case of passenger ships:

$$R = 1 - \frac{5{,}000}{L_s + 2.5N + 15{,}225}$$

where:

$N = N_1 + 2N_2$
N_1 = number of persons for whom lifeboats are provided
N_2 = number of persons (including officers and crew) the ship is permitted to carry in excess of N_1.

.4 Where the conditions of service are such that compliance with paragraph 2.3 of this regulation on the basis of $N = N_1 + 2N_2$ is impracticable and where the Administration considers that a suitably reduced degree of hazard exists, a lesser value of N may be taken but in no case less than $N = N_1 + N_2$.

Regulation 7
Attained subdivision index *A*

1 The attained subdivision index A is obtained by the summation of the partial indices A_s, A_p and A_l, (weighted as shown) calculated for the draughts d_s, d_p and d_l defined in regulation 2 in accordance with the following formula:

$$A = 0.4A_s + 0.4A_p + 0.2A_l$$

Each partial index is a summation of contributions from all damage cases taken in consideration, using the following formula:

$$A = \Sigma p_i s_i$$

where:

i represents each compartment or group of compartments under consideration,

p_i accounts for the probability that only the compartment or group of compartments under consideration may be flooded, disregarding any horizontal subdivision, as defined in regulation 7-1,

s_i accounts for the probability of survival after flooding the compartment or group of compartments under consideration, and includes the effect of any horizontal subdivision, as defined in regulation 7-2.

2 In the calculation of A, the level trim shall be used for the deepest subdivision draught and the partial subdivision draught. The actual service trim shall be used for the light service draught. If in any service condition, the trim variation in comparison with the calculated trim is greater than 0.5% of L_s, one or more additional calculations of A are to be submitted for the same draughts but different trims so that, for all service conditions, the difference in trim in comparison with the reference trim used for one calculation will be less than 0.5% of L_s.

3 When determining the positive righting lever (GZ) of the residual stability curve, the displacement used should be that of the intact condition. That is, the constant displacement method of calculation should be used.

4 The summation indicated by the above formula shall be taken over the ship's subdivision length (L_s) for all cases of flooding in which a single compartment or two or more adjacent compartments are involved. In the case of unsymmetrical arrangements, the calculated A value should be the mean value obtained from calculations involving both sides. Alternatively, it should be taken as that corresponding to the side which evidently gives the least favourable result.

5 Wherever wing compartments are fitted, contribution to the summation indicated by the formula shall be taken for all cases of flooding in which wing compartments are involved. Additionally, cases of simultaneous flooding of a wing compartment or group of compartments and the adjacent inboard compartment or group of compartments, but excluding damage of transverse extent greater than one half of the ship breadth B, may be added. For the purpose of this regulation, transverse extent is measured inboard from ship's side, at right angle to the centreline at the level of the deepest subdivision draught.

6 In the flooding calculations carried out according to the regulations, only one breach of the hull and only one free surface need to be assumed. The assumed vertical extent of damage is to extend from the baseline upwards to any watertight horizontal subdivision above the waterline or higher. However, if a lesser extent of damage will give a more severe result, such extent is to be assumed.

7 If pipes, ducts or tunnels are situated within the assumed extent of damage, arrangements are to be made to ensure that progressive flooding cannot thereby extend to compartments other than those assumed flooded. However, the Administration may permit minor progressive flooding if it is demonstrated that its effects can be easily controlled and the safety of the ship is not impaired.

Regulation 7-1
Calculation of the factor p_i

1 The factor p_i for a compartment or group of compartments shall be calculated in accordance with paragraphs 1.1 and 1.2 using the following notations:

j = the aftmost damage zone number involved in the damage starting with No.1 at the stern;

n = the number of adjacent damage zones involved in the damage;

k = is the number of a particular longitudinal bulkhead as barrier for transverse penetration in a damage zone counted from shell towards the centre line. The shell has $k = 0$;

$x1$ = the distance from the aft terminal of L_s to the aft end of the zone in question;

$x2$ = the distance from the aft terminal of L_s to the forward end of the zone in question;

b = the mean transverse distance in metres measured at right angles to the centreline at the deepest subdivision loadline between the shell and an assumed vertical plane extended between the longitudinal limits used in calculating the factor p_i and which is a tangent to, or common with, all or part of the outermost portion of the longitudinal bulkhead under consideration. This vertical plane shall be so orientated that the mean transverse distance to the shell is a maximum, but not more than twice the least distance between the plane and the shell. If the upper part of a longitudinal bulkhead is below the deepest subdivision loadline the vertical plane used for determination of b is assumed to extend upwards to the deepest subdivision waterline. In any case, b is not to be taken greater than $B/2$.

If the damage involves a single zone only:

$$p_i = p(x1_j,x2_j) \cdot [r(x1_j,x2_j,b_k) - r(x1_j,x2_j,b_{k-1})]$$

If the damage involves two adjacent zones:

$$\begin{aligned} p_i = \; & p(x1_j,x2_{j+1}) \cdot [r(x1_j,x2_{j+1},b_k) - r(x1_j,x2_{j+1},b_{k-1})] \\ & - p(x1_j,x2_j) \cdot [r(x1_j,x2_j,b_k) - r(x1_j,x2_j,b_{k-1})] \\ & - p(x1_{j+1},x2_{j+1}) \cdot [r(x1_{j+1},x2_{j+1},b_k) - r(x1_{j+1},x2_{j+1},b_{k-1})] \end{aligned}$$

If the damage involves three or more adjacent zones:

$$\begin{aligned} p_i = \; & p(x1_j,x2_{j+n-1}) \cdot [r(x1_j,x2_{j+n-1},b_k) - r(x1_j,x2_{j+n-1},b_{k-1})] \\ & - p(x1_j,x2_{j+n-2}) \cdot [r(x1_j,x2_{j+n-2},b_k) - r(x1_j,x2_{j+n-2},b_{k-1})] \\ & - p(x1_{j+1},x2_{j+n-1}) \cdot [r(x1_{j+1},x2_{j+n-1},b_k) - r(x1_{j+1},x2_{j+n-1},b_{k-1})] \\ & + p(x1_{j+1},x2_{j+n-2}) \cdot [r(x1_{j+1},x2_{j+n-2},b_k) - r(x1_{j+1},x2_{j+n-2},b_{k-1})] \end{aligned}$$

and where $r(x1, x2, b_0) = 0$

1.1 The factor $p(x1, x2)$ is to be calculated according to the following formulae:

Overall normalized max damage length:	J_{max}	=	10/33
Knuckle point in the distribution:	J_{kn}	=	5/33
Cumulative probability at J_{kn}:	p_k	=	11/12
Maximum absolute damage length:	l_{max}	=	60 m
Length where normalized distribution ends:	L^*	=	260 m

Probability density at $J = 0$:

$$b_0 = 2\left(\frac{p_k}{J_{kn}} - \frac{1-p_k}{J_{\max} - J_{kn}}\right)$$

When $L_s \le L^*$:

$$J_m = \min\left\{J_{\max}, \frac{l_{\max}}{L_s}\right\}$$

$$J_k = \frac{J_m}{2} + \frac{1 - \sqrt{1 + (1-2p_k)b_0 J_m + \frac{1}{4}{b_0}^2 {J_m}^2}}{b_0}$$

$$b_{12} = b_0$$

When $L_s > L^*$:

$$J_m^* = \min\left\{J_{\max}, \frac{l_{\max}}{L^*}\right\}$$

$$J_k^* = \frac{J_m^*}{2} + \frac{1 - \sqrt{1 + (1-2p_k)b_0 J_m^* + \frac{1}{4}{b_0}^2 {J_m^*}^2}}{b_0}$$

$$J_m = \frac{J_m^* \cdot L^*}{L_s}$$

$$J_k = \frac{J_k^* \cdot L^*}{L_s}$$

$$b_{12} = 2\left(\frac{p_k}{J_k} - \frac{1-p_k}{J_m - J_k}\right)$$

$$b_{11} = 4\frac{1-p_k}{(J_m - J_k)J_k} - 2\frac{p_k}{J_k^2}$$

$$b_{21} = -2\frac{1-p_k}{(J_m - J_k)^2}$$

$$b_{22} = -b_{21}J_m$$

The non-dimensional damage length:

$$J = \frac{(x2 - x1)}{L_s}$$

The normalized length of a compartment or group of compartments:

J_n is to be taken as the lesser of J and J_m

1.1.1 Where neither limits of the compartment or group of compartments under consideration coincides with the aft or forward terminals:

$J \le J_k$:

$$p(x1,x2) = p_1 = \frac{1}{6}\mathrm{J}^2(\mathrm{b}_{11}\mathrm{J} + 3\mathrm{b}_{12})$$

$J > J_k$:

$$p(x1,x2) = p_2 = -\frac{1}{3}b_{11}J_k^3 + \frac{1}{2}(b_{11}J - b_{12})J_k^2 + b_{12}JJ_k - \frac{1}{3}b_{21}(J_n^3 - J_k^3) + \frac{1}{2}(b_{21}J - b_{22})(J_n^2 - J_k^2) + b_{22}J(J_n - J_k)$$

1.1.2 Where the aft limit of the compartment or group of compartments under consideration coincides with the aft terminal or the forward limit of the compartment or group of compartments under consideration coincides with the forward terminal:

$J \le J_k$:

$$p(x1,x2) = \frac{1}{2}(p_1 + J)$$

$J > J_k$:

$$p(x1,x2) = \frac{1}{2}(p_2 + J)$$

1.1.3 Where the compartment or groups of compartments considered extends over the entire subdivision length (L_s):

$$p(x1, x2) = 1$$

1.2 The factor *r(x1, x2, b)* shall be determined by the following formulae:

$$r(x1,x2,b) = 1-(1-C)\cdot\left[1-\frac{G}{p(x1,x2)}\right]$$

where:

$$C = 12\cdot J_b\cdot\left(-45\cdot J_b+4\right), \text{ where}$$

$$J_b = \frac{b}{15\cdot B}$$

1.2.1 Where the compartment or groups of compartments considered extends over the entire subdivision length (L_s):

$$G = G_1 = \frac{1}{2}b_{11}J_b{}^2 + b_{12}J_b$$

1.2.2 Where neither limits of the compartment or group of compartments under consideration coincides with the aft or forward terminals:

$$G = G_2 = -\frac{1}{3}b_{11}J_0{}^3 + \frac{1}{2}\left(b_{11}J - b_{12}\right)J_0{}^2 + b_{12}JJ_0 \text{ , where}$$
$$J_0 = \min\left(J, J_b\right)$$

1.2.3 Where the aft limit of the compartment or group of compartments under consideration coincides with the aft terminal or the forward limit of the compartment or group of compartments under consideration coincides with the forward terminal:

$$G = \frac{1}{2}\cdot\left(G_2 + G_1\cdot J\right)$$

Regulation 7-2
Calculation of the factor s_i

1 The factor s_i shall be determined for each case of assumed flooding, involving a compartment or group of compartments, in accordance with the following notations and the provisions in this regulation.

