La seguridad es de todos | Mindefensa

Dirección General Marítima
Autoridad Marítima Colombiana

RESOLUCIÓN NÚMERO (0727-2020) MD-DIMAR-SUBMERC-AREM 29 DE OCTUBRE DE 2020

"Por medio de la cual se adicionan unos artículos al Capítulo 1 del Título 9 de la Parte 2 del REMAC 4 "*Actividades Marítimas*", en lo concerniente a acoger en el ámbito nacional las resoluciones del Comité de Seguridad Marítima y por la Conferencia de los Estados Parte de dicho Convenio, por medio de las cuales se adicionan y modifican el Capítulo XII en lo relacionado a las Medidas de Seguridad adicionales para graneleros, el Capítulo XIII relativo a la Verificación de cumplimiento, y el Capítulo XIV referente a las Medidas de seguridad para buques que operan en aguas polares marítima al anexo del Convenio Internacional para la Seguridad de la Vida Humana en el Mar (SOLAS enmendado)"

EL DIRECTOR GENERAL MARÍTIMO

En uso de sus facultades legales, particularmente en las contenidas en el numeral 5 del artículo 5 del Decreto Ley 2324 de 1984 y en el numeral 4 del artículo 2 del Decreto 5057 de 2009 y

CONSIDERANDO

Que Colombia se adhirió mediante Ley 8ª de 1980 al Convenio Internacional para la Seguridad de la Vida Humana en el Mar de 1974 y su Protocolo de 1978, mediante la cual acogió tanto el texto del convenio como todos los anexos técnicos.

Que el artículo VIII de dicho Convenio, determina que las enmiendas a los capítulos II a VIII del Anexo –en que figuran las disposiciones técnicas del Convenio– se considerarán aceptadas transcurrido un plazo de dos años (o al término de un plazo diferente fijado en el momento de la aprobación) a menos que sean rechazadas, dentro de un periodo especificado, por un tercio de los Gobiernos Contratantes o por un número de Gobiernos Contratantes cuyas flotas mercantes combinadas representen como mínimo el 50% del tonelaje bruto de la flota mercante mundial.

Que el artículo 26° de la Ley 730 de 2001 establece que las naves y artefactos navales deben reunir las condiciones de seguridad previstas en la legislación nacional y en los convenios internacionales.

Que la Dirección General Marítima es la Autoridad Marítima Nacional que ejecuta la política del Gobierno en materia marítima y tiene por objeto la dirección, coordinación y control de las actividades marítimas, en los términos señalados en el Decreto Ley 2324 de 1984.

Que numeral 5° del artículo 5° del Decreto Ley 2324 de 1984 determina que la Dirección General Marítima tiene la función de regular, dirigir y controlar las actividades relacionadas con la seguridad de la navegación en general y la seguridad de la vida humana en el mar.

Que el numeral 6° del artículo 5° del Decreto Ley 2324 de 1984, asigna a la Dirección General Marítima la función de autorizar la operación de las naves y artefactos navales en aguas colombianas.

Que la Dirección General Marítima es la autoridad designada por el Gobierno Nacional para la implementación y el cumplimiento de los instrumentos internacionales marítimos, en ejercicio de las disposiciones contenidas en el artículo 2 del decreto 5057 del 30 de diciembre de 2009.

Que el numeral 4 del artículo 2 del Decreto 5057 de 2009, establece como función de la Dirección General Marítima dictar las reglamentaciones técnicas relacionadas con las actividades marítimas y la seguridad de la vida humana en el mar.

Que mediante Resolución No. 135 del 27 de febrero de 2018 se expidió el Reglamento Marítimo Colombiano (REMAC), el cual en su artículo 3° determinó la estructura, incluyendo en el REMAC 4: *"Actividades Marítimas",* lo concerniente a la Seguridad Marítima.

Que dando cumplimiento a lo dispuesto en el artículo 5° de la Resolución número 135 de 27 de febrero de 2018, se hace necesario adicionar unos artículos al Capítulo 1 del Título 9 de la Parte 2 del REMAC 4 "Actividades Marítimas", en lo concerniente a acoger en el ámbito nacional las resoluciones del Comité de Seguridad Marítima y por la Conferencia de los Estados Parte de dicho Convenio, por medio de las cuales se adicionan y modifican el Capítulo XII en lo relacionado a las Medidas de Seguridad adicionales para graneleros, el Capítulo XIII relativo a la Verificación de cumplimiento, y el Capítulo XIV referente a las Medidas de seguridad para buques que operan en aguas polares marítima al anexo del Convenio Internacional para la Seguridad de la Vida Humana en el Mar (SOLAS enmendado)

Que en mérito de lo anterior, el Director General Marítimo

RESUELVE:

ARTÍCULO 1°. Adiciónense los siguientes artículos al Capítulo 1 del Título 9 de la Parte 2 del REMAC 4, en los siguientes términos

> **Artículo 4.2.9.1.23.** Acoger en el ámbito nacional la Resolución 1 de la Conferencia de los Gobiernos Contratantes del Convenio Solas 1974 (SOLAS enmendado), relativa a la seguridad de buques graneleros del 27 de noviembre 1997, en vigor desde el 1 de julio 1999, exclusivamente en lo pertinente a la adición del Capítulo XII sobre las Medidas de Seguridad adicionales para graneleros al Anexo del Convenio 1974 (SOLAS enmendado), la cual formará parte integral de la presente resolución.
>
> **Artículo 4.2.9.1.24.** Acoger en el ámbito nacional las Resoluciones emitidas por el Comité de Seguridad Marítima de la Organización Marítima

Internacional, exclusivamente en lo pertinente a la modificación del Capítulo XII Medidas de Seguridad adicionales para graneleros del Convenio Internacional para la Seguridad de la Vida Humana en el Mar 1974 (SOLAS enmendado), incorporado a la legislación nacional mediante la Ley 8 de 1980, así:

1. Resolución MSC. 134 (76) del 12 de diciembre de 2002, en vigor desde el 1 julio 2004.

2. Resolución MSC. 170 (79) del 9 de diciembre de 2004, en vigor desde 1 julio 2006.

3. Resolución MSC. 216 (82) del 8 de diciembre de 2006, en vigor desde 1 julio 2008.

Parágrafo. Las Resoluciones del Comité de Seguridad Marítima de la OMI, por medio de las cuales se modifica el Capítulo XII Medidas de Seguridad adicionales para graneleros del Convenio Internacional para la Seguridad de la Vida Humana en el Mar 1974 (SOLAS enmendado), contenidas en el presente artículo forman parte integral de la presente Resolución.

Artículo 4.2.9.1.25. Acoger en el ámbito nacional la Resolución MSC 388(89) del Comité de Seguridad Marítima, del 22 de mayo de 2014, en vigor desde el 1 de enero de 2016, exclusivamente en lo pertinente a la adición del Capítulo XIII sobre Verificación de cumplimiento al Anexo del Convenio Internacional para la Seguridad de la Vida Humana 1974 (SOLAS enmendado), la cual formará parte integral de la presente resolución.

Artículo 4.2.9.1.26. Acoger en el ámbito nacional la Resolución MSC 386(94) del Comité de Seguridad Marítima, del 21 de noviembre de 2014, en vigor desde el 1 de enero 2017, exclusivamente en lo pertinente a la adición del Capítulo XIV sobre Medidas de seguridad para buques que naveguen en aguas polares al Anexo del Convenio Internacional para la Seguridad de la Vida Humana 1974 (SOLAS enmendado), la cual formará parte integral de la presente resolución.

ARTÍCULO 2°. *Incorporación.* La presente resolución adiciona unos artículos al Capítulo 1 del Título 9 de la Parte 2 del REMAC 4 “Actividades Marítimas”, en lo concerniente a acoger en el ámbito nacional las resoluciones del Comité de Seguridad Marítima y por la Conferencia de los Estados Parte de dicho Convenio, por medio de las cuales se adicionan y modifican el Capítulo XII en lo relacionado a las Medidas de Seguridad adicionales para graneleros, el Capítulo XIII relativo a la Verificación de cumplimiento, y el Capítulo XIV referente a las Medidas de seguridad para buques que operan en aguas polares marítima al anexo del Convenio Internacional para la Seguridad de la Vida Humana en el Mar (SOLAS enmendado).

Lo dispuesto en ella se entiende incorporado al Reglamento Marítimo Colombiano, de acuerdo a lo establecido en el artículo 5 de la Resolución 135 del 27 de febrero de 2018, por medio de la cual se expidió el Reglamento Marítimo Colombiano (REMAC).

ARTÍCULO 3°. *Vigencia.* La presente resolución empieza a regir a partir de su publicación en el Diario Oficial.

PUBLÍQUESE Y CÚMPLASE

Contralmirante JUAN FRANCISCO HERRERA LEAL
Director General Marítimo

FINAL ACT OF THE CONFERENCE OF CONTRACTING GOVERNMENTS TO THE INTERNATIONAL CONVENTION FOR THE SAFETY OF LIFE AT SEA, 1974

ACTE FINAL DE LA CONFÉRENCE DES GOUVERNEMENTS CONTRACTANTS À LA CONVENTION INTERNATIONALE DE 1974 POUR LA SAUVEGARDE DE LA VIE HUMAINE EN MER

ACTA FINAL DE LA CONFERENCIA DE LOS GOBIERNOS CONTRATANTES DEL CONVENIO INTERNACIONAL PARA LA SEGURIDAD DE LA VIDA HUMANA EN EL MAR, 1974

Final Act
of the Conference of Contracting Governments to the
International Convention for the Safety of Life at Sea, 1974

1 Pursuant to the decisions of Contracting Governments to the International Convention for the Safety of Life at Sea, 1974 (the 1974 SOLAS Convention) attending the Maritime Safety Committee of the International Maritime Organization at its sixty-eighth session, the Council of the Organization at its seventy-eighth session and the Assembly of the Organization at its twentieth session and in accordance with article VIII(c) of the 1974 SOLAS Convention, the Organization convened a Conference of Contracting Governments to the International Convention for the Safety of Life at Sea, 1974. The purpose of the Conference was to consider and adopt amendments to the 1974 SOLAS Convention and to resolution A.744(18), aimed at enhancing the safety of bulk carriers.

2 The Conference was held at the Headquarters of the International Maritime Organization in London on 24, 27 (p.m.) and 28 (p.m.) November 1997.

3 Representatives of 98 Contracting Governments to the 1974 SOLAS Convention participated in the Conference, namely the representatives of:

ALGERIA
ARGENTINA
AUSTRALIA
BAHAMAS
BANGLADESH
BARBADOS
BELGIUM
BELIZE
BENIN
BRAZIL
BULGARIA
CAMBODIA
CAMEROON
CANADA
CHILE
CHINA
COLOMBIA
CONGO
COTE D'IVOIRE
CROATIA
CUBA
CYPRUS
CZECH REPUBLIC
DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA
DENMARK
ECUADOR
EGYPT
ESTONIA
ETHIOPIA
FIJI
FINLAND
FRANCE
GABON
GAMBIA
GERMANY
GHANA
GREECE
HONDURAS
HUNGARY
ICELAND
INDIA
INDONESIA
IRAN (ISLAMIC REPUBLIC OF)
IRELAND
ISRAEL
ITALY
JAMAICA
JAPAN
KUWAIT
LATVIA
LIBERIA
LITHUANIA
LUXEMBOURG
MALAYSIA
MALTA
MEXICO
MONACO

MOROCCO
MOZAMBIQUE
MYANMAR
NETHERLANDS
NEW ZEALAND
NIGERIA
NORWAY
OMAN
PANAMA
PAPUA NEW GUINEA
PERU
PHILIPPINES
POLAND
PORTUGAL
QATAR
REPUBLIC OF KOREA
ROMANIA
RUSSIAN FEDERATION
SAINT VINCENT AND THE GRENADINES
SAUDI ARABIA
SEYCHELLES
SINGAPORE
SLOVENIA
SOUTH AFRICA
SPAIN
SRI LANKA
SUDAN
SWEDEN
THAILAND
TRINIDAD AND TOBAGO
TUNISIA
TURKEY
UKRAINE
UNITED ARAB EMIRATES
UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND
UNITED STATES OF AMERICA
URUGUAY
VANUATU
VENEZUELA
VIETNAM
YEMEN

4 Bosnia and Herzegovina and the United Republic of Tanzania, which are not Contracting Governments to the 1974 SOLAS Convention, sent observers to the Conference.

5 Hong Kong, China and Macau, Associate Members of the International Maritime Organization, sent observers to the Conference.

6 The following intergovernmental organizations sent observers to the Conference:

INTERNATIONAL HYDROGRAPHIC ORGANIZATION (IHO)
COMMISSION OF THE EUROPEAN COMMUNITIES (EC)
INTERNATIONAL OIL POLLUTION COMPENSATION FUND (IOPC FUND)
LEAGUE OF ARAB STATES

7 The following non-governmental international organizations sent observers to the Conference:

INTERNATIONAL CHAMBER OF SHIPPING (ICS)
INTERNATIONAL UNION OF MARINE INSURANCE (IUMI)
INTERNATIONAL CONFEDERATION OF FREE TRADE UNIONS (ICFTU)
INTERNATIONAL RADIO-MARITIME COMMITTEE (CIRM)
THE BALTIC AND INTERNATIONAL MARITIME COUNCIL (BIMCO)
INTERNATIONAL ASSOCIATION OF CLASSIFICATION SOCIETIES (IACS)
LATIN AMERICAN SHIPOWNERS' ASSOCIATION (LASA)
OIL COMPANIES INTERNATIONAL MARINE FORUM (OCIMF)
INTERNATIONAL MARITIME PILOTS' ASSOCIATION (IMPA)
INTERNATIONAL ASSOCIATION OF INSTITUTES OF NAVIGATION (IAIN)
INTERNATIONAL FEDERATION OF SHIPMASTERS' ASSOCIATIONS (IFSMA)
ASSOCIATION OF EUROPEAN SHIPBUILDERS AND SHIPREPAIRERS (AWES)

THE INTERNATIONAL TANKER OWNERS POLLUTION FEDERATION LIMITED (ITOPF)
INTERNATIONAL LIFEBOAT FEDERATION (ILF)
INTERNATIONAL ROAD TRANSPORT UNION (IRU)
GREENPEACE INTERNATIONAL
INTERNATIONAL ASSOCIATION OF DRY CARGO SHIPOWNERS (INTERCARGO)
THE INSTITUTE OF MARINE ENGINEERS (IME)

8 The Conference was opened by Mr. W.A. O'Neil, Secretary-General of the International Maritime Organization.

9 The Conference elected Mr. T. Allan, Head of the delegation of the United Kingdom, President of the Conference.

10 The Conference elected Mr. Ali Jabra Ghabban, Head of the delegation of Saudi Arabia, Vice-President of the Conference.

11 The Secretariat of the Conference consisted of the following officers:

Secretary-General	-	Mr. W.A. O'Neil, Secretary-General of the International Maritime Organization
Executive Secretary	-	Mr. E.E. Mitropoulos, Director, Maritime Safety Division
Deputy Executive Secretary	-	Mr. F. Plaza, Senior Deputy Director, Maritime Safety Division
Deputy Executive Secretary	-	Mr. T. Fossum, Senior Deputy Director, Maritime Safety Division

12 The Conference used as the basis of its work:

- a draft text of amendments to the 1974 SOLAS Convention;
- a draft text of amendments to resolution A.744(18) - Guidelines on the enhanced programme of inspections during surveys of bulk carriers and oil tankers, and
- a draft text of associated Conference resolutions,

which were prepared and approved by the Maritime Safety Committee at its sixty-eighth session for consideration by the Conference.

13 The Conference also considered proposals and comments submitted by SOLAS Contracting Governments and international organizations concerned.

14 As a result of its deliberations, as recorded in the records of decisions of the plenary sessions, the Conference adopted:

.1 amendments to the International Convention for the Safety of Life at Sea, 1974, together with resolution 1 on the adoption of these amendments; and

2 amendments to resolution A.744(18) - Guidelines on the enhanced programme of inspections during surveys of bulk carriers and oil tankers, together with resolution 2 on the adoption of these amendments,

which constitute attachment 1 to this Final Act

15 The Conference also adopted the following resolutions contained in attachment 2 to this Final Act

Resolution 3	Recommendation on compliance with SOLAS regulation XII/5
Resolution 4:	Standards for the evaluation of scantlings of the transverse watertight vertically corrugated bulkhead between the two foremost cargo holds and for the evaluation of allowable hold loading of the foremost cargo hold
Resolution 5:	Recommendation on loading instruments
Resolution 6	Interpretation of the definition of "bulk carrier", as given in chapter IX of SOLAS 1974, as amended in 1994
Resolution 7:	Enhanced surveys carried out prior to entry into force of the amendments
Resolution 8	Further work on the safety of bulk carriers
Resolution 9	Implementation of the International Safety Management (ISM) Code

16 The text of this Final Act, including its attachments, is established in a single original text in the Arabic, Chinese, English, French, Russian and Spanish languages. The original is to be deposited with the Secretary-General of the International Maritime Organization

17 The Secretary-General of the International Maritime Organization shall send

(a) certified copies of this Final Act, including its attachment 2, to the Governments of the States invited to be represented at the Conference,

(b) certified copies of the text of the amendments to the 1974 SOLAS Convention and to resolution A.744(18), together with resolutions 1 and 2 on the adoption of the amendments, to all Contracting Governments to the 1974 SOLAS Convention in conformity with article VIII(c)(ii) of the 1974 SOLAS Convention, and

(c) copies of the text of the amendments to the 1974 SOLAS Convention and to resolution A.744(18), together with resolutions 1 and 2 on the adoption of the amendments, to Governments of States which are not Contracting Governments to the Convention

IN WITNESS WHEREOF the undersigned have affixed their signatures to this Final Act.

DONE AT LONDON this twenty-eighth day of November one thousand nine hundred and ninety-seven

Acte final
de la Conférence des Gouvernements contractants à la
Convention internationale de 1974 pour la sauvegarde de la vie humaine en mer

1 En application des décisions prises par les Gouvernements contractants à la Convention internationale de 1974 pour la sauvegarde de la vie humaine en mer (Convention SOLAS de 1974) qui ont participé à la soixante-huitième session du Comité de la sécurité maritime de l'Organisation maritime internationale, à la soixante-dix-huitième session du Conseil de l'Organisation et à la vingtième session de l'Assemblée de l'Organisation et, conformément à l'article VIII c) de la Convention SOLAS de 1974, l'Organisation a convoqué une conférence des Gouvernements contractants à la Convention internationale de 1974 pour la sauvegarde de la vie humaine en mer. L'objet de cette conférence était d'examiner et d'adopter des amendements à la Convention SOLAS de 1974 et à la résolution A.744(18) visant à renforcer la sécurité des vraquiers.

2 La Conférence s'est tenue au Siège de l'Organisation maritime internationale, à Londres, les 24, 27 (après-midi) et 28 (après-midi) novembre 1997.

3 Des représentants des 98 Gouvernements contractants à la Convention SOLAS de 1974 ci-après ont pris part aux travaux de la Conférence:

AFRIQUE DU SUD
ALGERIE
ALLEMAGNE
ARABIE SAOUDITE
ARGENTINE
AUSTRALIE
BAHAMAS
BANGLADESH
BARBADE
BELGIQUE
BELIZE
BENIN
BRESIL
BULGARIE
CAMBODGE
CAMEROUN
CANADA
CHILI
CHINE
CHYPRE
COLOMBIE
CONGO
CÔTE D'IVOIRE
CROATIE
CUBA
DANEMARK
EGYPTE
EMIRATS ARABES UNIS
EQUATEUR
ESPAGNE
ESTONIE
ETATS-UNIS D'AMERIQUE
ETHIOPIE
FEDERATION DE RUSSIE

FIDJI
FINLANDE
FRANCE
GABON
GAMBIE
GHANA
GRECE
HONDURAS
HONGRIE
INDE
INDONESIE
IRAN (REPUBLIQUE ISLAMIQUE D')
IRLANDE
ISLANDE
ISRAEL
ITALIE
JAMAIQUE
JAPON
KOWEIT
LETTONIE
LIBERIA
LITUANIE
LUXEMBOURG
MALAISIE
MALTE
MAROC
MEXIQUE
MONACO
MYANMAR
MOZAMBIQUE
NIGERIA
NORVEGE
NOUVELLE-ZELANDE
OMAN
PANAMA
PAPOUASIE-NOUVELLE-GUINEE
PAYS-BAS
PEROU
PHILIPPINES
POLOGNE
PORTUGAL
QATAR
REPUBLIQUE DE COREE
REPUBLIQUE POPULAIRE DEMOCRATIQUE DE COREE
REPUBLIQUE TCHEQUE
ROUMANIE
ROYAUME-UNI DE GRANDE-BRETAGNE ET D'IRLANDE DU NORD
SAINT-VINCENT-ET-LES GRENADINES
SEYCHELLES
SINGAPOUR
SLOVENIE
SOUDAN
SRI LANKA
SUEDE
THAILANDE
TRINITE-ET-TOBAGO
TUNISIE
TURQUIE
UKRAINE
URUGUAY
VANUATU
VENEZUELA
VIET NAM
YEMEN

4 La Bosnie-Herzégovine et la République-Unie de Tanzanie, qui ne sont pas des Gouvernements contractants à la Convention SOLAS de 1974, avaient envoyé des observateurs à la Conférence

5 Hong-kong, Chine et Macao, Membres associés de l'Organisation maritime internationale, avaient envoyé des observateurs à la Conférence.

6 Les organisations intergouvernementales ci-après avaient envoyé des observateurs à la Conférence

ORGANISATION HYDROGRAPHIQUE INTERNATIONALE (OHI)
COMMISSION DES COMMUNAUTES EUROPEENNES (CCE)
FONDS INTERNATIONAL D'INDEMNISATION POUR LES DOMMAGES DUS A LA POLLUTION PAR LES HYDROCARBURES (FIPOL)
LIGUE DES ETATS ARABES

7 Les organisations internationales non gouvernementales ci-après avaient envoyé des observateurs à la Conférence :

CHAMBRE INTERNATIONALE DE LA MARINE MARCHANDE (ICS)
UNION INTERNATIONALE D'ASSURANCES TRANSPORTS (IUMI)
CONFEDERATION INTERNATIONALE DES SYNDICATS LIBRES (CISL)
COMITE INTERNATIONAL RADIO-MARITIME (CIRM)
CONSEIL MARITIME INTERNATIONAL ET BALTIQUE (BIMCO)
ASSOCIATION INTERNATIONALE DES SOCIETES DE CLASSIFICATION (IACS)
ASSOCIATION DES ARMATEURS LATINO-AMERICAINS (LASA)
OIL COMPANIES INTERNATIONAL MARINE FORUM (OCIMF)
ASSOCIATION INTERNATIONALE DES PILOTES MARITIMES (IMPA)
ASSOCIATION INTERNATIONALE DES INSTITUTS DE NAVIGATION (IAIN)
FEDERATION INTERNATIONALE DES ASSOCIATIONS DE CAPITAINES DE NAVIRES (IFSMA)
ASSOCIATION OF EUROPEAN SHIPBUILDERS AND SHIPREPAIRERS (AWES)
THE INTERNATIONAL TANKER OWNERS POLLUTION FEDERATION LIMITED (ITOPF)
FEDERATION INTERNATIONALE DES UTILISATEURS DE BATEAUX DE SAUVETAGE
UNION INTERNATIONALE DES TRANSPORTS ROUTIERS (IRU)
GREENPEACE INTERNATIONAL
ASSOCIATION INTERNATIONALE DES TRANSPORTEURS DE MARCHANDISES SOLIDES (INTERCARGO)
THE INSTITUTE OF MARINE ENGINEERS (IME)

8 La Conférence a été ouverte par M. W.A. O'Neil, Secrétaire général de l'Organisation maritime internationale.

9 M. T. Allan, Chef de la délégation du Royaume-Uni, a été élu Président de la Conférence.

10 M. Ali Jabra Ghabban, Chef de la délégation de l'Arabie saoudite, a été élu Vice-président de la Conférence.

11 Le Secrétariat de la Conférence était composé des membres suivants :

Secrétaire général	M. W.A. O'Neil, Secrétaire général de l'Organisation maritime internationale
Secrétaire exécutif	M. E.E. Mitropoulos, Directeur de la Division de la sécurité maritime
Secrétaire exécutif adjoint	M. F. Plaza, Directeur adjoint principal de la Division de la sécurité maritime
Secrétaire exécutif adjoint	M. T. Fossum, Directeur adjoint principal de la Division de la sécurité maritime

12 La Conférence a fondé ses délibérations sur :

- un projet de texte des amendements à la Convention SOLAS de 1974;

- un projet de texte des amendements à la résolution A.744(18) - Directives sur le programme renforcé d'inspections à l'occasion des visites des vraquiers et des pétroliers; et

- un projet de texte des résolutions connexes de la Conférence,

qui avaient été élaborés et approuvés par le Comité de la sécurité maritime à sa soixante-huitième session aux fins d'examen par la Conférence.

13 La Conférence a aussi examiné les propositions et observations que les Gouvernements contractants à la Convention SOLAS et les organisations internationales intéressées lui avaient soumises.

14 A l'issue de ses délibérations, qui sont consignées dans les comptes rendus des décisions des séances plénières, la Conférence a adopté :

.1 les amendements à la Convention internationale de 1974 pour la sauvegarde de la vie humaine en mer, ainsi que la résolution 1 portant adoption de ces amendements; et

.2 les amendements à la résolution A.744(18) - Directives sur le programme renforcé d'inspections à l'occasion des visites des vraquiers et des pétroliers, ainsi que la résolution 2 portant adoption de ces amendements,

qui constituent le Document 1 joint au présent Acte final.

15 La Conférence a aussi adopté les résolutions ci-après qui font l'objet du Document 2 joint au présent Acte final :

Résolution 3 :	Recommandation sur la conformité avec la règle XII/5 de la Convention SOLAS
Résolution 4 :	Normes applicables à l'évaluation des échantillonnages de la cloison transversale étanche à l'eau ondulée verticalement qui sépare les deux cales à cargaison situées le plus à l'avant et normes applicables à l'évaluation du chargement admissible de la cale à cargaison située le plus à l'avant
Résolution 5 :	Recommandation sur les calculateurs de chargement
Résolution 6 :	Interprétation de la définition du terme "vraquier" donnée au chapitre IX de la Convention SOLAS de 1974, telle que modifiée en 1994
Résolution 7 :	Visites renforcées effectuées avant l'entrée en vigueur des amendements
Résolution 8 :	Poursuite des travaux sur la sécurité des vraquiers
Résolution 9 :	Application du Code international de gestion de la sécurité (Code ISM).

16 Le texte du présent Acte final, y compris les documents joints, est établi en un seul exemplaire original en langues anglaise, arabe, chinoise, espagnole, française et russe. L'original doit être déposé auprès du Secrétaire général de l'Organisation maritime internationale.

17 Le Secrétaire général de l'Organisation maritime internationale adressera :

a) des copies certifiées conformes du présent Acte final, y compris le Document joint 2, aux gouvernements des Etats invités à se faire représenter à la Conférence,

b) des copies certifiées conformes du texte des amendements à la Convention SOLAS de 1974 et à la résolution A.744(18), ainsi que des résolutions 1 et 2 portant adoption de ces amendements, à tous les Gouvernements contractants à la Convention SOLAS de 1974, conformément à l'article VIII c) ii) de la Convention SOLAS de 1974; et

c) des copies du texte des amendements à la Convention SOLAS de 1974 et à la résolution A.744(18), ainsi que des résolutions 1 et 2 portant adoption de ces amendements, aux gouvernements des Etats qui ne sont pas des Gouvernements contractants à la Convention.

EN FOI DE QUOI les soussignés ont apposé leur signature au bas du présent Acte final.

FAIT A LONDRES ce vingt-huit novembre mil neuf cent quatre-vingt-dix-sept.

Acta final de la Conferencia de los Gobiernos Contratantes del Convenio internacional para la seguridad de la vida humana en el mar, 1974

1 En cumplimiento de las decisiones adoptadas por los Gobiernos Contratantes del Convenio internacional para la seguridad de la vida humana en el mar, 1974, presentes en el 68° periodo de sesiones del Comité de Seguridad Marítima de la Organización Marítima Internacional, en el 78° periodo de sesiones del Consejo de la Organización y en el vigésimo periodo de sesiones de la Asamblea de la Organización, y de conformidad con lo dispuesto en el artículo VIII c) del Convenio internacional para la seguridad de la vida humana en el mar, 1974 (Convenio SOLAS 1974), la Organización convocó una conferencia de los Gobiernos Contratantes del Convenio internacional para la seguridad de la vida humana en el mar, 1974. El objeto de la Conferencia fue examinar y aprobar enmiendas al Convenio SOLAS 1974 y a la resolución A.744(18) destinadas a acrecentar la seguridad de los graneleros.

2 La Conferencia se celebró en la sede de la Organización Marítima Internacional, Londres, los días 24, 27 (tarde) y 28 (tarde) de noviembre de 1997.

3 Participaron en la Conferencia representantes de 98 Gobiernos Contratantes del Convenio SOLAS 1974, a saber, los representantes de:

ALEMANIA
ARABIA SAUDITA
ARGELIA
ARGENTINA
AUSTRALIA
BAHAMAS
BANGLADESH
BARBADOS
BÉLGICA
BELICE
BENIN
BRASIL
BULGARIA
CAMBOYA
CAMERÚN
CANADÁ
COLOMBIA
CONGO
CÔTE D'IVOIRE
CROACIA
CUBA
CHILE
CHINA
CHIPRE
DINAMARCA
ECUADOR
EGIPTO
EMIRATOS ÁRABES UNIDOS

ESLOVENIA
ESPAÑA
ESTADOS UNIDOS DE AMÉRICA
ESTONIA
ETIOPÍA
FEDERACIÓN DE RUSIA
FIJI
FILIPINAS
FINLANDIA
FRANCIA
GABÓN
GAMBIA
GHANA
GRECIA
HONDURAS
HUNGRÍA
INDIA
INDONESIA
IRÁN (REPÚBLICA ISLÁMICA DEL)
IRLANDA
ISLANDIA
ISRAEL
ITALIA
JAMAICA
JAPÓN
KUWAIT
LETONIA
LIBERIA
LITUANIA
LUXEMBURGO
MALASIA
MALTA
MARRUECOS
MÉXICO
MÓNACO
MOZAMBIQUE
MYANMAR
NIGERIA
NORUEGA
NUEVA ZELANDIA
OMÁN
PAÍSES BAJOS
PANAMÁ
PAPUA NUEVA GUINEA
PERÚ
POLONIA
PORTUGAL
QATAR
REINO UNIDO DE GRAN BRETAÑA E IRLANDA DEL NORTE
REPÚBLICA CHECA
REPÚBLICA DE COREA
REPÚBLICA POPULAR DEMOCRÁTICA DE COREA
RUMANIA
SAN VICENTE Y LAS GRANADINAS
SEYCHELLES
SINGAPUR
SRI LANKA
SUDÁFRICA
SUDÁN
SUECIA
TAILANDIA
TRINIDAD Y TABAGO
TÚNEZ
TURQUÍA
UCRANIA
URUGUAY
VANUATU
VENEZUELA
VIET NAM
YEMEN

4 Bosnia y Herzegovina y la República Unida de Tanzania, que no son Gobiernos Contratantes del Convenio SOLAS 1974, enviaron observadores a la Conferencia.

5 Hong Kong (China) y Macao, Miembros Asociados de la Organización Marítima Internacional, enviaron observadores a la Conferencia.

6 Enviaron observadores a la Conferencia las siguientes organizaciones intergubernamentales:

ORGANIZACIÓN HIDROGRÁFICA INTERNACIONAL (OHI)
COMISIÓN DE LAS COMUNIDADES EUROPEAS (CCE)
FONDO INTERNACIONAL DE INDEMNIZACIÓN DE DAÑOS DEBIDOS A CONTAMINACIÓN POR HIDROCARBUROS (FONDO IOPC)
LIGA DE LOS ESTADOS ÁRABES

7 Enviaron observadores a la Conferencia las siguientes organizaciones internacionales no gubernamentales:

CÁMARA NAVIERA INTERNACIONAL (ICS)
UNIÓN INTERNACIONAL DE SEGUROS DE TRANSPORTES (IUMI)
CONFEDERACIÓN INTERNACIONAL DE ORGANIZACIONES SINDICALES LIBRES (CIOSL)
COMITÉ INTERNACIONAL RADIOMARÍTIMO (CIRM)
CONSEJO MARÍTIMO INTERNACIONAL Y DEL BÁLTICO (BIMCO)
ASOCIACIÓN INTERNACIONAL DE SOCIEDADES DE CLASIFICACIÓN (IACS)
ASOCIACIÓN LATINOAMERICANA DE ARMADORES (ALAMAR)
FORO MARÍTIMO INTERNACIONAL DE COMPAÑÍAS PETROLERAS (OCIMF)
ASOCIACIÓN INTERNACIONAL DE PRÁCTICOS (IMPA)
ASOCIACIÓN INTERNACIONAL DE LOS INSTITUTOS DE NAVEGACIÓN (IAIN)
FEDERACIÓN INTERNACIONAL DE ASOCIACIONES DE CAPITANES DE BUQUES (IFSMA)
ASOCIACIÓN DE CONSTRUCTORES Y REPARADORES NAVALES DE EUROPA (AWES)
FEDERACIÓN INTERNACIONAL ANTICONTAMINACIÓN DE ARMADORES DE BUQUES TANQUE (ITOPF)
FEDERACIÓN INTERNACIONAL DE SALVAMENTO DE NÁUFRAGOS (ILF)
UNIÓN INTERNACIONAL DE TRANSPORTES POR CARRETERA (IRU)
GREENPEACE INTERNACIONAL
ASOCIACIÓN INTERNACIONAL DE ARMADORES DE BUQUES DE CARGA SECA (INTERCARGO)
EL INSTITUTO DE INGENIEROS NAVALES (MÁQUINAS) (IME)

8 Inauguró la Conferencia el Sr. W.A. O'Neil, Secretario General de la Organización Marítima Internacional.

9 El Sr. T. Allan, Jefe de la delegación del Reino Unido, fue elegido Presidente de la Conferencia.

10 El Sr. Ali Jabra Ghabban, Jefe de la delegación de Arabia Saudita, fue elegido Vicepresidente de la Conferencia.

11 La Secretaría de la Conferencia quedó constituida como sigue:

Secretario General:	Sr. W.A. O'Neil, Secretario General de la Organización Marítima Internacional
Secretario ejecutivo:	Sr. E.E. Mitropoulos, Director, División de Seguridad Marítima
Subsecretario ejecutivo:	Sr. F. Plaza, Director adjunto superior, División de Seguridad Marítima
Subsecretario ejecutivo:	Sr. T. Fossum, Director adjunto superior, División de Seguridad Marítima

12 La Conferencia utilizó como base de su labor:

- un proyecto de texto de enmiendas al Convenio SOLAS 1974;

- un proyecto de texto de enmiendas a la resolución A.744(18) - Directrices sobre el programa mejorado de inspecciones durante los reconocimientos de graneleros y petroleros; y

- un proyecto de texto de resoluciones de la Conferencia conexas,

elaborados y aprobados por el Comité de Seguridad Marítima, en su 68º periodo de sesiones, para que la Conferencia los examinara.

13 La Conferencia también examinó las observaciones y propuestas que le enviaron los Gobiernos Contratantes del Convenio SOLAS y las organizaciones internacionales interesadas.

14 Como resultado de sus deliberaciones, según consta en las actas de las decisiones de las sesiones plenarias, la Conferencia aprobó:

.1 las enmiendas al Convenio internacional para la seguridad de la vida humana en el mar, 1974, junto con la resolución 1 sobre la aprobación de dichas enmiendas; y

.2 las enmiendas a la resolución A.744(18) - Directrices sobre el programa mejorado de inspecciones durante los reconocimientos de graneleros y petroleros, junto con la resolución 2 sobre la aprobación de dichas enmiendas.

que constituyen el documento adjunto 1 de la presente Acta final.

15 La Conferencia también aprobó las siguientes resoluciones que figuran en el documento adjunto 2 de la presente Acta final:

Resolución 3:	Recomendación sobre el cumplimiento de la regla XII/5 del Convenio SOLAS
Resolución 4:	Normas para evaluar los escantillones del mamparo transversal estanco acanalado verticalmente, situado entre las dos bodegas de carga más cercanas a proa, y para evaluar la carga admisible de la bodega de carga más cercana a proa
Resolución 5:	Recomendación sobre los instrumentos de carga
Resolución 6:	Interpretación de la definición de "granelero", que figura en el capítulo IX del Convenio SOLAS 1974, en su forma enmendada en 1994
Resolución 7:	Reconocimientos mejorados efectuados antes de la entrada en vigor de las enmiendas

Resolución 8: Continuación de la labor relativa a la seguridad de los graneleros

Resolución 9: Implantación del Código internacional de gestión de la seguridad (Código IGS)

16 El texto de la presente Acta final, incluidos sus documentos adjuntos, ha sido redactado en un solo original en los idiomas árabe, chino, español, francés, inglés y ruso. El texto original quedará depositado ante el Secretario General de la Organización Marítima Internacional.

17 El Secretario General de la Organización Marítima Internacional hará llegar:

a) copias certificadas de la presente Acta final, incluido el documento adjunto 2, a los gobiernos de los Estados que fueron invitados a enviar representantes a la Conferencia;

b) copias certificadas del texto de las enmiendas al Convenio SOLAS 1974 y a la resolución A.744(18), junto con las resoluciones 1 y 2 sobre la aprobación de las enmiendas, a todos los Gobiernos Contratantes del Convenio SOLAS 1974, de conformidad con lo dispuesto en el artículo VIII c) ii) del Convenio; y

c) copias del texto de las enmiendas al Convenio SOLAS 1974 y a la resolución A.744(18), junto con las resoluciones 1 y 2 sobre la aprobación de las enmiendas, a los gobiernos de los Estados que no son Gobiernos Contratantes del Convenio.

EN FE DE LO CUAL los infrascritos firman la presente Acta final.

HECHO EN LONDRES, el día veintiocho de noviembre de mil novecientos noventa y siete.