θ_e is the equilibrium heel angle in any stage of flooding, in degrees;

θ_v is the angle, in any stage of flooding, where the righting lever becomes negative, or the angle at which an opening incapable of being closed weathertight becomes submerged;

GZ_{max} is the maximum positive righting lever, in metres, up to the angle θ_v;

Range is the range of positive righting levers, in degrees, measured from the angle θ_e. The positive range is to be taken up to the angle θ_v;

Flooding stage is any discrete step during the flooding process, including the stage before equalization (if any) until final equilibrium has been reached.

1.1 The factor s_i, for any damage case at any initial loading condition, d_i, shall be obtained from the formula:

$$s_i = \text{minimum } \{ s_{\text{intermediate,i}} \text{ or } s_{\text{final,i}} \cdot s_{\text{mom,i}} \}$$

where:

$s_{\text{intermediate,i}}$ is the probability to survive all intermediate flooding stages until the final equilibrium stage, and is calculated in accordance with paragraph 2;

$s_{\text{final,i}}$ is the probability to survive in the final equilibrium stage of flooding. It is calculated in accordance with paragraph 3;

$s_{\text{mom,i}}$ is the probability to survive heeling moments, and is calculated in accordance with paragraph 4.

2 The factor $s_{\text{intermediate,i}}$ is applicable only to passenger ships (for cargo ships $s_{\text{intermediate,i}}$ should be taken as unity) and shall be taken as the least of the s-factors obtained from all flooding stages including the stage before equalization, if any, and is to be calculated as follows:

$$s_{\text{intermediate,i}} = \left[\frac{GZ_{\max}}{0.05} \cdot \frac{Range}{7} \right]^{\frac{1}{4}}$$

where $GZ_{\max}$ is not to be taken as more than 0.05 m and *Range* as not more than 7°. $s_{\text{intermediate}} = 0$, if the intermediate heel angle exceeds 15°. Where cross-flooding fittings are required, the time for equalization shall not exceed 10 min.

3 The factor $s_{\text{final,i}}$ shall be obtained from the formula:

$$s_{\text{final,i}} = K \cdot \left[\frac{GZ_{\max}}{0.12} \cdot \frac{Range}{16} \right]^{\frac{1}{4}}$$

where:

$GZ_{\max}$ is not to be taken as more than 0.12 m;

Range is not to be taken as more than 16°;

$K = 1$ if $\theta_e \leq \theta_{\min}$

$K = 0$ if $\theta_e \geq \theta_{\max}$

$$K = \sqrt{\frac{\theta_{max} - \theta_e}{\theta_{max} - \theta_{min}}} \quad \text{otherwise,}$$

where:

θ_{min} is 7° for passenger ships and 25° for cargo ships; and

θ_{max} is 15° for passenger ships and 30° for cargo ships.

4 The factor $s_{mom,i}$ is applicable only to passenger ships (for cargo ships $s_{mom,i}$ shall be taken as unity) and shall be calculated at the final equilibrium from the formula:

$$s_{mom,i} = \frac{(GZ_{max} - 0.04) \cdot Displacement}{M_{heel}}$$

where:

Displacement is the intact displacement at the subdivision draught;

M_{heel} is the maximum assumed heeling moment as calculated in accordance with paragraph 4.1; and

$s_{mom,i} \leq 1$

4.1 The heeling moment M_{heel} is to be calculated as follows:

$$M_{heel} = \text{maximum } \{M_{passenger} \text{ or } M_{wind} \text{ or } M_{Survivalcraft}\}$$

4.1.1 $M_{passenger}$ is the maximum assumed heeling moment resulting from movement of passengers, and is to be obtained as follows:

$$M_{passenger} = (0.075 \cdot N_p) \cdot (0.45 \cdot B) \text{ (tm)}$$

where:

N_p is the maximum number of passengers permitted to be on board in the service condition corresponding to the deepest subdivision draught under consideration; and

B is the beam of the ship.

Alternatively, the heeling moment may be calculated assuming the passengers are distributed with 4 persons per square metre on available deck areas towards one side of the ship on the decks where muster stations are located and in such a way that they produce the most adverse heeling moment. In doing so, a weight of 75 kg per passenger is to be assumed.

4.1.2 M_{wind} is the maximum assumed wind force acting in a damage situation:

$$M_{wind} = (P \cdot A \cdot Z) / 9{,}806 \text{ (tm)}$$

where:

P = 120 N/m^2;

A = projected lateral area above waterline;

Z = distance from centre of lateral projected area above waterline to $T/2$; and

T = ship's draught, d_i.

4.1.3 $M_{Survivalcraft}$ is the maximum assumed heeling moment due to the launching of all fully loaded davit-launched survival craft on one side of the ship. It shall be calculated using the following assumptions:

.1 all lifeboats and rescue boats fitted on the side to which the ship has heeled after having sustained damage shall be assumed to be swung out fully loaded and ready for lowering;

.2 for lifeboats which are arranged to be launched fully loaded from the stowed position, the maximum heeling moment during launching shall be taken;

.3 a fully loaded davit-launched liferaft attached to each davit on the side to which the ship has heeled after having sustained damage shall be assumed to be swung out ready for lowering;

.4 persons not in the life-saving appliances which are swung out shall not provide either additional heeling or righting moment; and

.5 life-saving appliances on the side of the ship opposite to the side to which the ship has heeled shall be assumed to be in a stowed position.

5 Unsymmetrical flooding is to be kept to a minimum consistent with the efficient arrangements. Where it is necessary to correct large angles of heel, the means adopted shall, where practicable, be self-acting, but in any case where controls to equalization devices are provided they shall be operable from above the bulkhead deck. These fittings together with their controls shall be acceptable to the Administration. Suitable information concerning the use of equalization devices shall be supplied to the master of the ship.

5.1 Tanks and compartments taking part in such equalization shall be fitted with air pipes or equivalent means of sufficient cross-section to ensure that the flow of water into the equalization compartments is not delayed.

5.2 In all cases, s_i is to be taken as zero in those cases where the final waterline, taking into account sinkage, heel and trim, immerses:

.1 the lower edge of openings through which progressive flooding may take place and such flooding is not accounted for in the calculation of factor s_i. Such openings shall include air-pipes, ventilators and openings which are closed by means of weathertight doors or hatch covers; and

.2 any part of the bulkhead deck in passenger ships considered a horizontal evacuation route for compliance with chapter II-2.

5.3 The factor s_i is to be taken as zero if, taking into account sinkage, heel and trim, any of the following occur in any intermediate stage or in the final stage of flooding:

.1 immersion of any vertical escape hatch in the bulkhead deck intended for compliance with chapter II-2;

.2 any controls intended for the operation of watertight doors, equalization devices, valves on piping or on ventilation ducts intended to maintain the integrity of watertight bulkheads from above the bulkhead deck become inaccessible or inoperable;

.3 immersion of any part of piping or ventilation ducts carried through a watertight boundary that is located within any compartment included in damage cases contributing to the attained index *A*, if not fitted with watertight means of closure at each boundary.

5.4 However, where compartments assumed flooded due to progressive flooding are taken into account in the damage stability calculations multiple values of $s_{\text{intermediate,i}}$ may be calculated assuming equalization in additional flooding phases.

5.5 Except as provided in paragraph 5.3.1, openings closed by means of watertight manhole covers and flush scuttles, small watertight hatch covers, remotely operated sliding watertight doors, side scuttles of the non-opening type as well as watertight access doors and hatch covers required to be kept closed at sea need not be considered.

6 Where horizontal watertight boundaries are fitted above the waterline under consideration the s-value calculated for the lower compartment or group of compartments shall be obtained by multiplying the value as determined in paragraph 1.1 by the reduction factor v_m according to paragraph 6.1, which represents the probability that the spaces above the horizontal subdivision will not be flooded.

6.1 The factor v_m shall be obtained from the formula:

$$v_m = v(H_{j,\ n,\ m},\ d) - v(H_{j,\ n,\ m\text{-}1},\ d)$$

where:

$H_{j,\ n,\ m}$ is the least height above the baseline, in metres, within the longitudinal range of $x_{1(j)}...x_{2(j+n-1)}$ of the mth horizontal boundary which is assumed to limit the vertical extent of flooding for the damaged compartments under consideration;

$H_{j,\ n,\ m\text{-}1}$ is the least height above the baseline, in metres, within the longitudinal range of $x_{1(j)}...x_{2(j+n-1)}$ of the $(m\text{-}1)^{\text{th}}$ horizontal boundary which is assumed to limit the vertical extent of flooding for the damaged compartments under consideration;

j signifies the aft terminal of the damaged compartments under consideration;

m represents each horizontal boundary counted upwards from the waterline under consideration;

d is the draught in question as defined in regulation 2; and

x_1 and x_2 represent the terminals of the compartment or group of compartments considered in regulation 7-1.

6.1.1 The factors $v(H_j, n, m, d)$ and $v(H_j, n, m\text{-}1, d)$ shall be obtained from the formulae:

$$v(H,d) = 0.8\frac{(H-d)}{7.8} \quad \text{, if } (H_m\text{-}d) \text{ is less than, or equal to, 7.8 m;}$$

$$v(H,d) = 0.8 + 0.2\left[\frac{(H-d)-7.8}{4.7}\right] \quad \text{in all other cases,}$$

where:

$v(H_j, n, m, d)$ is to be taken as 1, if H_m coincides with the uppermost watertight boundary of the ship within the range $(x1_{(j)}...x2_{(j+n-1)})$, and

$v(H_j, n, 0, d)$ is to be taken as 0.

In no case is v_m to be taken as less than zero or more than 1.

6.2 In general, each contribution dA to the index A in the case of horizontal subdivisions is obtained from the formula:

$$dA = p_i \cdot \left[v_1 \cdot s_{\min 1} + (v_2 - v_1) \cdot s_{\min 2} + \cdots + (1 - v_{m-1}) \cdot s_{\min m}\right]$$

where:

v_m = the v-value calculated in accordance with paragraph 6.1;
$s_{\min}$ = the least s-factor for all combinations of damages obtained when the assumed damage extends from the assumed damage height H_m downwards.

Regulation 7-3
Permeability

1 For the purpose of the subdivision and damage stability calculations of the regulations, the permeability of each general compartment or part of a compartment shall be as follows:

Spaces	Permeability
Appropriated to stores	0.60
Occupied by accommodation	0.95
Occupied by machinery	0.85
Void spaces	0.95
Intended for liquids	0 or 0.95[1]

[1] Whichever results in the more severe requirement.

2 For the purpose of the subdivision and damage stability calculations of the regulations, the permeability of each cargo compartment or part of a compartment shall be as follows:

Spaces	**Permeability at draught d_s**	**Permeability at draught d_p**	**Permeability at draught d_l**
Dry cargo spaces	0.70	0.80	0.95
Container spaces	0.70	0.80	0.95
Ro-ro spaces	0.90	0.90	0.95
Cargo liquids	0.70	0.80	0.95

3 Other figures for permeability may be used if substantiated by calculations.

Regulation 8
Special requirements concerning passenger ship stability

1 A passenger ship intended to carry 400 or more persons shall have watertight subdivision abaft the collision bulkhead so that $s_i = 1$ for the three loading conditions on which is based the calculation of the subdivision index and for a damage involving all the compartments within $0.08L$ measured from the forward perpendicular.

2 A passenger ship intended to carry 36 or more persons is to be capable of withstanding damage along the side shell to an extent specified in paragraph 3. Compliance with this regulation is to be achieved by demonstrating that s_i, as defined in regulation 7-2, is not less than 0.9 for the three loading conditions on which is based the calculation of the subdivision index.

3 The damage extent to be assumed when demonstrating compliance with paragraph 2, is to be dependent on both N as defined in regulation 6, and L_s as defined in regulation 2, such that:

.1 the vertical extent of damage is to extend from the ship's moulded baseline to a position up to 12.5 m above the position of the deepest subdivision draught as defined in regulation 2, unless a lesser vertical extent of damage were to give a lower value of s_i, in which case this reduced extent is to be used;

.2 where 400 or more persons are to be carried, a damage length of $0.03L_s$ but not less than 3 m is to be assumed at any position along the side shell, in conjunction with a penetration inboard of $0.1B$ but not less than 0.75 m measured inboard from the ship side, at right angle to the centreline at the level of the deepest subdivision draught;

.3 where less than 400 persons are carried, damage length is to be assumed at any position along the shell side between transverse watertight bulkheads provided that the distance between two adjacent transverse watertight bulkheads is not less than the assumed damage length. If the distance between adjacent transverse watertight bulkheads is less than the assumed damage length, only one of these bulkheads shall be considered effective for the purpose of demonstrating compliance with paragraph 2;

.4 where 36 persons are carried, a damage length of $0.015L_s$ but not less than 3 m is to be assumed, in conjunction with a penetration inboard of $0.05B$ but not less than 0.75 m; and

.5 where more than 36, but fewer than 400 persons are carried the values of damage length and penetration inboard, used in the determination of the assumed extent of damage, are to be obtained by linear interpolation between the values of damage length and penetration which apply for ships carrying 36 persons and 400 persons as specified in subparagraphs .4 and .2.

Regulation 8-1
System capabilities after a flooding casualty on passenger ships

1 Application

This regulation applies to passenger ships constructed on or after 1 July 2010 to which regulation II-2/21 applies.

2 Availability of essential systems in case of flooding damage

A passenger ship shall be designed so that the systems specified in regulation II-2/21.4 remain operational when the ship is subject to flooding of any single watertight compartment.

PART B-2
SUBDIVISION, WATERTIGHT AND WEATHERTIGHT INTEGRITY

Regulation 9
Double bottoms in passenger ships and cargo ships other than tankers

1 A double bottom shall be fitted extending from the collision bulkhead to the afterpeak bulkhead, as far as this is practicable and compatible with the design and proper working of the ship.

2 Where a double bottom is required to be fitted the inner bottom shall be continued out to the ship's sides in such a manner as to protect the bottom to the turn of the bilge. Such protection will be deemed satisfactory if the inner bottom is not lower at any part than a plane parallel with the keel line and which is located not less than a vertical distance h measured from the keel line, as calculated by the formula:

$$h = B/20$$

However, in no case is the value of h to be less than 760 mm, and need not be taken as more than 2,000 mm.

3 Small wells constructed in the double bottom in connection with drainage arrangements of holds, etc., shall not extend downward more than necessary. A well extending to the outer bottom is, however, permitted at the after end of the shaft tunnel. Other wells (e.g., for lubricating oil under main engines) may be permitted by the Administration if satisfied that the arrangements give protection equivalent to that afforded by a double bottom complying with this regulation. In no case shall the vertical distance from the bottom of such a well to a plane coinciding with the keel line be less than 500 mm.

4 A double bottom need not be fitted in way of watertight tanks, including dry tanks of moderate size, provided the safety of the ship is not impaired in the event of bottom or side damage.

5 In the case of passenger ships to which the provisions of regulation 1.5 apply and which are engaged on regular service within the limits of a short international voyage as defined in regulation III/3.22, the Administration may permit a double bottom to be dispensed with if satisfied that the fitting of a double bottom in that part would not be compatible with the design and proper working of the ship.

6 Any part of a passenger ship or a cargo ship that is not fitted with a double bottom in accordance with paragraphs 1, 4 or 5 shall be capable of withstanding bottom damages, as specified in paragraph 8, in that part of the ship.

7 In the case of unusual bottom arrangements in a passenger ship or a cargo ship, it shall be demonstrated that the ship is capable of withstanding bottom damages as specified in paragraph 8.

8 Compliance with paragraphs 6 or 7 is to be achieved by demonstrating that s_i, when calculated in accordance with regulation 7-2, is not less than 1 for all service conditions when subject to a bottom damage assumed at any position along the ship's bottom and with an extent specified in subparagraph .2 for the affected part of the ship:

.1 Flooding of such spaces shall not render emergency power and lighting, internal communication, signals or other emergency devices inoperable in other parts of the ship.

.2 Assumed extent of damage shall be as follows:

	For 0.3 L from the forward perpendicular of the ship	Any other part of the ship
Longitudinal extent	1/3 $L^{2/3}$ or 14.5 m, whichever is less	1/3 $L^{2/3}$ or 14.5 m, whichever is less
Transverse extent	*B*/6 or 10 m, whichever is less	*B*/6 or 5 m, whichever is less
Vertical extent, measured from the keel line	*B*/20 or 2 m, whichever is less	*B*/20 or 2 m, whichever is less

.3 If any damage of a lesser extent than the maximum damage specified in subparagraph .2 would result in a more severe condition, such damage should be considered.

9 In case of large lower holds in passenger ships, the Administration may require an increased double bottom height of not more than *B*/10 or 3 m, whichever is less, measured from the keel line. Alternatively, bottom damages may be calculated for these areas, in accordance with paragraph 8, but assuming an increased vertical extent.

Regulation 10
Construction of watertight bulkheads

1 Each watertight subdivision bulkhead, whether transverse or longitudinal, shall be constructed having scantlings as specified in regulation 2.17. In all cases, watertight subdivision bulkheads shall be capable of supporting at least the pressure due to a head of water up to the bulkhead deck.

2 Steps and recesses in watertight bulkheads shall be as strong as the bulkhead at the place where each occurs.

Regulation 11
Initial testing of watertight bulkheads, etc.

1 Testing watertight spaces not intended to hold liquids and cargo holds intended to hold ballast by filling them with water is not compulsory. When testing by filling with water is not carried out, a hose test shall be carried out where practicable. This test shall be carried out in the most advanced stage of the fitting out of the ship. Where a hose test is not practicable because of possible damage to machinery, electrical equipment insulation or outfitting items, it may be replaced by a careful visual examination of welded connections, supported where deemed necessary by means such as a dye penetrant test or an ultrasonic leak test or an equivalent test. In any case a thorough inspection of the watertight bulkheads shall be carried out.

2 The forepeak, double bottom (including duct keels) and inner skins shall be tested with water to a head corresponding to the requirements of regulation 10.1.

3 Tanks which are intended to hold liquids, and which form part of the watertight subdivision of the ship, shall be tested for tightness and structural strength with water to a head corresponding to its design pressure. The water head is in no case to be less than the top of the air pipes or to a level of 2.4 m above the top of the tank, whichever is the greater.

4 The tests referred to in paragraphs 2 and 3 are for the purpose of ensuring that the subdivision structural arrangements are watertight and are not to be regarded as a test of the fitness of any compartment for the storage of oil fuel or for other special purposes for which a test of a superior character may be required depending on the height to which the liquid has access in the tank or its connections.

Regulation 12
Peak and machinery space bulkheads, shaft tunnels, etc.

1 A collision bulkhead shall be fitted which shall be watertight up to the bulkhead deck. This bulkhead shall be located at a distance from the forward perpendicular of not less than $0.05L$ or 10 m, whichever is the less, and, except as may be permitted by the Administration, not more than $0.08L$ or $0.05L + 3$ m, whichever is the greater.

2 Where any part of the ship below the waterline extends forward of the forward perpendicular, e.g., a bulbous bow, the distances stipulated in paragraph 1 shall be measured from a point either:

.1 at the mid-length of such extension;

.2 at a distance $0.015L$ forward of the forward perpendicular; or

.3 at a distance 3 m forward of the forward perpendicular,

whichever gives the smallest measurement.

3 The bulkhead may have steps or recesses provided they are within the limits prescribed in paragraph 1 or 2.

4 No doors, manholes, access openings, ventilation ducts or any other openings shall be fitted in the collision bulkhead below the bulkhead deck.

5.1 Except as provided in paragraph 5.2, the collision bulkhead may be pierced below the bulkhead deck by not more than one pipe for dealing with fluid in the forepeak tank, provided that the pipe is fitted with a screw-down valve capable of being operated from above the bulkhead deck, the valve chest being secured inside the forepeak to the collision bulkhead. The Administration may, however, authorize the fitting of this valve on the after side of the collision bulkhead provided that the valve is readily accessible under all service conditions and the space in which it is located is not a cargo space. All valves shall be of steel, bronze or other approved ductile material. Valves of ordinary cast iron or similar material are not acceptable.

5.2 If the forepeak is divided to hold two different kinds of liquids the Administration may allow the collision bulkhead to be pierced below the bulkhead deck by two pipes, each of which is fitted as required by paragraph 5.1, provided the Administration is satisfied that there is no practical alternative to the fitting of such a second pipe and that, having regard to the additional subdivision provided in the forepeak, the safety of the ship is maintained.

6 Where a long forward superstructure is fitted the collision bulkhead shall be extended weathertight to the deck next above the bulkhead deck. The extension need not be fitted directly above the bulkhead below provided it is located within the limits prescribed in paragraph 1 or 2 with the exception permitted by paragraph 7 and that the part of the deck which forms the step is made effectively weathertight. The extension shall be so arranged as to preclude the possibility of the bow door causing damage to it in the case of damage to, or detachment of, a bow door.

7 Where bow doors are fitted and a sloping loading ramp forms part of the extension of the collision bulkhead above the bulkhead deck the ramp shall be weathertight over its complete length. In cargo ships the part of the ramp which is more than 2.3 m above the bulkhead deck may extend forward of the limit specified in paragraph 1 or 2. Ramps not meeting the above requirements shall be disregarded as an extension of the collision bulkhead.

8 The number of openings in the extension of the collision bulkhead above the freeboard deck shall be restricted to the minimum compatible with the design and normal operation of the ship. All such openings shall be capable of being closed weathertight.

9 Bulkheads shall be fitted separating the machinery space from cargo and accommodation spaces forward and aft and made watertight up to the bulkhead deck. In passenger ships an afterpeak bulkhead shall also be fitted and made watertight up to the bulkhead deck. The afterpeak bulkhead may, however, be stepped below the bulkhead deck, provided the degree of safety of the ship as regards subdivision is not thereby diminished.