الرئيس

主 席

PRESIDENT

PRESIDENT

ПРЕДСЕДАТЕЛЬ

PRESIDENTE

نائب الرئيس

副主席

VICE-PRESIDENT

VICE-PRESIDENT

ВИЦЕ-ПРЕДСЕДАТЕЛЬ

VICEPRESIDENTE

أمين عام المنظمة البحرية الدولية

国际海事组织秘书长

SECRETARY-GENERAL OF THE INTERNATIONAL MARITIME ORGANIZATION

SECRETAIRE GENERAL DE L'ORGANISATION MARITIME INTERNATIONALE

ГЕНЕРАЛЬНЫЙ СЕКРЕТАРЬ МЕЖДУНАРОДНОЙ МОРСКОЙ ОРГАНИЗАЦИИ

SECRETARIO GENERAL DE LA ORGANIZACION MARITIMA INTERNACIONAL

الأمين التنفيذي للمؤتمر

会议执行秘书

EXECUTIVE SECRETARY OF THE CONFERENCE

SECRETAIRE EXECUTIF DE LA CONFERENCE

ИСПОЛНИТЕЛЬНЫЙ СЕКРЕТАРЬ КОНФЕРЕНЦИИ

SECRETARIO EJECUTIVO DE LA CONFERENCIA

نائب الأمين التنفيذى للمؤتمر

会议副执行秘书

DEPUTY EXECUTIVE SECRETARY OF THE CONFERENCE

SECRETAIRE EXECUTIF ADJOINT DE LA CONFERENCE

ЗАМЕСТИТЕЛЬ ИСПОЛНИТЕЛЬНОГО СЕКРЕТАРЯ КОНФЕРЕНЦИИ

SECRETARIO EJECUTIVO ADJUNTO DE LA CONFERENCIA

نائب الأمين التنفيذى للمؤتمر

会议副执行秘书

DEPUTY EXECUTIVE SECRETARY OF THE CONFERENCE

SECRETAIRE EXECUTIF ADJOINT DE LA CONFERENCE

ЗАМЕСТИТЕЛЬ ИСПОЛНИТЕЛЬНОГО СЕКРЕТАРЯ КОНФЕРЕНЦИИ

SECRETARIO EJECUTIVO ADJUNTO DE LA CONFERENCIA

عـن الجزائـــــــر

代表 阿尔及利亚

FOR ALGERIA:

POUR L'ALGERIE:

ЗА АЛЖИР:

POR ARGELIA:

عن الارجنتين

代表 阿根廷

FOR ARGENTINA:

POUR L'ARGENTINE:

ЗА АРГЕНТИНУ:

POR LA ARGENTINA:

عن استراليـــا

代表 澳大利亚

FOR AUSTRALIA:

POUR L'AUSTRALIE:

ЗА АВСТРАЛИЮ:

POR AUSTRALIA:

عن جزر البهاما

代表 巴哈马

FOR THE BAHAMAS:

POUR LES BAHAMAS:

ЗА БАГАМСКИЕ ОСТРОВА:

POR LAS BAHAMAS:

عـن بنـغلاديـــش

代表 孟加拉

FOR BANGLADESH:

POUR LE BANGLADESH:

ЗА БАНГЛАДЕШ:

POR BANGLADESH:

عــن بربــــادوس

代表 巴巴多斯

FOR BARBADOS:

POUR LA BARBADE:

ЗА БАРБАДОС:

POR BARBADOS:

عن بلجيكــــا

代表 比利时

FOR BELGIUM:

POUR LA BELGIQUE:

ЗА БЕЛЬГИЮ:

POR BELGICA:

عن بليز

代表 伯利兹

FOR BELIZE:

POUR LE BELIZE:

ЗА БЕЛИЗ:

POR BELICE:

عـــن بـــنـــن

代表 贝宁

FOR BENIN:

POUR LE BENIN:

ЗА БЕНИН:

POR BENIN:

عن البرازيـــل

代表 巴西

FOR BRAZIL:

POUR LE BRESIL:

ЗА БРАЗИЛИЮ:

POR EL BRASIL:

عن بلغاريـــا

代表 保加利亚

FOR BULGARIA:

POUR LA BULGARIE:

ЗА БОЛГАРИЮ:

POR BULGARIA:

عن كمبوديــــــا

代表 柬埔寨：

FOR CAMBODIA:

POUR LE CAMBODGE

ЗА КАМБОДЖУ

POR CAMBOYA:

عن الكاميرون

代表 喀麦隆

FOR CAMEROON:

POUR LE CAMEROUN:

ЗА КАМЕРУН:

POR EL CAMERUN:

عن كنـــدا

代表 加拿大

FOR CANADA:
POUR LE CANADA:
ЗА КАНАДУ:
POR EL CANADA:

عن شيلـــي

代表 智利

FOR CHILE:

POUR LE CHILI:

ЗА ЧИЛИ:

FOR CHILE:

عن الصين

代表 中国

FOR CHINA:

POUR LA CHINE:

ЗА КИТАЙ:

POR CHINA:

عن كولومبيـــــا

代表 哥伦比亚

FOR COLOMBIA:
POUR LA COLOMBIE:
ЗА КОЛУМБИЮ:
POR COLOMBIA:

V. Villalba

V. VILLALBA.

عن الكونغو

代表 刚果

FOR THE CONGO:

POUR LE CONGO:

ЗА КОНГО:

POR EL CONGO:

عــن كوت ديفــــــــوار

代表科特迪瓦

FOR COTE D'IVOIRE:

POUR LA COTE D'IVOIRE:

ЗА КОТ д'ИВУАР:

POR LA COTE D'IVOIRE:

عن كرواتيا

代表克罗地亚:

FOR CROATIA:

POUR LA CROATIE :

ЗА ХОРВАТИЮ:

POR CROACIA:

عن كوبـــا

代表 古巴

FOR CUBA:

POUR CUBA:

ЗА КУБУ:

POR CUBA:

عن قبرص

代表 塞浦路斯

FOR CYPRUS:

POUR CHYPRE:

ЗА КИПР:

POR CHIPRE:

Nικόλαος Χρ.

Chr. Pah

Chrysostomou

عن الجمهورية التشيكية

代表捷克共和国

FOR THE CZECH REPUBLIC

POUR LA REPUBLIQUE TCHEQUE

РЕСПУБЛИКА ЧЕХИЯ

POR LA REPUBLICA CHECA

عن جمهورية كوريا الشعبية الديمقراطيـــــــة

代表 朝鲜民主主义人民共和国

FOR THE DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA:

POUR LA REPUBLIQUE POPULAIRE DEMOCRATIQUE DE COREE:

ЗА КОРЕЙСКУЮ НАРОДНО-ДЕМОКРАТИЧЕСКУЮ РЕСПУБЛИКУ:

POR LA REPUBLICA POPULAR DEMOCRATICA DE COREA:

عن الدانمرك

代表 丹麦

FOR DENMARK:

POUR LE DANEMARK:

ЗА ДАНИЮ:

POR DINAMARCA:

عن الاكـــوادور

代表 厄瓜多尔

FOR ECUADOR:

POUR L'EQUATEUR:

ЗА ЭКВАДОР:

POR EL ECUADOR:

عن مصـــر

代表 埃及

FOR EGYPT:

POUR L'EGYPTE:

ЗА ЕГИПЕТ:

POR EGIPTO:

H. A. Ragab

عن استونيا

代表爱沙尼亚:

FOR ESTONIA:

POUR L'ESTONIE :

ЗА ЭСТОНИЮ:

POR ESTONIA.

عن إثيوبيا

代表 埃塞俄比亚

FOR ETHIOPIA:

POUR L'ETHIOPIE:

ЗА ЭФИОПИЮ:

POR ETIOPIA:

عن فيجـــي

代表 斐济

FOR FIJI:

POUR FIDJI:

ЗА ФИДЖИ:

POR FIJI:

for High Commissioner

عن فنلندا

代表 芬兰

FOR FINLAND:

POUR LA FINLANDE:

ЗА ФИНЛЯНДИЮ:

POR FINLANDIA:

عن فرنسا

代表 法国

FOR FRANCE:

POUR LA FRANCE:

ЗА ФРАНЦИЮ:

POR FRANCIA:

عـن الغـــابـــون

代表 加蓬

FOR GABON:

POUR LE GABON:

ЗА ГАБОН:

POR EL GABON:

عن غامبيا

代表 冈比亚

FOR THE GAMBIA:

POUR LA GAMBIE:

ЗА ГАМБИЮ:

POR GAMBIA:

عن ألمانيا
代表德国：
FOR GERMANY:
POUR L'ALLEMAGNE:
ЗА ГЕРМАНИЮ:
POR ALEMANIA:

عـن غـانـا

代表 加纳

FOR GHANA:

POUR LE GHANA:

ЗА ГАНУ:

POR GHANA:

عن اليونان

代表 希腊

FOR GREECE:

POUR LA GRECE:

ЗА ГРЕЦИЮ:

POR GRECIA:

عن هنـدوراس

代表 洪都拉斯

FOR HONDURAS:

POUR LE HONDURAS:

ЗА ГОНДУРАС:

POR HONDURAS:

عـــن هنغـاريـــا

代表 匈牙利

FOR HUNGARY:

POUR LA HONGRIE:

ЗА ВЕНГРИЮ:

POR HUNGRIA:

عن أيسلندا

代表 冰岛

FOR ICELAND:
POUR L'ISLANDE:
ЗА ИСЛАНДИЮ:
POR ISLANDIA:

Pétur Guðmundsson

عن الهند

代表 印度

FOR INDIA:

POUR L'INDE:

ЗА ИНДИЮ:

POR LA INDIA:

عن اندونيسيا

代表 印度尼西亚

FOR INDONESIA:

POUR L'INDONESIE:

ЗА ИНДОНЕЗИЮ:

POR INDONESIA:

عن جمهورية ايران الاسلامية

代表 伊朗伊斯兰共和国

FOR THE ISLAMIC REPUBLIC OF IRAN:
POUR LA REPUBLIQUE ISLAMIQUE D'IRAN:
ЗА ИСЛАМСКУЮ РЕСПУБЛИКУ ИРАН:
POR LA REPUBLICA ISLAMICA DEL IRAN:

عن أيرلنـدا

代表 爱尔兰

FOR IRELAND:

POUR L'IRLANDE:

ЗА ИРЛАНДИЮ:

POR IRLANDA: James J. Kelly

عن اسرائيل
代表 以色列
FOR ISRAEL:
POUR ISRAEL:
ЗА ИЗРАИЛЬ:
POR ISRAEL:

A. Rona
ארה רון

عن ايطاليا

代表 意大利

FOR ITALY:

POUR L'ITALIE:

ЗА ИТАЛИЮ:

POR ITALIA:

عن جامايكا

代表 牙买加

FOR JAMAICA:

POUR LA JAMAIQUE:

ЗА ЯМАЙКУ:

POR JAMAICA:

عن اليابان

代表 日本

FOR JAPAN:

POUR LE JAPON:

ЗА ЯПОНИЮ:

POR EL JAPON:

篠林義夫

平原祐

山田浩之

小西熙

عن الكويـــت

代表 科威特

FOR KUWAIT:

POUR LE KOWEIT:

ЗА КУВЕЙТ:

POR KUWAIT:

عن لاتفيا
代表拉脱维亚:
FOR LATVIA:
POUR LA LETTONIE :
ЗА ЛАТВИЮ:
POR LETONIA:

عن ليبريا

代表 利比里亚

FOR LIBERIA:

POUR LE LIBERIA:

ЗА ЛИБЕРИЮ:

POR LIBERIA:

عن ليتوانيا

代表立陶宛:

FOR LITHUANIA:

POUR LA LITUANIE :

ЗА ЛИТВУ:

POR LITUANIA:

عن لكسمبرغ

代表 卢森堡

FOR LUXEMBOURG:

POUR LE LUXEMBOURG:

ЗА ЛЮКСЕМБУРГ:

POR LUXEMBURGO:

عن ماليزيـــــا

代表 马来西亚

FOR MALAYSIA:

POUR LA MALAISIE:

ЗА МАЛАЙЗИЮ:

POR MALASIA:

عن مالطة

代表 马耳他

FOR MALTA:

POUR MALTE:

ЗА МАЛЬТУ:

POR MALTA:

عن المكسيك

代表 墨西哥

FOR MEXICO:

POUR LE MEXIQUE:

ЗА МЕКСИКУ:

POR MEXICO:

عن موناكـــو

代表 摩纳哥

FOR MONACO:

POUR MONACO:

ЗА МОНАКО:

POR MONACO:

I. S. [illegible]

عن المغــرب

代表 摩洛哥

FOR MOROCCO:

POUR LE MAROC:

ЗА МАРОККО:

POR MARRUECOS:

MEDREK KARIM

عن موزامبيق

代表 莫桑比克

FOR MOZAMBIQUE:

POUR LE MOZAMBIQUE:

ЗА МОЗАМБИК:

POR MOZAMBIQUE:

عن ميانمـــار

代表 缅甸：

FOR MYANMAR:

POUR LE MYANMAR

ЗА МЬЯНМА

POR MYANMAR:

عن هولندا

代表 荷兰

FOR THE NETHERLANDS:

POUR LES PAYS-BAS

ЗА НИДЕРЛАНДЫ:

POR LOS PAISES BAJOS:

عن نيوزيلندا

代表 新西兰

FOR NEW ZEALAND:

POUR LA NOUVELLE-ZELANDE:

ЗА НОВУЮ ЗЕЛАНДИЮ:

POR NUEVA ZELANDIA:

عن نيجيريـــا

代表 尼日利亚

FOR NIGERIA:

POUR LE NIGERIA:

ЗА НИГЕРИЮ:

POR NIGERIA:

عن النرويج
代表 挪威

FOR NORWAY:
POUR LA NORVEGE:
ЗА НОРВЕГИЮ:
POR NORUEGA:

عن عمان

代表 阿曼

FOR OMAN:

POUR L'OMAN:

ЗА ОМАН:

POR OMAN:

Hussain Ibrahim

عن بنما

代表 巴拿马

FOR PANAMA:

POUR LE PANAMA:

ЗА ПАНАМУ:

POR PANAMA:

عن بابوا غينيا الجديدة

代表 巴布亚新几内亚

FOR PAPUA NEW GUINEA:

POUR LA PAPOUASIE-NOUVELLE-GUINEE:

ЗА ПАПУА-НОВАЯ ГВИНЕЯ:

POR PAPUA NUEVA GUINEA:

عن البــيرو

代表 秘鲁

FOR PERU:

POUR LE PEROU:

ЗА ПЕРУ:

POR EL PERU:

عن بولندا

代表 波兰

FOR POLAND:

POUR LA POLOGNE:

ЗА ПОЛЬШУ:

POR POLONIA:

عن الفلبـــين

代表 菲律宾

FOR THE PHILIPPINES:

POUR LES PHILIPPINES:

ЗА ФИЛИППИНЫ:

POR FILIPINAS:

عن البرتغال

代表 葡萄牙

FOR PORTUGAL:

POUR LE PORTUGAL:

ЗА ПОРТУГАЛИЮ:

POR PORTUGAL:

عن قطـــر

代表 卡塔尔

FOR QATAR:

POUR LE QATAR:

ЗА КАТАР:

POR QATAR:

عن جمهورية كوريـا
代表 大韩民国
FOR THE REPUBLIC OF KOREA:
POUR LA REPUBLIQUE DE COREE:
ЗА РЕСПУБЛИКУ КОРЕЯ:
POR LA REPUBLICA DE COREA:

T. W. Kim

عن رومانيـــــا

代表 罗马尼亚

FOR ROMANIA:

POUR LA ROUMANIE:

ЗА РУМЫНИЮ:

POR RUMANIA:

عن الاتحاد الروسي

代表俄罗斯联邦:

FOR THE RUSSIAN FEDERATION:

POUR LA FEDERATION DE RUSSIE :

ЗА РОССИЙСКУЮ ФЕДЕРАЦИЮ:

POR LA FEDERACION DE RUSIA.

عن سانت فنسنت وجزر غرينادين

代表 圣文森特和格林纳丁斯

FOR SAINT VINCENT AND THE GRENADINES:

POUR SAINT-VINCENT-ET-GRENADINES:

ЗА СЕНТ-ВИНСЕНТ И ГРЕНАДИНЫ:

POR SAN VICENTE Y LAS GRANADINAS:

عن المملكة العربية السعودية

代表 沙特阿拉伯

FOR SAUDI ARABIA:

POUR L'ARABIE SAOUDITE:

ЗА САУДОВСКУЮ АРАВИЮ:

POR LA ARABIA SAUDITA:

عن سيشيـــــل

代表 塞舌尔

FOR SEYCHELLES:

POUR LES SEYCHELLES:

ЗА СЕЙШЕЛЬСКИЕ ОСТРОВА:

POR SEYCHELLES:

عن سنغافورة

代表 新加坡

FOR SINGAPORE:

POUR SINGAPOUR:

ЗА СИНГАПУР:

POR SINGAPUR:

K. H. K. Rangam

عن سلوفينيا

代表斯洛文尼亚:

FOR SLOVENIA:

POUR LA SLOVENIE :

ЗА СЛОВЕНИЮ:

POR ESLOVENIA.

عن جنوب أفريقيـــــا

代表　南非：

FOR SOUTH AFRICA:

POUR L'AFRIQUE DU SUD:

ЗА ЮЖНО-АФРИКАНСКУЮ РЕСПУБЛИКУ

POR SUDAFRICA:

عن اسبانيا

代表 西班牙

FOR SPAIN:

POUR L'ESPAGNE:

ЗА ИСПАНИЮ:

POR ESPAÑA:

عن سري لانكا

代表 斯里兰卡

FOR SRI LANKA:
POUR SRI LANKA:
ЗА ШРИ ЛАНКУ:
POR SRI LANKA:

عن السودان
代表 苏丹
FOR THE SUDAN:
POUR LE SOUDAN:
ЗА СУДАН:
POR EL SUDAN:

عن السويد

代表 瑞典

FOR SWEDEN:

POUR LA SUEDE:

ЗА ШВЕЦИЮ:

POR SUECIA:

عن تايلنـد

代表 泰国

FOR THAILAND:

POUR LA THAILANDE:

ЗА ТАИЛАНД:

POR TAILANDIA:

عن ترينيداد وتوباغو

代表 特立尼达和多巴哥

FOR TRINIDAD AND TOBAGO:

POUR LA TRINITE-ET-TOBAGO:

ЗА ТРИНИДАД И ТОБАГО:

POR TRINIDAD Y TABAGO:

عن تونس

代表 突尼斯

FOR TUNISIA:

POUR LA TUNISIE:

ЗА ТУНИС:

POR TÚNEZ:

JEMAI

عن تركيـــا

代表 土耳其

FOR TURKEY:

POUR LA TURQUIE:

ЗА ТУРЦИЮ:

POR TURQUIA:

عن أوكرانيا

代表乌克兰：

FOR UKRAINE:

POUR L'UKRAINE :

ЗА УКРАИНУ:

POR UCRANIA:

عن الامارات العربية المتحدة

代表 阿拉伯联合酋长国

FOR THE UNITED ARAB EMIRATES:

POUR LES EMIRATS ARABES UNIS:

ЗА ОБЪЕДИНЕННЫЕ АРАБСКИЕ ЭМИРАТЫ:

POR LOS EMIRATOS ARABES UNIDOS:

عن المملكة المتحدة لبريطانيا العظمى وآيرلندا الشمالية

代表 大不列颠和北爱尔兰联合王国

FOR THE UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND:
POUR LE ROYAUME-UNI DE GRANDE-BRETAGNE ET D'IRLANDE DU NORD:
ЗА СОЕДИНЕННОЕ КОРОЛЕВСТВО ВЕЛИКОБРИТАНИИ И СЕВЕРНОЙ ИРЛАНДИИ:
POR EL REINO UNIDO DE GRAN BRETAÑA E IRLANDA DEL NORTE:

عن الولايات المتحدة الأمريكية

代表 美利坚合众国

FOR THE UNITED STATES OF AMERICA:

POUR LES ETATS-UNIS D'AMERIQUE:

ЗА СОЕДИНЕННЫЕ ШТАТЫ АМЕРИКИ:

POR LOS ESTADOS UNIDOS DE AMERICA:

عــن الأوروغـــواي

代表 乌拉圭

FOR URUGUAY:

POUR L'URUGUAY:

ЗА УРУГВАЙ:

POR EL URUGUAY:

عن فانواتو

代表 瓦努阿图

FOR VANUATU:

POUR VANUATU:

ЗА ВАНУАТУ:

POR VANUATU:

عن فنزويـــلا

代表 委内瑞拉

FOR VENEZUELA:

POUR LE VENEZUELA:

ЗА ВЕНЕСУЭЛУ:

POR VENEZUELA:

عن فيتنام

代表 越南

FOR VIET NAM:

POUR LE VIET NAM:

ЗА ВЬЕТНАМ:

POR VIET NAM:

عن اليمـن

代表 也门

FOR YEMEN:

POUR LE YEMEN:

ЗА ЙЕМЕН:

POR EL YEMEN:

ATTACHMENT 2

RESOLUTION 3

RECOMMENDATION ON COMPLIANCE WITH SOLAS REGULATION XII/5

THE CONFERENCE,

HAVING ADOPTED amendments to the International Convention for the Safety of Life at Sea (SOLAS), 1974, as amended, concerning the safety of bulk carriers,

CONSIDERING that new SOLAS regulation XII/5 requires that bulk carriers of 150 m in length and upwards of single side skin construction, designed to carry solid bulk cargoes having a density of 1000 kg/m^3 and above and constructed on or after 1 July 1999 should have sufficient strength, taking into account the recommendations adopted by the Organization, to withstand flooding of any one cargo hold in all loading and ballast conditions, taking also into account dynamic effects,

NOTING that the International Association of Classification Societies (IACS) has issued the following relevant Unified Requirements:

S17 Longitudinal strength of hull girder in flooded condition for single side skin bulk carriers;

S18 Evaluation of scantlings of corrugated transverse watertight bulkheads for single side skin bulk carriers considering hold flooding; and

S20 Evaluation of allowable hold loading for single side skin bulk carriers considering hold flooding,

NOTING ALSO that the rules of classification societies should provide for adequate strength for bulk carriers of types other than single side skin construction in accordance with regulation II-1/3-1 of the Convention,

BEING OF THE OPINION that application of the said Unified Requirements will satisfy the requirements of regulation XII/5 of the Convention,

URGES Governments to ensure that all bulk carriers of single side skin construction, whether or not they are classed with classification societies being members of IACS, comply with the aforesaid IACS Unified Requirements.

RESOLUTION 4

STANDARDS FOR THE EVALUATION OF SCANTLINGS OF THE TRANSVERSE WATERTIGHT VERTICALLY CORRUGATED BULKHEAD BETWEEN THE TWO FOREMOST CARGO HOLDS AND FOR THE EVALUATION OF ALLOWABLE HOLD LOADING OF THE FOREMOST CARGO HOLD

THE CONFERENCE,

HAVING ADOPTED amendments to the International Convention for the Safety of Life at Sea (SOLAS), 1974, as amended, concerning the safety of bulk carriers,

CONSIDERING that new SOLAS regulation XII/6 requires that the transverse watertight vertically corrugated bulkhead between the two foremost cargo holds and the double bottom structure in way of the foremost cargo hold of bulk carriers of 150 m in length and upwards of single side skin construction, carrying solid bulk cargoes having a density of 1780 kg/m^3 and above, should have sufficient strength, in compliance with the Bulk carrier bulkhead and double bottom standards developed by the Organization, to withstand flooding of the foremost cargo hold, taking also into account dynamic effects,

BEING OF THE OPINION that the implementation by Governments of the said regulation in accordance with the implementation schedule prescribed in new SOLAS regulation XII/3 will greatly contribute to enhancing the safety of existing bulk carriers and safeguarding the lives of those on board,

HAVING CONSIDERED the recommendation made by the Maritime Safety Committee of the International Maritime Organization at its sixty-eighth session,

ADOPTS:

.1 the Standards for the evaluation of scantlings of the transverse watertight vertically corrugated bulkhead between the two foremost cargo holds, set out in Annex 1 to the present resolution; and

.2 the Standards for the evaluation of allowable hold loading of the foremost cargo hold, set out in Annex 2 to the present resolution,

for the purpose of application of SOLAS regulation XII/6.

ANNEX 1

STANDARDS FOR THE EVALUATION OF SCANTLINGS OF THE TRANSVERSE WATERTIGHT VERTICALLY CORRUGATED BULKHEAD BETWEEN THE TWO FOREMOST CARGO HOLDS

1 INTRODUCTION

The net scantlings of the transverse watertight vertically corrugated bulkhead between the two foremost cargo holds are to be calculated using the loads given in Section 2, the bending moment and shear force given in Section 3 and the strength criteria given in Section 4.

Where necessary, steel renewal and/or reinforcements are required as per Section 6.

In these standards, homogeneous loading condition means a loading condition in which the ratio between the highest and the lowest filling ratio, evaluated for the two foremost cargo holds, does not exceed 1.20, to be corrected for different cargo densities.

2 LOAD MODEL

2.1 General

The loads to be considered as acting on the bulkhead are those given by the combination of the cargo loads with those induced by the flooding of the foremost cargo hold.

The most severe combinations of cargo induced loads and flooding loads are to be used for the check of the scantlings of the bulkhead, depending on the loading conditions included in the loading manual:

- homogeneous loading conditions;
- non-homogeneous loading conditions.

Non-homogeneous part loading conditions associated with multiport loading and unloading operations for homogeneous loading conditions need not to be considered according to these standards.

2.2 Bulkhead corrugation flooding head

The flooding head h_f (see figure 1) is the distance, in m, measured vertically with the ship in the upright position, from the calculation point to a level located at a distance d_f, in m, from the baseline equal to:

(a) in general:

D

(b) for ships less than 50,000 tonnes deadweight with Type B freeboard:

$0.95 \cdot D$

where:

D = the distance, in m, from the baseline to the freeboard deck at side amidship (see figure 1).

(c) for ships to be operated at an assigned load line draught T_r less than the permissible loadline draught T, the flooding head defined in (a) and (b) may be reduced by $T - T_r$.

2.3 Pressure in the flooded hold

2.3.1 Bulk cargo loaded hold

Two cases are to be considered, depending on the values of d_1 and d_f, d_1 (see figure 1) being a distance from the baseline given, in m, by:

$$d_1 = \frac{M_c}{\rho_c \cdot l_c \cdot B} + \frac{V_{LS}}{l_c \cdot B} + (h_{HT} - h_{DB}) \cdot \frac{b_{HT}}{B} + h_{DB}$$

where:

M_c = mass of cargo, in tonnes, in the foremost cargo hold

ρ_c = bulk cargo density, in t/m^3

l_c = length of the foremost cargo hold, in m

B = ship's breadth amidships, in m

V_{LS} = volume, in m^3, of the bottom stool above the inner bottom

h_{HT} = height of the hopper tanks amidship, in m, from the baseline

h_{DB} = height of the double bottom, in m

b_{HT} = breadth of the hopper tanks amidship, in m.

(a) $d_f \geq d_1$

At each point of the bulkhead located at a distance between d_1 and d_f from the baseline, the pressure $p_{c,f}$, in kN/m^2, is given by:

$$p_{c,f} = \rho \cdot g \cdot h_f$$

where:

ρ = sea water density, in t/m^3

g = 9.81 m/s^2, gravity acceleration

h_f = flooding head as defined in section 2.2.

At each point of the bulkhead located at a distance lower than d_1 from the baseline, the pressure $p_{c,f}$, in kN/m^2, is given by:

$$p_{c,f} = \rho \cdot g \cdot h_f + [\rho_c - \rho \cdot (1 - perm)] \cdot g \cdot h_1 \cdot \tan^2 \gamma$$

where:

ρ, g, h_f = as given above

ρ_c = bulk cargo density, in t/m^3

perm = permeability of cargo, to be taken as 0.3 for ore (the corresponding bulk cargo density for iron ore may generally be taken as 3.0 t/m^3).

h_1 = vertical distance, in m, from the calculation point to a level located at a distance d_1, as defined above, from the base line (see figure 1)

γ = $45° - (\varphi/2)$

φ = angle of repose of the cargo, in degrees, which may generally be taken as 35° for iron ore.

The force $F_{c,f}$, in kN, acting on a corrugation is given by:

$$F_{c,f} = s_1 \cdot \left[\rho \cdot g \cdot \frac{(d_f - d_1)^2}{2} + \frac{\rho \cdot g \cdot (d_f - d_1) + (p_{c,f})_{le}}{2} \cdot (d_1 - h_{DB} - h_{LS})\right]$$

where:

s_1 = spacing of corrugations, in m (see figure 2a)

ρ, g, d_1, h_{DB} = as given above

d_f = as given in 2.2

$(p_{c,f})_{le}$ = pressure, in kN/m^2, at the lower end of the corrugation

h_{LS} = height of the lower stool, in m, from the inner bottom.

(b) $d_f < d_1$

At each point of the bulkhead located at a distance between d_f and d_1 from the baseline, the pressure $p_{c,f}$, in kN/m^2, is given by:

$$p_{c,f} = \rho_c \cdot g \cdot h_1 \cdot \tan^2 \gamma$$

where:

ρ_c, g, h_1, γ = as given in (a)

At each point of the bulkhead located at a distance lower than d_f from the baseline, the pressure $p_{c,f}$, in kN/m^2, is given by:

$$p_{c,f} = \rho \cdot g \cdot h_f + [\rho_c \cdot h_1 - \rho \cdot (1\text{-perm}) \cdot h_f] \cdot g \cdot \tan^2 \gamma$$

where:

ρ, g, h_f, ρ_c, h_1, perm, γ = as given in (a)

The force $F_{c,f}$, in kN, acting on a corrugation is given by:

$$F_{c,f} = s_1 \cdot \left[\rho_c \cdot g \cdot \frac{(d_1 - d_f)^2}{2} \cdot \tan^2\gamma + \frac{\rho_c \cdot g \cdot (d_1 - d_f) \cdot \tan^2 \gamma + (p_{c,f})_{le}}{2} \cdot (d_f - h_{DB} - h_{LS})\right]$$

where:

s_1, ρ_c, g, γ, $(p_{c,f})_{le}$, h_{LS} = as given in (a)

d_1, h_{DB}, = as given above

d_f = as given in 2.2.

2.3.2 Empty hold

At each point of the bulkhead, the hydrostatic pressure p_f induced by the flooding head h_f is to be considered.

The force F_f, in kN, acting on a corrugation is given by:

$$F_f = s_1 \cdot \rho \cdot g \cdot \frac{(d_f - h_{DB} - h_{LS})^2}{2}$$

where:

s_1, ρ, g, h_{LS} = as given in 2.3.1 (a)

h_{DB} = as given in 2.3.1

d_f = as given in 2.2

2.4 Pressure in the non-flooded bulk cargo loaded hold

At each point of the bulkhead, the pressure p_c, in kN/m², is given by:

$$p_c = \rho_c \cdot g \cdot h_1 \cdot \tan^2\gamma$$

where:

ρ_c, g, h_1, γ = as given in 2.3.1 (a)

The force F_c, in kN, acting on a corrugation is given by:

$$F_c = \rho_c \cdot g \cdot s_1 \cdot \frac{(d_1 - h_{DB} - h_{LS})^2}{2} \cdot \tan^2\gamma$$

where:

ρ_c, g, s_1, h_{LS}, γ = as given in 2.3.1 (a)

d_1, h_{DB} = as given in 2.3.1.

2.5 Resultant pressure

2.5.1 Homogeneous loading conditions

At each point in the bulkhead structure, the resultant pressure p, in kN/m², to be considered for the scantlings of the bulkhead, is given by:

$$p = p_{c,f} - 0.8 \cdot p_c$$

The resultant force F, in kN, acting on a corrugation is given by:

$$F = F_{c,f} - 0.8 \cdot F_c$$

2.5.2 Non-homogeneous loading conditions

At each point in the bulkhead structure, the resultant pressure p in kN/m², to be considered for the scantlings of the bulkhead, is given by:

$$p = p_{c,f}$$

The resultant force F, in kN, acting on a corrugation is given by:

$$F = F_{c,f}$$

In case the foremost cargo hold, in non-homogenous loading conditions, is not allowed to be loaded, the resultant pressure p, in kN/m^2, to be considered for the scantlings of the bulkhead, is given by:

$$p = p_f$$

and the resultant force F, in kN, acting on a corrugation is given by:

$$F = F_f$$

3 BENDING MOMENT AND SHEAR FORCE IN THE BULKHEAD CORRUGATIONS

The bending moment M and the shear force Q in the bulkhead corrugations are obtained using the formulae given in 3.1 and 3.2. The M and Q values are to be used for the checks in Section 4.

3.1 Bending moment

The design bending moment M, in kN·m, for the bulkhead corrugations is given by:

$$M = \frac{F \cdot \ell}{8}$$

where:

F = resultant force, in KN, as given in 2.5

ℓ = span of the corrugation, in m, to be taken according to figures 2a and 2b

3.2 Shear force

The shear force Q, in kN, at the lower end of the bulkhead corrugations is given by:

$$Q = 0.8 \cdot F$$

where:

F = as given in 2.5

4 STRENGTH CRITERIA

4.1 General

The following criteria are applicable to transverse bulkheads with vertical corrugations (see figure 2a).

Requirements for local net plate thickness are given in 4.7.

In addition, the criteria given in 4.2 and 4.5 are to be complied with.

Where the corrugation angle ϕ shown in figure 2a is less than 50°, an horizontal row of staggered shedder plates is to be fitted at approximately mid depth of the corrugations (see figure 2a) to help preserve dimensional stability of the bulkhead under flooding loads. The shedder plates are to be welded to the corrugations by double continuous welding, but they are not to be welded to the side shell.

The thicknesses of the lower part of corrugations considered in the application of 4.2 and 4.3 are to be maintained for a distance from the inner bottom (if no lower stool is fitted) or the top of the lower stool not less than $0.15 \cdot \ell$.

The thicknesses of the middle part of corrugations considered in the application of 4.2 and 4.4 are to be maintained to a distance from the deck (if no upper stool is fitted) or the bottom of the upper stool not greater than $0.3 \cdot \ell$.

4.2 Bending capacity and shear stress

The bending capacity is to comply with the following relationship:

$$10^3 \cdot \frac{M}{0.5 \cdot Z_{\ell e} \cdot \sigma_{a,\ell e} + Z_m \cdot \sigma_{a,m}} \leq 1.0$$

where:

M = bending moment, in kN·m, as given in 3.1.

$Z_{\ell e}$ = section modulus of one half pitch corrugation, in cm^3, at the lower end of corrugations, to be calculated according to 4.3.

Z_m = section modulus of one half pitch corrugation, in cm^3, at the mid-span of corrugations, to be calculated according to 4.4.

$\sigma_{a,\ell e}$ = allowable stress, in N/mm^2, as given in 4.5, for the lower end of corrugations

$\sigma_{a,m}$ = allowable stress, in N/mm^2, as given in 4.5, for the mid-span of corrugations.

In no case is Z_m to be taken greater than the lesser of $1.15 \cdot Z_{\ell e}$ and $1.15 \cdot Z'_{\ell e}$ for calculation of the bending capacity, $Z'_{\ell e}$ being defined below.

In case effective shedder plates are fitted which:

- are not knuckled;
- are welded to the corrugations and the top of the lower stool by one side penetration welds or equivalent;
- are fitted with a minimum slope of 45° and their lower edge is in line with the stool side plating;

or effective gusset plates are fitted which:

- are fitted in line with the stool side plating;
- have material properties at least equal to those provided for the flanges,

the section modulus $Z_{\ell e}$, in cm^3, is to be taken not larger than the value $Z'_{\ell e}$, in cm^3, given by:

$$Z'_{\ell e} = Z_g + 10^3 \cdot \frac{Q \cdot h_g - 0.5 \cdot h_g^2 \cdot s_1 \cdot p_g}{\sigma_a}$$

where:

Z_g	=	section modulus of one half pitch corrugation, in cm^3, according to 4.4, in way of the upper end of shedder or gusset plates, as applicable
Q	=	shear force, in kN, as given in 3.2
h_g	=	height, in m, of shedders or gusset plates, as applicable (see figures 3a, 3b, 4a and 4b)
s_1	=	as given in 2.3.1 (a)
p_g	=	resultant pressure, in kN/m^2, as defined in 2.5, calculated in way of the middle of the shedders or gusset plates, as applicable
σ_a	=	allowable stress, in N/mm^2, as given in 4.5.

Shear stresses τ are obtained by dividing the shear force Q by the shear area. The shear area is to be reduced in order to account for possible non-perpendicularity between the corrugation webs and flanges. In general, the reduced shear area may be obtained by multiplying the web sectional area by ($\sin \phi$), ϕ being the angle between the web and the flange.

When calculating the section moduli and the shear area, the net plate thicknesses are to be used

The section moduli of corrugations are to be calculated on the basis of the requirements standards given in 4.3 and 4.4.

4.3 Section modulus at the lower end of corrugations

The section modulus is to be calculated with the compression flange having an effective flange width, b_{ef}, not larger than as given in 4.6.1.

If the corrugation webs are not supported by local brackets below the stool top (or below the inner bottom) in the lower part, the section modulus of the corrugations is to be calculated considering the corrugation webs 30% effective.

(a) Provided that effective shedder plates, as defined in 4.2, are fitted (see figures 3a and 3b), when calculating the section modulus of corrugations at the lower end (cross-section ① in figures 3a and 3b), the area of the flange plates, in cm^2, may be increased by

$$\left(2.5 \cdot a \cdot \sqrt{t_f \cdot t_{sh}} \cdot \sqrt{\frac{\sigma_{Fsh}}{\sigma_{Ffl}}}\right) \text{(not to be taken greater than } 2.5 \cdot a \cdot t_f\text{)}$$

where:

a = width, in m, of the corrugation flange (see figure 2a)

t_{sh} = net shedder plate thickness, in mm

t_f = net flange thickness, in mm

σ_{Fsh} = minimum upper yield stress, in N/mm^2, of the material used for the shedder plates

σ_{Ffl} = minimum upper yield stress, in N/mm^2, of the material used for the corrugation flanges.

(b) Provided that effective gusset plates, as defined in 4.2, are fitted (see figures 4a and 4b), when calculating the section modulus of corrugations at the lower end (cross-section ① in figures 4a and 4b), the area of the flange plates, in cm^2, may be increased by $(7 \cdot h_g \cdot t_{gu})$

where:

h_g = height of gusset plate in m, see figures 4a and 4b, not to be taken greater than $\left(\frac{10}{7} \cdot s_{gu}\right)$

s_{gu} = width of the gusset plates, in m

t_{gu} = net gusset plate thickness, in mm, not to be taken greater than t_f

t_f = net flange thickness, in mm, based on the as built condition.

(c) If the corrugation webs are welded to a sloping stool top plate which is at an angle not less than 45° with the horizontal plane, the section modulus of the corrugations may be calculated considering the corrugation webs fully effective. In case effective gusset plates are fitted, when calculating the section modulus of corrugations the area of flange plates may be increased as specified in (b) above. No credit can be given to shedder plates only.

For angles less than 45°, the effectiveness of the web may be obtained by linear interpolation between 30% for 0° and 100% for 45°

4.4 Section modulus of corrugations at cross-sections other than the lower end

The section modulus is to be calculated with the corrugation webs considered effective and the compression flange having an effective flange width, b_{ef}, not larger than as given in 4.6.1.

4.5 Allowable stress check

The normal and shear stresses σ and τ are not to exceed the allowable values σ_a and τ_a, in N/mm^2, given by:

$$\sigma_a = \sigma_F$$
$$\tau_a = 0.5 \cdot \sigma_F$$

where:

σ_F = the minimum upper yield stress, in N/mm^2, of the material.

4.6 Effective compression flange width and shear buckling check

4.6.1 Effective width of the compression flange of corrugations

The effective width b_{ef}, in m, of the corrugation flange is given by:

$$b_{ef} = C_e \cdot a$$

where:

$C_e = \frac{2.25}{\beta} - \frac{1.25}{\beta^2}$ for $\beta > 1.25$

$C_e = 1.0$ for $\beta \leq 1.25$

$\beta = 10^3 \cdot \frac{a}{t_f} \cdot \sqrt{\frac{\sigma_F}{E}}$

t_f = net flange thickness, in mm

a = width, in m, of the corrugation flange (see figure 2a)

σ_F = minimum upper yield stress, in N/mm^2, of the material

E = modulus of elasticity, in N/mm^2, to be assumed equal to $2.06 \cdot 10^5$ N/mm^2 for steel

4.6.2 Shear

The buckling check is to be performed for the web plates at the corrugation ends.