10 In all cases stern tubes shall be enclosed in watertight spaces of moderate volume. In passenger ships the stern gland shall be situated in a watertight shaft tunnel or other watertight space separate from the stern tube compartment and of such volume that, if flooded by leakage through the stern gland, the bulkhead deck will not be immersed. In cargo ships other measures to minimize the danger of water penetrating into the ship in case of damage to stern tube arrangements may be taken at the discretion of the Administration.

Regulation 13
Openings in watertight bulkheads below the bulkhead deck in passenger ships

1 The number of openings in watertight bulkheads shall be reduced to the minimum compatible with the design and proper working of the ship, satisfactory means shall be provided for closing these openings.

2.1 Where pipes, scuppers, electric cables, etc., are carried through watertight bulkheads, arrangements shall be made to ensure the watertight integrity of the bulkheads.

2.2 Valves not forming part of a piping system shall not be permitted in watertight bulkheads.

2.3 Lead or other heat sensitive materials shall not be used in systems which penetrate watertight bulkheads, where deterioration of such systems in the event of fire would impair the watertight integrity of the bulkheads.

3 No doors, manholes, or access openings are permitted in watertight transverse bulkheads dividing a cargo space from an adjoining cargo space, except as provided in paragraph 9.1 and in regulation 14.

4 Subject to paragraph 10, not more than one door, apart from the doors to shaft tunnels, may be fitted in each watertight bulkhead within spaces containing the main and auxiliary propulsion machinery including boilers serving the needs of propulsion. Where two or more shafts are fitted, the tunnels shall be connected by an intercommunicating passage. There shall be only one door between the machinery space and the tunnel spaces where two shafts are fitted and only two doors where there are more than two shafts. All these doors shall be of the sliding type and shall be so located as to have their sills as high as practicable. The hand gear for operating these doors from above the bulkhead deck shall be situated outside the spaces containing the machinery.

5.1 Watertight doors, except as provided in paragraph 9.1 or regulation 14, shall be power-operated sliding doors complying with the requirements of paragraph 7 capable of being closed simultaneously from the central operating console at the navigation bridge in not more than 60 s with the ship in the upright position.

5.2 The means of operation whether by power or by hand of any power-operated sliding watertight door shall be capable of closing the door with the ship listed to 15° either way. Consideration shall also be given to the forces which may act on either side of the door as may be experienced when water is flowing through the opening applying a static head equivalent to a water height of at least 1 m above the sill on the centreline of the door.

5.3 Watertight door controls, including hydraulic piping and electric cables, shall be kept as close as practicable to the bulkhead in which the doors are fitted, in order to minimize the likelihood of them being involved in any damage which the ship may sustain. The positioning of watertight doors and their controls shall be such that if the ship sustains damage within one fifth of the breadth of the ship, as defined in regulation 2, such distance being measured at right angles to the centreline at the level of the deepest subdivision draught, the operation of the watertight doors clear of the damaged portion of the ship is not impaired.

6 All power-operated sliding watertight doors shall be provided with means of indication which will show at all remote operating positions whether the doors are open or closed. Remote operating positions shall only be at the navigation bridge as required by paragraph 7.1.5 and at the location where hand operation above the bulkhead deck is required by paragraph 7.1.4.

7.1 Each power-operated sliding watertight door:

.1 shall have a vertical or horizontal motion;

.2 shall, subject to paragraph 10, be normally limited to a maximum clear opening width of 1.2 m. The Administration may permit larger doors only to the extent considered necessary for the effective operation of the ship provided that other safety measures, including the following, are taken into consideration:

.1 special consideration shall be given to the strength of the door and its closing appliances in order to prevent leakages; and

.2 the door shall be located inboard the damage zone *B*/5;

.3 shall be fitted with the necessary equipment to open and close the door using electric power, hydraulic power, or any other form of power that is acceptable to the Administration;

.4 shall be provided with an individual hand-operated mechanism. It shall be possible to open and close the door by hand at the door itself from either side, and in addition, close the door from an accessible position above the bulkhead deck with an all round crank motion or some other movement providing the same degree of safety acceptable to the Administration. Direction of rotation or other movement is to be clearly indicated at all operating positions. The time necessary for the complete closure of the door, when operating by hand gear, shall not exceed 90 s with the ship in the upright position;

.5 shall be provided with controls for opening and closing the door by power from both sides of the door and also for closing the door by power from the central operating console at the navigation bridge;

.6 shall be provided with an audible alarm, distinct from any other alarm in the area, which will sound whenever the door is closed remotely by power and which shall sound for at least 5 s but no 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 hand operation it is sufficient for the audible alarm to

sound only when the door is moving. Additionally, in passenger areas and areas of high ambient noise the Administration may require the audible alarm to be supplemented by an intermittent visual signal at the door; and

.7 shall have an approximately uniform rate of closure under power. The closure time, from the time the door begins to move to the time it reaches the completely closed position, shall in no case be less than 20 s or more than 40 s with the ship in the upright position.

7.2 The electrical power required for power-operated sliding watertight doors shall be supplied from the emergency switchboard either directly or by a dedicated distribution board situated above the bulkhead deck. The associated control, indication and alarm circuits shall be supplied from the emergency switchboard either directly or by a dedicated distribution board situated above the bulkhead deck and be capable of being automatically supplied by the transitional source of emergency electrical power required by regulation 42.3.1.3 in the event of failure of either the main or emergency source of electrical power.

7.3 Power-operated sliding watertight doors shall have either:

.1 a centralized hydraulic system with two independent power sources each consisting of a motor and pump capable of simultaneously closing all doors. In addition, there shall be for the whole installation hydraulic accumulators of sufficient capacity to operate all the doors at least three times, i.e. closed-open-closed, against an adverse list of 15°. This operating cycle shall be capable of being carried out when the accumulator is at the pump cut-in pressure. The fluid used shall be chosen considering the temperatures liable to be encountered by the installation during its service. The power operating system shall be designed to minimize the possibility of having a single failure in the hydraulic piping adversely affect the operation of more than one door. The hydraulic system shall be provided with a low-level alarm for hydraulic fluid reservoirs serving the power-operated system and a low gas pressure alarm or other effective means of monitoring loss of stored energy in hydraulic accumulators. These alarms are to be audible and visual and shall be situated on the central operating console at the navigation bridge; or

.2 an independent hydraulic system for each door with each power source consisting of a motor and pump capable of opening and closing the door. In addition, there shall be a hydraulic accumulator of sufficient capacity to operate the door at least three times, i.e. closed-open-closed, against an adverse list of 15°. This operating cycle shall be capable of being carried out when the accumulator is at the pump cut-in pressure. The fluid used shall be chosen considering the temperatures liable to be encountered by the installation during its service. A low gas pressure group alarm or other effective means of monitoring loss of stored energy in hydraulic accumulators shall be provided at the central operating console on the navigation bridge. Loss of stored energy indication at each local operating position shall also be provided; or

.3 an independent electrical system and motor for each door with each power source consisting of a motor capable of opening and closing the door. The power source shall be capable of being automatically supplied by the transitional source of emergency electrical power as required by

regulation 42.4.2 – in the event of failure of either the main or emergency source of electrical power and with sufficient capacity to operate the door at least three times, i.e. closed-open-closed, against an adverse list of 15°.

For the systems specified in paragraphs 7.3.1, 7.3.2 and 7.3.3, provision should be made as follows: Power systems for power-operated watertight sliding doors shall be separate from any other power system. A single failure in the electric or hydraulic power-operated systems excluding the hydraulic actuator shall not prevent the hand operation of any door.

7.4 Control handles shall be provided at each side of the bulkhead at a minimum height of 1.6 m above the floor and shall be so arranged as to enable persons passing through the doorway to hold both handles in the open position without being able to set the power closing mechanism in operation accidentally. The direction of movement of the handles in opening and closing the door shall be in the direction of door movement and shall be clearly indicated.

7.5 As far as practicable, electrical equipment and components for watertight doors shall be situated above the bulkhead deck and outside hazardous areas and spaces.

7.6 The enclosures of electrical components necessarily situated below the bulkhead deck shall provide suitable protection against the ingress of water.

7.7 Electric power, control, indication and alarm circuits shall be protected against fault in such a way that a failure in one door circuit will not cause a failure in any other door circuit. Short circuits or other faults in the alarm or indicator circuits of a door shall not result in a loss of power operation of that door. Arrangements shall be such that leakage of water into the electrical equipment located below the bulkhead deck will not cause the door to open.

7.8 A single electrical failure in the power operating or control system of a power-operated sliding watertight door shall not result in a closed door opening. Availability of the power supply should be continuously monitored at a point in the electrical circuit as near as practicable to each of the motors required by paragraph 7.3. Loss of any such power supply should activate an audible and visual alarm at the central operating console at the navigation bridge.

8.1 The central operating console at the navigation bridge shall have a “master mode” switch with two modes of control: a “local control” mode which shall allow any door to be locally opened and locally closed after use without automatic closure, and a “doors closed” mode which shall automatically close any door that is open. The “doors closed” mode shall automatically close any door that is open. The “doors closed” mode shall permit doors to be opened locally and shall automatically re-close the doors upon release of the local control mechanism. The “master mode” switch shall normally be in the “local control” mode. The “doors closed” mode shall only be used in an emergency or for testing purposes. Special consideration shall be given to the reliability of the “master mode” switch.

8.2 The central operating console at the navigation bridge shall be provided with a diagram showing the location of each door, with visual indicators to show whether each door is open or closed. A red light shall indicate a door is fully open and a green light shall indicate a door is fully closed. When the door is closed remotely the red light shall indicate the intermediate position by flashing. The indicating circuit shall be independent of the control circuit for each door.

8.3 It shall not be possible to remotely open any door from the central operating console.

9.1 If the Administration is satisfied that such doors are essential, watertight doors of satisfactory construction may be fitted in watertight bulkheads dividing cargo between deck spaces. Such doors may be hinged, rolling or sliding doors but shall not be remotely controlled. They shall be fitted at the highest level and as far from the shell plating as practicable, but in no case shall the outboard vertical edges be situated at a distance from the shell plating which is less than one fifth of the breadth of the ship, as defined in regulation 2, such distance being measured at right angles to the centreline at the level of the deepest subdivision draught.

9.2 Should any such doors be accessible during the voyage, they shall be fitted with a device which prevents unauthorized opening. When it is proposed to fit such doors, the number and arrangements shall receive the special consideration of the Administration.

10 Portable plates on bulkheads shall not be permitted except in machinery spaces. The Administration may permit not more than one power-operated sliding watertight door in each watertight bulkhead larger than those specified in paragraph 7.1.2 to be substituted for these portable plates, provided these doors are intended to remain closed during navigation except in case of urgent necessity at the discretion of the master. These doors need not meet the requirements of paragraph 7.1.4 regarding complete closure by hand-operated gear in 90 s.