The shear stress τ is not to exceed the critical value τ_c, in N/mm^2, as obtained from the following:

$$\tau_c = \tau_E \quad \text{when } \tau_E \leq \frac{\tau_F}{2}$$

$$= \tau_F \left(1 - \frac{\tau_F}{4\tau_E}\right) \quad \text{when } \tau_E > \frac{\tau_F}{2}$$

where:

$\tau_F \quad = \quad \dfrac{\sigma_F}{\sqrt{3}}$

$\sigma_F \quad =$ minimum upper yield stress, in N/mm^2, of the material as given in 4.6.1

$\tau_E \quad = \quad 0.9\ k_t\ E \left(\dfrac{t}{1000\ c} \right)^2$

k_t, E, t, and c are given by:

$k_t \quad = \quad 6.34$

E = modulus of elasticity of material as given in 4.6.1

t = net thickness, in mm, of corrugation web

c = width, in m, of corrugation web (see figure 2a)

4.7 Local net plate thickness

The bulkhead local net plate thickness t, in mm, is given by:

$$t = 14.9 \cdot s_w \cdot \sqrt{\frac{p}{\sigma_F}}$$

where:

s_w = plate width, in m, to be taken equal to the width of the corrugation flange or web, whichever is the greater (see figure 2a)

p = resultant pressure, in kN/m^2, as defined in 2.5, at the bottom of each strake of plating; in all cases, the net thickness of the lowest strake is to be determined using the resultant pressure at the top of the lower stool, or at the inner bottom, if no lower stool is fitted or at the top of the shedders, if shedder or gusset/shedder plates are fitted.

σ_F = minimum upper yield stress, in N/mm^2, of the material

For built-up corrugated bulkheads, when the thicknesses of the flange and web are different, the net thickness of the narrower plating is to be not less than t_n, in mm, given by:

$$t_n = 14.9 \cdot s_n \cdot \sqrt{\frac{p}{\sigma_F}}$$

s_n = the width, in m, of the narrower plating.

The net thickness of the wider plating, in mm, is not to be taken less than the maximum of the following values:

$$t_w = 14.9 \cdot s_w \cdot \sqrt{\frac{p}{\sigma_F}}$$

and

$$t_w = \sqrt{\frac{440 \cdot s_w^2 \cdot p}{\sigma_F} - t_{np}^2}$$

where $t_{np} \leq$ actual net thickness of the narrower plating and not to be greater than

$$14.9 \cdot s_w \cdot \sqrt{\frac{p}{\sigma_F}}$$

5 LOCAL DETAILS

As applicable, the design of local details is to comply with the requirements of the Administration or of an organization recognized by the Administration in accordance with the provisions of SOLAS regulation XI/1 (hereinafter referred to as "the Administration") for the purpose of transferring the corrugated bulkhead forces and moments to the boundary structures, in particular to the double bottom and cross-deck structures.

In particular, the thickness and stiffening of gusset and shedder plates, installed for strengthening purposes, is to comply with the requirements of the Administration on the basis of the load model in Section 2.

Unless otherwise stated, weld connections and materials are to be dimensioned and selected in accordance with the requirements of the Administration.

6 CORROSION ADDITION AND STEEL RENEWAL

(a) Steel renewal is required where the gauged thickness is less than t_{net} + 0.5 mm, t_{net} being the thickness used for the calculation of bending capacity and shear stresses as given in 4.2 or the local net plate thickness as given in 4.7. Alternatively, reinforcing doubling strips may be used providing the net thickness is not dictated by shear strength requirements for web plates (see 4.5 and 4.6.2) or by local pressure requirements for web and flange plates (see 4.7).

Where the gauged thickness is within the range t_{net} + 0.5 mm and t_{net} + 1.0 mm, coating (applied in accordance with the coating manufacturer's requirements) or annual gauging may be adopted as an alternative to steel renewal.

(b) Where steel renewal or reinforcement is required, a minimum thickness of t_{net} + 2.5 mm is to be replenished for the renewed or reinforced parts.

(c) Gussets with shedder plates, extending from the lower end of corrugations up to $0.1 \cdot \ell$, or reinforcing doubling strips (on bulkhead corrugations and stool side plating) are to be fitted, when:

$$0.8 \cdot (\sigma_{Ff\ell} \cdot t_{f\ell}) \geq \sigma_{Fs} \cdot t_{st}$$

where:

$\sigma_{Ff\ell}$ = minimum upper yield stress, in N/mm^2, of the material used for the corrugation flanges

σ_{Fs} = minimum upper yield stress, in N/mm^2, of the material used for the lower stool side plating or floors (if no stool is fitted)

$t_{f\ell}$ = flange thickness, in mm, which is found to be acceptable on the basis of the criteria specified in (a) above or, when steel renewal is required, the replenished thickness according to the criteria specified in (b) above. The above flange thickness dictated by local pressure requirements (see 4.7) need not be considered for this purpose

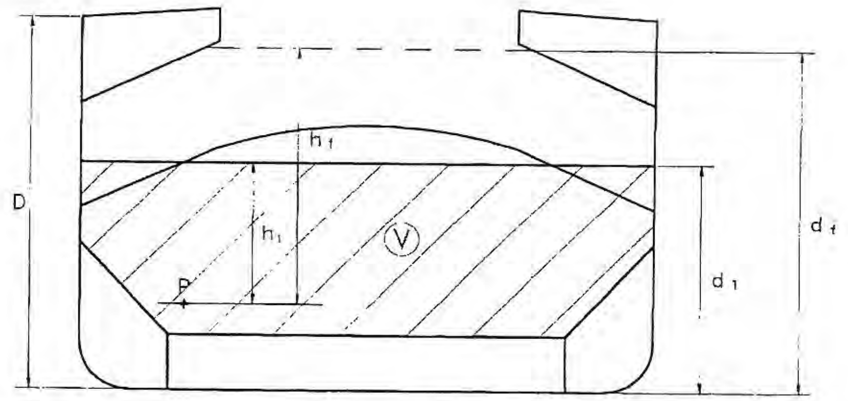
t_{st} = as built thickness, in mm, of the lower stool side plating or floors (if no stool is fitted)

If gusset plates are fitted, the material of such gusset plates is to be the same as that of the corrugation flanges. The gusset plates are to be connected to the lower stool shelf plate or inner bottom (if no lower stool is fitted) by deep penetration welds (see figure 5).

(d) Where steel renewal is required, the bulkhead connections to the lower stool shelf plate or inner bottom (if no stool is fitted) are to be at least made by deep penetration welds (see figure 5).

(e) Where gusset plates are to be fitted or renewed, their connections with the corrugations and the lower stool shelf plate or inner bottom (if no stool is fitted) are to be at least made by deep penetration welds (see figure 5).

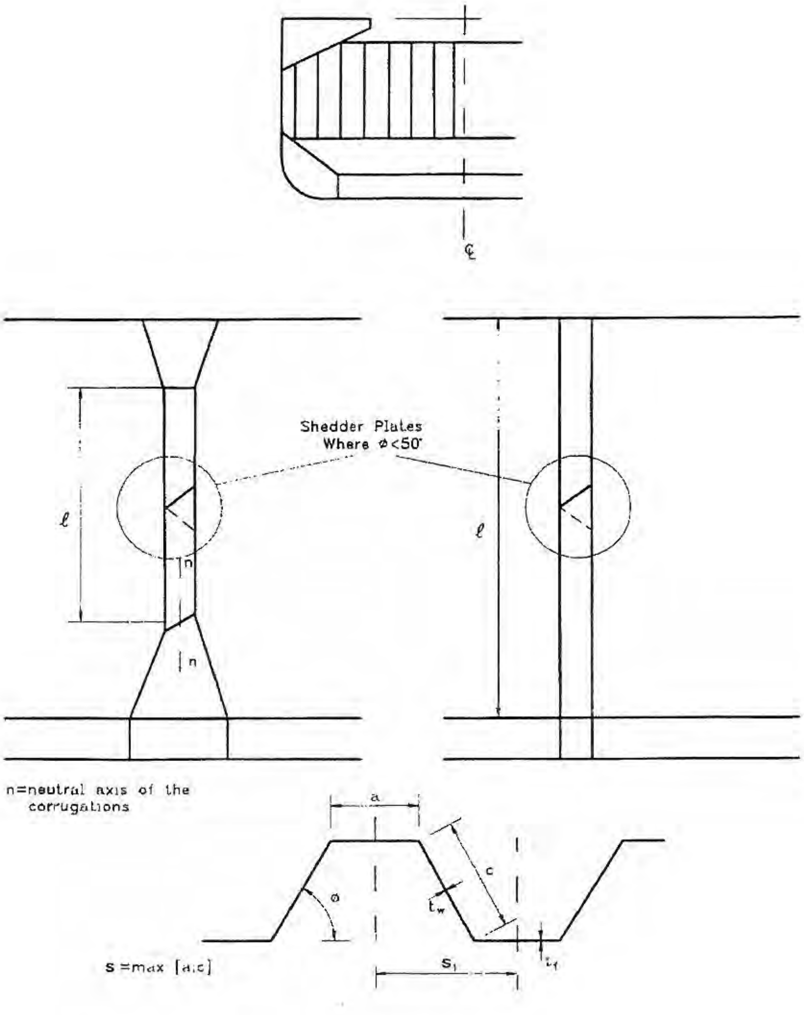
Figure 1



V = Volume of cargo

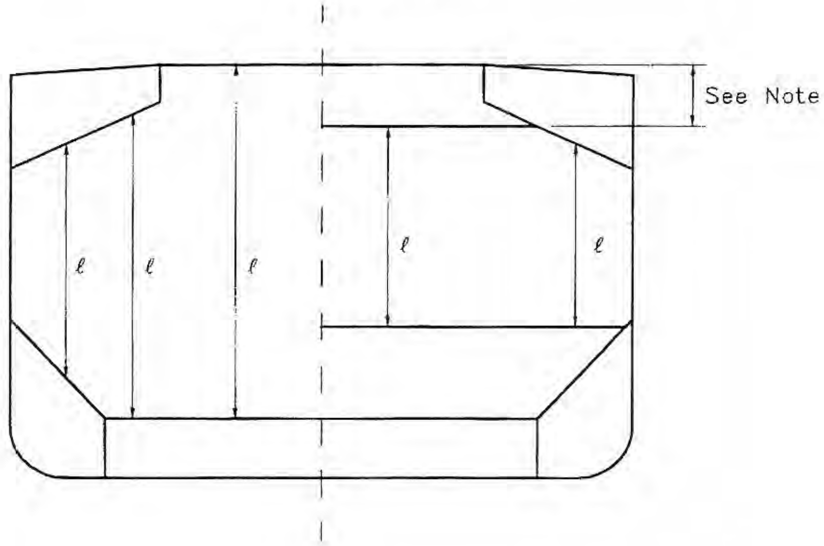
P = Calculation point

Figure 2a



℄
Shedder Plates
Where ø<50°
ℓ
n
n
ℓ
n=neutral axis of the
corrugations
a
c
ø
t_w
s_1
t_f
s =max [a,c]

Figure 2b



Note: For the definition of ℓ, the internal end of the upper stool is not to be taken more than a distance from the deck at the centre line equal to:

- 3 times the depth of corrugations, in general
- 2 times the depth of corrugations, for rectangular stool

Figure 3a
Symmetric shedder plates

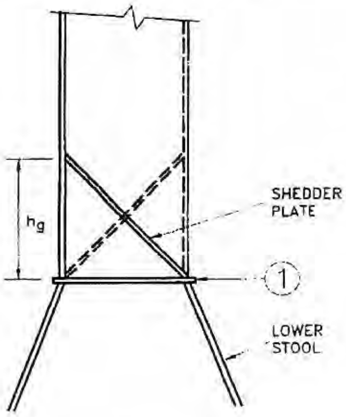


Figure 3b
Asymmetric shedder plates

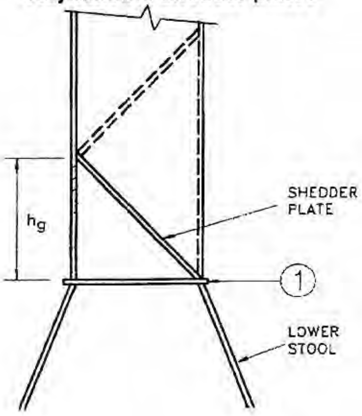


Figure 4a
Symmetric gusset / shedder plates

Figure 4b
Asymmetric gusset / shedder plates

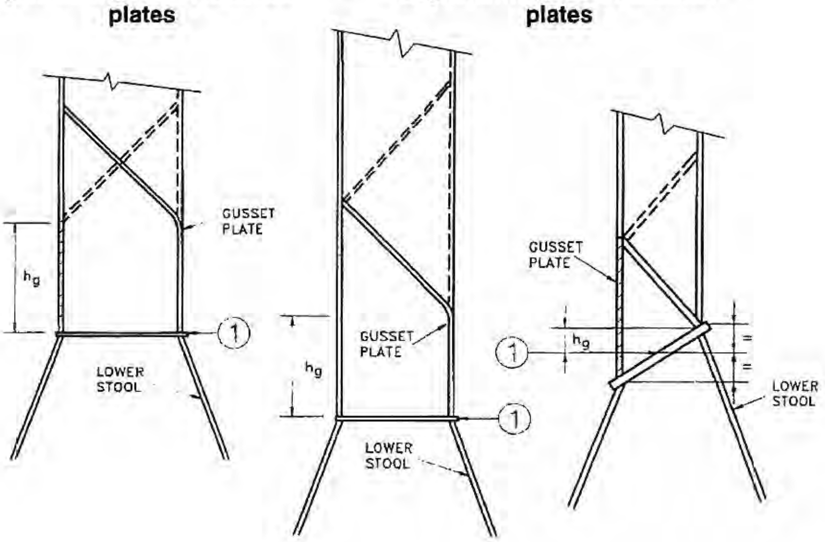
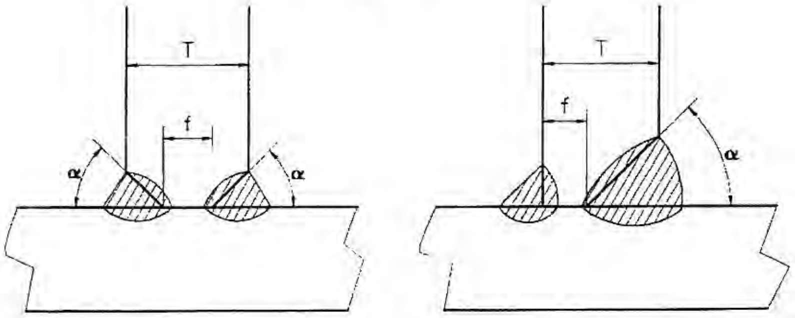


Figure 5



Root Face (f) : 3 mm to T/3 mm
Groove Angle (α) : 40° to 60°

ANNEX 2

STANDARDS FOR THE EVALUATION OF ALLOWABLE HOLD LOADING OF THE FOREMOST CARGO HOLD

1 INTRODUCTION

The loading in the foremost cargo hold is not to exceed the allowable hold loading in the flooded condition, calculated as per Section 4, using the loads given in Section 2 and the shear capacity of the double bottom given in Section 3.

In no case is the allowable hold loading in the flooding condition to be taken greater than the design hold loading in the intact condition.

2 LOAD MODEL

2.1 General

The loads to be considered as acting on the double bottom of the foremost cargo hold are those given by the external sea pressures and the combination of the cargo loads with those induced by the flooding of the foremost cargo hold.

The most severe combinations of cargo induced loads and flooding loads are to be used, depending on the loading conditions included in the loading manual:

- homogeneous loading conditions;
- non-homogeneous loading conditions;
- packed cargo conditions (such as steel mill products).

For each loading condition, the maximum bulk cargo density to be carried is to be considered in calculating the allowable hold limit.

2.2 Inner bottom flooding head

The flooding head h_f (see figure 1) is the distance, in m, measured vertically with the ship in the upright position, from the inner bottom to a level located at a distance d_f, in m, from the baseline equal to:

D, in general; or

$0.95 \cdot D$ for ships of less than 50,000 tonnes deadweight with Type B freeboard.

D being the distance, in m, from the baseline to the freeboard deck at side amidship (see figure 1).

3 SHEAR CAPACITY OF THE DOUBLE BOTTOM STRUCTURE IN WAY OF THE FOREMOST CARGO HOLD

The shear capacity C of the double bottom structure in way of the foremost cargo hold is defined as the sum of the shear strength at each end of:

- all floors adjacent to both hoppers, less one half of the strength of the two floors adjacent to each stool, or transverse bulkhead if no stool is fitted (see figure 2); and

- all double bottom girders adjacent to both stools, or transverse bulkheads if no stool is fitted.

The strength of girders or floors which run out and are not directly attached to the boundary stool or hopper girder is to be evaluated for the one end only.

Note that the floors and girders to be considered are those inside the hold boundaries formed by the hoppers and stools (or transverse bulkheads if no stool is fitted). The hopper side girders and the floors directly below the connection of the bulkhead stools (or transverse bulkheads if no stool is fitted) to the inner bottom are not to be included.

When the geometry and/or the structural arrangement of the double bottom are such as to make the above assumptions inadequate, to the discretion of the Administration or of an organization recognized by the Administration in accordance with the provisions of SOLAS regulation XI/1 (hereinafter referred to as "the Administration"), the shear capacity C of the double bottom is to be calculated according to the criteria laid down by the Administration.

In calculating the shear strength, the net thickness of floors and girders are to be used. The net thickness t_{net}, in mm, is given by:

$$t_{net} = t - t_c$$

where:

t = as built thickness, in mm, of floors and girders

t_c = corrosion diminution, equal to 2 mm, in general; a lower value of t_c may be adopted, provided that measures are taken, to the satisfaction of the Administration to justify the assumption made.

3.1 Floor shear strength

The floor shear strength in way of the floor panel adjacent to hoppers S_{f1}, in kN, and the floor shear strength in way of the openings in the "outermost" bay (i.e. that bay which is closest to the hopper) S_{f2}, in kN, are given by the following expressions:

$$S_{f1} = 10^{-3} \cdot A_f \cdot \frac{\tau_a}{\eta_1}$$

$$S_{f2} = 10^{-3} \cdot A_{f,h} \cdot \frac{\tau_a}{\eta_2}$$

where:

A_f = sectional area, in mm², of the floor panel adjacent to the hoppers

$A_{f,h}$ = net sectional area, in mm², of the floor panels in way of the openings in the "outermost" bay (i.e. that bay which is closest to the hopper)

τ_a = allowable shear stress, in N/mm², to be taken equal to $\sigma_F / \sqrt{3}$

σ_F = minimum upper yield stress, in N/mm², of the material

η_1 = 1.10

η_2 = 1.20

η_2 may be reduced, at the discretion of the Administration, down to 1.10 where appropriate reinforcements are fitted to the satisfaction of the Administration.

3.2 Girder shear strength

The girder shear strength in way of the girder panel adjacent to stools (or transverse bulkheads, if no stool is fitted) S_{g1}, in kN, and the girder shear strength in way of the largest opening in the "outermost" bay (i.e. that bay which is closest to the stool, or transverse bulkhead, if no stool is fitted) S_{g2}, in kN, are given by the following expressions:

$$S_{g1} = 10^{-3} \cdot A_g \cdot \frac{\tau_a}{\eta_1}$$

$$S_{g2} = 10^{-3} \cdot A_{g,h} \cdot \frac{\tau_a}{\eta_2}$$

where:

A_g = minimum sectional area, in mm², of the girder panel adjacent to the stools (or transverse bulkheads, if no stool is fitted)

$A_{g,h}$ = net sectional area, in mm², of the girder panel in way of the largest opening in the "outermost" bay (i.e. that bay which is closest to the stool, or transverse bulkhead, if no stool is fitted)

τ_a = allowable shear stress, in N/mm², as given in 3.1

η_1 = 1.10

η_2 = 1.15

η_2 may be reduced, at the discretion of the Administration, down to 1.10 where appropriate reinforcements are fitted to the satisfaction of the Administration.

4 ALLOWABLE HOLD LOADING

The allowable hold loading W, in tonnes, is given by:

$$W = \rho_c \cdot V \cdot \frac{1}{F}$$

where:

F = 1.05 in general
1.00 for steel mill products

ρ_c = cargo density, in t/m^3; for bulk cargoes, see 2.1; for steel products, ρ_c is to be taken as the density of steel

V = volume, in m^3, occupied by cargo at a level h_1

h_1 = $\dfrac{X}{\rho_c \cdot g}$

X = for bulk cargoes, the lesser of X_1 and X_2 given by

$$X_1 = \frac{Z + \rho \cdot g \cdot (E - h_f)}{1 + \frac{\rho}{\rho_c}(\text{perm} - 1)}$$

$$X_2 = Z + \rho \cdot g \cdot (E - h_f \cdot \text{perm})$$

X = for steel products, X may be taken as X_1, using perm = 0

ρ = sea water density, in t/m^3

g = 9.81 m/s^2, gravity acceleration

E = $d_f - 0.1 \cdot D$

d_f, D = as given in 2.2

h_f = flooding head, in m, as defined in 2.2

perm = permeability of cargo, to be taken as 0.3 for ore (corresponding bulk cargo density for iron ore may generally be taken as 3.0 t/m^3)

Z = the lesser of Z_1 and Z_2 given by:

$$Z_1 = \frac{C_h}{A_{DB,h}} \qquad Z_2 = \frac{C_e}{A_{DB,e}}$$

C_h = shear capacity of the double bottom, in kN, as defined in Section 3, considering, for each floor, the lesser of the shear strengths S_{f1} and S_{f2} (see 3.1) and, for each girder, the lesser of the shear strengths S_{g1} and S_{g2} (see 3.2)

C_e = shear capacity of the double bottom, in kN, as defined in Section 3, considering, for each floor, the shear strength S_{f1} (see 3.1) and, for each girder, the lesser of the shear strengths S_{g1} and S_{g2} (see 3.2)

$A_{DB,h}$ = $\sum_{i=1}^{i=n} S_i \cdot B_{DB,i}$

$A_{DB,e}$ = $\sum_{i=1}^{i=n} S_i \cdot (B_{DB} - s)$

n = number of floors between stools (or transverse bulkheads, if no stool is fitted)

S_i = space of ith-floor, in m

$B_{DB,i}$ = B_{DB} - s for floors whose shear strength is given by S_{f1} (see 3.1)

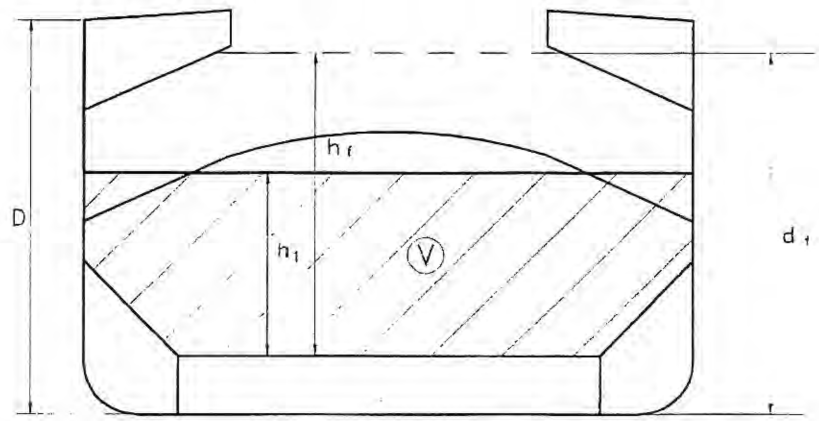
$B_{DB,i}$ = $B_{DB,h}$ for floors whose shear strength is given by S_{f2} (see 3.1)

B_{DB} = breadth of double bottom, in m, between hoppers (see figure 3)

$B_{DB,h}$ = distance, in m, between the two considered opening (see figure 3)

s = spacing, in m, of double bottom longitudinals adjacent to hoppers

Figure 1



V = Volume of cargo

Figure 2

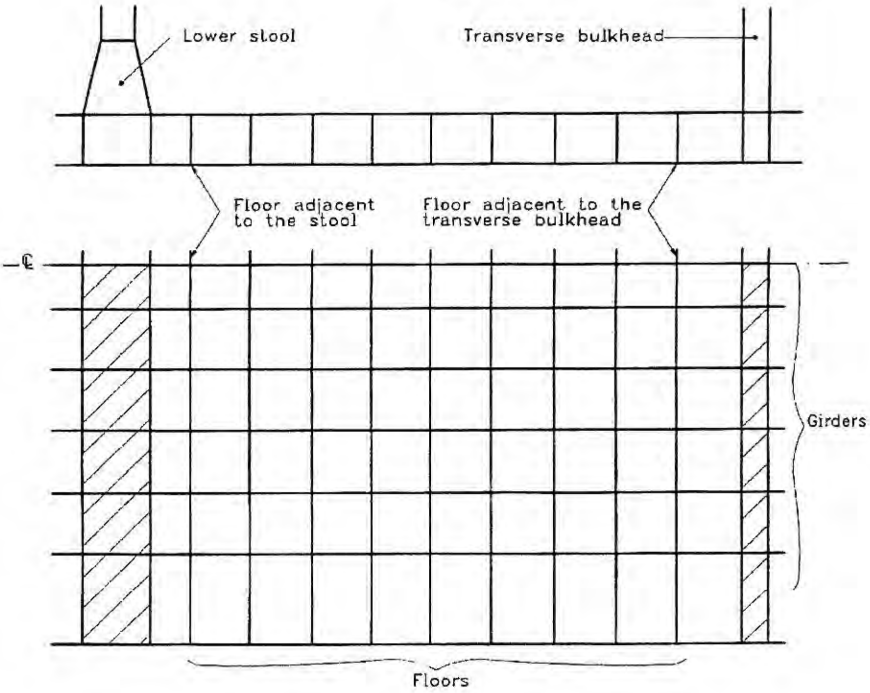
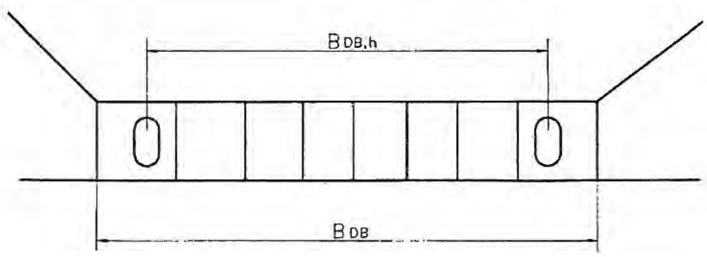


Figure 3



RESOLUTION 5

RECOMMENDATION ON LOADING INSTRUMENTS

THE CONFERENCE,

HAVING ADOPTED amendments to the International Convention for the Safety of Life at Sea (SOLAS), 1974, as amended, concerning the safety of bulk carriers,

NOTING that, in accordance with new SOLAS regulation XII/11, all bulk carriers of 150 m in length and upwards, as defined in regulation IX/1.6 of the Convention, are required to be fitted with a loading instrument capable of providing information on hull girder shear forces and bending moments, taking into account the recommendations adopted by the Organization,

BEING OF THE OPINION that the loading instrument is a necessary tool to more efficiently ensure that hull girder shear forces and bending moments are kept within permissible limits during and at the conclusion of loading and discharging operations,

BEING AWARE that the International Association of Classification Societies (IACS) has adopted Recommendation No. 48 on loading instruments, which is intended to be used by IACS member societies in conjunction with their requirements and procedures when approving, for their own purposes, loading instruments for ships not yet fitted with an approved loading instrument,

URGES Contracting Governments to:

(a) apply the above-mentioned IACS recommendation when approving loading instruments, as required by SOLAS regulation XII/11 for ships not yet fitted with an approved loading instrument; and

(b) ensure that loading instruments already fitted on ships to which SOLAS regulation XII/11 applies have been approved in accordance with the standards of the recognized organizations.

RESOLUTION 6

INTERPRETATION OF THE DEFINITION OF "BULK CARRIER", AS GIVEN IN CHAPTER IX OF SOLAS 1974, AS AMENDED IN 1994

THE CONFERENCE,

HAVING ADOPTED amendments to the International Convention for the Safety of Life at Sea (SOLAS), 1974, as amended, concerning the safety of bulk carriers,

NOTING that SOLAS chapter IX will enter into force on 1 July 1998,

NOTING ALSO that bulk carriers will have to comply with the requirements of SOLAS chapter IX by 1 July 1998,

NOTING FURTHER that the expected entry into force of the new SOLAS chapter XII on 1 July 1999 will make new requirements mandatory for bulk carriers,

RECOGNIZING that a number of SOLAS Contracting Governments have identified certain ambiguities in the definition of the term "bulk carrier", as given in SOLAS regulation IX/1.6, causing diverging interpretations of this term,

RECOGNIZING FURTHER the need to establish, for the purpose of the application of the new SOLAS chapter XII, guidance to Contracting Governments and to the industry as to which ships are subject to the new requirements,

BEING AWARE of the urgent need to establish, for the purpose of the application of SOLAS chapter IX on 1 July 1998, a clear guidance to Contracting Governments and to the industry as to which specific ships are subject to the requirements of the International Safety Management (ISM) Code,

DESIRING to ensure that all Contracting Governments should implement the ISM Code and the new SOLAS chapter XII in their capacity as flag State or as port State exercising control under the provisions of the Convention, in a consistent, systematic and harmonized manner, with a view of facilitating international seaborne trade,

CONSCIOUS of the fact that SOLAS chapter IX should be applied taking into account Conference resolution 9, as soon as possible,

1. URGES SOLAS Contracting Governments to interpret the definition of the term "bulk carrier", given in regulation IX/1.6, for the purpose of the application of SOLAS regulation IX/2.1.2 and chapter XII to mean:

- ships constructed with single deck, top-side tanks and hopper side tanks in cargo spaces and intended primarily to carry dry cargo in bulk; or

- ore carriers*; or

- combination carriers**;

2. INVITES the Maritime Safety Committee of the International Maritime Organization to consider, as soon as possible:

(a) actions necessary to remove the ambiguity which exists in the definition of the term "bulk carrier" as given in SOLAS regulation IX/1.6; and

(b) any other appropriate action which will facilitate the easy identification of the type of ship by SOLAS Contracting Governments when exercising their rights of control under the provisions of that Convention.

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* "Ore carrier" means a sea-going single deck ship having two longitudinal bulkheads and a double bottom throughout the cargo region and intended for the carriage of ore cargoes in the centre holds only.

** "Combination carrier" has the same meaning as in SOLAS regulation II-2/3.27.

RESOLUTION 7

ENHANCED SURVEYS CARRIED OUT PRIOR TO ENTRY INTO FORCE OF THE AMENDMENTS

THE CONFERENCE,

HAVING ADOPTED amendments to the International Convention for the Safety of Life at Sea (SOLAS), 1974, as amended, concerning the safety of bulk carriers,

NOTING that SOLAS regulation XII/7 requires that bulk carriers of 150 m in length and upwards of single side skin construction, of 10 years of age and over, shall not carry solid bulk cargoes having a density of 1780 kg/m^3 and above unless they have undergone the enhanced surveys in accordance with the provisions of SOLAS regulation XI/2,

RECOGNIZING that the enhanced survey provisions of SOLAS regulation XI/2 took effect on 1 January 1996,

RECOGNIZING ALSO that a significant number of bulk carriers had undergone the enhanced surveys under the provisions of resolution A.744(18) even before regulation XI/2 took effect, and such surveys may be recognized as effective for the purpose of application of regulation XII/7,

RESOLVES that SOLAS Contracting Governments may permit the existing bulk carriers to which regulation XII/7 applies to carry solid bulk cargoes having a density of 1780 kg/m^3 and above, if such bulk carriers have been subject to a periodical survey equivalent to a periodical survey in accordance with the enhanced programme of inspections required by regulation XI/2, before 1 January 1996.

RESOLUTION 8

FURTHER WORK ON THE SAFETY OF BULK CARRIERS

THE CONFERENCE,

HAVING ADOPTED amendments to the International Convention for the Safety of Life at Sea (SOLAS), 1974, as amended, concerning the safety of bulk carriers,

RECOGNIZING that new SOLAS chapter XII does not cover all types and sizes of bulk carriers, e.g. certain regulations do not apply to bulk carriers less than 150 m in length or bulk carriers other than those of single side skin construction,

ACKNOWLEDGING that a number of bulk carriers will be of a length less than 150 m and that a considerable number of single side skin bulk carriers may be engaged in the carriage of solid bulk cargoes having a density less than 1780 kg/m^3,

BEING OF THE OPINION that there is a need to consider further the safety standards of those types and sizes of bulk carriers to which the whole or part of SOLAS chapter XII does not apply,

RECOGNIZING FURTHER the need to establish a unified definition of the single side skin construction referred to in SOLAS regulation XII/1.2,

INVITES the Maritime Safety Committee of the International Maritime Organization, as a matter of urgency, to:

(a) consider further the safety of bulk carriers to which the whole or part of SOLAS chapter XII does not apply, in particular bulk carriers less than 150 m in length, new bulk carriers of double side skin construction, single side skin bulk carriers carrying solid bulk cargoes having a density less than 1780 kg/m^3, bulk carriers with insufficient number of cargo holds to satisfy regulation XII/4.2, and ships other than bulk carriers with single side skin construction intended to carry bulk cargoes; and develop appropriate requirements, recommendations and/or guidelines, as necessary; and

(b) develop a definition of single side skin construction.

RESOLUTION 9

IMPLEMENTATION OF THE INTERNATIONAL SAFETY MANAGEMENT (ISM) CODE

THE CONFERENCE,

HAVING ADOPTED amendments to the International Convention for the Safety of Life at Sea (SOLAS), 1974, as amended, concerning the safety of bulk carriers,

NOTING the adoption by:

- the Assembly of the International Maritime Organization (IMO) of resolution A.741(18) on the International Management Code for the Safe Operation of Ships and for Pollution Prevention (International Safety Management (ISM) Code);

- the 1994 Conference of Contracting Governments to the International Convention for the Safety of Life at Sea, 1974 of a new chapter IX on Management for the Safe Operation of Ships by virtue of which the ISM Code is due to become mandatory on 1 July 1998 (the date on which the new chapter will apply to passenger ships, including passenger high-speed craft, oil tankers, chemical tankers, gas carriers, bulk carriers and cargo high-speed craft of 500 gross tonnage and upwards, regardless of their date of construction); and

- the Assembly of IMO of resolution A.848(20) on the Implementation of the International Safety Management (ISM) Code,

NOTING FURTHER that, according to information received from SOLAS Contracting Governments, a significant number of shipping companies operating bulk carriers have not yet obtained ISM certification, and may not even have applied for it,

1. DRAWS the attention of SOLAS Contracting Governments and the industry to the fact that regulation IX/2 of the Convention does not provide for any extension of implementation dates for the introduction of the ISM Code;

2. URGES SOLAS Contracting Governments to make their utmost effort to finalize as soon as possible the ISM Code certification of ships entitled to fly their flags as required by SOLAS regulation IX/2;

3. URGES Governments with considerable numbers of bulk carriers in their fleets, as well as the recognized organizations and shipping companies concerned, to redouble their efforts to ensure timely and effective implementation of the ISM Code on these ships;

4. REQUESTS the Secretary-General of IMO to take any such additional measures as may be required aiming at assisting in ensuring the timely and effective implementation of the ISM Code.

DOCUMENT JOINT 2

RÉSOLUTION 3

RECOMMANDATION SUR LA CONFORMITÉ AVEC LA RÈGLE XII/5 DE LA CONVENTION SOLAS

LA CONFÉRENCE,

AYANT ADOPTÉ les amendements à la Convention internationale de 1974 pour la sauvegarde de la vie humaine en mer (Convention SOLAS), telle que modifiée, concernant la sécurité des vraquiers,

CONSIDÉRANT qu'aux termes de la nouvelle règle XII/5 de la Convention SOLAS, les vraquiers à muraille simple, d'une longueur égale ou supérieure à 150 m, qui sont conçus pour transporter des cargaisons solides en vrac d'une densité égale ou supérieure à 1 000 kg/m^3 et construits le 1er juillet 1999 ou après cette date, devraient avoir une résistance suffisante, compte tenu des recommandations adoptées par l'Organisation, pour résister à l'envahissement de l'une quelconque de leurs cales à cargaison dans toutes les conditions de chargement et de ballastage, compte tenu aussi des effets dynamiques,

NOTANT que l'Association internationale des sociétés de classification (IACS) a publié les prescriptions uniformes suivantes :

S17 Résistance longitudinale, dans les conditions d'envahissement, de la poutre-navire à bord des vraquiers à muraille simple;

S18 Évaluation de l'échantillonnage des cloisons transversales ondulées étanches à l'eau des vraquiers à muraille simple, compte tenu d'un envahissement des cales; et

S20 Évaluation du chargement admissible des cales à bord des vraquiers à muraille simple, compte tenu d'un envahissement des cales,

NOTANT ÉGALEMENT que les règles des sociétés de classification devraient prévoir une résistance adéquate pour les vraquiers d'un type autre que les vraquiers à muraille simple conformément à la règle II-1/3-1 de la Convention,

ÉTANT D'AVIS que l'application desdites prescriptions uniformes permettra de satisfaire aux dispositions de la règle XII/5 de la Convention,

PRIE INSTAMMENT les gouvernements de veiller à ce que tous les vraquiers à muraille simple, qu'ils soient ou non classés auprès de sociétés de classification membres de l'IACS, satisfassent auxdites prescriptions uniformes de l'IACS.

RÉSOLUTION 4

NORMES APPLICABLES À L'ÉVALUATION DES ÉCHANTILLONNAGES DE LA CLOISON TRANSVERSALE ÉTANCHE À L'EAU ONDULÉE VERTICALEMENT QUI SÉPARE LES DEUX CALES À CARGAISON SITUÉES LE PLUS À L'AVANT ET NORMES APPLICABLES À L'ÉVALUATION DU CHARGEMENT ADMISSIBLE DE LA CALE À CARGAISON SITUÉE LE PLUS À L'AVANT

LA CONFÉRENCE,

AYANT ADOPTÉ les amendements à la Convention internationale de 1974 pour la sauvegarde de la vie humaine en mer (SOLAS), telle que modifiée, concernant la sécurité des vraquiers,

CONSIDÉRANT qu'en vertu de la nouvelle règle XII/6 de la Convention SOLAS, la cloison transversale étanche à l'eau, ondulée verticalement qui sépare les deux cales à cargaison situées le plus à l'avant, ainsi que la structure de double fond au droit de la cale à cargaison située le plus à l'avant à bord des vraquiers à muraille simple, d'une longueur égale ou supérieure à 150 m, qui transportent des cargaisons solides en vrac d'une densité égale ou supérieure à 1 780 kg/m^3, devraient avoir une résistance suffisante, satisfaisant aux Normes de résistance de la cloison et du double fond des vraquiers élaborées par l'Organisation, pour résister à l'envahissement de la cale à cargaison située le plus à l'avant, compte tenu aussi des effets dynamiques,

ÉTANT D'AVIS que l'application de ladite règle par les gouvernements conformément au calendrier d'application prescrit par la nouvelle règle XII/3 de la Convention SOLAS contribuera grandement à renforcer la sécurité des vraquiers existants et à sauvegarder la vie des personnes à bord,

AYANT EXAMINÉ la recommandation formulée par le Comité de la sécurité maritime de l'Organisation maritime internationale à sa soixante-huitième session,

ADOPTE :

.1 les Normes applicables à l'évaluation des échantillonnages de la cloison transversale étanche à l'eau, ondulée verticalement qui sépare les deux cales à cargaison situées le plus à l'avant, dont le texte est reproduit à l'annexe 1 de la présente résolution, et

.2 les Normes applicables à l'évaluation du chargement admissible de la cale à cargaison située le plus à l'avant, dont le texte est reproduit à l'annexe 2 de la présente résolution,

aux fins de l'application de la règle XII/6 de la Convention SOLAS.

ANNEXE 1

NORMES APPLICABLES À L'ÉVALUATION DES ÉCHANTILLONNAGES DE LA CLOISON TRANSVERSALE ÉTANCHE À L'EAU ONDULÉE VERTICALEMENT QUI SÉPARE LES DEUX CALES À CARGAISON SITUÉES LE PLUS À L'AVANT

1 INTRODUCTION

Il faut calculer les échantillonnages nets de la cloison transversale étanche à l'eau, ondulée verticalement qui sépare les deux cales à cargaison situées le plus à l'avant en appliquant les charges indiquées dans la section 2, le moment de flexion et l'effort tranchant indiqués dans la section 3 et les critères de résistance indiqués dans la section 4.

Si nécessaire, le renouvellement et/ou le renforcement de l'acier sont prescrits, comme indiqué dans la section 6.

Aux fins des présentes normes, l'expression "état de chargement homogène" désigne un état de chargement dans lequel le rapport entre le taux de remplissage maximal et le taux de remplissage minimal, calculé pour les deux cales à cargaison situées le plus avant, ne dépasse pas 1,20, cette valeur devant être corrigée en fonction des différentes densités des cargaisons.

2 MODÈLE DES CHARGES

2.1 Généralités

Les charges qu'il faut considérer comme s'exerçant sur la cloison sont celles résultant de la conjugaison des charges dues à la cargaison et de celles dues à l'envahissement de la cale située le plus à l'avant.

Les combinaisons les plus défavorables de charges dues à la cargaison et à l'envahissement doivent être utilisées pour le contrôle des échantillonnages de la cloison, en fonction des états de chargement prévus dans le manuel de chargement :

- état de chargement homogène,
- état de chargement non homogène.

Il n'est pas nécessaire d'appliquer les présentes normes aux états de chargement partiel non homogènes qui existent lorsqu'un navire chargé de façon homogène procède à des opérations de chargement et de déchargement dans plusieurs ports.

2.2 Hauteur d'envahissement prise en considération pour les cloisons ondulées

La hauteur d'envahissement h_f (voir la figure 1) est la distance, en m, mesurée verticalement, le navire étant en position droite, depuis le point de calcul jusqu'à un niveau situé à une distance d_f, en m, du tracé de la quille égale à :

a) de manière générale :

D

b) pour les navires d'un port en lourd inférieur à 50 000 tonnes avec un franc-bord de type B :

$0{,}95 \cdot D$

D étant la distance, en m, mesurée depuis le tracé de la quille jusqu'au pont de franc-bord sur le côté, au milieu du navire (voir la figure 1).

c) pour les navires destinés à être exploités, pour la ligne de charge réglementaire, à un tirant d'eau T_r inférieur au tirant d'eau T admissible correspondant à la ligne de charge, la hauteur d'envahissement définie en a) et b) peut être réduite de $T - T_r$.

2.3 Pression dans la cale envahie

2.3.1 Cale chargée d'une cargaison en vrac

Deux cas doivent être envisagés, selon les valeurs de d_1 et de d_f, d_1 (voir figure 1) étant la distance, en m, à partir du tracé de la quille, obtenue à l'aide de la formule suivante :

$$d_1 = \frac{M_c}{\rho_c \cdot l_c \cdot B} + \frac{V_{LS}}{l_c \cdot B} + (h_{HT} - h_{DB}) \cdot \frac{b_{HT}}{B} + h_{DB}$$

dans laquelle :

M_c	=	masse de la cargaison, en tonnes, dans la cale à cargaison située le plus à l'avant
ρc	=	densité de la cargaison en vrac, en t/m^3
l_c	=	longueur de la cale à cargaison située le plus à l'avant, en m
B	=	largeur du navire au milieu du navire, en m
V_{LS}	=	volume, en m^3, du caisson inférieur au-dessus du plafond de double fond
h_{HT}	=	hauteur des citernes en trémie au milieu du navire, en m, mesurée depuis le tracé de la quille
h_{DB}	=	hauteur du double fond, en m
b_{HT}	=	largeur des citernes en trémie au milieu du navire, en m.

a) $d_f \geq d_1$

À chaque point de la cloison situé à une distance du tracé de la quille comprise entre d_1 et d_f, la pression $p_{c,f}$, en kN/m², est obtenue à l'aide de la formule suivante :

$$p_{c,f} = \rho \cdot g \cdot h_f$$

dans laquelle :

ρ	=	densité de l'eau de mer, en t/m³
g	=	9,81 m/s², accélération due à la gravité
h_f	=	hauteur d'envahissement telle que définie dans la section 2.2.

À chaque point de la cloison situé à une distance du tracé de la quille inférieure à d_1, la pression $p_{c,f}$, en kN/m², est obtenue à l'aide de la formule suivante :

$$p_{c,f} = \rho \cdot g \cdot h_f + [\rho_c - \rho \cdot (1 - perm)] \cdot g \cdot h_1 \cdot \tan^2\gamma$$

dans laquelle :

ρ, g, h_f	=	voir ci-dessus
ρ_c	=	densité de la cargaison en vrac, en t/m³
perm	=	perméabilité de la cargaison, considérée comme étant égale à 0,3 pour les minerais (la densité apparente correspondante pour le minerai de fer peut généralement être considérée comme étant égale à 3,0 t/m³).
h_1	=	distance verticale, en m, depuis le point de calcul jusqu'à un niveau situé à une distance d_1, telle que définie ci-dessus, du tracé de la quille (voir la figure 1)
γ	=	45° - (φ/2)
φ	=	angle de repos de la cargaison en degrés, qui peut généralement être considéré comme étant égal à 35° pour le minerai de fer

La force $F_{c,f}$, en kN, qui s'exerce sur une ondulation est obtenue à l'aide de la formule suivante :

$$F_{c,f} = s_1 \cdot \left[\rho \cdot g \cdot \frac{(d_f - d_1)^2}{2} + \frac{\rho \cdot g \cdot (d_f - d_1) + (p_{c,f})_{le}}{2} \cdot (d_1 - h_{DB} - h_{LS})\right]$$

dans laquelle :

s_1	=	espacement des ondulations, en m (voir figure 2 a)
ρ, g, d_1, h_{DB}	=	voir ci-dessus
d_f	=	voir 2.2 ci-dessus
$(p_{c,f})_{le}$	=	pression en kN/m², sur l'extrémité inférieure de l'ondulation.
h_{LS}	=	hauteur du caisson inférieur, en m, à partir du plafond de double fond.

b) $d_f < d_1$

À chaque point de la cloison situé à une distance du tracé de la quille comprise entre d_f et d_1, la pression $p_{c,f}$, en kN/m² est obtenue à l'aide de la formule suivante :

$$p_{c,f} = \rho_c \cdot g \cdot h_1 \cdot \tan^2 \gamma$$

dans laquelle :

ρ_c, g, h_1, γ = voir a)

À chaque point de la cloison situé à une distance du tracé de la quille inférieure à d_f, la pression $p_{c,f}$, en kN/m², est obtenue à l'aide de la formule suivante :

$$p_{c,f} = \rho_c \cdot g \cdot h_f + [\rho_c \cdot h_1 - \rho \cdot (1-perm) \cdot h_f] \cdot g \cdot \tan^2 \gamma$$

dans laquelle :

ρ, g, h_f, ρ_c, h_1, perm, γ = voir a)

La force $F_{c,f}$, en kN, qui s'exerce sur une ondulation est obtenue à l'aide de la formule suivante :

$$F_{c,f} = s_1 \cdot \left[\rho_c \cdot g \cdot \frac{(d_1 - d_f)^2}{2} \cdot \tan^2 \gamma + \frac{\rho_c \cdot g \cdot (d_1 - d_f) \cdot \tan^2 \gamma + (p_{c,f})_{le}}{2} \cdot (d_f - h_{DB} - h_{LS}) \right]$$

dans laquelle :

s_1, ρ_c, g, γ, $(p_{c,f})_{le}$, h_{LS}	=	voir a)
d_1, h_{DB}	=	voir ci-dessus
d_f	=	voir 2.2

2.3.2 Cale vide

Il est nécessaire de considérer la pression hydrostatique p_f due à la hauteur d'envahissement h_f en chaque point de la cloison.

La force F_f, en kN, qui s'exerce sur une ondulation est obtenue à l'aide de la formule suivante :

$$F_f = s_1 \cdot \rho \cdot g \cdot \frac{(d_f - h_{DB} - h_{LS})^2}{2}$$

dans laquelle :

s_1, ρ, g, h_{LS}	=	voir 2.3.1 a)
h_{DB}	=	voir 2.3.1
d_f	=	voir 2.2

2.4 Pression dans la cale à cargaison non envahie, chargée d'une cargaison en vrac

À chaque point de la cloison, la pression p_c, en kN/m², est obtenue à l'aide de la formule suivante :

$$p_c = \rho_c \cdot g \cdot h_1 \cdot \tan^2\gamma$$

dans laquelle :

ρ_c, g, h_1, γ	=	voir 2.3.1 a)

La force F_c, en kN, qui s'exerce sur une ondulation est obtenue à l'aide de la formule suivante :

$$F_c = \rho_c \cdot g \cdot s_1 \cdot \frac{(d_1 - h_{DB} - h_{LS})^2}{2} \cdot \tan^2\gamma$$

dans laquelle :

$\rho_c, g, s_1, h_{LS}, \gamma$	=	voir 2.3.1 a)
d_1, h_{DB}	=	voir 2.3.1

2.5 Pression résultante

2.5.1 État de chargement homogène

À chaque point de la structure de la cloison, la pression résultante p, en kN/m², à prendre en considération pour les échantillonnages de la cloison est obtenue à l'aide de la formule suivante :

$$p = p_{c,f} - 0{,}8 \cdot p_c$$

La force résultante F, en kN, qui s'exerce sur une ondulation est obtenue à l'aide de la formule suivante :

$$F = F_{c,f} - 0,8 \cdot F_c$$

2.5.2 État de chargement non homogène

À chaque point de la structure de la cloison, la pression résultante p, en kN/m², à prendre en considération pour les échantillonnages de la cloison est obtenue à l'aide de la formule suivante :

$$p = p_{c,f}$$

La force résultante F, en kN, qui s'exerce sur une ondulation est obtenue à l'aide de la formule :

$$F = F_{c,f}$$

Dans le cas où la cale à cargaison située le plus à l'avant, en état de chargement non homogène, ne peut pas être chargée, la pression résultante p, en kN/m², à prendre en considération pour les échantillonnages de la cloison est obtenue à l'aide de la formule :

$$p = p_f$$

et la force résultante F, en kN, qui s'exerce sur une ondulation est obtenue à l'aide de la formule :

$$F = F_f$$

3 MOMENT DE FLEXION ET EFFORT TRANCHANT AUXQUELS SONT SOUMISES LES ONDULATIONS DE LA CLOISON

Le moment de flexion M et l'effort tranchant Q auxquels sont soumises les ondulations de la cloison sont obtenus à l'aide des formules données en 3.1 et 3.2. Les valeurs de M et Q doivent être utilisées pour les contrôles visés dans la section 4.

3.1 Moment de flexion

Le moment de flexion nominal M, en kN·m, des ondulations de la cloison est obtenu à l'aide de la formule suivante :

$$M = \frac{F \cdot \ell}{8}$$

dans laquelle :

- F = force résultante, en kN, comme indiqué en 2.5
- ℓ = longueur de l'ondulation en m, comme indiqué sur les figures 2a et 2b.

3.2 Effort tranchant

L'effort tranchant Q, en kN, à l'extrémité inférieure des ondulations de la cloison est obtenu à l'aide de la formule suivante :

$$Q = 0,8 \cdot F$$

dans laquelle :

F = voir 2.5.

4 CRITÈRES DE RÉSISTANCE

4.1 Généralités

Les critères suivants s'appliquent aux cloisons transversales à ondulations verticales (voir la figure 2a).

Les prescriptions applicables à l'épaisseur de tôle nette locale sont énoncées en 4.7.

De plus, les critères énoncés en 4.2 et 4.5 doivent être respectés.

Lorsque l'angle d'ondulation ϕ indiqué à la figure 2a est inférieur à 50°, une rangée horizontale de goussets inclinés doit être fixée à peu près à mi-hauteur des ondulations, de part et d'autre de celles-ci (voir la figure 2a), pour aider à préserver la stabilité dimensionnelle de la cloison soumise aux charges d'un envahissement. Les goussets inclinés doivent être soudés aux ondulations par soudage continu double, mais ils ne doivent pas être soudés à la muraille.

Les épaisseurs de la partie inférieure des ondulations considérées aux fins de l'application de 4.2 et 4.3 doivent être maintenues sur une distance à partir du plafond de double fond (s'il n'existe pas de caisson inférieur), ou de la face supérieure du caisson inférieur qui ne soit pas inférieure à $0{,}15 \cdot \ell$.

Les épaisseurs de la partie médiane des ondulations considérées aux fins de l'application de 4.2 et 4.4 doivent être maintenues jusqu'à une distance à partir du pont (s'il n'existe pas de caisson supérieur), ou de la face inférieure du caisson supérieur qui ne soit pas inférieure à $0{,}3 \cdot \ell$.

4.2 Capacité de flexion et contrainte de cisaillement

La capacité de flexion doit respecter le rapport suivant :

$$10^3 \cdot \frac{M}{0{,}5 \cdot Z_{\ell e} \cdot \sigma_{a,\ell e} + Z_m \cdot \sigma_{a,m}} \leq 1{,}0$$

Dans cette formule :

M = moment de flexion en kN.m, comme indiqué en 3.1.

$Z_{\ell e}$ = module de résistance, en cm³, d'une demi-ondulation, à l'extrémité inférieure des ondulations, à calculer comme indiqué en 4.3.

Z_m = module de résistance, en cm³, d'une demi-ondulation, à mi-longueur des ondulations, à calculer comme indiqué en 4.4.

$\sigma_{a,\ell e}$ = contrainte admissible, en N/mm², comme indiqué en 4.5, pour l'extrémité inférieure des ondulations.

$\sigma_{a,m}$ = contrainte admissible, en N/mm², comme indiqué en 4.5, à mi-longueur des ondulations.

En aucun cas la valeur Z_m ne doit être supérieure à la plus petite des valeurs $1{,}15 \cdot Z_{le}$ et $1{,}15 \cdot Z'_{le}$ pour le calcul de la capacité de flexion, Z'_{le} étant définie ci-dessous.

Si des goussets inclinés efficaces sont installés qui :

- ne sont pas pliés;
- sont soudés aux ondulations et au sommet du caisson inférieur par soudures à pénétration d'un seul côté ou équivalentes;
- ont une inclinaison minimale de 45°, leur bord inférieur étant dans l'alignement des tôles de bordé du caisson;

ou si des tôles mouchoirs efficaces sont installées qui :

- sont montées dans l'alignement des tôles de bordé du caisson;
- sont en matériau dont les propriétés sont au moins égales à celles prévues pour les semelles;

le module de résistance Z_{le}, en cm³, ne doit pas être supérieur à la valeur Z'_{le}, en cm³, obtenue à l'aide de la formule suivante :

$$Z'_{le} = Z_g + 10^3 \cdot \frac{Q \cdot h_g - 0{,}5 \cdot h_g^2 s_1 \cdot p_g}{\sigma_a}$$

dans laquelle :

Z_g = module de résistance en cm³ d'une demi-ondulation, calculé comme prévu en 4.4, au niveau du bord supérieur des goussets inclinés ou tôles mouchoirs, selon le cas.

Q = effort tranchant, en kN, comme indiqué en 3.2.

h_g = hauteur en m des goussets inclinés ou tôles mouchoirs, selon le cas (voir les figures 3a, 3b, 4a et 4b).

s_1 = voir 2.3.1 a)

p_g = pression résultante, en kN/m², telle que définie en 2.5, calculée au milieu des goussets inclinés ou des tôles mouchoirs, selon le cas.

σ_a = contrainte admissible, en N/mm², comme indiqué en 4.5.

Les contraintes de cisaillement τ sont obtenues en divisant l'effort tranchant Q par l'aire de cisaillement. Il convient de réduire l'aire de cisaillement compte tenu d'une éventuelle non-perpendicularité entre les semelles et les âmes des ondulations. De façon générale, il est possible d'obtenir l'aire réduite de cisaillement en multipliant la section de l'âme par ($\sin \phi$), ϕ étant l'angle formé par la semelle et l'âme.

Pour le calcul du module de résistance et de l'aire de cisaillement, on utilise les épaisseurs nettes de tôle.

Le module de résistance des ondulations doit être calculé conformément aux normes énoncées en 4.3 et 4.4.

4.3 Module de résistance à l'extrémité inférieure des ondulations

Pour le calcul du module de résistance, la largeur efficace de semelle b_{ef} ne doit pas être supérieure à celle prévue en 4.6.1.

Si les âmes des ondulations ne sont pas soutenues localement par des goussets au-dessous du plafond de caisson (ou au-dessous du plafond de double fond) dans leur partie inférieure, le module de résistance des ondulations doit être calculé compte tenu d'une largeur efficace des âmes d'ondulation égale à 30 % de leur largeur effective.

a) À condition qu'il existe des goussets inclinés efficaces, tels que définis en 4.2 (voir les figures 3a et 3b), lorsque l'on calcule le module de résistance des ondulations à leur extrémité inférieure (section ① dans les figures 3a et 3b), l'aire, en cm^2, des tôles semelles peut être augmentée de la valeur suivante :

$$\left(2{,}5 \cdot a \cdot \sqrt{t_f \cdot t_{sh}} \cdot \sqrt{\frac{\sigma_{Fsh}}{\sigma_{Ffl}}}\right) \text{(qui ne doit pas être supérieure à } 2{,}5 \cdot a \cdot t_f\text{)}.$$

dans cette formule :

a	=	largeur en m de la semelle d'ondulation (voir la figure 2a)
t_{sh}	=	épaisseur nette du gousset incliné, en mm
t_f	=	épaisseur nette de la semelle, en mm
σ_{Fsh}	=	limite élastique supérieure minimale, en N/mm^2, du matériau utilisé pour les goussets inclinés
σ_{Ffl}	=	limite élastique supérieure minimale, en N/mm^2, du matériau utilisé pour les semelles d'ondulation.

b) À condition qu'il existe des tôles mouchoirs efficaces telles que définies en 4.2 (voir les figures 4a et 4b), lorsque l'on calcule le module de résistance des ondulations à l'extrémité inférieure (section ① sur les figures 4a et 4b), l'aire, en cm^2, des tôles semelles peut être augmentée de $(7 \cdot h_g \cdot t_{gu})$, formule dans laquelle :

h_g	=	hauteur des tôles mouchoirs en m (voir les figures 4a et 4b), cette valeur ne dépassant pas $\left(\frac{10}{7} \cdot s_{gu}\right)$
s_{gu}	=	largeur des tôles mouchoirs, en m
t_{gu}	=	épaisseur nette des tôles mouchoirs, en mm, cette valeur ne dépassant pas t_f
t_f	=	épaisseur nette de la semelle, en mm, sur la base de l'état à la construction.

c) Si les âmes des ondulations sont soudées sur un plafond de caisson incliné à un angle qui n'est pas inférieur à 45° par rapport à l'horizontale, le module de résistance de ces ondulations peut être calculé en considérant les âmes d'ondulations comme pleinement efficaces. S'il existe des tôles mouchoirs efficaces, pour le calcul du module de résistance des ondulations, l'aire des tôles semelles peut être augmentée de la façon indiquée en b) ci-dessus. Aucun marge ne peut être accordée s'il existe seulement des goussets inclinés.

Pour des angles inférieurs à 45°, l'efficacité de l'âme peut s'obtenir par interpolation linéaire de 30 % pour 0° à 100 % pour 45°.

4.4 Module de résistance des ondulations aux sections autres que l'extrémité inférieure

Pour le calcul du module de résistance, on considère que les âmes des ondulations sont efficaces et que la semelle comprimée a une largeur efficace, b_{ef}, qui n'est pas supérieure à celle donnée en 4.6.1.

4.5 Contrôle des contraintes admissibles

Les contraintes normales et de cisaillement σ et τ ne doivent pas dépasser les valeurs admissibles σ_a et τ_a en N/mm², définies comme suit :

$$\sigma_a = \sigma_F$$

$$\tau_a = 0{,}5 \cdot \sigma_F$$

σ_F étant la limite élastique supérieure minimale du matériau, en N/mm².

4.6 Contrôle de la largeur efficace de la semelle de compression et du flambement sous l'effet du cisaillement

4.6.1 Largeur efficace de la semelle de compression des ondulations

La largeur efficace b_{ef}, en m, de la semelle d'ondulation est obtenue à l'aide de la formule :

$$b_{ef} = C_e \cdot a$$

dans laquelle :

$$C_e = \frac{2{,}25}{\beta} - \frac{1{,}25}{\beta^2} \quad \text{pour } \beta > 1{,}25$$

$$C_e = 1{,}0 \quad \text{pour } \beta \leq 1{,}25$$

$$\beta = 10^3 \cdot \frac{a}{t_f} \cdot \sqrt{\frac{\sigma_F}{E}}$$

t_f = épaisseur nette de la semelle, en mm

a = largeur, en m, de la semelle d'ondulation (voir la figure 2a)

σ_F = limite élastique maximale en N/mm² du matériau

E = module d'élasticité en N/mm², supposé égale à $2{,}06 \cdot 10^5$ N/mm² pour l'acier

4.6.2 Cisaillement

Le contrôle du flambement doit être effectué pour les tôles âmes situées aux extrémités des ondulations.

La contrainte de cisaillement τ ne doit pas dépasser la valeur critique τ_c, en N/mm², définie par la formule suivante :

$$\tau_c = \tau_E \qquad \text{lorsque } \tau_E \leq \frac{\tau_F}{2}$$

$$= \tau_F \left(1 - \frac{\tau_F}{4\tau_E}\right) \qquad \text{lorsque } \tau_E > \frac{\tau_F}{2}$$

dans laquelle :

τ_F = $\frac{\sigma_F}{\sqrt{3}}$

σ_F = limite élastique supérieure minimale, en N/mm², du matériau, telle qu'indiquée en 4.6.1.

τ_E = $0{,}9\, k_t E \left(\frac{t}{1000\, c}\right)^2$

k_t, E, t, et c sont définis comme suit :

k_t = 6,34

E = module d'élasticité du matériau tel qu'indiqué en 4.6.1.

t = épaisseur nette, en mm, de l'âme d'ondulation

c = largeur, en m, de l'âme d'ondulation (voir figure 2a)

4.7 Épaisseur nette locale de la tôle

L'épaisseur nette locale de la tôle de cloison t, en mm, est obtenue à l'aide de la formule suivante :

$$t = 14{,}9 \cdot s_w \cdot \sqrt{\frac{p}{\sigma_F}}$$

dans laquelle :

s_w = largeur de tôle, en m, égale à la largeur de la semelle ou de l'âme d'ondulation, la plus grande de ces deux valeurs étant appliquée (voir figure 2a)

p = pression résultante en kN/m², telle que définie en 2.5, sur la partie inférieure de chaque virure; dans tous les cas l'épaisseur nette de la virure la plus basse doit être déterminée en utilisant la pression résultante au sommet du caisson inférieur ou du plafond de double fond, en l'absence de caisson, ou à la partie supérieure des goussets inclinés, s'il existe des tôles mouchoirs/goussets inclinés.

σ_F = Limite élastique supérieure minimale du matériau, en N/mm².

Dans le cas de cloisons ondulées assemblées, lorsque la semelle et l'âme ont des épaisseurs différentes, l'épaisseur nette de la tôle la plus étroite ne doit pas être inférieure à t_n, en mm, obtenue à l'aide de la formule suivante :

$$t_n = 14{,}9 \cdot s_n \cdot \sqrt{\frac{p}{\sigma_F}}$$

s_n = largeur, en m, de la tôle la plus étroite.

L'épaisseur nette de la tôle la plus large, en mm, ne doit pas être inférieure à la plus grande des valeurs suivantes :

$$t_w = 14{,}9 \cdot s_w \cdot \sqrt{\frac{p}{\sigma_F}}$$

et

$$t_w = \sqrt{\frac{440 \cdot s_w^2 \cdot p}{\sigma_F} - t_{np}^2}$$

$t_{np} \leq$ épaisseur nette effective de la tôle la plus étroite, qui ne doit pas être supérieure à

$$14{,}9 \cdot s_w \cdot \sqrt{\frac{p}{\sigma_F}}.$$

5 CARACTÉRISTIQUES LOCALES

Selon le cas, la conception des éléments locaux doit satisfaire aux prescriptions de l'Administration ou d'un organisme reconnu par l'Administration conformément aux dispositions de la règle XI/1 de la Convention SOLAS (ci-après appelée "l'Administration") en ce qui concerne le transfert des efforts et des moments qui s'exercent sur la cloison ondulée aux structures d'entourage, notamment aux structures de double fond et aux structures transversales de pont.

Plus particulièrement l'épaisseur et le raidissage des tôles mouchoirs et des goussets inclinés installés à des fins de renforcement doivent satisfaire aux prescriptions de l'Administration, sur la base du modèle des charges décrit dans la section 2.

Sauf indication contraire, les soudures et les matériaux doivent être dimensionnés et choisis conformément aux prescriptions de l'Administration.

6 COMPENSATION POUR CORROSION ET RENOUVELLEMENT DE L'ACIER

a) Le renouvellement de l'acier est nécessaire lorsque l'épaisseur mesurée est inférieure à t_{net} + 0,5 mm, t_{net} étant l'épaisseur utilisée pour calculer la capacité de flexion et les contraintes de cisaillement, comme indiqué en 4.2, ou l'épaisseur de tôle nette locale, comme indiqué en 4.7. On peut encore poser des bandes de renforcement, à condition que l'épaisseur nette ne soit pas dictée par les prescriptions concernant la résistance au cisaillement des tôles âmes (voir 4.5 et 4.6.2) ni par les prescriptions applicables à la pression locale pour les tôles âmes et les tôles semelles (voir 4.7).

Lorsque l'épaisseur mesurée se trouve dans les limites de t_{net} + 0,5 mm à t_{net} + 1,0 mm, un revêtement (appliqué conformément aux instructions de son fabricant) ou des mesures annuelles peuvent être adoptés en remplacement du renouvellement de l'acier.

b) Lorsqu'il est nécessaire de renouveler ou de renforcer l'acier, il convient de veiller à obtenir une épaisseur minimale de t_{net} + 2,5 mm pour les éléments renouvelés ou renforcés.

c) Des tôles mouchoirs munies de goussets inclinés allant de la partie inférieure des ondulations jusqu'à $0,1 \cdot \ell$, ou des doublantes de renforcement (sur les ondulations de la cloison et le bordé de caisson) doivent être installées, lorsque

$$0,8 \cdot (\sigma_{FR} \cdot t_R) \geq \sigma_{Fs} \cdot t_{st}$$

Dans cette formule :

σ_{FR} = limite élastique supérieure minimale, en N/mm², du matériau utilisé pour les semelles d'ondulation

σ_{Fs} = limite élastique supérieure minimale, en N/mm², du matériau utilisé pour les tôles de bordé du caisson inférieur ou les varangues (en l'absence de caisson)

t_R = épaisseur de la semelle en mm, jugée acceptable au regard des critères spécifiés en a) ci-dessus ou, si le renouvellement de l'acier est nécessaire, épaisseur après renouvellement conformément aux critères énoncés en b) ci-dessus. Il n'est pas nécessaire de prendre ici en considération l'épaisseur des semelles indiquée plus haut et dictée par la pression locale (voir 1.4.7)

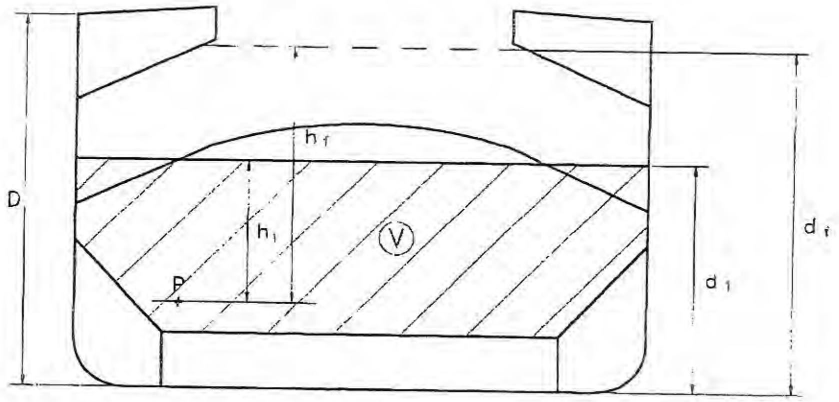
t_{st} = épaisseur à la construction, en mm, du bordé de caisson inférieur ou des varangues (en l'absence de caisson)

Si des tôles mouchoirs sont installées, le même matériau que celui des semelles d'ondulations doit être utilisé. Ces tôles mouchoirs doivent être assemblées au plafond du caisson inférieur ou au plafond de double fond (en l'absence de caisson inférieur) par des soudures à pénétration forte (voir figure 5).

d) Lorsqu'il est nécessaire de renouveler l'acier, l'assemblage de la cloison au plafond du caisson inférieur ou de double fond (en l'absence de caisson) doit se faire, au minimum, au moyen de soudures à pénétration forte (voir figure 5).

e) Lorsqu'il est nécessaire de poser ou de renouveler des tôles mouchoirs, leur assemblage aux ondulations et au plafond de caisson inférieur ou de double fond (en l'absence de caisson) doit se faire, au minimum, au moyen de soudures à pénétration forte (voir figure 5).

Figure 1



V = Volume de la cargaison
P = Point de calcul

Figure 2a

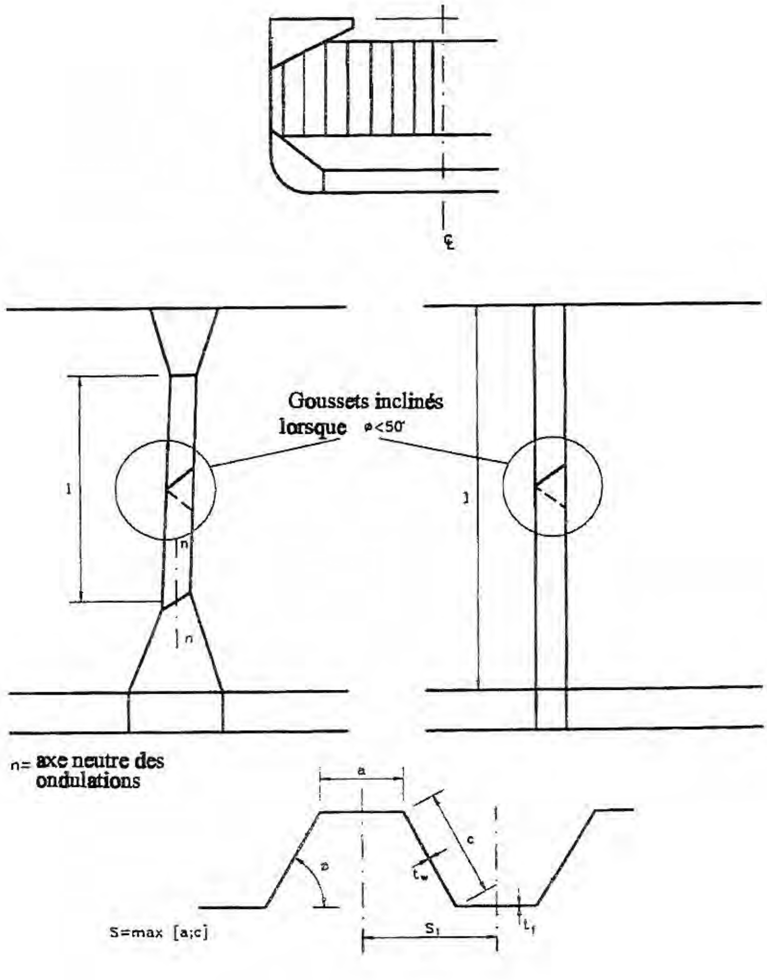
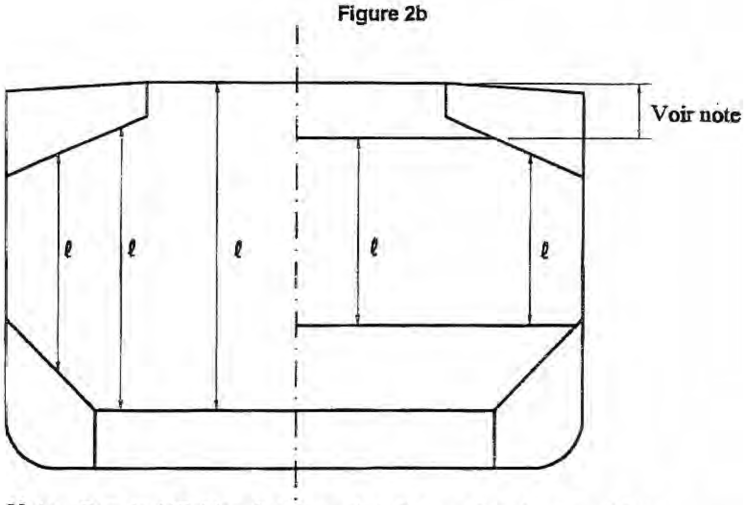

Goussets inclinés
lorsque φ<50°
l
l
n
n
n= axe neutre des ondulations
a
c
φ
t_w
S=max [a;c]
S_1
t_f

Figure 2b



Note Pour la définition de ℓ, la partie inférieure du caisson supérieur ne doit pas être supérieure à une distance du pont, au livet milieu, égale à :

- 3 fois la hauteur des ondulations, en règle générale,
- 2 fois la hauteur des ondulations, dans le cas d'un caisson rectangulaire

Figure 3a

Goussets inclinés symétriques

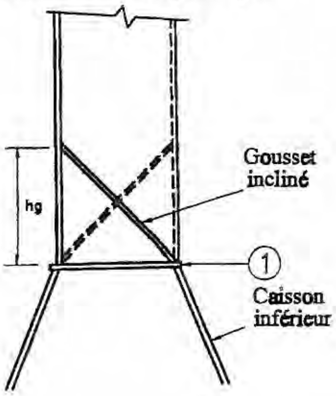


Figure 3b

Goussets inclinés asymétriques

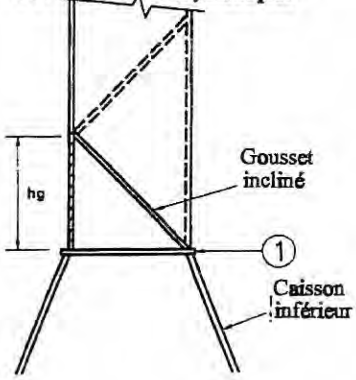


Figure 4a

Tôles mouchoirs/goussets inclinés symétriques

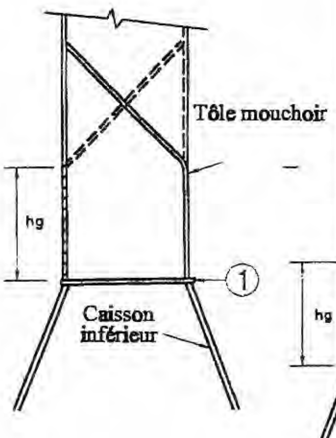


Figure 4b

Tôles mouchoirs/goussets inclinés asymétriques

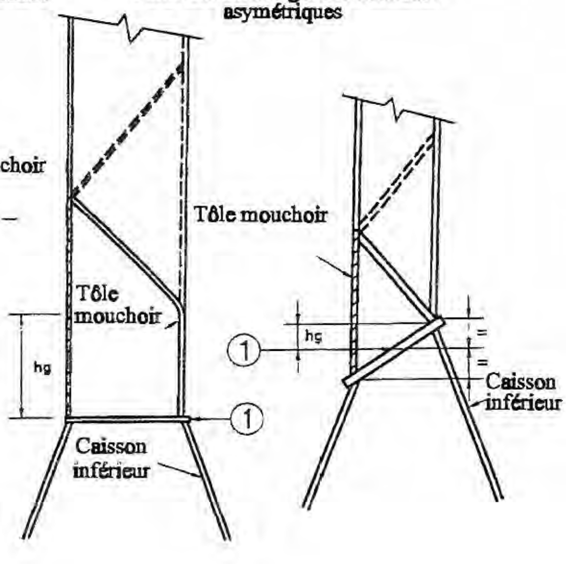
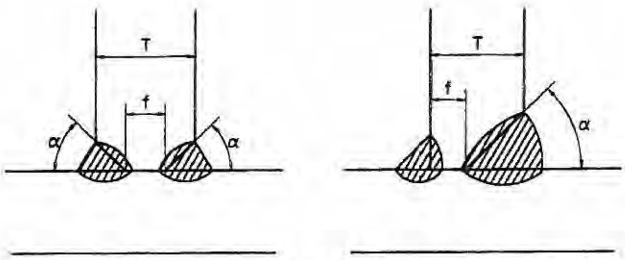


Figure 5



Talon (f) = 3 mm à T/3 mm
Chanfrein (α) = 40° à 60°

ANNEXE 2

NORMES APPLICABLES À L'ÉVALUATION DU CHARGEMENT ADMISSIBLE DE LA CALE À CARGAISON SITUÉE LE PLUS À L'AVANT

1 INTRODUCTION

Le chargement de la cale à cargaison située le plus à l'avant ne doit pas dépasser le chargement admissible de la cale après envahissement, que l'on calcule comme indiqué à la section 4, en appliquant les charges définies à la section 2 et résistance au cisaillement du double fond définie à la section 3.

Le chargement admissible de la cale après envahissement ne doit en aucun cas être supérieur au chargement nominal à l'état intact.

2 MODÉLISATION DES CHARGES

2.1 Généralités

Les charges qu'il faut considérer comme s'exerçant sur le double fond de la cale située le plus à l'avant sont celles résultant des pressions extérieures de la mer ainsi que de la conjugaison des charges dues à la cargaison conjuguées et de celles dues à l'envahissement de la cale à cargaison située le plus à l'avant.

Les combinaisons les plus défavorables de charges dues à la cargaison et à l'envahissement doivent être utilisées, en fonction des états de chargement prévus dans le manuel de chargement :

- état de chargement homogène;
- état de chargement non homogène;
- état de chargement en paquet (par exemple, produits d'aciérie).