11.1 Where trunkways or tunnels for access from crew accommodation to the stokehold, for piping, or for any other purpose are carried through watertight bulkheads, they shall be watertight and in accordance with the requirements of regulation 16-1. The access to at least one end of each such tunnel or trunkway, if used as a passage at sea, shall be through a trunk extending watertight to a height sufficient to permit access above the bulkhead deck. The access to the other end of the trunkway or tunnel may be through a watertight door of the type required by its location in the ship. Such trunkways or tunnels shall not extend through the first subdivision bulkhead abaft the collision bulkhead.

11.2 Where it is proposed to fit tunnels piercing watertight bulkheads, these shall receive the special consideration of the Administration.

11.3 Where trunkways in connection with refrigerated cargo and ventilation or forced draught trunks are carried through more than one watertight bulkhead, the means of closure at such openings shall be operated by power and be capable of being closed from a central position situated above the bulkhead deck.

Regulation 13-1
Openings in watertight bulkheads and internal decks in cargo ships

1 The number of openings in watertight subdivisions is to be kept to a minimum compatible with the design and proper working of the ship. Where penetrations of watertight bulkheads and internal decks are necessary for access, piping, ventilation, electrical cables, etc., arrangements are to be made to maintain the watertight integrity. The Administration may permit relaxation in the watertightness of openings above the freeboard deck, provided that it is demonstrated that any progressive flooding can be easily controlled and that the safety of the ship is not impaired.

2 Doors provided to ensure the watertight integrity of internal openings which are used while at sea are to be sliding watertight doors capable of being remotely closed from the bridge and are also to be operable locally from each side of the bulkhead. Indicators are to be provided at the control position showing whether the doors are open or closed, and an audible alarm is to be provided at the door closure. The power, control and indicators are to be operable in the event of main power failure. Particular attention is to be paid to minimizing the effect of control system failure. Each power-operated sliding watertight door shall be provided with an individual hand-operated mechanism. It shall be possible to open and close the door by hand at the door itself from both sides.

3 Access doors and access hatch covers normally closed at sea, intended to ensure the watertight integrity of internal openings, shall be provided with means of indication locally and on the bridge showing whether these doors or hatch covers are open or closed. A notice is to be affixed to each such door or hatch cover to the effect that it is not to be left open.

4 Watertight doors or ramps of satisfactory construction may be fitted to internally subdivide large cargo spaces, provided that the Administration is satisfied that such doors or ramps are essential. These doors or ramps may be hinged, rolling or sliding doors or ramps, but shall not be remotely controlled. Should any of the doors or ramps be accessible during the voyage, they shall be fitted with a device which prevents unauthorized opening.

5 Other closing appliances which are kept permanently closed at sea to ensure the watertight integrity of internal openings shall be provided with a notice which is to be affixed to each such closing appliance to the effect that it is to be kept closed. Manholes fitted with closely bolted covers need not be so marked.

Regulation 14
Passenger ships carrying goods vehicles and accompanying personnel

1 This regulation applies to passenger ships designed or adapted for the carriage of goods vehicles and accompanying personnel.

2 If in such a ship the total number of passengers which include personnel accompanying vehicles does not exceed $12 + A_d/25$, where A_d = total deck area (square metres) of spaces available for the stowage of goods vehicles and where the clear height at the stowage position and at the entrance to such spaces is not less than 4 m, the provisions of regulations 13.9.1 and 13.9.2 in respect of watertight doors apply except that the doors may be fitted at any level in watertight bulkheads dividing cargo spaces. Additionally, indicators are required on the navigation bridge to show automatically when each door is closed and all door fastenings are secured.

3 The ship may not be certified for a higher number of passengers than assumed in paragraph 2, if a watertight door has been fitted in accordance with this regulation.

Regulation 15
Openings in the shell plating below the bulkhead deck of passenger ships and the freeboard deck of cargo ships

1 The number of openings in the shell plating shall be reduced to the minimum compatible with the design and proper working of the ship.

2 The arrangement and efficiency of the means for closing any opening in the shell plating shall be consistent with its intended purpose and the position in which it is fitted and generally to the satisfaction of the Administration.

3.1 Subject to the requirements of the International Convention on Load Lines in force, no sidescuttle shall be fitted in such a position that its sill is below a line drawn parallel to the bulkhead deck at side and having its lowest point 2.5% of the breadth of the ship above the deepest subdivision draught, or 500 mm, whichever is the greater.

3.2 All sidescuttles the sills of which are below the bulkhead deck of passenger ships and the freeboard deck of cargo ships, as permitted by paragraph 3.1, shall be of such construction as will effectively prevent any person opening them without the consent of the master of the ship.

4 Efficient hinged inside deadlights so arranged that they can be easily and effectively closed and secured watertight, shall be fitted to all sidescuttles except that abaft one eighth of the ship's length from the forward perpendicular and above a line drawn parallel to the bulkhead deck at side and having its lowest point at a height of 3.7 m plus 2.5% of the breadth of the ship above the deepest subdivision draught, the deadlights may be portable in passenger accommodation other than that for steerage passengers, unless the deadlights are required by the International Convention on Load Lines in force to be permanently attached in their proper positions. Such portable deadlights shall be stowed adjacent to the sidescuttles they serve.

5.1 No sidescuttles shall be fitted in any spaces which are appropriated exclusively to the carriage of cargo or coal.

5.2 Sidescuttles may, however, be fitted in spaces appropriated alternatively to the carriage of cargo or passengers, but they shall be of such construction as will effectively prevent any person opening them or their deadlights without the consent of the master.

6 Automatic ventilating sidescuttles shall not be fitted in the shell plating below the bulkhead deck of passenger ships and the freeboard deck of cargo ships without the special sanction of the Administration.

7 The number of scuppers, sanitary discharges and other similar openings in the shell plating shall be reduced to the minimum either by making each discharge serve for as many as possible of the sanitary and other pipes, or in any other satisfactory manner.

8.1 All inlets and discharges in the shell plating shall be fitted with efficient and accessible arrangements for preventing the accidental admission of water into the ship.

8.2.1 Subject to the requirements of the International Convention on Load Lines in force, and except as provided in paragraph 8.3, each separate discharge led through the shell plating from spaces below the bulkhead deck of passenger ships and the freeboard deck of cargo ships shall be provided with either one automatic non-return valve fitted with a positive means of closing it from above the bulkhead deck or with two automatic non-return valves without positive means of closing, provided that the inboard valve is situated above the deepest subdivision draught and is always accessible for examination under service conditions. Where a valve with positive means of closing is fitted, the operating position above the bulkhead deck shall always be readily accessible and means shall be provided for indicating whether the valve is open or closed.

8.2.2 The requirements of the International Convention on Load Lines in force shall apply to discharges led through the shell plating from spaces above the bulkhead deck of passenger ships and the freeboard deck of cargo ships.

8.3 Machinery space, main and auxiliary sea inlets and discharges in connection with the operation of machinery shall be fitted with readily accessible valves between the pipes and the shell plating or between the pipes and fabricated boxes attached to the shell plating. In manned machinery spaces the valves may be controlled locally and shall be provided with indicators showing whether they are open or closed.

8.4 Moving parts penetrating the shell plating below the deepest subdivision draught shall be fitted with a watertight sealing arrangement acceptable to the Administration. The inboard gland shall be located within a watertight space of such volume that, if flooded, the bulkhead deck will not be submerged. The Administration may require that if such compartment is flooded, essential or emergency power and lighting, internal communication, signals or other emergency devices must remain available in other parts of the ship.

8.5 All shell fittings and valves required by this regulation shall be of steel, bronze or other approved ductile material. Valves of ordinary cast iron or similar material are not acceptable. All pipes to which this regulation refers shall be of steel or other equivalent material to the satisfaction of the Administration.

9 Gangway, cargo and fuelling ports fitted below the bulkhead deck of passenger ships and the freeboard deck of cargo ships shall be watertight and in no case be so fitted as to have their lowest point below the deepest subdivision draught.

10.1 The inboard opening of each ash-chute, rubbish-chute, etc., shall be fitted with an efficient cover.

10.2 If the inboard opening is situated below the bulkhead deck of passenger ships and the freeboard deck of cargo ships, the cover shall be watertight and, in addition, an automatic non-return valve shall be fitted in the chute in an easily accessible position above the deepest subdivision draught.

Regulation 15-1
External openings in cargo ships

1 All external openings leading to compartments assumed intact in the damage analysis, which are below the final damage waterline, are required to be watertight.

2 External openings required to be watertight in accordance with paragraph 1 shall, except for cargo hatch covers, be fitted with indicators on the bridge.

3 Openings in the shell plating below the deck limiting the vertical extent of damage shall be fitted with a device that prevents unauthorized opening if they are accessible during the voyage.

4 Other closing appliances which are kept permanently closed at sea to ensure the watertight integrity of external openings shall be provided with a notice affixed to each appliance to the effect that it is to be kept closed. Manholes fitted with closely bolted covers need not be so marked.

Regulation 16
Construction and initial tests of watertight doors, sidescuttles, etc.

1 In all ships:

.1 the design, materials and construction of all watertight doors, sidescuttles, gangway and cargo ports, valves, pipes, ash-chutes and rubbish-chutes referred to in these regulations shall be to the satisfaction of the Administration;

.2 such valves, doors and mechanisms shall be suitably marked to ensure that they may be properly used to provide maximum safety; and

.3 the frames of vertical watertight doors shall have no groove at the bottom in which dirt might lodge and prevent the door closing properly.

2 In passenger ships and cargo ships watertight doors shall be tested by water pressure to a head of water they might sustain in a final or intermediate stage of flooding. Where testing of individual doors is not carried out because of possible damage to insulation or outfitting items, testing of individual doors may be replaced by a prototype pressure test of each type and size of door with a test pressure corresponding at least to the head required for the intended location. The prototype test shall be carried out before the door is fitted. The installation method and procedure for fitting the door on board shall correspond to that of the prototype test. When fitted on board, each door shall be checked for proper seating between the bulkhead, the frame and the door.

Regulation 16-1
Construction and initial tests of watertight decks, trunks, etc.

1 Watertight decks, trunks, tunnels, duct keels and ventilators shall be of the same strength as watertight bulkheads at corresponding levels. The means used for making them watertight, and the arrangements adopted for closing openings in them, shall be to the satisfaction of the Administration. Watertight ventilators and trunks shall be carried at least up to the bulkhead deck in passenger ships and up to the freeboard deck in cargo ships.

2 Where a ventilation trunk passing through a structure penetrates the bulkhead deck, the trunk shall be capable of withstanding the water pressure that may be present within the trunk, after having taken into account the maximum heel angle allowable during intermediate stages of flooding, in accordance with regulation 7-2.

3 Where all or part of the penetration of the bulkhead deck is on the main ro-ro deck, the trunk shall be capable of withstanding impact pressure due to internal water motions (sloshing) of water trapped on the ro-ro deck.

4 After completion, a hose or flooding test shall be applied to watertight decks and a hose test to watertight trunks, tunnels and ventilators.