Pour chaque état de chargement, la densité maximale apparente de la cargaison à transporter doit être prise en considération lors du calcul de la limite admissible pour la cale.

2.2 Hauteur d'envahissement au-dessus du double fond

La hauteur d'envahissement h_f (voir la figure 1) est la distance, en m, mesurée verticalement, le navire étant en position droite, depuis le plafond de double fond jusqu'à un niveau situé à une distance d_f du tracé de la quille, égale à :

- D en règle générale; ou
- $0{,}95 \cdot D$ pour les navires d'un port en lourd inférieur à 50 000 tonnes avec un franc-bord de type B.

D étant la distance, en m, mesurée depuis le tracé de la quille jusqu'au pont de franc-bord sur le côté, au milieu du navire (voir la figure 1).

3 RÉSISTANCE AU CISAILLEMENT DE LA STRUCTURE DE DOUBLE FOND DE LA CALE À CARGAISON SITUÉE LE PLUS À L'AVANT

La résistance au cisaillement, C, de la structure de double fond au niveau de la cale à cargaison située le plus à l'avant est définie comme étant la somme de la résistance au cisaillement à chaque extrémité des éléments suivants :

- toutes les varangues adjacentes aux deux trémies, moins la moitié de la résistance des deux varangues adjacentes à chaque caisson ou cloison transversale, en l'absence de caissons (voir la figure 2); et

- tous les supports de double fond adjacents aux deux caissons ou aux cloisons transversales, en l'absence de caissons.

La résistance des supports ou des varangues qui n'atteignent pas le caisson limitant la cale ou le support de trémie et ne leur sont pas directement rattachés doit être évaluée pour une seule extrémité.

Il convient de noter que les varangues et supports à prendre en considération sont ceux qui se trouvent à l'intérieur de l'entourage de la cale constitué par les trémies et caissons (ou cloisons transversales en l'absence de caissons). Les supports latéraux de trémies et les varangues se trouvant directement au-dessous des caissons de cloisons (ou des cloisons transversales en l'absence de caissons), là où ceux-ci sont rattachés au plafond de double fond, ne sont pas pris en considération.

Lorsque la géométrie et/ou l'agencement des structures de double fond sont de nature à invalider les hypothèses ci-dessus, cette appréciation étant à la discrétion de l'Administration ou d'un organisme reconnu par l'Administration conformément aux dispositions de la règle XI/1 de la Convention SOLAS (ci-après dénommé "l'Administration"), la résistance au cisaillement C du double fond doit être calculée conformément aux critères définis par l'Administration.

Lors du calcul de la résistance au cisaillement, il faut appliquer l'épaisseur nette des varangues et des supports. L'épaisseur nette t_{net}, en mm, est obtenue à l'aide de la formule suivante :

$$t_{net} = t - t_c$$

dans laquelle :

t = épaisseur à la construction, en mm, des varangues et des supports

t_c = réduction pour corrosion, égale généralement à 2 mm; une valeur inférieure de t_c peut être adoptée, à condition que des mesures jugées satisfaisantes par l'Administration soient prises pour justifier une telle hypothèse de calcul.

3.1 Résistance au cisaillement des varangues

La résistance au cisaillement des varangues au niveau du panneau adjacent aux trémies S_{f1}, en kN, et la résistance au cisaillement des varangues au niveau des ouvertures de la maille située "le plus sur le côté" (c'est-à-dire celle qui est la plus proche de la trémie) S_{f2}, en kN, sont exprimées à l'aide des formules suivantes :

$$S_{f1} = 10^{-3} \cdot A_f \cdot \frac{\tau_a}{\eta_1}$$

$$S_{f2} = 10^{-3} \cdot A_{f,h} \cdot \frac{\tau_a}{\eta_2}$$

dans lesquelles :

A_f	=	section, en mm^2, du panneau de varangue adjacent aux trémies
$A_{f,h}$	=	section nette, en mm^2, des panneaux de varangue à l'emplacement des ouvertures dans la maille située le plus sur le côté (c'est-à-dire la plus proche de la trémie)
τ_a	=	contrainte de cisaillement admissible, en N/mm^2, considérée comme étant égale à $\sigma_F / \sqrt{3}$
σ_F	=	limite élastique supérieure minimale du matériau, en N/mm^2
η_1	=	1,10
η_2	=	1,20
		la valeur de η_2 peut être réduite, à la discrétion de l'Administration, jusqu'à 1,10, lorsqu'il est prévu des renforcements appropriés jugés satisfaisants par l'Administration.

3.2 Résistance au cisaillement des supports

La résistance au cisaillement des supports, au niveau du panneau de support adjacent aux caissons (ou aux cloisons transversales en l'absence de caissons) S_{g1}, en kN, et la résistance au cisaillement des supports au niveau de la plus grande ouverture dans la maille "située le plus à l'extérieur" (c'est-à-dire la plus proche du caisson ou de la cloison transversale, en l'absence de caissons) S_{g2}, en kN, sont obtenues à l'aide des formules suivantes :

$$S_{g1} = 10^{-3} \cdot A_g \cdot \frac{\tau_a}{\eta_1}$$

$$S_{g2} = 10^{-3} \cdot A_{g,h} \cdot \frac{\tau_a}{\eta_2}$$

dans lesquelles :

A_g = section minimale, en mm^2, du panneau de support adjacent aux caissons (ou cloisons transversales en l'absence de caissons)

$A_{g,h}$ = section nette, en mm^2, du panneau de support à l'emplacement de la plus grande ouverture de la maille située "le plus à l'extérieur" (c'est-à-dire la maille la plus proche du caisson ou de la cloison transversale, en l'absence de caissons)

τ_a = contrainte de cisaillement admissible en N/mm^2, telle qu'indiquée en 3.1

η_1 = 1,10

η_2 = 1,15

la valeur de η_2 peut être réduite, à la discrétion de l'Administration, jusqu'à 1,10, lorsqu'il est prévu des renforcements appropriés jugés satisfaisants par l'Administration.

4 CHARGEMENT ADMISSIBLE DES CALES

Le chargement admissible d'une cale W, en tonnes, est obtenu à l'aide de la formule suivante :

$$W = \rho_c \cdot V \cdot \frac{1}{F}$$

dans laquelle :

F = 1,05, en règle générale
1,00 pour les produits d'aciérie

ρ_c = densité de la cargaison en t/m^3; pour les cargaisons en vrac, voir 2.1; pour les produits en acier, ρ_c = densité de l'acier

V = volume, en m^3, occupé par la cargaison au niveau h_1

h_1 = $\dfrac{X}{\rho_c \cdot g}$

X = pour les cargaisons en vrac, la plus petite des valeurs X_1 ou X_2 obtenues comme suit :

$$X_1 = \frac{Z + \rho \cdot g \cdot (E - h_f)}{1 + \frac{\rho}{\rho_c}(perm - 1)}$$

$$X_2 = Z + \rho \cdot g \cdot (E - h_f \cdot perm)$$

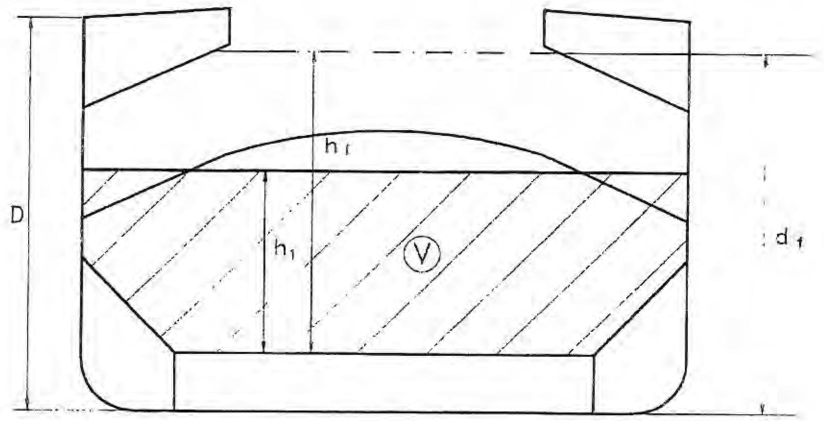
X = pour les produits en acier, X peut être égal à X_1, avec perm = 0

ρ = densité de l'eau de mer en t/m^3

g = 9,81 m/s^2, accélération due à la pesanteur

E	=	$d_f - 0{,}1\ D$
d_f, D	=	telle qu'indiquée en 2.2
h_f	=	hauteur d'envahissement, en m, telle qu'indiquée en 2.2
perm	=	perméabilité de la cargaison, considérée comme égale à 0,3 pour le minerai (la densité apparente correspondante de la cargaison de minerai de fer peut être généralement considérée comme égale à 3,0 t/m³)
Z	=	la plus petite des deux valeurs Z_1 ou Z_2 obtenues comme suit : $Z_1 = \frac{C_h}{A_{DB,h}}$ $Z_2 = \frac{C_e}{A_{DB,e}}$
C_h	=	résistance au cisaillement du double fond, en kN, telle que définie à la section 3 en prenant, pour chaque varangue, la moindre des deux résistances au cisaillement S_{f1} et S_{f2} (voir 3.1) et, pour chaque support, la moindre des deux résistances au cisaillement S_{g1} et S_{g2} (voir 3.2)
C_e	=	résistance au cisaillement du double fond, en kN, telle que définie à la section 3, en prenant pour chaque varangue la résistance au cisaillement S_{f1} (voir 3.1) et, pour chaque support, la moindre des deux résistances au cisaillement S_{g1} et S_{g2} (voir 3.2)
$A_{DB,h}$	=	$\sum_{i=1}^{i=n} S_i \cdot B_{DB,i}$
$A_{DB,e}$	=	$\sum_{i=1}^{i=n} S_i \cdot (B_{DB} - s)$
n	=	nombre de varangues entre les caissons (ou les cloisons transversales en l'absence de caissons)
S_i	=	espacement de la enième varangue, en mètres
$B_{DB,i}$	=	$B_{DB} - s$ pour les varangues dont la résistance au cisaillement est égale à S_{f1} (voir 3.1)
$B_{DB,i}$	=	$B_{DB,h}$ pour les varangues dont la résistance au cisaillement est égale à S_{f2} (voir 3.1)
B_{DB}	=	largeur du double fond, en mètres, entre trémies (voir la figure 3)
$B_{DB,h}$	=	distance, en mètres, entre les deux ouvertures considérées (voir la figure 3)
s	=	espacement, en mètres, des lisses de double fond adjacentes aux trémies

Figure 1



V = Volume de la cargaison

Figure 2

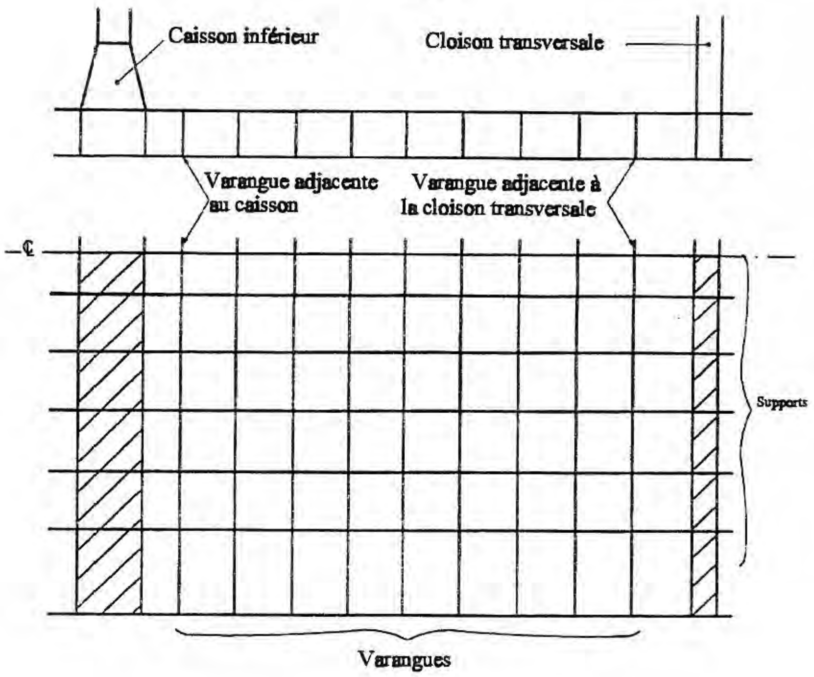
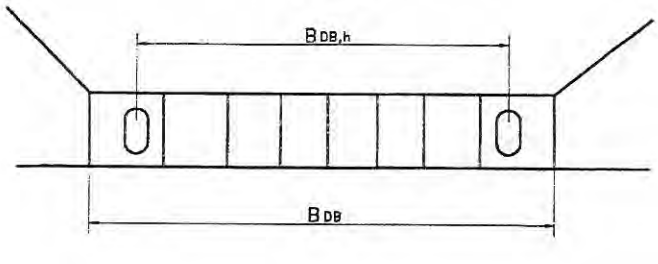


Figure 3



RÉSOLUTION 5

RECOMMANDATION SUR LES CALCULATEURS DE CHARGEMENT

LA CONFÉRENCE,

AYANT ADOPTÉ les amendements à la Convention internationale de 1974 pour la sauvegarde de la vie humaine en mer (Convention SOLAS), telle que modifiée, concernant la sécurité des vraquiers,

NOTANT qu'en vertu de la nouvelle règle XII/11 de la Convention SOLAS, tous les vraquiers d'une longueur égale ou supérieure à 150 m, tels que définis à la règle IX/1.6 de la Convention, doivent être munis d'un calculateur de chargement capable de fournir des renseignements sur les efforts tranchants et les moments de flexion auxquels est soumise la poutre-navire, compte tenu de la recommandation adoptée par l'Organisation,

ÉTANT D'AVIS que le calculateur de chargement est un outil nécessaire qui permet de garantir de manière plus efficace que les efforts tranchants et les moments de flexion auxquels est soumise la poutre-navire sont maintenus dans les limites admissibles pendant les opérations de chargement et de déchargement et à la fin de ces opérations,

CONSCIENTE DU FAIT que l'Association internationale des sociétés de classification (IACS) a adopté la recommandation No 48 sur les calculateurs de chargement qui est destinée à être appliquée par ses sociétés membres, parallèlement à leurs prescriptions et procédures, lorsqu'elles approuvent, à leurs propres fins, les calculateurs de chargement destinés aux navires qui ne sont pas encore munis d'un calculateur de chargement approuvé,

PRIE INSTAMMENT les Gouvernements contractants :

a) d'appliquer la recommandation susmentionnée de l'IACS lorsqu'ils approuveront les calculateurs de chargement prescrits par la règle XII/11 de la Convention SOLAS et destinés aux navires qui ne sont pas encore munis d'un calculateur de chargement approuvé; et

b) de s'assurer que les calculateurs de chargement qui sont déjà installés à bord des navires auxquels s'applique la règle XII/11 de la Convention SOLAS ont été approuvés conformément aux normes des organismes reconnus.

RÉSOLUTION 6

INTERPRÉTATION DE LA DÉFINITION DU TERME "VRAQUIER", DONNÉE AU CHAPITRE IX DE LA CONVENTION SOLAS DE 1974, TELLE QUE MODIFIÉE EN 1994

LA CONFÉRENCE,

AYANT ADOPTÉ les amendements à la Convention internationale de 1974 pour la sauvegarde de la vie humaine en mer (Convention SOLAS), telle que modifiée, concernant la sécurité des vraquiers,

NOTANT que le chapitre IX de la Convention SOLAS entrera en vigueur le 1er juillet 1998,

NOTANT ÉGALEMENT que les vraquiers devront satisfaire aux prescriptions du chapitre IX de la Convention SOLAS d'ici au 1er juillet 1998,

NOTANT EN OUTRE que l'entrée en vigueur du nouveau chapitre XII de la Convention SOLAS, qui aura lieu en principe le 1er juillet 1999, rendra l'application des nouvelles prescriptions obligatoires pour les vraquiers,

RECONNAISSANT que plusieurs Gouvernements contractants à la Convention SOLAS ont décelé certaines ambiguïtés dans la définition du terme "vraquier", telle qu'elle figure à la règle IX/1.6 de la Convention SOLAS, qui donnent lieu à des interprétations divergentes de ce terme,

RECONNAISSANT EN OUTRE la nécessité d'établir, aux fins de l'application du nouveau chapitre XII de la Convention SOLAS, des directives à l'intention des Gouvernements contractants et du secteur maritime, établissant quels sont les navires visés par les nouvelles prescriptions,

TENANT COMPTE de la nécessité urgente d'établir, aux fins de l'application du chapitre IX de la Convention SOLAS au 1er juillet 1998, des directives précises à l'intention des Gouvernements contractants et du secteur maritime afin de définir quels sont les navires visés par les prescriptions du Code international de gestion de la sécurité (Code ISM),

SOUHAITANT assurer que tous les Gouvernements contractants appliquent les dispositions du Code ISM et du nouveau chapitre XII de la Convention SOLAS, en leur qualité d'État du pavillon ou d'État du port exerçant un contrôle en vertu des dispositions de la Convention, de manière cohérente, systématique et uniforme, afin de faciliter le commerce maritime international,

CONSCIENTE du fait que les dispositions du chapitre IX de la Convention SOLAS devraient être appliquées compte tenu de la résolution 9 de la Conférence, dès que possible,

1. PRIE INSTAMMENT les Gouvernements contractants à la Convention SOLAS d'interpréter la définition du terme "vraquier" donnée à la règle IX/1.6, aux fins de l'application de la règle IX/2.1.2 de la Convention SOLAS et du chapitre XII, comme signifiant :

- les navires construits avec un seul pont, des citernes latérales supérieures et des citernes latérales en trémie dans les espaces à cargaison et destinés essentiellement à transporter des cargaisons sèches en vrac; ou

- des minéraliers*; ou

- des transporteurs mixtes**;

2. INVITE le Comité de la sécurité maritime de l'Organisation maritime internationale à examiner, dès que possible :

a) les mesures nécessaires pour supprimer l'ambiguïté qui existe dans la définition du terme "vraquier" donnée à la règle IX/1.6 de la Convention SOLAS; et

b) toute autre mesure appropriée visant à permettre aux Gouvernements contractants à la Convention SOLAS d'identifier facilement le type de navire lorsqu'ils exercent leurs droits de contrôle en vertu des dispositions de ladite Convention.

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* Le terme "minéralier" désigne un navire de mer à un seul pont, doté de deux cloisons longitudinales et d'un double fond sur toute la longueur de la zone de cargaison, et destiné à transporter des cargaisons de minerai uniquement dans les cales centrales.

** Le terme "transporteur mixte" a le même sens que celui défini à la règle II-2/3.27 de la Convention SOLAS.

RÉSOLUTION 7

VISITES RENFORCÉES EFFECTUÉES AVANT L'ENTRÉE EN VIGUEUR DES AMENDEMENTS

LA CONFÉRENCE,

AYANT ADOPTÉ les amendements à la Convention internationale de 1974 pour la sauvegarde de la vie humaine en mer (Convention SOLAS), telle que modifiée, concernant la sécurité des vraquiers,

NOTANT qu'en vertu de la règle XII/7 de la Convention SOLAS les vraquiers à muraille simple, d'une longueur égale ou supérieure à 150 m et âgés de 10 ans ou plus ne doivent pas transporter de cargaisons solides en vrac d'une densité égale ou supérieure à 1780 kg/m^3, à moins d'avoir été soumis à des visites renforcées conformément aux dispositions de la règle XI/2, de la Convention SOLAS,

RECONNAISSANT que les dispositions de la règle XI/2 de la Convention SOLAS, relatives aux visites renforcées, ont pris effet le 1er janvier 1996,

RECONNAISSANT ÉGALEMENT qu'un nombre important de vraquiers ont été soumis aux visites renforcées prévues par les dispositions de la résolution A.744(18), même avant que la règle XI/2 ne prenne effet, et que de telles visites peuvent être reconnues comme étant valables aux fins de l'application de la règle XII/7,

DÉCIDE que les Gouvernements contractants à la Convention SOLAS peuvent autoriser les vraquiers existants auxquels s'applique la règle XII/7 à transporter des cargaisons solides en vrac d'une densité égale ou supérieure à 1780 kg/m^3, si ces vraquiers ont fait l'objet d'une visite périodique équivalente à une visite périodique effectuée conformément au programme renforcé d'inspections prescrit à la règle XI/2, avant le 1er janvier 1996.

RÉSOLUTION 8

POURSUITE DES TRAVAUX SUR LA SÉCURITÉ DES VRAQUIERS

LA CONFÉRENCE,

AYANT ADOPTÉ les amendements à la Convention internationale de 1974 pour la sauvegarde de la vie humaine en mer (Convention SOLAS), telle que modifiée, concernant la sécurité des vraquiers,

RECONNAISSANT que le nouveau chapitre XII de la Convention SOLAS ne vise pas tous les types et toutes les dimensions de vraquiers, certaines règles ne s'appliquant pas, par exemple, aux vraquiers d'une longueur inférieure à 150 m ou aux vraquiers autres que ceux à muraille simple,

TENANT COMPTE du fait qu'un certain nombre de vraquiers seront d'une longueur inférieure à 150 m et qu'un nombre considérable de vraquiers à muraille simple peuvent se livrer au transport de cargaisons solides en vrac d'une densité inférieure à 1 780 kg/m^3,

ESTIMANT qu'il est nécessaire d'examiner plus avant les normes de sécurité des vraquiers de ces types et dimensions auxquels la totalité ou une partie du chapitre XII de la Convention SOLAS ne s'applique pas,

RECONNAISSANT EN OUTRE qu'il faut mettre au point une définition uniforme de la construction à muraille simple visée à la règle XII/1.2 de la Convention SOLAS,

INVITE le Comité de la sécurité maritime de l'Organisation maritime internationale à prendre de toute urgence les mesures suivantes :

a) examiner plus avant la question de la sécurité des vraquiers auxquels la totalité ou une partie du chapitre XII de la Convention SOLAS ne s'applique pas, en particulier les vraquiers d'une longueur inférieure à 150 m, les vraquiers neufs à double muraille, les vraquiers à muraille simple qui transportent des cargaisons solides en vrac d'une densité inférieure à 1 780 kg/m^3, les vraquiers dotés d'un nombre insuffisant de cales à cargaison pour satisfaire à la règle XII/4.2 et les navires autres que les vraquiers à muraille simple destinés à transporter des cargaisons en vrac; et élaborer, le cas échéant, des prescriptions, des recommandations et/ou des directives appropriées; et

b) mettre au point une définition de la construction à muraille simple.

RÉSOLUTION 9

APPLICATION DU CODE INTERNATIONAL DE GESTION DE LA SÉCURITÉ (CODE ISM)

LA CONFÉRENCE,

AYANT ADOPTÉ les amendements à la Convention internationale de 1974 pour la sauvegarde de la vie humaine en mer (Convention SOLAS), telle que modifiée, concernant la sécurité des vraquiers,

NOTANT l'adoption :

- par l'Assemblée de l'Organisation maritime internationale (OMI), de la résolution A.741(18) sur le Code international de gestion pour la sécurité de l'exploitation des navires et la prévention de la pollution (Code international de gestion de la sécurité (Code ISM));

- par la Conférence de 1994 des Gouvernements contractants à la Convention internationale de 1974 pour la sauvegarde de la vie humaine en mer, d'un nouveau chapitre IX sur la gestion pour la sécurité de l'exploitation des navires, en vertu duquel le Code ISM doit devenir obligatoire le 1er juillet 1998 (date à laquelle ce nouveau chapitre s'appliquera aux navires à passagers, y compris les engins à grande vitesse à passagers, aux pétroliers, aux navires-citernes pour produits chimiques, aux transporteurs de gaz, aux vraquiers et aux engins à grande vitesse à cargaisons, d'une jauge brute égale ou supérieure à 500, quelle que soit la date à laquelle ils ont été construits); et

- par l'Assemblée de l'OMI, de la résolution A.848(20) sur l'application du Code international pour la gestion de la sécurité (Code ISM),

NOTANT EN OUTRE que, d'après les informations communiquées par les Gouvernements contractants à la Convention SOLAS, un nombre significatif de compagnies maritimes qui exploitent des vraquiers n'ont pas encore obtenu la certification ISM et ne l'ont peut-être même pas encore demandée,

1. APPELLE l'attention des Gouvernements contractants à la Convention SOLAS et de l'industrie sur le fait que la règle IX/2 de la Convention ne prévoit aucune prorogation des dates d'application du Code ISM;

2. PRIE INSTAMMENT les Gouvernements contractants à la Convention SOLAS de s'efforcer par tous les moyens de mener à bien dès que possible la certification ISM des navires habilités à battre leur pavillon, comme l'exige la règle IX/2 de la Convention SOLAS;

3. PRIE INSTAMMENT les gouvernements dont la flotte compte un très grand nombre de vraquiers, de même que les organismes reconnus et les compagnies maritimes concernés, de redoubler d'efforts en vue de garantir l'application effective, dans les délais voulus, du Code ISM à bord de ces navires;

4. INVITE le Secrétaire général de l'OMI à prendre toutes les mesures additionnelles requises en vue de faciliter l'application effective, dans les délais voulus, du Code ISM.

DOCUMENTO ADJUNTO 2

RESOLUCIÓN 3

RECOMENDACIÓN SOBRE EL CUMPLIMIENTO DE LA REGLA XII/5DEL CONVENIO SOLAS

LA CONFERENCIA,

HABIENDO APROBADO enmiendas al Convenio internacional para la seguridad de la vida humana en el mar, 1974 (Convenio SOLAS), enmendado, relativas a la seguridad de los graneleros,

CONSIDERANDO que en la nueva regla XII/5 del Convenio SOLAS se exige que todo granelero de forro sencillo en el costado de eslora igual o superior a 150 m, proyectado para transportar cargas sólidas a granel de densidad igual o superior a 1 000 kg/m^3, construido el 1 de julio de 1999 o posteriormente, tendrá una resistencia suficiente, teniendo en cuenta las recomendaciones aprobadas por la Organización, para soportar la inundación de una cualquiera de las bodegas de carga en todas las condiciones de carga y lastre, teniendo también en cuenta los efectos dinámicos,

TOMANDO NOTA de que la Asociación Internacional de Sociedades de Clasificación (IACS) ha publicado las siguientes Prescripciones unificadas:

S17 Resistencia longitudinal de la viga-casco de los graneleros de forro sencillo en el costado, con inundación;

S18 Evaluación de los escantillones de los mamparos transversales estancos acanalados de los graneleros de forro sencillo en el costado, teniendo en cuenta la inundación de las bodegas; y

S20 Evaluación de la carga admisible de las bodegas de los graneleros de forro sencillo en el costado, teniendo en cuenta la inundación de éstas,

TOMANDO NOTA TAMBIÉN de que las reglas de las sociedades de clasificación deberían determinar una resistencia adecuada para los graneleros que no sean de forro sencillo en el costado, de conformidad con la regla II-1/3-1 del Convenio,

ESTIMANDO que la aplicación de las mencionadas Prescripciones unificadas permitirá cumplir lo dispuesto en la regla XII/5 del Convenio,

INSTA a los gobiernos a que se aseguren de que todos los graneleros de forro sencillo en el costado, estén o no clasificados por sociedades de clasificación que sean miembros de la IACS, cumplen las Prescripciones unificadas antedichas de la IACS.

RESOLUCIÓN 4

NORMAS PARA EVALUAR LOS ESCANTILLONES DEL MAMPARO TRANSVERSAL ESTANCO ACANALADO VERTICALMENTE, SITUADO ENTRE LAS DOS BODEGAS DE CARGA MÁS CERCANAS A PROA, Y PARA EVALUAR LA CARGA ADMISIBLE DE LA BODEGA DE CARGA MÁS CERCANA A PROA

LA CONFERENCIA,

HABIENDO APROBADO enmiendas al Convenio internacional para la seguridad de la vida humana en el mar, 1974 (Convenio SOLAS), enmendado, relativos a la seguridad de los graneleros,

CONSIDERANDO que en la nueva regla XII/6 del Convenio SOLAS se exige que el mamparo transversal estanco acanalado verticalmente, situado entre las dos bodegas de carga más cercanas a proa, y la estructura del doble fondo a la altura de la bodega de carga más cercana a proa de los graneleros de eslora igual o superior a 150 m y forro sencillo en el costado que transporten cargas sólidas a granel de densidad igual o superior a 1 780 kg/m^3 tendrán una resistencia suficiente, de conformidad con las Normas relativas a la resistencia del mamparo y el doble fondo de los graneleros elaboradas por la Organización, para soportar la inundación de la bodega de carga más cercana a proa, teniendo también en cuenta los efectos dinámicos,

ESTIMANDO que la aplicación de dicha regla por los gobiernos, de conformidad con el plan de implantación prescrito en la nueva regla XII/3 del Convenio SOLAS, contribuirá a mejorar considerablemente la seguridad de los graneleros existentes y a salvaguardar las vidas de sus tripulaciones,

HABIENDO EXAMINADO la recomendación hecha por el Comité de Seguridad Marítima de la Organización Marítima Internacional en su 68º periodo de sesiones,

APRUEBA:

.1 las Normas para evaluar los escantillones del mamparo transversal estanco acanalado verticalmente, situado entre las dos bodegas de carga más cercanas a proa, cuyo texto figura en el anexo 1 de la presente resolución; y

.2 las Normas para evaluar la carga admisible de la bodega de carga más cercana a proa, cuyo texto figura en el anexo 2 de la presente resolución,

a los efectos de la aplicación de la regla XII/6 del Convenio SOLAS.

ANEXO 1

NORMAS PARA EVALUAR LOS ESCANTILLONES DEL MAMPARO TRANSVERSAL ESTANCO ACANALADO VERTICALMENTE, SITUADO ENTRE LAS DOS BODEGAS DE CARGA MÁS CERCANAS A PROA

1 INTRODUCCIÓN

Los escantillones netos de los mamparos transversales estancos acanalados verticalmente, situados entre las dos bodegas de carga más cercanas a proa, se calcularán utilizando las cargas indicadas en la sección 2, el momento flector y la fuerza cortante indicados en la sección 3 y los criterios de resistencia indicados en la sección 4.

Cuando sea necesario, la renovación y el refuerzo del acero se efectuarán de conformidad con lo indicado en la sección 6.

En las presentes normas, por condiciones de carga homogéneas se entienden aquellas en que la relación entre los niveles de llenado máximo y mínimo, evaluados respecto de las dos bodegas más cercanas a proa, no excede de 1,20, corregida en función de la densidad de la carga.

2 MODELO DE APLICACIÓN DE CARGAS

2.1 Generalidades

Se considerará que las cargas que actúan sobre los mamparos son las cargas resultantes de la combinación de las cargas debidas al cargamento y las debidas a la inundación de la bodega de carga más cercana a proa.

Para comprobar los escantillones de cada mamparo, se emplearán las combinaciones más rigurosas de cargas debidas al cargamento y a la inundación, teniendo en cuenta las condiciones de carga indicadas en el manual de carga:

- condiciones de carga homogéneas;
- condiciones de carga no homogéneas.

No será necesario aplicar las presentes normas a las condiciones de carga parcial no homogéneas que se dan cuando un buque en condiciones de carga homogéneas realiza operaciones de carga y descarga en varios puertos.

2.2 Altura de inundación con mamparos acanalados

La altura de inundación h_f (véase la figura 1) es la distancia, en metros, medida verticalmente con el buque adrizado, desde el punto de cálculo hasta un nivel situado a una distancia d_f, en metros, de la línea base igual a:

a) en general:

D

b) respecto de los buques de peso muerto inferior a 50 000 toneladas con francobordo para buques de tipo B:

$0,95 \cdot D$

donde:

$D =$ distancia, en metros, de la línea base a la cubierta de francobordo a media eslora en el costado (véase la figura 1).

c) respecto de los buques que se vayan a explotar con un calado T_r, correspondiente a la línea de máxima carga asignada, inferior al calado T, correspondiente a la línea de máxima carga admisible, la altura de inundación definida en a) y b) se podrá reducir en una cuantía igual a $T - T_r$.

2.3 Presión en la bodega inundada

2.3.1 Bodega con carga a granel

Se considerarán dos casos, según los valores de d_1 y d_f, siendo d_1 (véase la figura 1) la distancia desde la línea base, en metros, dada por:

$$d_1 = \frac{M_c}{\rho_c \cdot l_c \cdot B} + \frac{V_{LS}}{l_c \cdot B} + (h_{HT} - h_{DB}) \cdot \frac{b_{HT}}{B} + h_{DB}$$

donde:

M_c = masa de la carga, en toneladas, en la bodega de carga más cercana a proa

ρ_c = densidad de la carga a granel, en toneladas por metro cúbico

l_c = longitud de la bodega de carga más cercana a proa, en metros

B = manga del buque a media eslora, en metros

V_{LS} = volumen, en metros cúbicos, del polín inferior por encima del techo del doble fondo

h_{HT} = altura de los tanques laterales de pantoque a media eslora, en metros, desde la línea base

h_{CB} = altura del doble fondo, en metros

b_{HT} = anchura de los tanques laterales de pantoque en la sección central, en metros.

a) $d_f \geq d_1$

En cada punto del mamparo situado a una distancia comprendida entre d_1 y d_f de la línea base, la presión $p_{c,f}$, en kilonewton por metro cuadrado, viene dada por:

$$p_{c,f} = \rho . g . h_f$$

donde:

- ρ = densidad del agua de mar en toneladas por metro cuadrado
- g = 9,81 m/s², aceleración de la gravedad
- h_f = altura de la inundación según se define en la sección 2.2.

En cada punto del mamparo situado a una distancia inferior a d_1 de la línea base, la presión $p_{c,f}$, en kilonewton por metro cuadrado, viene dada por:

$$p_{c,f} = \rho \cdot g \cdot h_f + [\rho_c - \rho \ . \ (1 - \text{perm})] \ . \ g \ . \ h_1 \ . \ \tan^2 \gamma$$

donde:

- ρ, g, h_f = lo indicado más arriba
- ρ_c = densidad de la carga a granel, en toneladas por metro cúbico
- perm = permeabilidad de la carga, que se supondrá de 0,3 para mineral (en general, se supone que la densidad correspondiente de la carga a granel de mineral de hierro es de 3,0 t/m³).
- h_1 = distancia vertical, en metros, desde el punto de cálculo hasta un nivel situado a la distancia d_1, según se define más arriba, de la línea base (véase la figura 1)
- Υ = $45^\circ - (\varphi/2)$
- φ = ángulo de reposo de la carga, en grados, que en general puede suponerse igual a 35° para el mineral de hierro.

La fuerza $F_{c,f}$, en kilonewton, que actúa sobre una acanaladura viene dada por:

$$F_{c,f} = s_1 \cdot \left[\rho \cdot g \cdot \frac{(d_f - d_1)^2}{2} + \frac{\rho \cdot g \cdot (d_f - d_1) + (p_{c,f})_{le}}{2} \cdot (d_1 - h_{DB} - h_{LS}) \right]$$

donde:

- s_1 = separación de las acanaladuras, en metros (véase la figura 2a)
- ρ, g, d_1, h_{DB} = lo indicado más arriba
- d_f = lo indicado en 2.2
- $(p_{c,f})_{le}$ = presión, en kilonewton por metro cuadrado, en el extremo inferior de la acanaladura
- h_{LS} = altura del polín inferior, en metros, desde el techo del doble fondo

b) $d_f < d_1$

En cada punto del mamparo situado a una distancia comprendida entre d_f y d_1 de la línea base, la presión $p_{c,f}$, en kilonewton por metro cuadrado, viene dada por:

$$p_{c,f} = \rho_c \cdot g \cdot h_1 \cdot \tan^2 \gamma$$

donde:

ρ_c, g, h_1, γ = lo indicado en a)

En cada punto del mamparo situado a una distancia inferior a d_f de la línea base, la presión $p_{c,f}$, en kilonewton por metro cuadrado, viene dada por:

$$p_{c,f} = \rho \cdot g \cdot h_f + [\rho_c \cdot h_1 - \rho \cdot (1\text{-perm}) \cdot h_f] \cdot g \cdot \tan^2 \gamma$$

donde:

ρ, g, h_f, p_c, h_1, perm, γ = lo indicado en a)

La fuerza $F_{c,f}$, en kilonewton, que actúa sobre una acanaladura viene dada por:

$$F_{c,f} = s_1 \cdot \left[\rho_c \cdot g \cdot \frac{(d_1 - d_f)^2}{2} \cdot \tan^2 \gamma + \frac{\rho_c \cdot g \cdot (d_1 - d_f) \cdot \tan^2 \gamma + (p_{c,f})_{le}}{2} \cdot (d_f - h_{DB} - h_{LS}) \right]$$

donde:

s_1, ρ_c, g, γ, $(p_{c,f})_{le}$, h_{LS} = lo indicado en a)

d_1, h_{DB} = lo indicado más arriba

d_f = lo indicado en 2.2

2.3.2 Bodega vacía

En cada punto del mamparo, se considerará la presión hidrostática p_f debida a la altura de inundación h_f.

La fuerza F_f, en kilonewton , que actúa sobre una acanaladura viene dada por:

$$F_f = s_1 \cdot \rho \cdot g \cdot \frac{(d_f - h_{DB} - h_{LS})^2}{2}$$

donde:

s_1, ρ, g, h_{LS} = lo indicado en 2.3.1 a)

h_{DB} = lo indicado en 2.3.1

d_f = lo indicado en 2.2.

2.4 Presión en la bodega no inundada que lleva carga a granel

En cada punto del mamparo, la presión p_c, en kilonewton por metro cuadrado, viene dada por:

$$p_c = \rho_c \cdot g \cdot h_1 \cdot \tan^2 \gamma$$

donde:

ρ_c, g, h_1, γ = lo indicado en 2.3.1 a)

La fuerza F_c, en kilonewton , que actúa sobre una acanaladura viene dada por:

$$F_c = \rho_c \cdot g \cdot s_1 \cdot \frac{(d_1 - h_{DB} - h_{LS})^2}{2} \cdot \tan^2 \gamma$$

donde:

ρ_c, g, s_1, h_{LS}, γ = lo indicado en 2.3.1 a)

d_1, h_{DB} = lo indicado en 2.3.1

2.5 Presión resultante

2.5.1 Condiciones de carga homogéneas

En cada punto de la estructura del mamparo, la presión resultante p, en kilonewton por metro cuadrado, que debe considerarse para los escantillones del mamparo viene dada por:

$$p = p_{c,f} - 0,8 \cdot p_c$$

La fuerza resultante F, en kilonewton, que actúa sobre una acanaladura viene dada por:

$$F = F_{c,f} - 0,8 \cdot F_c$$

2.5.2 Condiciones de carga no homogéneas

En cada punto de la estructura del mamparo, la presión resultante p, en kilonewton por metro cuadrado, que debe considerarse para los escantillones del mamparo viene dada por:

$$p = p_{c,f}$$

La fuerza resultante F, en kilonewton, que actúa sobre una acanaladura viene dada por:

$$F = F_{c,f}$$

En el caso de que no se permita la carga de la bodega de carga más cercana a proa, en condiciones de carga no homogénea, la presión resultante p, en kilonewton por metro cuadrado, que debe considerarse para los escantillones del mamparo, viene dada por:

$$p = p_f$$

y la fuerza resultante F, en kilonewton, que actúa sobre una acanaladura, viene dada por:

$$F = F_f$$

3 MOMENTO FLECTOR Y FUERZA CORTANTE EN LAS ACANALADURAS DEL MAMPARO

El momento flector M y la fuerza cortante Q en las acanaladuras del mamparo se obtienen mediante las fórmulas indicadas en 3.1 y 3.2. Los valores de M y Q se utilizarán para efectuar las comprobaciones indicadas en la sección 4

3.1 Momento flector

El momento flector de proyecto M, en kilonewton-metros, para las acanaladuras del mamparo viene dado por:

$$M = \frac{F \cdot \ell}{8}$$

donde:

F = fuerza resultante, en kilonewton, según lo indicado en 2.5

ℓ = luz de la acanaladura, en metros, conforme a lo indicado en las figuras 2a y 2b

3.2 Fuerza cortante

La fuerza cortante Q, en kilonewton, en el extremo inferior de las acanaladuras del mamparo viene dada por:

$$Q = 0{,}8 \cdot F$$

donde:

F = lo indicado en 2.5

4 CRITERIOS DE RESISTENCIA

4.1 Generalidades

Los criterios siguientes son aplicables a los mamparos transversales que tienen acanaladuras verticales (véase la figura 2a).