Regulation 17
Internal watertight integrity of passenger ships above the bulkhead deck

1 The Administration may require that all reasonable and practicable measures shall be taken to limit the entry and spread of water above the bulkhead deck. Such measures may include partial bulkheads or webs. When partial watertight bulkheads and webs are

fitted on the bulkhead deck, above or in the immediate vicinity of watertight bulkheads, they shall have watertight shell and bulkhead deck connections so as to restrict the flow of water along the deck when the ship is in a heeled damaged condition. Where the partial watertight bulkhead does not line up with the bulkhead below, the bulkhead deck between shall be made effectively watertight. Where openings, pipes, scuppers, electric cables etc. are carried through the partial watertight bulkheads or decks within the immersed part of the bulkhead deck, arrangements shall be made to ensure the watertight integrity of the structure above the bulkhead deck.

2 All openings in the exposed weather deck shall have coamings of ample height and strength and shall be provided with efficient means for expeditiously closing them weathertight. Freeing ports, open rails and scuppers shall be fitted as necessary for rapidly clearing the weather deck of water under all weather conditions.

3 The open end of air pipes terminating within a superstructure shall be at least 1 m above the waterline when the ship heels to an angle of 15°, or the maximum angle of heel during intermediate stages of flooding, as determined by direct calculation, whichever is the greater. Alternatively, air pipes from tanks other than oil tanks may discharge through the side of the superstructure. The provisions of this paragraph are without prejudice to the provisions of the International Convention on Load Lines in force.

4 Sidescuttles, gangway, cargo and fuelling ports and other means for closing openings in the shell plating above the bulkhead deck shall be of efficient design and construction and of sufficient strength having regard to the spaces in which they are fitted and their positions relative to the deepest subdivision draught.

5 Efficient inside deadlights, so arranged that they can be easily and effectively closed and secured watertight, shall be provided for all sidescuttles to spaces below the first deck above the bulkhead deck.

Regulation 17-1
Integrity of the hull and superstructure, damage prevention and control on ro-ro passenger ships

1.1 Subject to the provisions of paragraphs 1.2 and 1.3, all accesses that lead to spaces below the bulkhead deck shall have a lowest point which is not less than 2.5 m above the bulkhead deck.

1.2 Where vehicle ramps are installed to give access to spaces below the bulkhead deck, their openings shall be able to be closed weathertight to prevent ingress of water below, alarmed and indicated to the navigation bridge.

1.3 The Administration may permit the fitting of particular accesses to spaces below the bulkhead deck provided they are necessary for the essential working of the ship, e.g., the movement of machinery and stores, subject to such accesses being made watertight, alarmed and indicated on the navigation bridge.

2 Indicators shall be provided on the navigation bridge for all shell doors, loading doors and other closing appliances which, if left open or not properly secured, could, in the opinion of the Administration, lead to flooding of a special category space or ro-ro space. The indicator system shall be designed on the fail-safe principle and shall show by visual alarms if the door is not fully closed or if any of the securing arrangements are not in place and fully locked and by audible alarms if such door or closing appliances become

open or the securing arrangements become unsecured. The indicator panel on the navigation bridge shall be equipped with a mode selection function "harbour/sea voyage" so arranged that an audible alarm is given on the navigation bridge if the ship leaves harbour with the bow doors, inner doors, stern ramp or any other side shell doors not closed or any closing device not in the correct position. The power supply for the indicator system shall be independent of the power supply for operating and securing the doors.

3 Television surveillance and a water leakage detection system shall be arranged to provide an indication to the navigation bridge and to the engine control station of any leakage through inner and outer bow doors, stern doors or any other shell doors which could lead to flooding of special category spaces or ro-ro spaces.

PART B-3
SUBDIVISION LOAD LINE ASSIGNMENT FOR PASSENGER SHIPS

Regulation 18
Assigning, marking and recording of subdivision load lines for passenger ships

1 In order that the required degree of subdivision shall be maintained, a load line corresponding to the approved subdivision draught shall be assigned and marked on the ship's sides. A ship intended for alternating modes of operation may, if the owners desire, have one or more additional load lines assigned and marked to correspond with the subdivision draughts which the Administration may approve for the alternative service configurations. Each service configuration so approved shall comply with part B-1 of this chapter independently of the results obtained for other modes of operation.

2 The subdivision load lines assigned and marked shall be recorded in the Passenger Ship Safety Certificate, and shall be distinguished by the notation P1 for the principal passenger service configuration, and P2, P3, etc., for the alternative configurations. The principal passenger configuration shall be taken as the mode of operation in which the required subdivision index *R* will have the highest value.

3 The freeboard corresponding to each of these load lines shall be measured at the same position and from the same deck line as the freeboards determined in accordance with the International Convention on Load Lines in force.

4 The freeboard corresponding to each approved subdivision load line and the service configuration, for which it is approved, shall be clearly indicated on the Passenger Ship Safety Certificate.

5 In no case shall any subdivision load line mark be placed above the deepest load line in salt water as determined by the strength of the ship or the International Convention on Load Lines in force.

6 Whatever may be the position of the subdivision load line marks, a ship shall in no case be loaded so as to submerge the load line mark appropriate to the season and locality as determined in accordance with the International Convention on Load Lines in force.

7 A ship shall in no case be so loaded that when it is in salt water the subdivision load line mark appropriate to the particular voyage and service configuration is submerged.

PART B-4
STABILITY MANAGEMENT

Regulation 19
Damage control information

1 There shall be permanently exhibited, or readily available on the navigation bridge, for the guidance of the officer in charge of the ship, plans showing clearly for each deck and hold the boundaries of the watertight compartments, the openings therein with the means of closure and position of any controls thereof, and the arrangements for the correction of any list due to flooding. In addition, booklets containing the aforementioned information shall be made available to the officers of the ship.

2 Watertight doors in passenger ships permitted to remain open during navigation shall be clearly indicated in the ship's stability information.

3 General precautions to be included shall consist of a listing of equipment, conditions, and operational procedures, considered by the Administration to be necessary to maintain watertight integrity under normal ship operations.

4 Specific precautions to be included shall consist of a listing of elements (i.e. closures, security of cargo, sounding of alarms, etc.) considered by the Administration to be vital to the survival of the ship, passengers and crew.

5 In case of ships to which damage stability requirements of part B-1 apply, damage stability information shall provide the master a simple and easily understandable way of assessing the ship’s survivability in all damage cases involving a compartment or group of compartments.

Regulation 20
Loading of passenger ships

1 On completion of loading of the ship and prior to its departure, the master shall determine the ship’s trim and stability and also ascertain and record that the ship is in compliance with stability criteria in relevant regulations. The determination of the ship’s stability shall always be made by calculation. The Administration may accept the use of an electronic loading and stability computer or equivalent means for this purpose.

2 Water ballast should not in general be carried in tanks intended for oil fuel. In ships in which it is not practicable to avoid putting water in oil fuel tanks, oily-water separating equipment to the satisfaction of the Administration shall be fitted, or other alternative means, such as discharge to shore facilities, acceptable to the Administration shall be provided for disposing of the oily-water ballast.

3 The provisions of this regulation are without prejudice to the provisions of the International Convention for the Prevention of Pollution from Ships in force.

Regulation 21
Periodical operation and inspection of watertight doors, etc., in passenger ships

1 Drills for the operating of watertight doors, sidescuttles, valves and closing mechanisms of scuppers, ash-chutes and rubbish-chutes shall take place weekly. In ships in which the voyage exceeds one week in duration a complete drill shall be held before leaving port, and others thereafter at least once a week during the voyage.

2 All watertight doors, both hinged and power-operated, in watertight bulkheads, in use at sea, shall be operated daily.

3 The watertight doors and all mechanisms and indicators connected therewith, all valves, the closing of which is necessary to make a compartment watertight, and all valves the operation of which is necessary for damage control cross connections shall be periodically inspected at sea at least once a week.

4 A record of all drills and inspections required by this regulation shall be entered in the log-book with an explicit record of any defects which may be disclosed.

Regulation 22
Prevention and control of water ingress, etc.

1 All watertight doors shall be kept closed during navigation except that they may be opened during navigation as specified in paragraphs 3 and 4. Watertight doors of a width of more than 1.2 m in machinery spaces as permitted by regulation 13.10 may only be opened in the circumstances detailed in that regulation. Any door which is opened in accordance with this paragraph shall be ready to be immediately closed.

2 Watertight doors located below the bulkhead deck having a maximum clear opening width of more than 1.2 m shall be kept closed when the ship is at sea, except for limited periods when absolutely necessary as determined by the Administration.

3 A watertight door may be opened during navigation to permit the passage of passengers or crew, or when work in the immediate vicinity of the door necessitates it being opened. The door must be immediately closed when transit through the door is complete or when the task which necessitated it being open is finished.

4 Certain watertight doors may be permitted to remain open during navigation only if considered absolutely necessary; that is, being open is determined essential to the safe and effective operation of the ship's machinery or to permit passengers normally unrestricted access throughout the passenger area. Such determination shall be made by the Administration only after careful consideration of the impact on ship operations and survivability. A watertight door permitted to remain thus open shall be clearly indicated in the ship's stability information and shall always be ready to be immediately closed.

5 Portable plates on bulkheads shall always be in place before the ship leaves port, and shall not be removed during navigation except in case of urgent necessity at the discretion of the master. The necessary precautions shall be taken in replacing them to ensure that the joints are watertight. Power-operated sliding watertight doors permitted in machinery spaces in accordance with regulation 13.10 shall be closed before the ship leaves port and shall remain closed during navigation except in case of urgent necessity at the discretion of the master.

6 Watertight doors fitted in watertight bulkheads dividing cargo between deck spaces in accordance with regulation 13.9.1 shall be closed before the voyage commences and shall be kept closed during navigation; the time of opening such doors in port and of closing them before the ship leaves port shall be entered in the logbook.

7 Gangway, cargo and fuelling ports fitted below the bulkhead deck shall be effectively closed and secured watertight before the ship leaves port, and shall be kept closed during navigation.

8 The following doors, located above the bulkhead deck, shall be closed and locked before the ship proceeds on any voyage and shall remain closed and locked until the ship is at its next berth:

.1 cargo loading doors in the shell or the boundaries of enclosed superstructures;

.2 bow visors fitted in positions as indicated in paragraph 8.1;

.3 cargo loading doors in the collision bulkhead; and

.4 ramps forming an alternative closure to those defined in paragraphs 8.1 to 8.3 inclusive.

9 Provided that where a door cannot be opened or closed while the ship is at the berth such a door may be opened or left open while the ship approaches or draws away from the berth, but only so far as may be necessary to enable the door to be immediately operated. In any case, the inner bow door must be kept closed.

10 Notwithstanding the requirements of paragraphs 8.1 and 8.4, the Administration may authorize that particular doors can be opened at the discretion of the master, if necessary for the operation of the ship or the embarking and disembarking of passengers when the ship is at safe anchorage and provided that the safety of the ship is not impaired.