Las prescripciones relativas al espesor neto local de la plancha se indican en 4.7.

Además, se cumplirán los criterios especificados en 4.2 y 4.5.

Si el ángulo de la acanaladura ϕ indicado en la figura 2a es inferior a 50°, se instalará una fila horizontal de planchas inclinadas escalonadas a la mitad aproximadamente de la profundidad de las acanaladuras (véase la figura 2a) con objeto de preservar la estabilidad dimensional del mamparo en condiciones de inundación. Esas planchas se soldarán a las acanaladuras mediante soldadura doble continua pero no se soldarán al forro del costado.

Los espesores de la sección inferior de las acanaladuras consideradas al aplicar 4.2 y 4.3 se mantendrán a una distancia no inferior a 0,15 $\cdot \ell$ del techo del doble fondo (si no se ha instalado un polín inferior) o de la cara alta del polín inferior.

Los espesores de la sección media de las acanaladuras consideradas al aplicar 4.2 y 4.4 se mantendrán a una distancia no superior a 0,3 $\cdot \ell$ de la cubierta (si no se ha instalado un polín superior) o de la cara baja del polín superior.

4.2 Capacidad de flexión y esfuerzo cortante

La capacidad de flexión se ajustará a la relación siguiente:

$$10^3 \cdot \frac{M}{0.5 \cdot Z_{\ell e} \cdot \sigma_{a,\ell e} + Z_m \cdot \sigma_{a,m}} \leq 1.0$$

donde:

M	=	momento flector, en kilonewton-metros, según lo indicado en 3.1
$Z_{\ell e}$	=	módulo de resistencia de media sección de la acanaladura, en centímetros cúbicos, en el extremo inferior de las acanaladuras, se calculará de conformidad con 4.3
Z_m	=	módulo de resistencia de media sección de la acanaladura, en centímetros cúbicos, en la parte media de las acanaladuras; se calculará de conformidad con 4.4
$\sigma_{a,\ell e}$	=	esfuerzo admisible, en newton por milímetro cuadrado, según lo indicado en 4.5, para el extremo inferior de las acanaladuras
$\sigma_{a,m}$	=	esfuerzo admisible, en newton por milímetro cuadrado, según lo indicado en 4.5, para el punto medio de las acanaladuras

En ningún caso se supondrá que Z_m es superior al menor de los valores $1,15 \cdot Z_{\ell e}$ y $1,15 \cdot Z'_{\ell e}$ para calcular la capacidad de flexión, definiéndose $Z'_{\ell e}$ a continuación.

Si se han instalado planchas inclinadas eficaces que:

- no están acodadas;
- están soldadas a las acanaladuras y a la cara alta del polín inferior mediante soldadura de penetración por un solo lado u otra soldadura equivalente;
- tienen una inclinación mínima de 45° y su canto inferior está alineado con las planchas laterales del polín;

o se han instalado cartabones de unión eficaces que:

- están alineados con las planchas laterales del polín;
- son de un material cuyas propiedades son iguales, como mínimo, a las del material de las faldillas,

El valor del módulo de resistencia $Z_{\ell e}$, en centímetros cúbicos, no será superior al valor de $Z'_{\ell e}$, en centímetros cúbicos, dado por:

$$Z'_{\ell e} = Z_g + 10^3 \cdot \frac{Q \cdot h_g - 0{,}5 \cdot h_g^2 \cdot s_1 \cdot p_g}{\sigma_a}$$

donde:

Z_g = módulo de resistencia de media sección de la acanaladura, en centímetros cúbicos, de conformidad con 4.4, en el extremo superior de las planchas inclinadas o los cartabones de unión, según proceda

Q = fuerza cortante, en kilonewton, según lo indicado en 3.2

h_g = altura, en metros, de las planchas inclinadas o los cartabones de unión, según proceda (véanse las figuras 3a, 3b, 4a y 4b)

s_1 = lo indicado en 2.3.1 a)

p_g = presión resultante, en kilonewton por metro cuadrado, según se define en 2.5, calculada en el medio de las planchas inclinadas o los cartabones de unión, según proceda

σ_a = esfuerzo admisible, en newton por milímetro cuadrado, según lo indicado en 4.5.

Los esfuerzos τ se obtienen dividiendo la fuerza cortante Q por el área de resistencia a la fuerza cortante. Ésta se reducirá para tener en cuenta la posible falta de perpendicularidad entre las almas y las alas de las acanaladuras. En general, cabe obtener el área de resistencia a la fuerza cortante reducida multiplicando la superficie de la sección del alma por sin ϕ, siendo ϕ el ángulo entre el alma y el ala.

Al calcular los módulos de resistencia y el área de resistencia a la fuerza cortante se utilizarán los espesores netos de la plancha.

Los módulos de resistencia de las acanaladuras se calcularán basándose en las normas que a continuación se dan en 4.3 y 4.4.

4.3 Módulo de resistencia en el extremo inferior de las acanaladuras

El módulo de resistencia se calculará suponiendo que el cordón comprimido tiene una anchura eficaz de ala b_{ef} no mayor que la indicada en 4.6.1.

Si las almas de las acanaladuras no descansan localmente sobre cartabones por debajo de la cara alta del polín (o por debajo del techo del doble fondo) el módulo de resistencia de las acanaladuras se calculará considerando que las almas de las acanaladuras tienen una eficacia del 30%.

a) Siempre que se hayan instalado planchas inclinadas eficaces, según se definen en 4.2 (véanse las figuras 3a y 3b), al calcular el módulo de resistencia de las acanaladuras en su extremo inferior (sección transversal 1 de las figuras 3a y 3b), el área de las planchas de las alas, en centímetros cuadrados, se podrá incrementar añadiéndole el valor

$$\left(2.5 \cdot a \cdot \sqrt{t_f \cdot t_{sh}} \cdot \sqrt{\frac{\sigma_{Fsh}}{\sigma_{Ffl}}}\right)$$ (que no será superior a $2{,}5 \cdot a \cdot t_f$),

donde:

a	=	anchura, en metros, del ala de la acanaladura (véase la figura 2a)
t_{sh}	=	espesor neto de la plancha inclinada, en milímetros
t_f	=	espesor neto del ala, en milímetros
σ_{Fsh}	=	límite elástico superior mínimo, en newton por milímetro cuadrado, del material utilizado para las planchas inclinadas
σ_{Ffl}	=	límite elástico superior mínimo, en newton por milímetro cuadrado, del material utilizado para las alas de las acanaladuras

b) Siempre que se hayan instalado cartabones de unión eficaces, según se definen en 4.2, (véanse las figuras 4a y 4b) al calcular el módulo de resistencia de las acanaladuras en su extremo inferior (sección transversal 1 en las figuras 4a y 4b) el área de las planchas de las alas, en centímetros cuadrados, se podrá incrementar añadiéndole el valor

$$7 \cdot h_g \cdot t_{gu},$$

donde:

h_g	=	altura del cartabón de unión, en metros (véanse las figuras 4a y 4b), que no será superior a $\frac{10}{7} \cdot s_{gu}$
s_{gu}	=	anchura de los cartabones de unión, en metros
t_{gu}	=	espesor neto de las chapas del cartabón, en milímetros; no será superior a t_f
t_f	=	espesor neto de fábrica del ala, en milímetros.

c) Si las almas de las acanaladuras van soldadas a una plancha superior de polín inclinada, que se encuentre a un ángulo no inferior a 45° con respecto al plano horizontal, el módulo de resistencia de las acanaladuras se podrá calcular considerando que las almas de las acanaladuras son plenamente eficaces. En el caso de que se hayan instalado cartabones de unión eficaces, al calcular el módulo de resistencia de las acanaladuras, el área de las planchas de las alas se podrá incrementar como se especifica en b) *supra*. La existencia de planchas inclinadas, por sí sola, no autoriza dicho incremento.

Para ángulos inferiores a 45°, la eficacia del alma se obtendrá mediante extrapolación lineal entre el 30% para un ángulo de 0° y el 100% para un ángulo de 45°.

4.4 Módulo de resistencia de las acanaladuras en las secciones transversales que no sean las del extremo inferior

El módulo de resistencia se calculará considerando que las almas de las acanaladuras son eficaces y que el cordón comprimido tiene una anchura efectiva b_{ef} no mayor que la indicada en 4.6.1.

4.5 Comprobación del esfuerzo admisible

Los esfuerzos normal y cortante σ y τ no excederán de los valores admisibles σ_a y τ_a, en newton por milímetro cuadrado, dados por:

$$\sigma_a = \sigma_F$$

$$\tau_a = 0{,}5 \cdot \sigma_F$$

donde:

σ_F = límite elástico superior mínimo, en newton por milímetro cuadrado, del material.

4.6 Comprobación de la anchura eficaz del cordón comprimido y del pandeo debido a la fuerza cortante

4.6.1 Anchura eficaz del cordón comprimido de las acanaladuras

La anchura eficaz b_{ef}, en metros, del ala de las acanaladuras viene dada por:

$$b_{ef} = C_e \cdot a$$

donde:

C_e = $\frac{2{,}25}{\beta} - \frac{1{,}25}{\beta^2}$ para $\beta > 1{,}25$

C_e = 1,0 para $\beta \leq 1{,}25$

β = $10^3 \cdot \frac{a}{t_f} \cdot \sqrt{\frac{\sigma_F}{E}}$

t_f = espesor neto del ala, en milímetros

a = anchura, en metros, del ala de la acanaladura (véase la figura 2a)

σ_F = límite elástico superior mínimo, en newton por milímetro cuadrado, del material

E = módulo de elasticidad, en newton por milímetro cuadrado; se supone que es igual a $2{,}06 \cdot 10^5$ N/mm² para el acero

4.6.2 Cizalladura

La comprobación del pandeo de las planchas del alma se realizará en los extremos de las acanaladuras.

El esfuerzo cortante τ no excederá del valor crítico τ_c, en newton por milímetro cuadrado, obtenido como se indica a continuación:

$$\tau_c = \tau_E \qquad \text{cuando } \tau_E \leq \frac{\tau_F}{2}$$

$$= \tau_F\left(1 - \frac{\tau_F}{4\tau_E}\right) \qquad \text{cuando } \tau_E > \frac{\tau_F}{2}$$

donde:

τ_F = $\dfrac{\sigma_F}{\sqrt{3}}$

σ_F = límite elástico superior mínimo, en newton por milímetro cuadrado, del material, según lo indicado en 4.6.1

τ_E = $0{,}9\ k_t\ E\left(\dfrac{t}{1000c}\right)^2$

k_t, E, t y c vienen dados por:

k_t = 6,34

E = módulo de elasticidad del material, según lo indicado en 4.6.1

t = espesor neto, en milímetros, del alma de la acanaladura

c = anchura, en metros, del alma de la acanaladura (véase la figura 2a)

4.7 Espesor neto local de las planchas

El espesor neto local t, en milímetros, de las planchas del mamparo viene dado por:

$$t = 14.9 \cdot s_w \cdot \sqrt{\frac{p}{\sigma_F}}$$

donde:

s_w = anchura de la plancha, en metros, que se supondrá igual a la anchura del ala de la acanaladura o del alma, si ésta es mayor (véase la figura 2a)

p = presión resultante, en kilonewton por metro cuadrado, según se define en 2.5, en la parte inferior de cada traca; el espesor neto de la traca inferior se determinará, en todos los casos, utilizando la presión resultante en la parte alta del polín inferior o en el techo del doble fondo, si no hay polín inferior, o en la cara alta de las planchas inclinadas, si se instalan éstas o cartabones de unión con plancha inclinada

σ_F = límite elástico superior mínimo, en newton por milímetro cuadrado, del material.

Tratándose de mamparos acanalados compuestos, cuando los espesores del ala y el alma difieran, el espesor neto de las planchas más estrechas no será inferior a al valor t_n, en milímetros, dado por:

$$t_n = 14.9 \cdot s_n \cdot \sqrt{\frac{p}{\sigma_F}}$$

donde

s_n = anchura, en metros, de las planchas más estrechas.

El espesor neto de las planchas más anchas, en milímetros, no se supondrá inferior al máximo de los siguientes valores:

$$t_w = 14.9 \cdot s_w \cdot \sqrt{\frac{p}{\sigma_F}}$$

y

$$t_w = \sqrt{\frac{440 \cdot s_w^2 \cdot p}{\sigma_F} - t_{np}^2}$$

donde

t_{np} ≤ espesor neto efectivo de las planchas más estrechas, y no superior a

$$14.9 \cdot s_w \cdot \sqrt{\frac{p}{\sigma_F}}.$$

5 DETALLES LOCALES

Según proceda, el proyecto de los elementos locales cumplirá las prescripciones de la Administración o de una organización reconocida por la Administración de conformidad con las disposiciones de la regla XI/1 del Convenio SOLAS (en adelante llamada "la Administración"), con objeto de transferir las fuerzas y momentos que se ejerzan sobre el mamparo acanalado a las estructuras de contorno, en particular al doble fondo y a las estructuras transversales de cubierta.

En particular, el espesor y la rigidización de los cartabones de unión y las planchas inclinadas, instalados con objeto de aumentar la resistencia, cumplirán las prescripciones de la Administración, tomando como referencia el modelo de aplicación de cargas indicado en la sección 2.

Salvo que se indique lo contrario, las uniones soldadas y los materiales se dimensionarán y seleccionarán de conformidad con las prescripciones de la Administración.

6 COMPENSACIÓN POR CORROSIÓN Y RENOVACIÓN DEL ACERO

a) La renovación del acero es necesaria cuando el espesor medido es inferior a t_{neto} + 0,5 mm, siendo t_{neto} el espesor utilizado para calcular la capacidad de flexión y los esfuerzos cortantes, según se indica en 4.2, o el espesor neto local de las planchas, según se indica en 4.7. Otra posibilidad consiste en utilizar pletinas de refuerzo, a condición de que el espesor neto no venga determinado por las prescripciones relativas a la resistencia al esfuerzo cortante de las planchas de alma (véanse 4.5 y 4.6.2) o las prescripciones relativas a la presión local aplicables a las planchas de alma y de ala (véase 4.7).

Cuando el espesor medido esté comprendido entre t_{neto} + 0,5 mm y t_{neto} + 1,0 mm, una alternativa para la renovación del acero puede ser un revestimiento (aplicado de conformidad con las instrucciones del fabricante) o una medición anual.

b) Cuando sea necesario renovar o reforzar el acero, el espesor de las partes renovadas o reforzadas será como mínimo de t_{neto} + 2,5 mm.

c) Se instalarán cartabones de unión con planchas inclinadas que se extiendan desde el extremo inferior de las acanaladuras hasta $0{,}1 \cdot \ell$, o pletinas de refuerzo (sobre las acanaladuras de los mamparos y las planchas laterales de los polines) cuando:

$$0{,}8 \cdot (\sigma_{Ffl} \cdot t_{fl}) \geq \sigma_{Fs} \cdot t_{st}$$

donde:

σ_{Ffl} = límite elástico superior mínimo, en newton por milímetro cuadrado, del material utilizado para las alas de las acanaladuras

σ_{Fs} = límite elástico superior mínimo, en newton por milímetro cuadrado, del material utilizado para las planchas laterales del polín inferior o de las varengas (si no hay polín)

t_{fl} = espesor del ala, en milímetros, que se considera aceptable en función de los criterios especificados en a) *supra* o, cuando se precisa renovar el acero, el espesor repuesto según los criterios especificado en b) *supra*. No es necesario tener en cuenta a estos efectos el espesor del ala antedicho determinado por las prescripciones relativas a la presión local (véase 4.7)

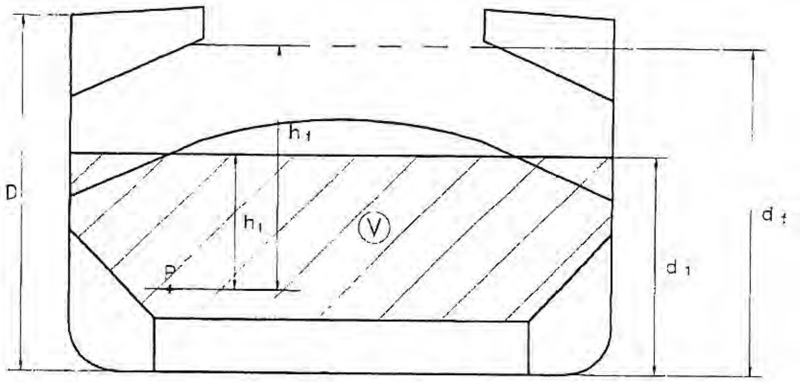
t_{st} = espesor de fábrica, en milímetros, de las planchas laterales del polín inferior o de las varengas (si no hay polín)

Si se instalan cartabones de unión, el material de los mismos será idéntico al de las alas de las acanaladuras. Dichos cartabones se unirán al durmiente del polín inferior o al techo del doble fondo (si no hay polín inferior) mediante soldaduras de gran penetración (véase la figura 5).

d) Si es necesario renovar el acero, las uniones del mamparo con el durmiente del polín inferior o el techo del doble fondo (si no hay polín) se harán mediante, por lo menos, soldaduras de gran penetración (véase la figura 5).

e) Cuando se vayan a instalar o renovar cartabones de unión, sus uniones con las acanaladuras y el durmiente del polín inferior o el techo del doble fondo (si no hay polín) se harán mediante, por lo menos, soldaduras de gran penetración (véase la figura 5).

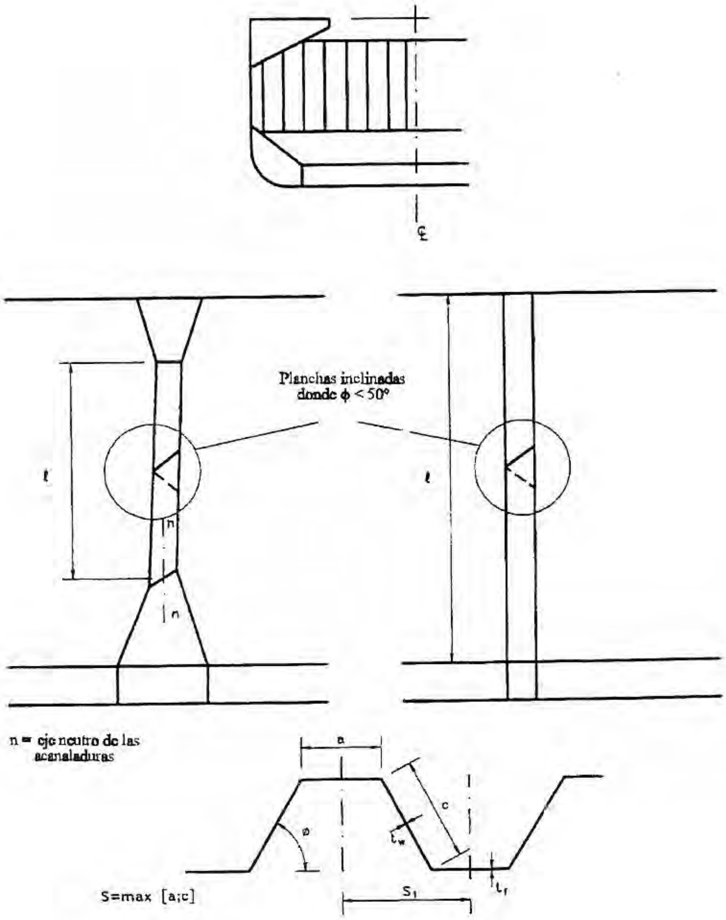
Figura 1



V = Volumen de la carga

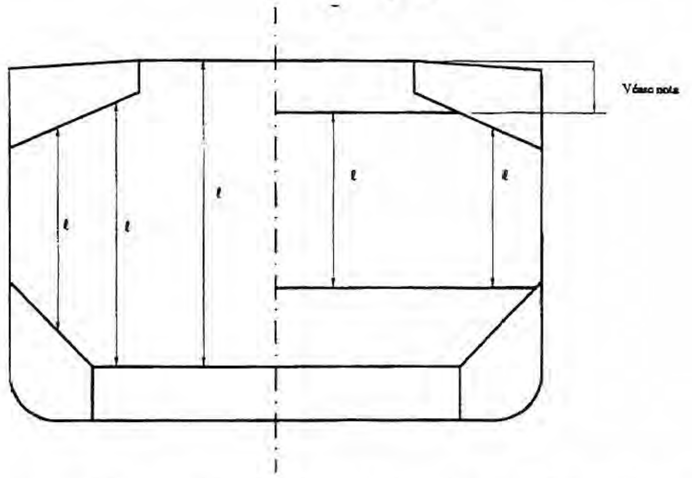
P = Punto de cálculo

Figura 2a



℄
Planchas inclinadas
donde ϕ < 50°
ℓ
ℓ
n
n
n = eje neutro de las
acanaladuras
a
c
ϕ
t_w
t_f
S_1
S=max [a;c]

Figura 2b



Nota: Para la definición de ℓ, el extremo interior del polín superior no estará a una distancia de la cubierta en crujía superior a:

- 3 veces la profundidad de las acanaladuras, en general
- 2 veces la profundidad de las acanaladuras, si el soporte es rectangular

Figura 3a
Planchas inclinadas simétricas

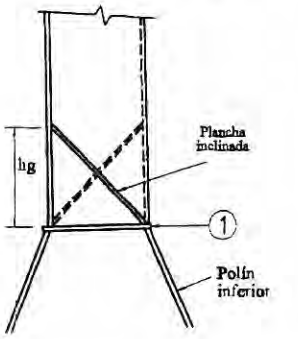


Figura 3b
Planchas inclinadas asimétricas

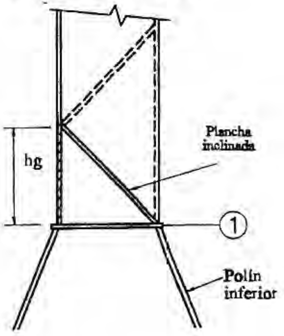


Figura 4a
Cartabones y planchas
inclinadas simétricas

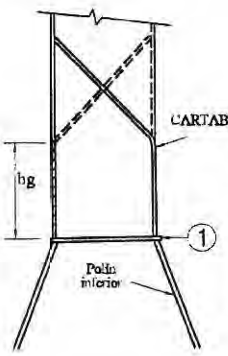


Figura 4b
Cartabones y planchas
inclinadas asimétricas

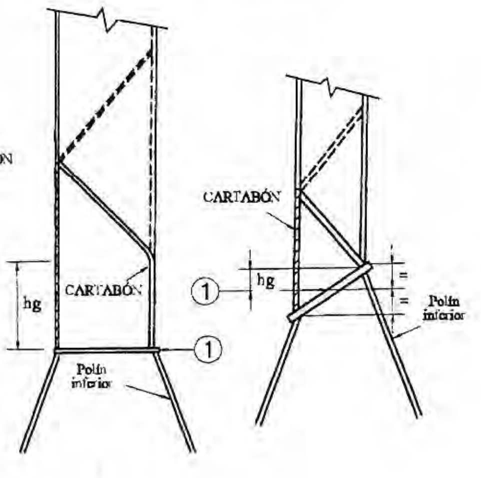
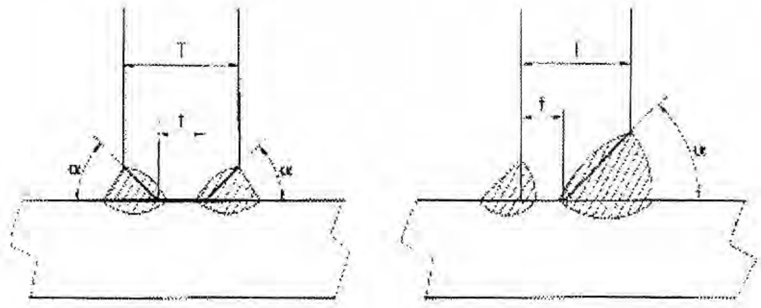


Figura 5



Cara de la raíz (f) = 3 mm a T/3 mm
Ángulo de la abertura (∝) = 40° a 60°

ANEXO 2

NORMAS PARA EVALUAR LA CARGA ADMISIBLE DE LA BODEGA DE CARGA MÁS CERCANA A PROA

1 INTRODUCCIÓN

La carga de la bodega de carga más cercana a proa no excederá la carga admisible de las bodegas, con inundación, calculada según se indica en la sección 4, utilizando las cargas indicadas en la sección 2 y la resistencia al esfuerzo cortante del doble fondo indicada en la sección 3.

En ningún caso se supondrá que la carga admisible de las bodegas, con inundación, es superior a la carga de proyecto de las bodegas sin avería.

2 MODELO DE APLICACIÓN DE CARGAS

2.1 Generalidades

Se considerará que las cargas que actúan sobre el doble fondo de la bodega de carga más cercana a proa son las cargas resultantes de las presiones exteriores del mar y de la combinación de las cargas debidas al cargamento y las debidas a la inundación de la bodega de carga más cercana a proa.

Se emplearán las combinaciones más rigurosasde cargas debidas al cargamento y a la inundación, teniendo en cuenta las condiciones de carga indicadas en el manual de carga:

- condiciones de carga homogéneas;
- condiciones de carga no homogéneas;
- carga en bultos (tales como productos de acerías).

Para calcular el límite de carga admisible de la bodega, se considerará la densidad máxima de la carga a granel que se va a transportar con respecto a cada una de las condiciones de carga.

2.2 Altura de inundación por encima del techo del doble fondo

La altura de inundación h_f (véase la figura 1) es la distancia, en metros, medida verticalmente, con el buque adrizado, desde el techo del doble fondo hasta un nivel situado a una distancia d_f, en metros, de la línea base igual a:

- D en general; o
- $0,95 \cdot D$ tratándose de los buques de peso muerto inferior a 50 000 toneladas con francobordo para buques de tipo B.

D es la distancia, en metros, desde la línea base a la cubierta de francobordo a media eslora en el costado (véase la figura 1).

3 RESISTENCIA AL ESFUERZO CORTANTE DE LA ESTRUCTURA DEL DOBLE FONDO EN LA BODEGA DE CARGA MÁS CERCANA A PROA

La resistencia al esfuerzo cortante C de la estructura del doble fondo en la bodega de carga más cercana a proa se define como la suma de la resistencia al esfuerzo cortante en cada extremo de:

- todas las varengas adyacentes a ambas tolvas, menos la mitad de la resistencia de las dos varengas adyacentes a cada polín, o al mamparo transversal si no hay polín (véase la figura 2), y

- todas las vagras del doble fondo adyacentes a ambos polines, o a los mamparos transversales si no hay polines.

La resistencia de las vagras o las varengas que se acaban sin estar directamente unidas al polín de contorno o a la vagra de la tolva, se evaluará en ese extremo solamente.

Obsérvese que las varengas y las vagras que se deben considerar son las que se encuentran dentro de los contornos de la bodega formados por las tolvas y los polines (o los mamparos transversales si no hay polines). No se incluirán las vagras laterales de las tolvas ni las varengas que estén directamente debajo de la unión de los polines de los mamparos (o los mamparos transversales si no hay polines) con el techo del doble fondo.

Cuando la configuración o la disposición estructural del doble fondo no permitan las hipótesis anteriores, a discreción de la Administración o de una organización reconocida por la Administración de conformidad con las disposiciones de la regla XI/1 del Convenio SOLAS (en adelante llamada "la Administración"), la resistencia al esfuerzo cortante C del doble fondo se calculará de conformidad con los criterios establecidos por la Administración.

Al calcular la resistencia al esfuerzo cortante se utilizarán los espesores netos de las varengas y las vagras. El espesor neto t_{net}, en milímetros, viene dado por:

$$t_{net} = t - t_c$$

donde:

t	=	espesor de fábrica, en milímetros, de las varengas y las vagras
t_c	=	disminución por corrosión igual a 2 mm, en general; podrá adoptarse un valor inferior a t_c a condición de que se hagan mediciones, que a juicio de la Administración justifiquen la hipótesis adoptada.

3.1 Resistencia al esfuerzo cortante de las varengas

La resistencia al esfuerzo cortante de las varengas en el panel de varengas adyacente a las tolvas S_{f1}, en kilonewton, y dicha resistencia en la zona de las aberturas en la clara "más próxima" al costado (es decir, la clara más próxima a la tolva) S_{f2}, en kilonewton, se obtienen mediante las siguientes fórmulas:

$$S_{f1} = 10^{-3} \cdot A_f \cdot \frac{\tau_a}{\eta_1}$$

$$S_{f2} = 10^{-3} \cdot A_{f,h} \cdot \frac{\tau_a}{\eta_2}$$

donde:

A_f = área de la sección, en milímetros cuadrados, del panel de varengas adyacente a las tolvas

$A_{f,h}$ = área neta de la sección, en milímetros cuadrados, de los paneles de varengas en la zona de las aberturas en la clara "más próxima" al costado (es decir, la clara más próxima a la tolva)

τ_a = esfuerzo cortante admisible, en newton por milímetro cuadrado; se supondrá que es igual a $\sigma_F / \sqrt{3}$

σ_F = límite elástico superior mínimo, en newton por milímetro cuadrado, del material

η_1 = 1,10

η_2 = 1,20

η_2 se podrá reducir, a discreción de la Administración, hasta 1,10 cuando se instalen refuerzos adecuados a juicio de la Administración.

3.2 Resistencia al esfuerzo cortante de las vagras

La resistencia al esfuerzo cortante de las vagras en la zona del panel de vagras adyacente a los polines (o a los mamparos transversales si no hay polines) S_{g1}, en kilonewton, y la resistencia al esfuerzo cortante de las vagras en la zona de la mayor abertura en la clara "más próxima" al costado (es decir, la clara más próxima al polín, o al mamparo transversal si no hay polín) S_{g2}, en kilonewton, se obtienen mediante las siguientes fórmulas:

$$S_{g1} = 10^{-3} \cdot A_g \cdot \frac{\tau_a}{\eta_1}$$

$$S_{g2} = 10^{-3} \cdot A_{g,h} \cdot \frac{\tau_a}{\eta_2}$$

donde:

A_g = área mínima de la sección, en milímetros cuadrados, del panel de vagras adyacente a los polines (o a los mamparos transversales si no hay polines)

A_{gh} = área neta de la sección, en milímetros cuadrados, del panel de vagras en la zona de la mayor abertura en la clara "más próxima" al costado (es decir, la clara más próxima al polín o al mamparo transversal si no hay polín)

τ_a = el esfuerzo cortante admisible, en newton por milímetro cuadrado, según se indica en 3.1

η_1 = 1,10

η_2 = 1,15

η_2 se podrá reducir, a discreción de la Administración, hasta 1,10 cuando se instalen refuerzos adecuados a juicio de la Administración.

4 CARGA ADMISIBLE DE LA BODEGA

La carga admisible de la bodega W, en toneladas, viene dada por:

$$W = \rho_c \cdot V \cdot \frac{1}{F}$$

donde:

F = 1,05 en general
1,00 para los productos de acería

ρ_c = densidad de la carga, en toneladas por metro cúbico; para las cargas a granel, véase 2.1; para los productos de acerías se supondrá que ρ_c es la densidad del acero

V = volumen, en metros cúbicos, ocupado por la carga a un nivel h_1

$$h_1 = \frac{X}{\rho_c \cdot g}$$

X = para las cargas a granel, el menor de los dos valores X_1 y X_2 dados por:

$$X_1 = \frac{Z + \rho \cdot g \cdot (E - h_f)}{1 + \frac{\rho}{\rho_c}(perm - 1)}$$

X_2 = $Z + \rho \cdot g \cdot (E - h_f \cdot perm)$

X = para los productos de acería, se supondrá que X es igual a X_1 y perm = 0

ρ = densidad del agua de mar, en toneladas por metro cúbico

g = 9,81 m/s², aceleración de la gravedad

E = $d_f - 0{,}1 \cdot D$

d_f, D = lo indicado en 2.2

h_f = altura de inundación, en metros, según se define en 2.2

perm = permeabilidad de la carga; se supondrá que es igual a 0,3 para minerales (en general, se podrá suponer que la densidad correspondiente de la carga a granel para el mineral de hierro es igual a 3,0 t/m³)

Z = el menor de los dos valores Z_1 y Z_2 dados por:

$$Z_1 = \frac{C_h}{A_{DB,h}}$$

$$Z_2 = \frac{C_e}{A_{DB,e}}$$

C_h = resistencia al esfuerzo cortante del doble fondo, en kilonewton, definida en la sección 3, considerando, para cada varenga, la menor de las resistencias al esfuerzo cortante S_{f1} y S_{f2} (véase 3.1) y, para cada vagra, la menor de las resistencias al esfuerzo cortante S_{g1} y S_{g2} (véase 3.2)

C_e = resistencia al esfuerzo cortante del doble fondo, en kilonewton, definida en la sección 3, considerando, para cada varenga, la resistencia al esfuerzo cortante S_{f1} (véase 3.1) y, para cada vagra, la menor de las resistencias al esfuerzo cortante S_{g1} y S_{g2} (véase 3.2)

$$A_{DB,h} = \sum_{i=1}^{i=n} S_i \cdot B_{DB,i}$$

$$A_{DB,e} = \sum_{i=1}^{i=n} S_i \cdot (B_{DB} - s)$$

n = número de varengas entre polines (o mamparos transversales si no hay polines)

S_i = distancia de la iésima varenga, en metros

$B_{DB,i}$ = B_{DB} - s para las varengas cuya resistencia al esfuerzo cortante viene dada por S_{f1} (véase 3.1)

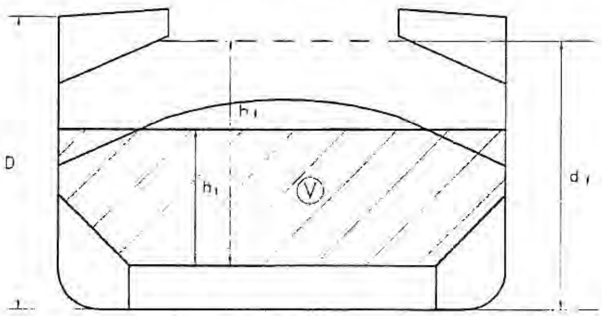
$B_{DB,i}$ = $B_{DB,h}$ para las varengas cuya resistencia al esfuerzo cortante viene dada por S_{f2} (véase 3.1)

B_{DB} = anchura del doble fondo, en metros, entre tolvas (véase la figura 3)

$B_{DB,h}$ = distancia, en metros, entre las dos aberturas consideradas (véase la figura 3)

s = separación, en metros, entre los longitudinales del doble fondo adyacentes a las tolvas

Figura 1



V = Volumen de la carga

Figura 2

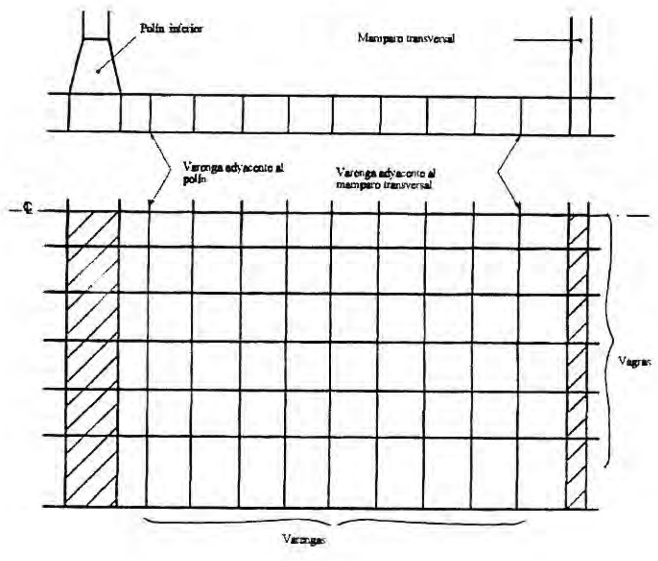
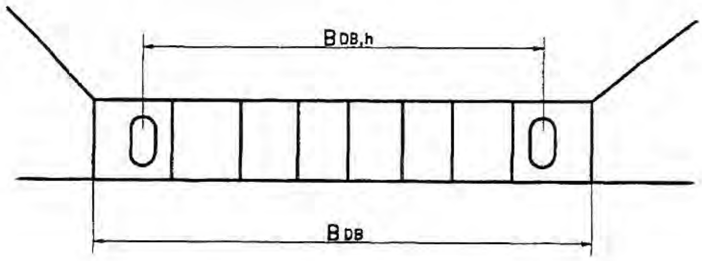


Figura 3



RESOLUCIÓN 5

RECOMENDACIÓN SOBRE LOS INSTRUMENTOS DE CARGA

LA CONFERENCIA,

HABIENDO APROBADO enmiendas al Convenio internacional para la seguridad de la vida humana en el mar (Convenio SOLAS), 1974, enmendado, relativas a la seguridad de los graneleros,

TOMANDO NOTA de que, de conformidad con la nueva regla XII/11 del Convenio SOLAS, se exige que todos los graneleros de eslora igual o superior a 150 m que se ajusten a lo definido en la regla XI/1.6 del Convenio estén provistos de un instrumento de carga que proporcione información sobre las fuerzas cortantes y los momentos flectores a que está sometida la viga-casco, teniendo en cuenta las recomendaciones aprobadas por la Organización,

ESTIMANDO que el instrumento de carga es un medio necesario para garantizar con más eficacia que las fuerzas cortantes y los momentos flectores a que está sometida la viga-casco no excedan de los límites admisibles durante las operaciones de carga y descarga y una vez terminadas éstas,

CONSCIENTE de que la Asociación Internacional de Sociedades de Clasificación (IACS) ha aprobado la recomendación Nº 48 sobre instrumentos de carga, para que hagan uso de ella las sociedades miembros de dicha entidad, junto con sus propias prescripciones y procedimientos, cuando aprueben, para sus propios fines, instrumentos de carga para los buques que aún no estén provistos de un instrumento de carga aprobado,

INSTA a los Gobiernos Contratantes a que:

a) apliquen la recomendación antedicha de la IACS para la aprobación de instrumentos de carga, con arreglo a lo prescrito en la regla XII/11 del Convenio SOLAS, para los buques que aún no estén provistos de un instrumento de carga aprobado, y

b) garanticen que los instrumentos de carga ya instalados en los buques a los que se aplica la regla XII/11 del Convenio SOLAS han sido aprobados de conformidad con las normas de las organizaciones reconocidas.