11 The master shall ensure that an effective system of supervision and reporting of the closing and opening of the doors referred to in paragraph 8 is implemented.

12 The master shall ensure, before the ship proceeds on any voyage, that an entry in the log-book is made of the time of the last closing of the doors specified in paragraph 13 and the time of any opening of particular doors in accordance with paragraph 14.

13 Hinged doors, portable plates, sidescuttles, gangway, cargo and bunkering ports and other openings, which are required by these regulations to be kept closed during navigation, shall be closed before the ship leaves port. The time of closing and the time of opening (if permissible under these regulations) shall be recorded in such log-book as may be prescribed by the Administration.

14 Where in a between-decks, the sills of any of the sidescuttles referred to in regulation 15.3.2 are below a line drawn parallel to the bulkhead deck at side and having its lowest point 1.4 m plus 2.5% of the breadth of the ship above the water when the ship departs from any port, all the sidescuttles in that between-decks shall be closed watertight and locked before the ship leaves port, and they shall not be opened before the ship

arrives at the next port. In the application of this paragraph the appropriate allowance for fresh water may be made when applicable.

.1 The time of opening such sidescuttles in port and of closing and locking them before the ship leaves port shall be entered in such log-book as may be prescribed by the Administration.

.2 For any ship that has one or more sidescuttles so placed that the requirements of paragraph 14 would apply when it was floating at its deepest subdivision draught, the Administration may indicate the limiting mean draught at which these sidescuttles will have their sills above the line drawn parallel to the bulkhead deck at side, and having its lowest point 1.4 m plus 2.5% of the breadth of the ship above the waterline corresponding to the limiting mean draught, and at which it will therefore be permissible to depart from port without previously closing and locking them and to open them at sea on the responsibility of the master during the voyage to the next port. In tropical zones as defined in the International Convention on Load Lines in force, this limiting draught may be increased by 0.3 m.

15 Sidescuttles and their deadlights which will not be accessible during navigation shall be closed and secured before the ship leaves port.

16 If cargo is carried in spaces referred to in regulation 15.5.2, the sidescuttles and their deadlights shall be closed watertight and locked before the cargo is shipped and such closing and locking shall be recorded in such log-book as may be prescribed by the Administration.

17 When a rubbish-chute, etc., is not in use, both the cover and the valve required by regulation 15.10.2 shall be kept closed and secured.

Regulation 22-1
Flooding detection systems for passenger ships carrying 36 or more persons constructed on or after 1 July 2010

A flooding detection system for watertight spaces below the bulkhead deck shall be provided based on the guidelines developed by the Organization.

Regulation 23
Special requirements for ro-ro passenger ships

1 Special category spaces and ro-ro spaces shall be continuously patrolled or monitored by effective means, such as television surveillance, so that any movement of vehicles in adverse weather conditions and unauthorized access by passengers thereto can be detected whilst the ship is underway.

2 Documented operating procedures for closing and securing all shell doors, loading doors and other closing appliances which, if left open or not properly secured, could, in the opinion of the Administration, lead to flooding of a special category space or ro-ro space, shall be kept on board and posted at an appropriate place.

3 All accesses from the ro-ro deck and vehicle ramps that lead to spaces below the bulkhead deck shall be closed before the ship leaves the berth on any voyage and shall remain closed until the ship is at its next berth.

4 The master shall ensure that an effective system of supervision and reporting of the closing and opening of such accesses referred to in paragraph 3 is implemented.

5 The master shall ensure, before the ship leaves the berth on any voyage, that an entry in the log-book, as required by regulation 22.13, is made of the time of the last closing of the accesses referred to in paragraph 3.

6 Notwithstanding the requirements of paragraph 3, the Administration may permit some accesses to be opened during the voyage, but only for a period sufficient to permit through passage and, if required, for the essential working of the ship.

7 All transverse or longitudinal bulkheads which are taken into account as effective to confine the seawater accumulated on the ro-ro deck shall be in place and secured before the ship leaves the berth and remain in place and secured until the ship is at its next berth.

8 Notwithstanding the requirements of paragraph 7, the Administration may permit some accesses within such bulkheads to be opened during the voyage but only for sufficient time to permit through passage and, if required, for the essential working of the ship.

9 In all ro-ro passenger ships, the master or the designated officer shall ensure that, without the expressed consent of the master or the designated officer, no passengers are allowed access to an enclosed ro-ro deck when the ship is under way.

Regulation 24
Prevention and control of water ingress, etc., in cargo ships

1 Openings in the shell plating below the deck limiting the vertical extent of damage shall be kept permanently closed while at sea.

2 Notwithstanding the requirements of paragraph 3, the Administration may authorize that particular doors may be opened at the discretion of the master, if necessary for the operation of the ship and provided that the safety of the ship is not impaired.

3 Watertight doors or ramps fitted to internally subdivide large cargo spaces shall be closed before the voyage commences and shall be kept closed during navigation; the time of opening such doors in port and of closing them before the ship leaves port shall be entered in the logbook.

4 The use of access doors and hatch covers intended to ensure the watertight integrity of internal openings shall be authorized by the officer of the watch.

Regulation 25
Water level detectors on single hold cargo ships other than bulk carriers

1 Single hold cargo ships other than bulk carriers constructed before 1 January 2007 shall comply with the requirements of this regulation not later than 31 December 2009.

2 Ships having a length (*L*) of less than 80 m, or 100 m if constructed before 1 July 1998, and a single cargo hold below the freeboard deck or cargo holds below the freeboard deck which are not separated by at least one bulkhead made watertight up to that deck, shall be fitted in such space or spaces with water level detectors.

3 The water level detectors required by paragraph 2 shall:

.1 give an audible and visual alarm at the navigation bridge when the water level above the inner bottom in the cargo hold reaches a height of not less than 0.3 m, and another when such level reaches not more than 15% of the mean depth of the cargo hold; and

.2 be fitted at the aft end of the hold, or above its lowest part where the inner bottom is not parallel to the designed waterline. Where webs or partial watertight bulkheads are fitted above the inner bottom, Administrations may require the fitting of additional detectors.

4 The water level detectors required by paragraph 2 need not be fitted in ships complying with regulation XII/12, or in ships having watertight side compartments each side of the cargo hold length extending vertically at least from inner bottom to freeboard deck."

ANNEX 3

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

CHAPTER II-1
CONSTRUCTION – STRUCTURE, SUBDIVISION AND STABILITY, MACHINERY AND ELECTRICAL INSTALLATIONS

PART D
ELECTRICAL INSTALLATIONS

Regulation 41 – Main source of electrical power and lighting systems

1 The following new paragraph 6 is added after the existing paragraph 5:

"6 In passenger ships, supplementary lighting shall be provided in all cabins to clearly indicate the exit so that occupants will be able to find their way to the door. Such lighting, which may be connected to an emergency source of power or have a self-contained source of electrical power in each cabin, shall automatically illuminate when power to the normal cabin lighting is lost and remain on for a minimum of 30 min."

2 The following new part F is added after the existing regulation 54:

"PART F
ALTERNATIVE DESIGN AND ARRANGEMENTS

Regulation 55
Alternative design and arrangements

1 Purpose

The purpose of this regulation is to provide a methodology for alternative design and arrangements for machinery and electrical installations.

2 General

2.1 Machinery and electrical installation design and arrangements may deviate from the requirements set out in parts C, D and E, provided that the alternative design and arrangements meet the intent of the requirements concerned and provide an equivalent level of safety to this chapter.

2.2 When alternative design or arrangements deviate from the prescriptive requirements of parts C, D and E, an engineering analysis, evaluation and approval of the design and arrangements shall be carried out in accordance with this regulation.

3 Engineering analysis

The engineering analysis shall be prepared and submitted to the Administration, based on the guidelines developed by the Organization and shall include, as a minimum, the following elements:

.1 determination of the ship type, machinery, electrical installations and space(s) concerned;

.2 identification of the prescriptive requirement(s) with which the machinery and electrical installations will not comply;

.3 identification of the reason the proposed design will not meet the prescriptive requirements supported by compliance with other recognized engineering or industry standards;

.4 determination of the performance criteria for the ship, machinery, electrical installation or the space(s) concerned addressed by the relevant prescriptive requirement(s):

.1 performance criteria shall provide a level of safety not inferior to the relevant prescriptive requirements contained in parts C, D and E; and

.2 performance criteria shall be quantifiable and measurable;

.5 detailed description of the alternative design and arrangements, including a list of the assumptions used in the design and any proposed operational restrictions or conditions;

.6 technical justification demonstrating that the alternative design and arrangements meet the safety performance criteria; and

.7 risk assessment based on identification of the potential faults and hazards associated with the proposal.

4 Evaluation of the alternative design and arrangements

4.1 The engineering analysis required in paragraph 3 shall be evaluated and approved by the Administration, taking into account the guidelines developed by the Organization.

4.2 A copy of the documentation, as approved by the Administration, indicating that the alternative design and arrangements comply with this regulation, shall be carried on board the ship.

5 Exchange of information

The Administration shall communicate to the Organization pertinent information concerning alternative design and arrangements approved by them for circulation to all Contracting Governments.

6 Re-evaluation due to change of conditions

If the assumptions and operational restrictions that were stipulated in the alternative design and arrangements are changed, the engineering analysis shall be carried out under the changed condition and shall be approved by the Administration."

CHAPTER II-2
CONSTRUCTION – FIRE PROTECTION, FIRE DETECTION AND FIRE EXTINCTION

Regulation 3 – Definitions

3 The following new paragraphs 51 and 52 are added after the existing paragraph 50:

"51 *Safe area in the context of a casualty* is, from the perspective of habitability, any area(s) which is not flooded or which is outside the main vertical zone(s) in which a fire has occurred such that it can safely accommodate all persons onboard to protect them from hazards to life or health and provide them with basic services.

52 *Safety centre* is a control station dedicated to the management of emergency situations. Safety systems' operation, control and/or monitoring are an integral part of the safety centre."

Regulation 7 – Detection and alarm

4 The following new paragraph 2.4 is added after the existing paragraph 2.3:

"2.4 A fixed fire detection and fire alarm system for passenger ships shall be capable of remotely and individually identifying each detector and manually operated call point."

5 In paragraphs 5.2 and 5.3.1, the following new text is added at the end of the paragraphs:

"Detectors fitted in cabins, when activated, shall also be capable of emitting, or cause to be emitted, an audible alarm within the space where they are located."

Regulation 8 – Control of smoke spread

6 In paragraph 2, the following new sentence is added at the end of the paragraph:

"The ventilation system serving safety centres may be derived from the ventilation system serving the navigation bridge, unless located in an adjacent main vertical zone."

Regulation 9 – Containment of fire

7 In paragraph 2.2.3.2.2 (7), the words "Sale shops" are deleted.

8 In paragraph 2.2.3.2.2 (8), the words "Sale shops" are added.

9 In the notes for tables 9.3 and 9.4, the following sentence is added at the end of subscript "c":

"No fire rating is required for those partitions separating the navigation bridge and the safety centre when the latter is within the navigation bridge."