RESOLUCIÓN 6

INTERPRETACIÓN DE LA DEFINICIÓN DE "GRANELERO", QUE FIGURA EN EL CAPÍTULO IX DEL CONVENIO SOLAS 1974, ENMENDADO EN 1994

LA CONFERENCIA,

HABIENDO ADOPTADO enmiendas al Convenio internacional para la seguridad de la vida humana en el mar (Convenio SOLAS), 1974, enmendado, relativas a la seguridad de los graneleros,

TOMANDO NOTA de que el capítulo IX del Convenio SOLAS entrará en vigor el 1 de julio de 1998,

TOMANDO NOTA ASIMISMO de que los graneleros deberán cumplir las prescripciones del capítulo IX del Convenio SOLAS a más tardar el 1 de julio de 1998,

TOMANDO NOTA ADEMÁS de que a partir de la fecha prevista de entrada en vigor del nuevo capítulo XII del Convenio SOLAS, el 1 de julio de 1999, las nuevas prescripciones tendrán carácter obligatorio para los graneleros,

RECONOCIENDO que varios Gobiernos Contratantes del Convenio SOLAS han señalado ciertas ambigüedades en la definición de la palabra "granelero", que figura en la regla IX/1.6 del Convenio SOLAS, las cuales dan lugar a interpretaciones distintas de esa palabra,

RECONOCIENDO ADEMÁS la necesidad, a efectos de la aplicación del nuevo capítulo XII del Convenio SOLAS, de establecer orientaciones para los Gobiernos Contratantes y el sector sobre cuáles son los buques a los que se aplican las nuevas prescripciones,

CONSCIENTE de la urgente necesidad, a efectos de la aplicación del capítulo IX del Convenio SOLAS a partir del 1 de julio de 1998, de establecer orientaciones claras para los Gobiernos Contratantes y el sector acerca de cuáles son los buques a los que se aplican las prescripciones del Código Internacional de Gestión de la Seguridad (Código IGS),

DESEANDO garantizar que todos los Gobiernos Contratantes implanten el Código IGS y el nuevo capítulo XII del Convenio SOLAS en tanto que Estado de abanderamiento o Estado rector del puerto que ejerce sus facultades de supervisión de conformidad con las disposiciones del Convenio, de manera coherente, sistemática y armonizada, con miras a facilitar el tráfico marítimo internacional,

CONSCIENTE de que el capítulo IX del Convenio SOLAS debería aplicarse teniendo en cuenta la resolución 9 de la Conferencia, tan pronto como sea posible,

1. INSTA a los Gobiernos Contratantes del Convenio SOLAS a que interpreten que la definición de la palabra "granelero" que figura en la regla IX/1.6 , a efectos de la aplicación de la regla IX/2.1.2 y del capítulo XII del Convenio SOLAS, significa:

- buques construidos con una sola cubierta, tanques laterales superiores y tanques laterales de pantoque en los espacios de carga y proyectados fundamentalmente para transportar carga seca a granel; o

- buques mineraleros*; o

- buques de carga combinados**;

2. INVITA al Comité de Seguridad Marítima de la Organización Marítima Internacional, a que examine, tan pronto como sea posible:

a) las medidas necesarias para corregir la ambigüedad que existe en la definición de la palabra "granelero", que figura en la regla IX/1.6 del Convenio SOLAS; y

b) cualquier otra medida adecuada para facilitar la determinación del tipo del buque por los Gobiernos Contratantes del Convenio SOLAS cuando éstos ejerzan sus derechos de supervisión de conformidad con las disposiciones de dicho Convenio.

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* Buque mineralero: buque de navegación marítima de una sola cubierta, con dos mamparos longitudinales y doble fondo en toda la zona de la carga y proyectado para transportar cargas de minerales únicamente en las bodegas centrales.

** Buque de carga combinado: tiene el mismo significado que en la regla II-2/3.27 del Convenio SOLAS.

RESOLUCIÓN 7

RECONOCIMIENTOS MEJORADOS EFECTUADOS ANTES DE LA ENTRADA EN VIGOR DE LAS ENMIENDAS

LA CONFERENCIA,

HABIENDO APROBADO las enmiendas al Convenio internacional para la seguridad de la vida humana en el mar (Convenio SOLAS), 1974, enmendado, relativas a la seguridad de los graneleros,

TOMANDO NOTA de que en la regla XII/7 del Convenio SOLAS se prescribe que los graneleros de eslora igual o superior a 150 m, de forro sencillo en el costado y de 10 años de edad o más, no transportarán cargas sólidas a granel de densidad igual o superior a 1 780 kg/m^3, a menos que hayan sido objeto de los reconocimientos mejorados prescritos en la regla XI/2 del Convenio SOLAS,

RECONOCIENDO que las disposiciones relativas a los reconocimientos mejorados de la regla XI/2 del Convenio SOLAS entraron en vigor el 1 de enero de 1996,

RECONOCIENDO ADEMÁS que un importante número de graneleros fueron objeto de los reconocimientos mejorados previstos en las disposiciones de la resolución A.744(18) antes incluso de que entrara en vigor la regla XI/2, y de que tales reconocimientos pueden considerarse válidos a los fines de la aplicación de la regla XII/7,

DECIDE que los Gobiernos Contratantes del Convenio SOLAS podrán permitir que los graneleros existentes a los que se les aplican las disposiciones de la regla XII/7 transporten cargas sólidas a granel de densidad igual o superior a 1 780 kg/m^3, si dichos graneleros han sido objeto de un reconocimiento periódico equivalente a un reconocimiento periódico acorde con el programa mejorado de inspecciones prescrito en la regla XI/2 antes del 1 de enero de 1996.

RESOLUCIÓN 8

CONTINUACIÓN DE LA LABOR RELATIVA A LA SEGURIDAD DE LOS GRANELEROS

LA CONFERENCIA,

HABIENDO APROBADO enmiendas al Convenio internacional para la seguridad de la vida humana en el mar, (Convenio SOLAS), 1974, enmendado, relativas a la seguridad de los graneleros,

RECONOCIENDO que el nuevo capítulo XII del Convenio SOLAS no abarca todos los tipos y tamaños de graneleros, ya que por ejemplo, determinadas reglas no se aplican a los graneleros de eslora inferior a 150 m o a los graneleros, que no son de forro sencillo en el costado,

TOMANDO NOTA de que un cierto número de graneleros son de eslora inferior a 150 m y de que es posible que un número considerable de graneleros de forro sencillo en el costado estén dedicados al transporte de cargas sólidas de densidad inferior a 1 780 kg/m^3,

OPINANDO que es necesario seguir considerando las normas de seguridad relativas a los graneleros de los tipos y tamaños a los que no se aplica el capítulo XII del Convenio SOLAS o parte del mismo,

RECONOCIENDO la necesidad de establecer una definición unificada de la expresión "forro sencillo en el costado" que se menciona en la regla XII/1.2 del Convenio SOLAS,

INVITA al Comité de Seguridad Marítima de la Organización Marítima Internacional a que, con carácter de urgencia::

a) siga examinando la cuestión de la seguridad de los graneleros a los que no se aplica el capítulo XII del Convenio SOLAS o parte del mismo, en particular los graneleros de eslora inferior a 150 m, los nuevos graneleros de doble forro en el costado a los de forro sencillo en el costado que transportan cargas sólidas de densidad inferior a 1 780 kg/m^3, los graneleros cuyo número de bodegas de carga sea insuficiente para satisfacer la regla XII/4.2 y los buques que no sean graneleros de forro sencillo en el costado y estén destinados al transporte de carga a granel, y elabore, según corresponda, las oportunas prescripciones, recomendaciones o directrices; y

b) elabore una definición de la expresión "forro sencillo en el costado".

RESOLUCIÓN 9

IMPLANTACIÓN DEL CÓDIGO INTERNACIONAL DE GESTIÓN DE LA SEGURIDAD (CÓDIGO IGS)

LA CONFERENCIA,

HABIENDO APROBADO enmiendas al Código internacional para la seguridad de la vida humana en el mar (Convenio SOLAS), 1974, enmendado, relativas ala seguridad de los graneleros,

TOMANDO NOTA de que:

- la Asamblea de la Organización Marítima Internacional (OMI) aprobó la resolución A.741(18) sobre el Código internacional de gestión de la seguridad operacional del buque y la prevención de la contaminación (Código Internacional de Gestión de la Seguridad (IGS));

- la Conferencia de 1994 de los Gobiernos Contratantes del Convenio internacional para la seguridad de la vida humana en el mar, 1974, aprobó un nuevo capítulo IX sobre la gestión de la seguridad operacional de los buques en virtud del cual el Código IGS será obligatorio a partir del 1 de julio de 1998 (fecha en la que el nuevo capítulo se aplicará a los buques de pasaje, incluidas las naves de pasaje de gran velocidad, los petroleros, los quimiqueros, los gaseros, los graneleros y las naves de carga de gran velocidad de arqueo bruto igual o superior a 500, independientemente de su fecha de construcción); y

- la Asamblea de la OMI aprobó la resolución A.848(20) sobre la implantación del Código Internacional de Gestión de la Seguridad (Código IGS),

TOMANDO NOTA ASIMISMO de que según la información recibida por los Gobiernos Contratantes del Covenio SOLAS, un número importante de compañías navieras que explotan graneleros no han obtenido aún la certificación estipulada en el Código IGS y puede que ni siquiera la hayan solicitado,

1. SEÑALA a los Gobiernos Contratantes del Convenio SOLAS y al sector, que en la regla IX/2 del Convenio no se prevé la ampliación de los plazos para implantar el Código IGS;

2. INSTA a los Gobiernos Contratantes del SOLAS a que hagan el máximo esfuerzo por concluir cuanto antes la certificación de los buques que tengan derecho a enarbolar su pabellón, según lo prescrito en la regla IX/2 del Convenio SOLAS;

3. INSTA a los gobiernos que tengan un número importante de graneleros en sus flotas, así como a las organizaciones reconocidas y a las compañías navieras interesadas, a que redoblen sus esfuerzos por garantizar la implantación puntual y efectiva del Código IGS en tales buques;

4. PIDE al Secretario General de la OMI que adopte las medidas adicionales que puedan ser necesarias con el fin de garantizar la implantación puntual y efectiva del Código IGS.

CERTIFIED TRUE COPY of the Final Act, with attachment 2 (resolutions 3 to 9), of the Conference of Contracting Governments to the International Convention for the Safety of Life at Sea, 1974, done at London on 28 November 1997, the original of which is deposited with the Secretary-General of the International Maritime Organization.

COPIE CERTIFIÉE CONFORME de l'Acte final, accompagné du document joint 2 (résolutions 3 à 9), de la Conférence des Gouvernements contractants à la Convention internationale de 1974 pour la sauvegarde de la vie humaine en mer, fait à Londres le 28 novembre 1997, dont l'original est déposé auprès du Secrétaire général de l'Organisation maritime internationale.

COPIA AUTÉNTICA CERTIFICADA del Acta final, con el documento adjunto 2 (resoluciones 3 a 9), de la Conferencia de los Gobiernos Contratantes del Convenio internacional para la seguridad de la vida humana en el mar, 1974, hecha en Londres el 28 de noviembre de 1997, cuyo original se ha depositado ante el Secretario General de la Organización Marítima Internacional.

For the Secretary-General of the International Maritime Organization:

Pour le Secrétaire général de l'Organisation maritime internationale :

Por el Secretario General de la Organización Marítima Internacional:

London,

Londres, le 4. IX. 1998

Londres,

ANNEX 3

RESOLUTION MSC.134(76)
(adopted on 12 December 2002)

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

THE MARITIME SAFETY COMMITTEE,

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

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

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

1. ADOPTS, in accordance with article VIII(b)(iv) of the Convention, amendments to the Convention, the text of which is set out in the Annex to the present resolution;

2. DETERMINES, in accordance with article VIII(b)(vi)(2)(bb) of the Convention, that the said amendments shall be deemed to have been accepted on 1 January 2004, unless, prior to that date, more than one third of the Contracting Governments to the Convention or Contracting Governments the combined merchant fleets of which constitute not less than 50% of the gross tonnage of the world's merchant fleet, have notified their objections to the amendments;

3. INVITES SOLAS Contracting Governments to note that, in accordance with article VIII(b)(vii)(2) of the Convention, the amendments shall enter into force on 1 July 2004 upon their acceptance in accordance with paragraph 2 above;

4. REQUESTS the Secretary-General, in conformity with article VIII(b)(v) of the Convention, to transmit certified copies of the present resolution and the text of the amendments contained in the Annex to all Contracting Governments to the Convention;

5. FURTHER REQUESTS the Secretary-General to transmit copies of this resolution and its Annex to Members of the Organization, which are not Contracting Governments to the Convention.

ANNEX

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

CHAPTER II-1

CONSTRUCTION – STRUCTURE, SUBDIVISION AND STABILITY, MACHINERY AND ELECTRICAL INSTALLATIONS

PART A-1

STRUCTURE OF SHIPS

1 The following new regulation 3-6 is added after existing regulation 3-5:

"Regulation 3-6

Access to and within spaces in the cargo area of oil tankers and bulk carriers

1 Application

1.1 Except as provided for in paragraph 1.2, this regulation applies to oil tankers of 500 gross tonnage and over and bulk carriers, as defined in regulation IX/1, of 20,000 gross tonnage and over, constructed on or after 1 January 2005.

1.2 Oil tankers of 500 gross tonnage and over constructed on or after 1 October 1994 but before 1 January 2005 shall comply with the provisions of regulation II-1/12-2 adopted by resolution MSC.27(61).

2 Means of access to cargo and other spaces

2.1 Each space within the cargo area shall be provided with a permanent means of access to enable, throughout the life of a ship, overall and close-up inspections and thickness measurements of the ship's structures to be carried out by the Administration, the company, as defined in regulation IX/1, and the ship's personnel and others as necessary. Such means of access shall comply with the requirements of paragraph 5 and with the Technical provisions for means of access for inspections, adopted by the Maritime Safety Committee by resolution MSC.133(76), as may be amended by the Organization, provided that such amendments are adopted, brought into force and take effect in accordance with the provisions of article VIII of the present Convention concerning the amendment procedures applicable to the Annex other than chapter I.

2.2 Where a permanent means of access may be susceptible to damage during normal cargo loading and unloading operations or where it is impracticable to fit permanent means of access, the Administration may allow, in lieu thereof, the provision of movable or portable means of access, as specified in the Technical provisions, provided that the means of attaching, rigging, suspending or supporting the portable means of access forms a permanent part of the ship's structure. All portable equipment shall be capable of being readily erected or deployed by ship's personnel.

2.3 The construction and materials of all means of access and their attachment to the ship's structure shall be to the satisfaction of the Administration. The means of access shall be subject to survey prior to, or in conjunction with, its use in carrying out surveys in accordance with regulation I/10.

3 Safe access to cargo holds, cargo tanks, ballast tanks and other spaces

3.1 Safe access* to cargo holds, cofferdams, ballast tanks, cargo tanks and other spaces in the cargo area shall be direct from the open deck and such as to ensure their complete inspection. Safe access* to double bottom spaces may be from a pump-room, deep cofferdam, pipe tunnel, cargo hold, double hull space or similar compartment not intended for the carriage of oil or hazardous cargoes.

3.2 Tanks, and subdivisions of tanks, having a length of 35 m or more, shall be fitted with at least two access hatchways and ladders, as far apart as practicable. Tanks less than 35 m in length shall be served by at least one access hatchway and ladder. When a tank is subdivided by one or more swash bulkheads or similar obstructions which do not allow ready means of access to the other parts of the tank, at least two hatchways and ladders shall be fitted.

3.3 Each cargo hold shall be provided with at least two means of access as far apart as practicable. In general, these accesses should be arranged diagonally, for example one access near the forward bulkhead on the port side, the other one near the aft bulkhead on the starboard side.

4 Ship structure access manual

4.1 A ship's means of access to carry out overall and close-up inspections and thickness measurements shall be described in a Ship structure access manual approved by the Administration, an updated copy of which shall be kept on board. The Ship structure access manual shall include the following for each space in the cargo area:

.1 plans showing the means of access to the space, with appropriate technical specifications and dimensions;

.2 plans showing the means of access within each space to enable an overall inspection to be carried out, with appropriate technical specifications and dimensions. The plans shall indicate from where each area in the space can be inspected;

.3 plans showing the means of access within the space to enable close-up inspections to be carried out, with appropriate technical specifications and dimensions. The plans shall indicate the positions of critical structural areas, whether the means of access is permanent or portable and from where each area can be inspected;

---

* Refer to the Recommendations for entering enclosed spaces aboard ships, adopted by the Organization by resolution A.864(20).

.4 instructions for inspecting and maintaining the structural strength of all means of access and means of attachment, taking into account any corrosive atmosphere that may be within the space;

.5 instructions for safety guidance when rafting is used for close-up inspections and thickness measurements;

.6 instructions for the rigging and use of any portable means of access in a safe manner;

.7 an inventory of all portable means of access; and

.8 records of periodical inspections and maintenance of the ship's means of access.

4.2 For the purpose of this regulation "critical structural areas" are locations which have been identified from calculations to require monitoring or from the service history of similar or sister ships to be sensitive to cracking, buckling, deformation or corrosion which would impair the structural integrity of the ship.

5 General technical specifications

5.1 For access through horizontal openings, hatches or manholes, the dimensions shall be sufficient to allow a person wearing a self-contained air-breathing apparatus and protective equipment to ascend or descend any ladder without obstruction and also provide a clear opening to facilitate the hoisting of an injured person from the bottom of the space. The minimum clear opening shall not be less than 600 mm x 600 mm. When access to a cargo hold is arranged through the cargo hatch, the top of the ladder shall be placed as close as possible to the hatch coaming. Access hatch coamings having a height greater than 900 mm shall also have steps on the outside in conjunction with the ladder.

5.2 For access through vertical openings, or manholes, in swash bulkheads, floors, girders and web frames providing passage through the length and breadth of the space, the minimum opening shall be not less than 600 mm x 800 mm at a height of not more than 600 mm from the bottom shell plating unless gratings or other foot holds are provided.

5.3 For oil tankers of less than 5,000 tonnes deadweight, the Administration may approve, in special circumstances, smaller dimensions for the openings referred to in paragraphs 5.1 and 5.2, if the ability to traverse such openings or to remove an injured person can be proved to the satisfaction of the Administration."

PART B

SUBDIVISION AND STABILITY

Regulation 12-2 - Access to spaces in the cargo area of oil tankers

2 The existing regulation 12-2 is deleted.

PART C

MACHINERY INSTALLATIONS

Regulation 31 - Machinery control

3 The following new subparagraph .10 is added to paragraph 2 of the regulation:

".10 automation systems shall be designed in a manner which ensures that threshold warning of impending or imminent slowdown or shutdown of the propulsion system is given to the officer in charge of the navigational watch in time to assess navigational circumstances in an emergency. In particular, the systems shall control, monitor, report, alert and take safety action to slow down or stop propulsion while providing the officer in charge of the navigational watch an opportunity to manually intervene, except for those cases where manual intervention will result in total failure of the engine and/or propulsion equipment within a short time, for example in the case of overspeed."

CHAPTER II-2

CONSTRUCTION – FIRE PROTECTION, FIRE DETECTION AND FIRE EXTINCTION

Regulation 3 – Definitions

4 In paragraph 20, the words “regulation VII/2” are replaced by the words “the IMDG Code, as defined in regulation VII/1.1”.

Regulation 19 – Carriage of dangerous goods

5 In table 19.3, in vertical columns 7 and 8 (concerning flashpoints of class 3), the numbers “3.1 3.2” and “3.3”, respectively, are replaced by the number “3”.

6 In table 19.3, in vertical column 13 (concerning class 5.2), the character "X" in rows 15 (concerning paragraph 3.10.1) and 16 (concerning paragraph 3.10.2) is replaced by the character "X[16]" and a new note 16 is added as follows:

"[16] Under the provisions of the IMDG Code, as amended, stowage of class 5.2 dangerous goods under deck or in enclosed ro-ro spaces is prohibited."

CHAPTER III

LIFE-SAVING APPLIANCES AND ARRANGEMENTS

Regulation 26 - Additional requirements for ro-ro passenger ships

7 The following new subparagraph .4 is added at the end of paragraph 1:

".4 before 1 July 2004 shall comply with the requirements of paragraph 2.5 not later than the first survey on or after that date."

8 The following new subparagraph .5 is added at the end of paragraph 2:

".5 Liferafts carried on ro-ro passenger ships shall be fitted with a radar transponder* in the ratio of one transponder for every four liferafts. The transponder shall be mounted inside the liferaft so its antenna is more than one metre above the sea level when the liferaft is deployed, except that for canopied reversible liferafts the transponder shall be so arranged as to be readily accessed and erected by survivors. Each transponder shall be arranged to be manually erected when the liferaft is deployed. Containers of liferafts fitted with transponders shall be clearly marked.

* Refer to the Performance standards for survival craft radar transponders for use in search and rescue operations, adopted by the Organization by resolution A.802(19)."

CHAPTER XII

ADDITIONAL SAFETY MEASURES FOR BULK CARRIERS

9 The following new regulations 12 and 13 are added after existing regulation 11:

"Regulation 12

Hold, ballast and dry space water level detectors

(This regulation applies to bulk carriers regardless of their date of construction)

1 Bulk carriers shall be fitted with water level detectors:

.1 in each cargo hold, giving audible and visual alarms, one when the water level above the inner bottom in any hold reaches a height of 0.5 m and another at a height not less than 15% of the depth of the cargo hold but not more than 2 m. On bulk carriers to which regulation 9.2 applies, detectors with only the latter alarm need be installed. The water level detectors shall be fitted in the aft end of the cargo holds. For cargo holds which are used for water ballast, an alarm overriding device may be installed. The visual alarms shall clearly discriminate between the two different water levels detected in each hold;

.2 in any ballast tank forward of the collision bulkhead required by regulation II-1/11, giving an audible and visual alarm when the liquid in the tank reaches a level not exceeding 10% of the tank capacity. An alarm overriding device may be installed to be activated when the tank is in use; and

.3 in any dry or void space other than a chain cable locker, any part of which extends forward of the foremost cargo hold, giving an audible and visual alarm at a water level of 0.1 m above the deck. Such alarms need not be provided in enclosed spaces the volume of which does not exceed 0.1% of the ship's maximum displacement volume.

2 The audible and visual alarms specified in paragraph 1 shall be located on the navigation bridge.

3 Bulk carriers constructed before 1 July 2004 shall comply with the requirements of this regulation not later than the date of the annual, intermediate or renewal survey of the ship to be carried out after 1 July 2004, whichever comes first.

Regulation 13

Availability of pumping systems

(This regulation applies to bulk carriers regardless of their date of construction)

1 On bulk carriers, the means for draining and pumping ballast tanks forward of the collision bulkhead and bilges of dry spaces any part of which extends forward of the foremost cargo hold shall be capable of being brought into operation from a readily accessible enclosed space, the location of which is accessible from the navigation bridge or propulsion machinery control position without traversing exposed freeboard or superstructure decks. Where pipes serving such tanks or bilges pierce the collision bulkhead, valve operation by means of remotely operated actuators may be accepted, as an alternative to the valve control specified in regulation II-1/11.4, provided that the location of such valve controls complies with this regulation.

2 Bulk carriers constructed before 1 July 2004 shall comply with the requirements of this regulation not later than the date of the first intermediate or renewal survey of the ship to be carried out after 1 July 2004, but in no case later than 1 July 2007."

***

RESOLUTION MSC.170(79)
(adopted on 9 December 2004)

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

THE MARITIME SAFETY COMMITTEE,

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

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

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

1. ADOPTS, in accordance with article VIII(b)(iv) of the Convention, amendments to the Convention, the text of which is set out in the Annex to the present resolution;

2. DETERMINES, in accordance with article VIII(b)(vi)(2)(bb) of the Convention, that the said amendments shall be deemed to have been accepted on 1 January 2006, unless, prior to that date, more than one third of the Contracting Governments to the Convention or Contracting Governments the combined merchant fleets of which constitute not less than 50% of the gross tonnage of the world's merchant fleet, have notified their objections to the amendments;

3. INVITES SOLAS Contracting Governments to note that, in accordance with article VIII(b)(vii)(2) of the Convention, the amendments shall enter into force on 1 July 2006 upon their acceptance in accordance with paragraph 2 above;

4. REQUESTS the Secretary-General, in conformity with article VIII(b)(v) of the Convention, to transmit certified copies of the present resolution and the text of the amendments contained in the Annex to all Contracting Governments to the Convention;

5. FURTHER REQUESTS the Secretary-General to transmit copies of this resolution and its Annex to Members of the Organization, which are not Contracting Governments to the Convention.

ANNEX

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

CHAPTER II-1

CONSTRUCTION – STRUCTURE, SUBDIVISION AND STABILITY, MACHINERY AND ELECTRICAL INSTALLATIONS

Regulation 2 - Definitions

1 The following new paragraph 14 is added after existing paragraph 13:

"14 *Bulk carrier* means a bulk carrier as defined in regulation XII/1.1."

Regulation 18 – Construction and initial tests of watertight doors, sidescuttles, etc., in passenger ships and cargo ships

2 Paragraph 2 of the regulation is replaced by the following:

"2 In passenger ships and cargo ships watertight doors shall be tested by water pressure to a head up to the bulkhead deck or freeboard deck respectively. 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 45 - Precautions against shock, fire and other hazards of electrical origin

3 After the heading the following words are added:

"(*Paragraphs 10 and 11 of this regulation apply to ships constructed on or after 1 January 2007*)".

4 Existing paragraph 10 is replaced by the following:

"10 No electrical equipment shall be installed in any space where flammable mixtures are liable to collect, e.g. 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."

5 The following new paragraph 11 is added after paragraph 10, as amended:

"11 In tankers, electrical equipment, cables and wiring shall not be installed in hazardous locations unless it conforms with standards not inferior to those acceptable to the Organization. However, for locations not covered by such standards, electrical equipment, cables and wiring which do not conform to the standards may be installed in hazardous locations based on a risk assessment to the satisfaction of the Administration, to ensure that an equivalent level of safety is assured."

6 Existing paragraph 11 is renumbered as paragraph 12.

CHAPTER III

LIFE-SAVING APPLIANCES AND ARRANGEMENTS

Regulation 31 - Survival craft and rescue boats

7 The following new paragraph 1.8 is added after existing paragraph 1.7:

"1.8 Notwithstanding the requirements of paragraph 1.1, bulk carriers as defined in regulation IX/1.6 constructed on or after 1 July 2006 shall comply with the requirements of paragraph 1.2."

CHAPTER V

SAFETY OF NAVIGATION

Regulation 19 – Carriage requirements for shipborne navigational systems and equipment

8 In paragraph 2.5, the existing text of subparagraph .1 is replaced by the following:

".1 a gyro compass, or other means, to determine and display their heading by shipborne non-magnetic means, being clearly readable by the helmsman at the main steering position. These means shall also transmit heading information for input to the equipment referred in paragraphs 2.3.2, 2.4 and 2.5.5;"

Regulation 20 – Voyage data recorders

9 The following new paragraph 2 is added after existing paragraph 1:

"2 To assist in casualty investigations, cargo ships, when engaged on international voyages, shall be fitted with a VDR which may be a simplified voyage data recorder (S-VDR) as follows:

.1 in the case of cargo ships of 20,000 gross tonnage and upwards constructed before 1 July 2002, at the first scheduled dry-docking after 1 July 2006 but not later than 1 July 2009;

.2 in the case of cargo ships of 3,000 gross tonnage and upwards but less than 20,000 gross tonnage constructed before 1 July 2002, at the first scheduled dry-docking after 1 July 2007 but not later than 1 July 2010; and

.3 Administrations may exempt cargo ships from the application of the requirements of subparagraphs .1 and .2 when such ships will be taken permanently out of service within two years after the implementation date specified in subparagraphs .1 and .2 above."

10 Existing paragraph 2 is renumbered as paragraph 3.

CHAPTER VII

CARRIAGE OF DANGEROUS GOODS

Regulation 10 – Requirements for chemical tankers

11 The following sentence is deleted from paragraph 1 of the regulation:

"For the purpose of this regulation, the requirements of the Code shall be treated as mandatory."

CHAPTER XII

ADDITIONAL SAFETY MEASURES FOR BULK CARRIERS

12 The existing text of chapter XII is replaced by the following:

"Regulation 1

Definitions

For the purpose of this chapter:

1 *Bulk carrier* means a ship which is intended primarily to carry dry cargo in bulk, including such types as ore carriers and combination carriers.

2 *Bulk carrier of single-side skin construction* means a bulk carrier as defined in paragraph 1, in which:

.1 any part of a cargo hold is bounded by the side shell; or

.2 one or more cargo holds are bounded by a double-side skin, the width of which is less than 760 mm in bulk carriers constructed before 1 January 2000 and less than 1,000 mm in bulk carriers constructed on or after 1 January 2000 but before 1 July 2006, the distance being measured perpendicular to the side shell.

Such ships include combination carriers in which any part of a cargo hold is bounded by the side shell.

3 *Bulk carrier of double-side skin construction* means a bulk carrier as defined in paragraph 1, in which all cargo holds are bounded by a double-side skin, other than as defined in paragraph 2.2.

4 *Double-side skin* means a configuration where each ship side is constructed by the side shell and a longitudinal bulkhead connecting the double bottom and the deck. Hopper side tanks and top-side tanks may, where fitted, be integral parts of the double-side skin configuration.

5 *Length* of a bulk carrier means the length as defined in the International Convention on Load Lines in force.

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

7 *Bulk carrier bulkhead and double bottom strength standards* means "Standards for the evaluation of scantlings of the transverse watertight vertically corrugated bulkhead between the two foremost cargo holds and for the evaluation of allowable hold loading of the foremost cargo hold" adopted by resolution 4 of the Conference of Contracting Governments to the International Convention for the Safety of Life at Sea, 1974 on 27 November 1997, 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.

8 *Bulk carriers constructed* means bulk carriers the keels of which are laid or which are at a similar stage of construction.

9 *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.

10 *Breadth* (B) of a bulk carrier means the breadth as defined in the International Convention on Load Lines in force.

Regulation 2

Application

Bulk carriers shall comply with the requirements of this chapter in addition to the applicable requirements of other chapters.

Regulation 3

Implementation schedule

Bulk carriers constructed before 1 July 1999 to which regulations 4 or 6 apply shall comply with the provisions of such regulations according to the following schedule, with reference to the enhanced programme of inspections required by regulation XI-1/2:

.1 bulk carriers, which are 20 years of age and over on 1 July 1999, by the date of the first intermediate survey or the first periodical survey after 1 July 1999, whichever comes first;

.2 bulk carriers, which are 15 years of age and over but less than 20 years of age on 1 July 1999, by the date of the first periodical survey after 1 July 1999, but not later than 1 July 2002; and

.3 bulk carriers, which are less than 15 years of age on 1 July 1999, by the date of the first periodical survey after the date on which the ship reaches 15 years of age, but not later than the date on which the ship reaches 17 years of age.

Regulation 4

Damage stability requirements applicable to bulk carriers

1 Bulk carriers of 150 m in length and upwards of single-side skin construction, designed to carry solid bulk cargoes having a density of 1,000 kg/m^3 and above, constructed on or after 1 July 1999, shall, when loaded to the summer load line, be able to withstand flooding of any one cargo hold in all loading conditions and remain afloat in a satisfactory condition of equilibrium, as specified in paragraph 4.

2 Bulk carriers of 150 m in length and upwards of double-side skin construction in which any part of longitudinal bulkhead is located within B/5 or 11.5 m, whichever is less, inboard from the ship's side at right angle to the centreline at the assigned summer load line, designed to carry solid bulk cargoes having a density of 1,000 kg/m^3 and above, constructed on or after 1 July 2006, shall, when loaded to the summer load line, be able to withstand flooding of any one cargo hold in all loading conditions and remain afloat in a satisfactory condition of equilibrium, as specified in paragraph 4.

3 Bulk carriers of 150 m in length and upwards of single-side skin construction, carrying solid bulk cargoes having a density of 1,780 kg/m^3 and above, constructed before 1 July 1999 shall, when loaded to the summer load line, be able to withstand flooding of the foremost cargo hold in all loading conditions and remain afloat in a satisfactory condition of equilibrium, as specified in paragraph 4. This requirement shall be complied with in accordance with the implementation schedule specified in regulation 3.

4 Subject to the provisions of paragraph 7, the condition of equilibrium after flooding shall satisfy the condition of equilibrium laid down in the annex to resolution A.320(IX) - Regulation equivalent to regulation 27 of the International Convention on Load Lines, 1966, as amended by resolution A.514(13). The assumed flooding need only take into account flooding of the cargo hold space to the water level outside the ship in that flooded condition. The permeability of a loaded hold shall be assumed as 0.9 and the permeability of an empty hold shall be assumed as 0.95, unless a permeability relevant to a particular cargo is assumed for the volume of a flooded hold occupied by cargo and a permeability of 0.95 is assumed for the remaining empty volume of the hold.

5 Bulk carriers constructed before 1 July 1999, which have been assigned a reduced freeboard in compliance with regulation 27(7) of the International Convention on Load Lines, 1966, as adopted on 5 April 1966, may be considered as complying with paragraph 3 of this regulation.

6 Bulk carriers which have been assigned a reduced freeboard in compliance with the provisions of paragraph (8) of the regulation equivalent to regulation 27 of the International Convention on Load Lines, 1966, adopted by resolution A.320(IX), as amended by resolution A.514(13), may be considered as complying with paragraphs 1 or 2, as appropriate.

7 On bulk carriers which have been assigned reduced freeboard in compliance with the provisions of regulation 27(8) of Annex B of the Protocol of 1988 relating to the International Convention on Load Lines, 1966, the condition of equilibrium after flooding shall satisfy the relevant provisions of that Protocol.

Regulation 5

Structural strength of bulk carriers

1 Bulk carriers of 150 m in length and upwards of single-side skin construction, designed to carry solid bulk cargoes having a density of 1,000 kg/m^3 and above, constructed on or after 1 July 1999, shall have sufficient strength to withstand flooding of any one cargo hold to the water level outside the ship in that flooded condition in all loading and ballast conditions, taking also into account dynamic effects resulting from the presence of water in the hold, and taking into account the recommendations adopted by the Organization.

2 Bulk carriers of 150 m in length and upwards of double-side skin construction, in which any part of longitudinal bulkhead is located within B/5 or 11.5 m, whichever is less, inboard from the ship's side at right angle to the centreline at the assigned summer load line, designed to carry bulk cargoes having a density of 1,000 kg/m^3 and above, constructed on or after 1 July 2006, shall comply with the structural strength provisions of paragraph 1.

Regulation 6

Structural and other requirements for bulk carriers

1 Bulk carriers of 150 m in length and upwards of single-side skin construction, carrying solid bulk cargoes having a density of 1,780 kg/m^3 and above, constructed before 1 July 1999, shall comply with the following requirements in accordance with the implementation schedule specified in regulation 3:

.1 The transverse watertight bulkhead between the two foremost cargo holds and the double bottom of the foremost cargo hold shall have sufficient strength to withstand flooding of the foremost cargo hold, taking also into account dynamic effects resulting from the presence of water in the hold, in compliance with the Bulk carrier bulkhead and double bottom strength standards. For the purpose of this regulation, the Bulk carrier bulkhead and double bottom strength standards shall be treated as mandatory.

.2 In considering the need for, and the extent of, strengthening of the transverse watertight bulkhead or double bottom to meet the requirements of 1.1, the following restrictions may be taken into account:

.1 restrictions on the distribution of the total cargo weight between the cargo holds; and

.2 restrictions on the maximum deadweight.

.3 For bulk carriers using either of, or both, the restrictions given in 1.2.1 and 1.2.2 above for the purpose of fulfilling the requirements of 1.1, these restrictions shall be complied with whenever solid bulk cargoes having a density of 1,780 kg/m^3 and above are carried.

2 Bulk carriers of 150 m in length and upwards constructed on or after 1 July 2006, shall comply in all areas with double-side skin construction with the following requirements:

.1 Primary stiffening structures of the double-side skin shall not be placed inside the cargo hold space.

.2 Subject to the provisions below, the distance between the outer shell and the inner shell at any transverse section shall not be less than 1,000 mm measured perpendicular to the side shell. The double-side skin construction shall be such as to allow access for inspection as provided in regulation II-1/3-6 and the Technical Provisions referring thereto.

.1 The clearances below need not be maintained in way of cross ties, upper and lower end brackets of transverse framing or end brackets of longitudinal framing.

.2 The minimum width of the clear passage through the double-side skin space in way of obstructions such as piping or vertical ladders shall not be less than 600 mm.

.3 Where the inner and/or outer skins are transversely framed, the minimum clearance between the inner surfaces of the frames shall not be less than 600 mm.

.4 Where the inner and outer skins are longitudinally framed, the minimum clearance between the inner surfaces of the frames shall not be less than 800 mm. Outside the parallel part of the cargo hold length this clearance may be reduced where necessitated by the structural configuration, but shall in no case be less than 600 mm.

.5 The minimum clearance referred to above shall be the shortest distance measured between assumed lines connecting the inner surfaces of the frames on the inner and outer skins.

3 Double-side skin spaces and dedicated seawater ballast tanks arranged in bulk carriers of 150 m in length and upwards constructed on or after 1 July 2006 shall be coated in accordance with the requirements of regulation II-1/3-2 and also based on the Performance standards for coatings to be adopted by the Organization.

4 The double-side skin spaces, with the exception of top-side wing tanks, if fitted, shall not be used for the carriage of cargo.

5 In bulk carriers of 150 m in length and upwards, carrying solid bulk cargoes having a density of 1,000 kg/m^3 and above, constructed on or after 1 July 2006:

.1 the structure of cargo holds shall be such that all contemplated cargoes can be loaded and discharged by standard loading/discharge equipment and procedures without damage which may compromise the safety of the structure;

.2 effective continuity between the side shell structure and the rest of the hull structure shall be assured; and

.3 the structure of cargo areas shall be such that single failure of one stiffening structural member will not lead to immediate consequential failure of other structural items potentially leading to the collapse of the entire stiffened panels.

Regulation 7

Survey and maintenance of bulk carriers

1 Bulk carriers of 150 m in length and upwards of single-side skin construction, constructed before 1 July 1999, of 10 years of age and over, shall not carry solid bulk cargoes having a density of 1,780 kg/m^3 and above unless they have satisfactorily undergone either:

.1 a periodical survey, in accordance with the enhanced programme of inspections during surveys required by regulation XI-1/2; or

.2 a survey of all cargo holds to the same extent as required for periodical surveys in the enhanced programme of inspections during surveys required by regulation XI-1/2.

2 Bulk carriers shall comply with the maintenance requirements provided in regulation II-1/3-1 and the Standards for owners' inspection and maintenance of bulk carrier hatch covers, adopted by the Organization by resolution MSC.169(79), 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.

Regulation 8

Information on compliance with requirements for bulk carriers

1 The booklet required by regulation VI/7.2 shall be endorsed by the Administration, or on its behalf, to indicate that regulations 4, 5, 6 and 7, as appropriate, are complied with.