10 The following new paragraph 2.2.7 is added after paragraph 2.2.6:

"2.2.7 *Protection of atriums*

2.2.7.1 Atriums shall be within enclosures formed of "A" class divisions having a fire rating determined in accordance with tables 9.2 and 9.4, as applicable.

2.2.7.2 Decks separating spaces within atriums shall have a fire rating determined in accordance with tables 9.2 and 9.4, as applicable."

11 The existing paragraph 7.5.1 is renumbered as paragraph 7.5.1.1 and the following new paragraph 7.5.1.2 is added thereafter:

"7.5.1.2 Exhaust ducts from ranges for cooking equipment installed on open decks shall conform to paragraph 7.5.1.1, as applicable, when passing through accommodation spaces or spaces containing combustible materials."

12 The following new paragraph 7.6 is added after the existing paragraph 7.5.2.1:

"7.6 *Ventilation systems for main laundries in ships carrying more than 36 passengers*

Exhaust ducts from main laundries shall be fitted with:

.1 filters readily removable for cleaning purposes;

.2 a fire damper located in the lower end of the duct which is automatically and remotely operated;

.3 remote-control arrangements for shutting off the exhaust fans and supply fans from within the space and for operating the fire damper mentioned in paragraph 7.6.2; and

.4 suitably located hatches for inspection and cleaning."

Regulation 10 – Fire fighting

13 In the first sentence of paragraph 6.4, between the words "equipment" and "shall", the words "installed in enclosed spaces or on open decks" are added.

Regulation 13 – Means of escape

14 In paragraph 3.2.3, the words "public spaces" in the third sentence are deleted and the following new sentence is added before the fourth sentence:

"Public spaces may also have direct access to stairway enclosures except for the backstage of a theatre."

15 The following new paragraph 3.2.5.3 is added after the existing paragraph 3.2.5.2:

"3.2.5.3 In lieu of the escape route lighting system required by paragraph 3.2.5.1, alternative evacuation guidance systems may be accepted if approved by the Administration based on the guidelines developed by the Organization."

16 The following new regulations 21, 22 and 23 are added after the existing regulation 20:

"Regulation 21
Casualty threshold, safe return to port and safe areas

1 Application

Passenger ships constructed on or after 1 July 2010 having a length, as defined in regulation II-1/2.5, of 120 m or more or having three or more main vertical zones shall comply with the provisions of this regulation.

2 Purpose

The purpose of this regulation is to establish design criteria for a ship's safe return to port under its own propulsion after a casualty that does not exceed the casualty threshold stipulated in paragraph 3 and also provides functional requirements and performance standards for safe areas.

3 Casualty threshold

The casualty threshold, in the context of a fire, includes:

.1 loss of space of origin up to the nearest "A" class boundaries, which may be a part of the space of origin, if the space of origin is protected by a fixed fire-extinguishing system; or

.2 loss of the space of origin and adjacent spaces up to the nearest "A" class boundaries, which are not part of the space of origin.

4 Safe return to port

When fire damage does not exceed the casualty threshold indicated in paragraph 3, the ship shall be capable of returning to port while providing a safe area as defined in regulation 3.51. To be deemed capable of returning to port, the following systems shall remain operational in the remaining part of the ship not affected by fire:

.1 propulsion;

.2 steering systems and steering-control systems;

.3 navigational systems;

.4 systems for fill, transfer and service of fuel oil;

.5 internal communication between the bridge, engineering spaces, safety centre, fire-fighting and damage control teams, and as required for passenger and crew notification and mustering;

.6 external communication;

.7 fire main system;

.8 fixed fire-extinguishing systems;

.9 fire and smoke detection system;

.10 bilge and ballast system;

.11 power-operated watertight and semi-watertight doors;

.12 systems intended to support "safe areas" as indicated in paragraph 5.1.2;

.13 flooding detection systems; and

.14 other systems determined by the Administration to be vital to damage control efforts.

5 Safe area(s)

5.1 *Functional requirements:*

.1 the safe area(s) shall generally be an internal space(s); however, the use of an external space as a safe area may be allowed by the Administration taking into account any restriction due to the area of operation and relevant expected environmental conditions;

.2 the safe area(s) shall provide all occupants with the following basic services to ensure that the health of passengers and crew is maintained:

.1 sanitation;

.2 water;

.3 food;

.4 alternate space for medical care;

.5 shelter from the weather;

.6 means of preventing heat stress and hypothermia;

.7 light; and

.8 ventilation;

.3 ventilation design shall reduce the risk of smoke and hot gases that could affect the use of the safe area(s); and

.4 means of access to life-saving appliances shall be provided from each area identified or used as a safe area, taking into account that a main vertical zone may not be available for internal transit.

5.2 *Alternate space for medical care*

Alternate space for medical care shall conform to a standard acceptable to the Administration.

Regulation 22
Design criteria for systems to remain operational after a fire casualty

1 Application

Passenger ships constructed on or after 1 July 2010 having a length, as defined in regulation II-1/2.2, of 120 m or more or having three or more main vertical zones shall comply with the provisions of this regulation.

2 Purpose

The purpose of this regulation is to provide design criteria for systems required to remain operational for supporting the orderly evacuation and abandonment of a ship, if the casualty threshold, as defined in regulation 21.3, is exceeded.

3 Systems

3.1 In case any one main vertical zone is unserviceable due to fire, the following systems shall be so arranged and segregated as to remain operational:

.1 fire main;

.2 internal communications (in support of fire-fighting as required for passenger and crew notification and evacuation);

.3 means of external communications;

.4 bilge systems for removal of fire-fighting water;

.5 lighting along escape routes, at assembly stations and at embarkation stations of life-saving appliances; and

.6 guidance systems for evacuation shall be available.

3.2 The above systems shall be capable of operation for at least 3 h based on the assumption of no damage outside the unserviceable main vertical zone. These systems are not required to remain operational within the unserviceable main vertical zones.

3.3 Cabling and piping within a trunk constructed to an "A-60" standard shall be deemed to remain intact and serviceable while passing through the unserviceable main vertical zone for the purposes of paragraph 3.1. An equivalent degree of protection for cabling and piping may be approved by the Administration.

Regulation 23
Safety centre on passenger ships

1 Application

Passenger ships constructed on or after 1 July 2010 shall have on board a safety centre complying with the requirements of this regulation.

2 Purpose

The purpose of this regulation is to provide a space to assist with the management of emergency situations.

3 Location and arrangement

The safety centre shall either be a part of the navigation bridge or be located in a separate space adjacent, but having direct access, to the navigation bridge, so that the management of emergencies can be performed without distracting watch officers from their navigational duties.

4 Layout and ergonomic design

The layout and ergonomic design of the safety centre shall take into account the guidelines developed by the Organization, as appropriate.

5 Communications

Means of communication between the safety centre, the central control station, the navigation bridge, the engine control room, the storage room(s) for fire-extinguishing system(s) and fire equipment lockers shall be provided.

6 Control and monitoring of safety systems

Notwithstanding the requirements set out elsewhere in the Convention, the full functionality (operation, control, monitoring or any combination thereof, as required) of the safety systems listed below shall be available from the safety centre:

.1 all powered ventilation systems;

.2 fire doors;

.3 general emergency alarm system;

.4 public address system;

.5 electrically powered evacuation guidance systems;

.6 watertight and semi-watertight doors;

.7 indicators for shell doors, loading doors and other closing appliances;

.8 water leakage of inner/outer bow doors, stern doors and any other shell door;

.9 television surveillance system;

.10 fire detection and alarm system;

.11 fixed fire-fighting local application system(s);

.12 sprinkler and equivalent systems;

.13 water-based fire-extinguishing systems for machinery spaces;

.14 alarm to summon the crew;

.15 atrium smoke extraction system;

.16 flooding detection systems; and

.17 fire pumps and emergency fire pumps."

CHAPTER III
LIFE-SAVING APPLIANCES AND ARRANGEMENTS

Regulation 4 – Evaluation, testing and approval of life-saving appliances and arrangements

17 Paragraph 3 is replaced by the following:

"3 Before giving approval to novel life-saving appliances or arrangements, the Administration shall ensure that such:

.1 appliances provide safety standards at least equivalent to the requirements of this chapter and the Code and have been evaluated and tested based on the guidelines developed by the Organization; or

.2 arrangements have successfully undergone an engineering analysis, evaluation and approval in accordance with regulation 38."

18 The following new part C is added after the existing regulation 37:

"PART C
ALTERNATIVE DESIGN AND ARRANGEMENTS

Regulation 38
Alternative design and arrangements

1 Purpose

The purpose of this regulation is to provide a methodology for alternative design and arrangements for life-saving appliances and arrangements.

2 General

2.1 Life-saving appliances and arrangements may deviate from the requirements set out in part B, provided that the alternative design and arrangements meet the intent of the requirements concerned and provide an equivalent level of safety to this chapter.

2.2 When alternative design or arrangements deviate from the prescriptive requirements of part B, an engineering analysis, evaluation and approval of the design and arrangements shall be carried out in accordance with this regulation.

3 Engineering analysis

The engineering analysis shall be prepared and submitted to the Administration, based on the guidelines developed by the Organization and shall include, as a minimum, the following elements:

.1 determination of the ship type and the life-saving appliance and arrangements concerned;

.2 identification of the prescriptive requirement(s) with which the life-saving appliance and arrangements will not comply;

.3 identification of the reason the proposed design will not meet the prescriptive requirements supported by compliance with other recognized engineering or industry standards;

.4 determination of the performance criteria for the ship and the life-saving appliance and arrangements concerned addressed by the relevant prescriptive requirement(s):

.4.1 performance criteria shall provide a level of safety not inferior to the relevant prescriptive requirements contained in part B; and

.4.2 performance criteria shall be quantifiable and measurable;

.5 detailed description of the alternative design and arrangements, including a list of the assumptions used in the design and any proposed operational restrictions or conditions;

.6 technical justification demonstrating that the alternative design and arrangements meet the safety performance criteria; and

.7 risk assessment based on identification of the potential faults and hazards associated with the proposal.

4 Evaluation of the alternative design and arrangements

4.1 The engineering analysis required in paragraph 3 shall be evaluated and approved by the Administration, taking into account the guidelines developed by the Organization.

4.2 A copy of the documentation, as approved by the Administration, indicating that the alternative design and arrangements comply with this regulation, shall be carried on board the ship.

5 Exchange of information

The Administration shall communicate to the Organization pertinent information concerning alternative design and arrangements approved by them for circulation to all Contracting Governments.

6 Re-evaluation due to change of conditions

If the assumptions and operational restrictions that were stipulated in the alternative design and arrangements are changed, the engineering analysis shall be carried out under the changed condition and shall be approved by the Administration."

二零一五年十一月十八日於行政長官辦公室

辦公室主任　柯嵐

Gabinete do Chefe do Executivo, aos 18 de Novembro de 2015. — A Chefe do Gabinete, *O Lam*.

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