2 Any restrictions imposed on the carriage of solid bulk cargoes having a density of 1,780 kg/m^3 and above in accordance with the requirements of regulations 6 and 14 shall be identified and recorded in the booklet referred to in paragraph 1.

3 A bulk carrier to which paragraph 2 applies shall be permanently marked on the side shell at midships, port and starboard, with a solid equilateral triangle, having sides of 500 mm and its apex 300 mm below the deck line, and painted a contrasting colour to that of the hull.

Regulation 9

Requirements for bulk carriers not being capable of complying with regulation 4.3 due to the design configuration of their cargo holds

For bulk carriers constructed before 1 July 1999 being within the application limits of regulation 4.3, which have been constructed with an insufficient number of transverse watertight bulkheads to satisfy that regulation, the Administration may allow relaxation from the application of regulations 4.3 and 6, on condition that they shall comply with the following requirements:

.1 for the foremost cargo hold, the inspections prescribed for the annual survey in the enhanced programme of inspections during surveys required by regulation XI-1/2 shall be replaced by the inspections prescribed therein for the intermediate survey of cargo holds;

.2 are provided with bilge well high water level alarms in all cargo holds, or in cargo conveyor tunnels, as appropriate, giving an audible and visual alarm on the navigation bridge, as approved by the Administration or an organization recognized by it in accordance with the provisions of regulation XI-1/1; and

.3 are provided with detailed information on specific cargo hold flooding scenarios. This information shall be accompanied by detailed instructions on evacuation preparedness under the provisions of section 8 of the International Safety Management (ISM) Code and be used as the basis for crew training and drills.

Regulation 10

Solid bulk cargo density declaration

1 Prior to loading bulk cargo on bulk carriers of 150 m in length and upwards, the shipper shall declare the density of the cargo, in addition to providing the cargo information required by regulation VI/2.

2 For bulk carriers to which regulation 6 applies, unless such bulk carriers comply with all relevant requirements of this chapter applicable to the carriage of solid bulk cargoes having a density of 1,780 kg/m^3 and above, any cargo declared to have a density within the range 1,250 kg/m^3 to 1,780 kg/m^3 shall have its density verified by an accredited testing organization.

Regulation 11

Loading instrument

(Unless provided otherwise, this regulation applies to bulk carriers regardless of their date of construction)

1 Bulk carriers of 150 m in length and upwards shall be fitted with a loading instrument capable of providing information on hull girder shear forces and bending moments, taking into account the recommendation adopted by the Organization.

2 Bulk carriers of 150 m in length and upwards constructed before 1 July 1999 shall comply with the requirements of paragraph 1 not later than the date of the first intermediate or periodical survey of the ship to be carried out after 1 July 1999.

3 Bulk carriers of less than 150 m in length constructed on or after 1 July 2006 shall be fitted with a loading instrument capable of providing information on the ship's stability in the intact condition. The computer software shall be approved for stability calculations by the Administration and shall be provided with standard conditions for testing purposes relating to the approved stability information.

Regulation 12

Hold, ballast and dry space water ingress alarms

(This regulation applies to bulk carriers regardless of their date of construction)

1 Bulk carriers shall be fitted with water level detectors:

.1 in each cargo hold, giving audible and visual alarms, one when the water level above the inner bottom in any hold reaches a height of 0.5 m and another at a height not less than 15% of the depth of the cargo hold but not more than 2 m. On bulk carriers to which regulation 9.2 applies, detectors with only the latter alarm need be installed. The water level detectors shall be fitted in the aft end of the cargo holds. For cargo holds which are used for water ballast, an alarm overriding device may be installed. The visual alarms shall clearly discriminate between the two different water levels detected in each hold;

.2 in any ballast tank forward of the collision bulkhead required by regulation II-1/11, giving an audible and visual alarm when the liquid in the tank reaches a level not exceeding 10% of the tank capacity. An alarm overriding device may be installed to be activated when the tank is in use; and

.3 in any dry or void space other than a chain cable locker, any part of which extends forward of the foremost cargo hold, giving an audible and visual alarm at a water level of 0.1 m above the deck. Such alarms need not be provided in enclosed spaces the volume of which does not exceed 0.1% of the ship's maximum displacement volume.

2 The audible and visual alarms specified in paragraph 1 shall be located on the navigation bridge.

3 Bulk carriers constructed before 1 July 2004 shall comply with the requirements of this regulation not later than the date of the annual, intermediate or renewal survey of the ship to be carried out after 1 July 2004, whichever comes first.

Regulation 13

Availability of pumping systems

(This regulation applies to bulk carriers regardless of their date of construction)

1 On bulk carriers, the means for draining and pumping ballast tanks forward of the collision bulkhead and bilges of dry spaces any part of which extends forward of the foremost cargo hold shall be capable of being brought into operation from a readily accessible enclosed space, the location of which is accessible from the navigation bridge or propulsion machinery control position without traversing exposed freeboard or superstructure decks. Where pipes serving such tanks or bilges pierce the collision bulkhead, valve operation by means of remotely operated actuators may be accepted, as an alternative to the valve control specified in regulation II-1/11.4, provided that the location of such valve controls complies with this regulation.

2 Bulk carriers constructed before 1 July 2004 shall comply with the requirements of this regulation not later than the date of the first intermediate or renewal survey of the ship to be carried out after 1 July 2004, but in no case later than 1 July 2007.

Regulation 14

Restrictions from sailing with any hold empty

Bulk carriers of 150 m in length and upwards of single-side skin construction, carrying cargoes having a density of 1,780 kg/m^3 and above, if not meeting the requirements for withstanding flooding of any one cargo hold as specified in regulation 5.1 and the Standards and criteria for side structures of bulk carriers of single-side skin construction, adopted by the Organization by resolution MSC.168(79), 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, shall not sail with any hold loaded to less than 10% of the hold's maximum allowable cargo weight when in the full load condition, after reaching 10 years of age. The applicable full load condition for this regulation is a load equal to or greater than 90% of the ship's deadweight at the relevant assigned freeboard."

APPENDIX

CERTIFICATES

Form of Safety Certificate for Passenger Ships

13 The following new section is inserted between the section commencing with the words "This certificate is valid until" and the section commencing with the words "Issued at":

"Completion date of the survey on which this certificate is based:…………………"
(dd/mm/yyyy)

Form of Safety Construction Certificate for Cargo Ships

14 The following new section is inserted between the section commencing with the words "This certificate is valid until" and the section commencing with the words "Issued at":

"Completion date of the survey on which this certificate is based:…………………"
(dd/mm/yyyy)

Form of Safety Equipment Certificate for Cargo Ships

15 The following new section is inserted between the section commencing with the words "This certificate is valid until" and the section commencing with the words "Issued at":

"Completion date of the survey on which this certificate is based:…………………"
(dd/mm/yyyy)

Record of Equipment for the Cargo Ship Safety Equipment Certificate (Form E)

16 Existing section 3 is replaced by the following:

"3 Details of navigational systems and equipment

Item	Actual provision
1.1 Standard magnetic compass*	....
1.2 Spare magnetic compass*	....
1.3 Gyro compass*	....
1.4 Gyro compass heading repeater*	....
1.5 Gyro compass bearing repeater*	....
1.6 Heading or track control system*	....
1.7 Pelorus or compass bearing device*	....
1.8 Means of correcting heading and bearings	....
1.9 Transmitting heading device (THD)*	....

2.1	Nautical charts/Electronic chart display and information system (ECDIS)**	....
2.2	Back up arrangements for ECDIS	....
2.3	Nautical publications	....
2.4	Back up arrangements for electronic nautical publications	....
3.1	Receiver for a global navigation satellite system/ terrestrial radionavigation system*, **	....
3.2	9 GHz radar*	....
3.3	Second radar (3 GHz/ 9 GHZ**)*	....
3.4	Automatic radar plotting aid (ARPA)*	....
3.5	Automatic tracking aid*	....
3.6	Second automatic tracking aid*	....
3.7	Electronic plotting aid*	....
4	Automatic identification system (AIS)	....
5.1	Voyage data recorder (VDR)**	....
5.2	Simplified voyage data recorder (S-VDR)**	…………
6.1	Speed and distance measuring device (through the water)*	....
6.2	Speed and distance measuring device (over the ground in the forward and athwartship direction)*	....
6.3	Echo sounding device*	....
7.1	Rudder, propeller, thrust, pitch and operational mode indicator*	....
7.2	Rate of turn indicator*	....
8	Sound reception system*	....
9	Telephone to emergency steering position*	....
10	Daylight signalling lamp*	....
11	Radar reflector*	....
12	International Code of Signals	....
13	IAMSAR Manual, Volume III	....

* Alternative means of meeting this requirement are permitted under regulation V/19. In case of other means, they shall be specified.

** Delete as appropriate."

Form of Safety Radio Certificate for Cargo Ships

17 The following new section is inserted between the section commencing with the words "This certificate is valid until" and the section commencing with the words "Issued at":

"Completion date of the survey on which this certificate is based:…………………"
(dd/mm/yyyy)

Form of Safety Certificate for Nuclear Passenger Ships

18 The existing form of the certificate is replaced by the following:

"NUCLEAR PASSENGER SHIP SAFETY CERTIFICATE

This Certificate shall be supplemented by a Record of Equipment (Form PNUC)

(Official seal) *(State)*

for an[1] / a short international voyage

Issued under the provisions of the
INTERNATIONAL CONVENTION FOR THE SAFETY OF LIFE
AT SEA, 1974 as modified by the Protocol of 1988 relating thereto

under the authority of the Government of

____
(name of the State)

by ____
(person or organization authorized)

[1] Delete as appropriate.

Particulars of ship[2]

Name of ship ....

Distinctive number or letters ....

Port of registry ....

Gross tonnage ....

Sea areas in which ship is certified to operate (regulation IV/2) ....

IMO Number ....

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 ....……………………………………………………………………………..

THIS IS TO CERTIFY:

1 That the ship has been surveyed in accordance with the requirements of regulation VIII/9 of the Convention.

2 That the ship, being a nuclear ship, complied with all the requirements of chapter VIII of the Convention and conformed to the Safety Assessment approved for the ship; and that:

2.1 the ship complied with the requirements of the Convention as regards:

.1 the structure, main and auxiliary machinery, boilers and other pressure vessels, including the nuclear propulsion plant and the collision protective structure;

.2 the watertight subdivision arrangements and details;

.3 the following subdivision load lines:

Subdivision load lines assigned and marked on the ship's side amidships (regulation II-1/13)	Freeboard	To apply when the spaces in which passengers are carried include the following alternative spaces
C.1	....	....
C.2	....	....
C.3	....	....

2.2 the ship complied with the requirements of the Convention as regards structural fire protection, fire safety systems and appliances and fire control plans;

2.3 the ship complied with the requirements of the Convention as regards radiation protection systems and equipment;

---

2 Alternatively, the particulars of the ship may be placed horizontally in boxes.

2.4 the life-saving appliances and the equipment of the lifeboats, liferafts and rescue boats were provided in accordance with the requirements of the Convention;

2.5 the ship was provided with a line-throwing appliance and radio installations used in life-saving appliances in accordance with the requirements of the Convention;

2.6 the ship complied with the requirements of the Convention as regards radio installations;

2.7 the functioning of the radio installations used in life-saving appliances complied with the requirements of the Convention;

2.8 the ship complied with the requirements of the Convention as regards shipborne navigational equipment, means of embarkation for pilots and nautical publications;

2.9 the ship was provided with lights, shapes, means of making sound signals and distress signals in accordance with the requirements of the Convention and the International Regulations for Preventing Collisions at Sea in force;

2.10 in all other respects the ship complied with the relevant requirements of the Convention.

This certificate is valid until ....

Completion date of the survey on which this certificate is based ....
dd/mm/yyyy

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)”

19 The following Record of Equipment for the Nuclear Passenger Ship Safety Certificate is added after the form of the Nuclear Passenger Ship Safety Certificate:

"RECORD OF EQUIPMENT FOR THE NUCLEAR PASSENGER SHIP SAFETY CERTIFICATE (FORM PNUC)

This Record shall be permanently attached to the
Nuclear Passenger Ship Safety Certificate

RECORD OF EQUIPMENT FOR COMPLIANCE WITH
THE INTERNATIONAL CONVENTION FOR THE SAFETY
OF LIFE AT SEA, 1974, AS MODIFIED BY THE PROTOCOL
OF 1988 RELATING THERETO

1 Particulars of ship

Name of ship ....

Distinctive number or letters ....

Number of passengers for which certified ....

Minimum number of persons with required qualifications
to operate the radio installations ....

2 Details of life-saving appliances

1	Total number of persons for which life-saving appliances are provided	....	
		Port side	Starboard side
2	Total number of lifeboats	....	....
2.1	Total number of persons accommodated by them	....	....
2.2	Number of partially enclosed lifeboats (regulation III/21 and LSA Code, section 4.5)	....	....
2.3	Number of totally enclosed lifeboats (regulation III/21 and LSA Code, section 4.6)	....	....
2.4	Other lifeboats		
2.5.1	Number	....	....
2.5.2	Type	....	....

3	Number of motor lifeboats included in the total lifeboats shown above	....
3.1	Number of lifeboats fitted with searchlights	....
4	Number of rescue boats	....
4.1	Number of boats which are included in the total lifeboats shown above	....
5	Liferafts	
5.1	Those for which approved launching appliances are required	
5.1.1	Number of liferafts	....
5.1.2	Number of persons accommodated by them	....
5.2	Those for which approved launching appliances are not required	
5.2.1	Number of liferafts	....
5.2.2	Number of persons accommodated by them	....
6	Buoyant apparatus	
6.1	Number of apparatus	....
6.2	Number of persons capable of being supported	....
7	Number of lifebuoys	....
8	Number of lifejackets	
9	Immersion suits	....
9.1	Total number	....
9.2	Number of suits complying with the requirements for lifejackets	....
10	Number of thermal protective aids[1]	....
11	Radio installations used in life-saving appliances	....
11.1	Number of radar transponders	....
11.2	Number of two-way VHF radiotelephone apparatus	....

[1] Excluding those required by the LSA Code, paragraphs 4.1.5.1.24, 4.4.8.31 and 5.1.2.213.

3 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 marine 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	....

4 Methods used to ensure availability of radio facilities (regulations IV/15.6 and 15.7)

4.1 Duplication of equipment ....

4.2 Shore-based maintenance ....

4.3 At-sea maintenance capability ....

5 Details of navigation systems and equipment

	Actual provision
1.1 Standard magnetic compass[2]	....
1.2 Spare magnetic compass[2]	....
1.3 Gyro compass[2]	....
1.4 Gyro compass heading repeater[2]	....
1.5 Gyro compass bearing repeater[2]	....
1.6 Heading or track control system[2]	....
1.7 Pelorus or compass bearing device[2]	....
1.8 Means of correcting heading and bearings	....
1.9 Transmitting heading device (THD)[2]	....
2.1 Nautical charts/Electronic chart display and information system (ECDIS)[3]	....
2.2 Back up arrangements for ECDIS	....
2.3 Nautical publications	....
2.4 Back up arrangements for electronic nautical publications	....
3.1 Receiver for a global navigation satellite system/terrestrial radio navigation system[2, 3]	....
3.2 9 GHz radar[2]	....
3.3 Second radar (3 GHz/9 GHz[3])[2]	....
3.4 Automatic radar plotting aid (ARPA)[2]	....
3.5 Automatic tracking aid[2]	....
3.6 Second automatic tracking aid[2]	....
3.7 Electronic plotting aid[2]	....
4 Automatic identification system (AIS)	....
5 Voyage data recorder (VDR)	....
6.1 Speed and distance measuring device (through the water)[2]	....
6.2 Speed and distance measuring device (over the ground in the forward and athwartship direction)[2]	....
7 Echo sounding device[2]	....

[2] Alternative means of meeting this requirement are permitted under regulation V/19. In case of other means, they shall be specified.
[3] Delete as appropriate.

		Actual provision
8.1	Rudder, propeller, thrust, pitch and operational mode indicator[2]	…………
8.2	Rate of turn indicator[2]	…………
9	Sound reception system[2]	…………
10	Telephone to emergency steering position[2]	…………
11	Daylight signalling lamp[2]	…………
12	Radar reflector[2]	…………
13	International Code of Signals	…………
14	IAMSAR Manual, Volume III	…………

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)”

Form of Safety Certificate for Nuclear Cargo Ships

20 The existing form of the certificate is replaced by the following:

"NUCLEAR CARGO SHIP SAFETY CERTIFICATE

This Certificate shall be supplemented by a Record of Equipment (Form CNUC)

(Official seal) *(State)*

Issued under the provisions of the
INTERNATIONAL CONVENTION FOR THE SAFETY OF LIFE
AT SEA, 1974 as modified by the Protocol of 1988 relating thereto

under the authority of the Government of

____
(name of the State)

by ____
(person or organization authorized)

Particulars of ship[1]

Name of ship ....

Distinctive number or letters ....

Port of registry ....

Gross tonnage ....

Deadweight of ship (metric tons)[2] ....

Length of ship (regulation III/3.12) ....

[1] Alternatively the particulars of the ship may be placed horizontally in boxes.
[2] For oil tankers, chemical tankers and gas carriers only.

Sea areas in which ship is certified to operate (regulation IV/2) ....

IMO Number...

Type of ship[3]

Bulk carrier
Oil tanker
Chemical tanker
Gas carrier
Cargo ship other than any of the above

Date on which keel was laid or ship was at a similar stage of construction or, where applicable, date on which work for an alteration or modification of a major character was commenced ....

THIS IS TO CERTIFY:

1 That the ship has been surveyed in accordance with the requirements of regulation VIII/9 of the Convention.

2 That the ship, being a nuclear ship, complied with all the requirements of chapter VIII of the Convention and conformed to the Safety Assessment approved for the ship; and that:

2.1 the condition of the structure, machinery and equipment as defined in regulation I/10 (as applicable to comply with regulation VIII/9), including the nuclear propulsion plant and the collision protective structure, was satisfactory and the ship complied with the relevant requirements of chapter II-1 and chapter II-2 of the Convention (other than those relating to fire safety systems and appliances and fire control plans);

2.2 the ship complied with the requirements of the Convention as regards fire safety systems and appliances and fire control plans;

2.3 the life-saving appliances and the equipment of the lifeboats, liferafts and rescue boats were provided in accordance with the requirements of the Convention;

2.4 the ship was provided with a line-throwing appliance and radio installations used in life-saving appliances in accordance with the requirements of the Convention;

2.5 the ship complied with the requirements of the Convention as regards radio installations;

2.6 the functioning of the radio installations used in life-saving appliances complied with the requirements of the Convention;

2.7 the ship complied with the requirements of the Convention as regards shipborne navigational equipment, means of embarkation for pilots and nautical publications;

2.8 the ship was provided with lights, shapes, means of making sound signals and distress signals in accordance with the requirements of the Convention and the International Regulations for Preventing Collisions at Sea in force;

[3] Delete as appropriate.

2.9 in all other respects the ship complied with the relevant requirements of the regulations, so far as these requirements apply thereto.

This certificate is valid until ....

Completion date of the survey on which this certificate is based ....
dd/mm/yyyy

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)"

21 The following Record of Equipment for the Nuclear Cargo Ship Safety Certificate is added after the form of the Nuclear Cargo Ship Safety Certificate:

"RECORD OF EQUIPMENT FOR THE NUCLEAR CARGO SHIP SAFETY CERTIFICATE (FORM CNUC)

This Record shall be permanently attached to the
Nuclear Cargo Ship Safety Certificate

RECORD OF EQUIPMENT FOR COMPLIANCE WITH THE INTERNATIONAL CONVENTION FOR THE SAFETY OF LIFE AT SEA, 1974, AS MODIFIED BY THE PROTOCOL OF 1988 RELATING THERETO

1 Particulars of ship

Name of ship ....

Distinctive number or letters ....

Minimum number of persons with required qualifications
to operate the radio installations ....

2 Details of life-saving appliances

1	Total number of persons for which life-saving appliances are provided	....	
		Port side	Starboard side
2	Total number of lifeboats	....	....
2.1	Total number of persons accommodated by them	....	....
2.2	Number of totally enclosed lifeboats (regulation III/31 and LSA Code, section 4.6)	....	....
2.3	Number of self-righting partially enclosed lifeboats (regulation III/31 and LSA Code, section 4.8)	....	....
2.4	Number of fire-protected lifeboats (regulation III/31 and LSA Code, section 4.9)	....	....
2.5	Other lifeboats		
2.5.1	Number	....	....
2.5.2	Type	....	....
2.6	Number of free-fall life-boats	....	....
2.6.1	Totally enclosed (regulation III/31 and LSA Code, section 4.7)	....	....
2.6.2	Self-contained (regulation III/31 and LSA Code, section 4.8)	....	....
2.6.3	Fire-protected (regulation III/31 and LSA Code, section 4.9)	....	....

3	Number of motor lifeboats included in the total lifeboats shown above	....
3.1	Number of lifeboats fitted with searchlights	....
4	Number of rescue boats	....
4.1	Number of boats which are included in the total lifeboats shown above	....
5	Liferafts	
5.1	Those for which approved launching appliances are required	
5.1.1	Number of liferafts	....
5.1.2	Number of persons accommodated by them	....
5.2	Those for which approved launching appliances are not required	
5.2.1	Number of liferafts	....
5.2.2	Number of persons accommodated by them	....
5.3	Number of liferafts required by regulation III/31.1.4	....
6	Number of lifebuoys	....
7	Number of lifejackets	
8	Immersion suits	....
8.1	Total number	....
8.2	Number of suits complying with the requirements for lifejackets	....
9	Number of thermal protective aids[1]	....
10	Radio installations used in life-saving appliances	....
10.1	Number of radar transponders	....
10.2	Number of two-way VHF radiotelephone apparatus	....

[1] Excluding those required by the LSA Code, paragraphs 4.1.5.1.24, 4.1.8.31 and 5.1.2.2.13.

3 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 marine 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	....

4 Methods used to ensure availability of radio facilities (regulations IV/15.6 and 15.7)

4.1 Duplication of equipment ....

4.2 Shore-based maintenance ....

4.3 At-sea maintenance capability ....

5 Details of navigation systems and equipment

		Actual provision
1.1	Standard magnetic compass[2]	....
1.2	Spare magnetic compass[2]	....
1.3	Gyro compass[2]	....
1.4	Gyro compass heading repeater[2]	....
1.5	Gyro compass bearing repeater[2]	....
1.6	Heading or track control system[2]	....
1.7	Pelorus or compass bearing device[2]	....
1.8	Means of correcting heading and bearings	....
1.9	Transmitting heading device (THD)[2]	....
2.1	Nautical charts/Electronic chart display and information system (ECDIS)[3]	....
2.2	Back up arrangements for ECDIS	
2.3	Nautical publications	....
2.4	Back up arrangements for electronic nautical publications	....
3.1	Receiver for a global navigation satellite system/terrestrial radio navigation system[2,3]	....
3.2	9 GHz radar[2]	....
3.3	Second radar (3 GHz/9 GHz[3])[2]	....
3.4	Automatic radar plotting aid (ARPA)[2]	....
3.5	Automatic tracking aid[2]	....
3.6	Second automatic tracking aid[2]	....
3.7	Electronic plotting aid[2]	....
4	Automatic identification system (AIS)	....
5.1	Voyage data recorder (VDR)[3]	....
5.2	Simplified voyage data recorder (S-VDR)[3]	....
6.1	Speed and distance measuring device (through the water)[2]	....
6.2	Speed and distance measuring device (over the ground in the forward and athwartship direction)[2]	....
6.3	Echo sounding device[2]	....
7.1	Rudder, propeller, thrust, pitch and operational mode indicator[2]	
7.2	Rate of turn indicator[2]	....
8	Sound reception system[2]	....
9	Telephone to emergency steering position[2]	
10	Daylight signalling lamp[2]	....
11	Radar reflector[2]	....
12	International Code of Signals	....
13	IAMSAR Manual, Volume III	

[2] Alternative means of meeting this requirement are permitted under regulation V/19. In case of other means, they shall be specified.

[3] Delete as appropriate.

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)"

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.

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_i. 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:

$J \le J_k$:

$$p(x1,x2) = p_1 = \frac{1}{6}\mathrm{J}^2\left(\mathrm{b}_{11}\mathrm{J} + 3\mathrm{b}_{12}\right)$$

$J > J_k$:

$$p(x1,x2) = p_2 = -\frac{1}{3}b_{11}J_k^3 + \frac{1}{2}(b_{11}J - b_{12})J_k^2 + b_{12}JJ_k - \frac{1}{3}b_{21}\left(J_n^3 - J_k^3\right) + \frac{1}{2}(b_{21}J - b_{22})\left(J_n^2 - J_k^2\right) + b_{22}J(J_n - J_k)$$

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;
1.
$s_{\text{mom,i}}$ 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:

$\theta_{\min}$ is 7° for passenger ships and 25° for cargo ships; and

$\theta_{\max}$ is 15° for passenger ships and 30° for cargo ships.

4 The factor $s_{\text{mom,i}}$ is applicable only to passenger ships (for cargo ships $s_{\text{mom,i}}$ shall be taken as unity) and shall be calculated at the final equilibrium from the formula:

$$s_{\text{mom},i} = \frac{(GZ_{\max} - 0.04) \cdot Displacement}{M_{\text{heel}}}$$

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

$s_{\text{mom,i}} \leq 1$

4.1 The heeling moment M_{heel} is to be calculated as follows:

$$M_{\text{heel}} = \text{maximum } \{M_{\text{passenger}} \text{ or } M_{\text{wind}} \text{ or } M_{\text{Survivalcraft}}\}$$

4.1.1 $M_{\text{passenger}}$ is the maximum assumed heeling moment resulting from movement of passengers, and is to be obtained as follows:

$$M_{\text{passenger}} = (0.075 \cdot N_p) \cdot (0.45 \cdot B) \text{ (tm)}$$

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:

$$M_{\text{wind}} = (P \cdot A \cdot Z) / 9{,}806 \text{ (tm)}$$

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 $M_{\text{Survivalcraft}}$ 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:

$$v_m = v(H_{j,\,n,\,m}, d) - v(H_{j,\,n,\,m-1}, d)$$

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 m^{th} horizontal boundary which is assumed to limit the vertical extent of flooding for the damaged compartments under consideration;

$H_{j,\,n,\,m-1}$ 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 $v(H_{j,\,n,\,m-1}, d)$ shall be obtained from the formulae:

$$v(H,d) = 0.8\frac{(H-d)}{7.8}$$, if $(H_m\text{-}d)$ is less than, or equal to, 7.8 m;

$$v(H,d) = 0.8 + 0.2\left[\frac{(H-d)-7.8}{4.7}\right]$$ 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 $(x1_{(j)} \ldots x2_{(j+n-1)})$, 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^o 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 15º. 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^{o}. 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 15º, 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."

ANEXO 13

RESOLUCIÓN MSC.388(94)
(adoptada el 18 de noviembre de 2014)

ENMIENDA A LA RECOMENDACIÓN SOBRE LAS CONDICIONES PARA LA APROBACIÓN DE ESTACIONES DE SERVICIO DE BALSAS SALVAVIDAS INFLABLES (RESOLUCIÓN A.761(18))

EL COMITÉ DE SEGURIDAD MARÍTIMA,

RECORDANDO el artículo 28 b) del Convenio constitutivo de la Organización Marítima Internacional, artículo que trata de las funciones del Comité,

RECORDANDO TAMBIÉN que, al adoptar la resolución A.761(18): "Recomendación sobre las condiciones para la aprobación de estaciones de servicio de balsas salvavidas inflables", la Asamblea autorizó al Comité a mantener esta resolución sometida a examen y a adoptar, cuando procediera, enmiendas a la misma,

HABIENDO EXAMINADO, en su 94º periodo de sesiones, la recomendación formulada por el Subcomité de sistemas y equipo del buque, en su 1º periodo de sesiones, tras revisar la recomendación,

1 ADOPTA la enmienda a la Recomendación sobre las condiciones para la aprobación de estaciones de servicio de balsas salvavidas inflables (anexo de la resolución A.761(18)), que figura en el anexo de la presente resolución;

2 INVITA a los Gobiernos a que inspeccionen las estacionen de servicio de balsas salvavidas inflables que estén bajo su jurisdicción, de conformidad con la recomendación enmendada por la presente resolución.

ANEXO

ENMIENDA A LA RECOMENDACIÓN SOBRE LAS CONDICIONES PARA LA APROBACIÓN DE ESTACIONES DE SERVICIO DE BALSAS SALVAVIDAS INFLABLES (RESOLUCIÓN A.761(18))

ANEXO

Se sustituye el apartado 5.11 existente por el texto siguiente:

".11 se deberán comprobar todos los componentes del equipo para verificar que están en buen estado y que se sustituyen los que van a quedar obsoletos en los casos en los que la fecha de caducidad sea anterior a la del siguiente servicio de la balsa salvavidas;"

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ANEXO 7

RESOLUCIÓN MSC.386(94)
(adoptada el 21 de noviembre de 2014)

ENMIENDAS AL CONVENIO INTERNACIONAL PARA LA SEGURIDAD DE LA VIDA HUMANA EN EL MAR, 1974, ENMENDADO

EL COMITÉ DE SEGURIDAD MARÍTIMA,

RECORDANDO el artículo 28 b) del Convenio constitutivo de la Organización Marítima Internacional, artículo que trata de las funciones del Comité,

RECORDANDO TAMBIÉN el artículo VIII b) del Convenio internacional para la seguridad de la vida humana en el mar (Convenio SOLAS), 1974 ("el Convenio"), relativo al procedimiento de enmienda aplicable al anexo del Convenio, con excepción de las disposiciones del capítulo I,

RECONOCIENDO la necesidad de facilitar un marco obligatorio para los buques que operen en aguas polares como consecuencia de las exigencias adicionales en los buques, sus sistemas y funcionamiento, que rebasan las prescripciones actuales del Convenio y de otros instrumentos vinculantes de la OMI pertinentes,

TOMANDO NOTA de la resolución MSC.385(94), por la que el Comité adoptó el Código internacional para los buques que operen en aguas polares (Código polar) en lo que respecta a las disposiciones sobre seguridad,

TOMANDO NOTA TAMBIÉN de que el Comité de protección del medio marino, en su 67º periodo de sesiones, aprobó enmiendas al Convenio internacional para prevenir la contaminación por los buques, 1973, modificado por el Protocolo de 1978, con miras a adoptarlas en su 68º periodo de sesiones, y que también examinará la adopción de las disposiciones sobre protección ambiental del Código polar,

TOMANDO NOTA ADEMÁS de las propuestas de enmienda al Convenio para conferir carácter obligatorio a las disposiciones sobre seguridad del Código polar,

HABIENDO EXAMINADO, en su 94º periodo de sesiones, las enmiendas al Convenio propuestas y distribuidas de conformidad con lo dispuesto en el artículo VIII b) i) del Convenio,

1 ADOPTA, de conformidad con lo dispuesto en el artículo VIII b) iv) del Convenio, las enmiendas al Convenio cuyo texto figura en el anexo de la presente resolución;

2 DECIDE, de conformidad con lo dispuesto en el artículo VIII b) vi) 2) bb) del Convenio, que dichas enmiendas se considerarán aceptadas el 1 de julio de 2016, a menos que, antes de esa fecha, más de un tercio de los Gobiernos Contratantes del Convenio o un número de Gobiernos Contratantes cuyas flotas mercantes combinadas representen como mínimo el 50 % del arqueo bruto de la flota mercante mundial hayan notificado al Secretario General de la Organización que recusan las enmiendas;

3 INVITA a los Gobiernos Contratantes del Convenio SOLAS a que tomen nota de que, de conformidad con lo dispuesto en el artículo VIII b) vii) 2) del Convenio, las enmiendas entrarán en vigor el 1 de enero de 2017, una vez aceptadas con arreglo a lo dispuesto en el párrafo 2 anterior;

4 PIDE al Secretario General que, a los efectos del artículo VIII b) v) del Convenio, remita copias certificadas de la presente resolución y del texto de las enmiendas que figura en el anexo a todos los Gobiernos Contratantes del Convenio;

5 PIDE TAMBIÉN al Secretario General que remita copias de la presente resolución y de su anexo a los Miembros de la Organización que no son Gobiernos Contratantes del Convenio.

ANEXO

ENMIENDAS AL CONVENIO INTERNACIONAL PARA LA SEGURIDAD
DE LA VIDA HUMANA EN EL MAR, 1974, ENMENDADO

A continuación del capítulo XIII actual se añade el nuevo capítulo XIV siguiente:

"CAPÍTULO XIV
MEDIDAS DE SEGURIDAD PARA LOS BUQUES QUE OPEREN EN AGUAS POLARES

Regla 1
Definiciones

A los efectos del presente capítulo:

1 *Código polar:* Código internacional para los buques que operen en aguas polares, que consta de una introducción y de las partes I-A y II-A y las partes I-B y II-B, y que fue adoptado mediante las resoluciones MSC.385(94) y del Comité de protección del medio marino,* según sea enmendado, siempre que:

.1 las enmiendas a las disposiciones relativas a la seguridad de la introducción y la parte I-A del Código polar se adopten, entren en vigor y se apliquen de conformidad con lo dispuesto en el artículo VIII del presente Convenio respecto de los procedimientos de enmienda aplicables al anexo, con excepción del capítulo I; y

.2 las enmiendas a la parte I-B del Código polar sean adoptadas por el Comité de seguridad marítima de conformidad con su Reglamento interior.

* Véase la resolución de la adopción del Código internacional para los buques que operen en aguas polares por parte del Comité de protección del medio marino.

2 *Zona del Antártico:* extensión de mar situada al sur de los 60º S de latitud.

3 *Aguas árticas:* aguas situadas al norte de una línea que va desde los 58º00',0 N de latitud y los 042º00',0 W de longitud hasta los 64º37',0 N de latitud y los 035º27',0 W de longitud, y de ahí, por una loxodrómica, hasta los 67º03',9 N de latitud y los 026º33',4 W de longitud, y, a continuación, por una loxodrómica, hasta la latitud 70º49',56 N y la longitud 008º59',61 W (Sørkapp, Jan Mayen) y, por la costa meridional de Jan Mayen, hasta la posición 73º31',6 N y 019º01',0 E por la isla de Bjørnøya, y, a continuación, por la línea del círculo polar máximo, hasta la latitud 68º38',29 N y la longitud 043º23',08 E (cabo Kanin Nos), y, siguiendo la costa septentrional del continente asiático hacia el este, hasta el estrecho de Bering, y de ahí, hacia el oeste, por los 60º N de latitud hasta Il'pyrskiy, siguiendo a continuación el paralelo 60º N hacia el este, hasta el estrecho de Etolin inclusive, bordeando después la costa septentrional del continente norteamericano, hasta los 60º N de latitud y hacia el este, siguiendo el paralelo 60º N hasta los 056º37',1 W de longitud, y de ahí, hasta los 58º00',0 N de latitud y los 042º00',0 W de longitud.

4 *Aguas polares:* aguas árticas y/o zona del Antártico.

5 *Buque construido:* buque cuya quilla haya sido colocada, o cuya construcción se halle en una fase equivalente.

6 La frase *cuya construcción se halle en una fase equivalente* indica la fase en que:

.1 ha comenzado una construcción identificable como propia de un buque determinado; y

.2 ha comenzado una fase del montaje del buque que suponga la utilización de, cuando menos, 50 toneladas del total del material estructural estimado o un 1 % de dicho total, si este segundo valor es menor.

Regla 2
Ámbito de aplicación

1 Salvo disposición expresa en otro sentido, el presente capítulo se aplica a los buques que operen en aguas polares, certificados de conformidad con el capítulo I.

2 Los buques construidos antes del 1 de enero de 2017 cumplirán las prescripciones pertinentes del Código polar a más tardar en el primer reconocimiento intermedio, o en el reconocimiento de renovación, si éste es anterior, con posterioridad al 1 de enero de 2018.

3 Al aplicar la parte I-A del Código polar, deberían tenerse en cuenta las orientaciones adicionales que figuran en la parte I-B del Código polar.

4 El presente capítulo no se aplicará a los buques que sean propiedad de un Gobierno Contratante o sean explotados por éste y que se utilicen, por el momento, sólo en servicios gubernamentales de carácter no comercial. Sin embargo, se recomienda a los buques que sean propiedad de un Gobierno Contratante o sean explotados por éste y que se utilicen, por el momento, sólo en servicios gubernamentales de carácter no comercial que, en la medida que sea razonable y factible, actúen de acuerdo con lo dispuesto en el presente capítulo.

5 Nada de lo dispuesto en el presente capítulo irá en detrimento de los derechos y obligaciones de los Estados en virtud del derecho internacional.

Regla 3
Prescripciones para los buques a los que se aplica el presente capítulo

1 Los buques a los que se aplica el presente capítulo cumplirán lo prescrito en las disposiciones relativas a la seguridad de la introducción y la parte I-A del Código polar y, además de satisfacer las prescripciones de las reglas I/7, I/8, I/9 y I/10 que les sean aplicables, serán objeto de reconocimiento y certificación de conformidad con lo dispuesto en ese código.

2 Los buques a los que se aplica el presente capítulo que cuenten con un certificado expedido de conformidad con lo dispuesto en el párrafo 1 estarán sujetos a la supervisión establecida en las reglas I/19 y XI-1/4. A tal fin, esos certificados serán considerados como certificados expedidos en virtud de las reglas I/12 o I/13.

Regla 4
Proyectos y disposiciones alternativos

1 El objetivo de la presente regla es proporcionar una metodología para determinar proyectos y disposiciones alternativos de estructura, máquinas e instalaciones eléctricas, seguridad contra incendios y dispositivos y medios de salvamento.

2 Las disposiciones estructurales, las máquinas e instalaciones eléctricas, las medidas de proyecto y disposiciones de seguridad contra incendios, así como los dispositivos y medios de salvamento, podrán diferir de las prescripciones preceptivas que figuran en los capítulos 3, 6, 7 y 8 del Código polar, siempre y cuando los proyectos y disposiciones alternativos se ajusten al propósito del objetivo y de las prescripciones funcionales pertinentes y ofrezcan un nivel de seguridad equivalente al prescrito en dichos capítulos.

3 Cuando los proyectos o disposiciones alternativos difieran de las prescripciones preceptivas de los capítulos 3, 6, 7 y 8 del Código polar, se procederá al análisis técnico, la evaluación y la aprobación de los proyectos y disposiciones de conformidad con las directrices aprobadas por la Organización.[1]

4 Toda disposición o proyecto alternativo que difiera de las prescripciones preceptivas se registrará en el Certificado para buque polar y en el Manual de operaciones en aguas polares del buque, tal como se exige en el Código polar, y se determinarán también las medidas y condiciones técnicas y operacionales para la desviación permitida.

[1] Véanse las Directrices para la aprobación de alternativas y equivalencias previstas en varios instrumentos de la OMI (MSC.1/Circ.1455), las Directrices sobre los proyectos y disposiciones alternativos contemplados en los capítulos II-1 y III del Convenio SOLAS (MSC.1/Circ.1212) y las Directrices sobre proyectos y disposiciones alternativos de seguridad contra incendios (MSC/Circ.1002), según proceda."

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