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REPORT OF THE MARINE ENVIRONMENT PROTECTION COMMITTEE ON ITS SEVENTY-FIRST SESSION

Attached are annexes 11 and 19 to the report of the Marine Environment Protection Committee on its seventy-first session (MEPC 71/17).

ANNEX 11 MANUAL ON BALLAST WATER MANAGEMENT – HOW TO DO IT

ANNEX 19 DRAFT ASSEMBLY RESOLUTION ON THE CODE FOR THE TRANSPORT AND HANDLING OF HAZARDOUS AND NOXIOUS LIQUID SUBSTANCES IN BULK ON OFFSHORE SUPPORT VESSELS (OSV CHEMICAL CODE)

(See document MEPC 71/17/Add.1 for annexes 1 to 10, 12 to 18 and 20 to 29)

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ANNEX 11

MANUAL ON BALLAST WATER MANAGEMENT – HOW TO DO IT

PREFACE

This manual is published by the International Maritime Organization (IMO) to provide advice on the process of ratification, implementation and enforcement of the International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 (hereafter the Convention).

The manual provides useful practical information to Governments, particularly those of developing countries, Administrations, shipowners, port State control authorities, environmental agencies and other stakeholders on the implications of ratifying, implementing and enforcing the Convention. The aim is to encourage the further ratification and proper implementation and enforcement of the Convention. However, it should be noted that, for legal purposes, the authentic text of the Convention should always be consulted.

It is emphasized that the annex to the Convention is a living document that develops over time, once the Convention enters into force. This manual does not attempt to be fully up to date and the reader is strongly advised to consult any updates of the Convention and relevant guidelines contained in IMO documents and publications.

TABLE OF CONTENTS

ABBREVIATIONS

BWE:	Ballast water exchange
BWMP:	Ballast water management plan
BWMS:	Ballast water management systems
BWRB:	Ballast Water Record Book
COLREG:	Convention on the International Regulations for Preventing Collisions at Sea
DBPS:	Disinfection By-Products
DMEL:	Derived Minimal Effect Levels
DNEL:	Derived No-Effect Levels
FPSOs:	Floating Production Storage and Offloading Units
FSUs:	Floating Storage Units
GISIS:	Global Integrated Shipping Information System
HES:	Human Exposure Scenario
IBWMC:	International Ballast Water Management Certificate
LL:	International Convention on Load Lines
MADC:	Maximum Allowable Discharge Concentration
MARPOL:	International Convention for the Prevention of Pollution from Ships
MEPC:	Marine Environment Protection Committee
MoUs:	Memoranda of Understanding
PBT:	Persistency, Bioaccumulation and Toxicity
PNEC:	Predicted No Effect Concentrations
PSC:	Port State Control
PSCO:	Port State Control Officer
QAPP:	Quality Assurance Project Plan
QMP:	Quality Management Plan
RO:	Recognized Organization
SDL:	System Design Limitations
SMS:	Safety Management System
SRA:	Same Risk Area
SOLAS:	International Convention for the Safety of Life at Sea
UNCLOS:	United Nations Convention on the Law of the Sea

CHAPTER 1 – Introduction: The Ballast Water Management Convention

1.1 Harmful aquatic organisms and pathogens present a major threat to marine ecosystems and shipping has been identified as a significant pathway for introducing species to new environments. The problem has increased with the introduction of steel hulls, allowing ships to use water instead of solid materials as ballast, and in particular over the last few decades as trade and traffic volumes have expanded. The effects of the introduction of non-indigenous species have, in many areas of the world, been devastating. Quantitative data show the rate of bio-invasions is continuing to increase significantly. As the volumes of seaborne trade continue overall to increase, the problem may not yet have reached its peak.

1.2 The Convention aims to prevent, minimize and ultimately eliminate risks to the environment, human health, property and resources arising from the transfer of harmful aquatic organisms and pathogens, by establishing standards and procedures for the management and control of ships' ballast water and sediments.

1.3 Under the Convention, ships to which the Convention's provisions apply will be required to manage their ballast water and sediments to a certain standard, according to a ship-specific Ballast Water Management Plan (BWMP). Ships will also have to carry a Ballast Water Record Book (BWRB) and an International Ballast Water Management Certificate (IBWMC). The ballast water management standards will be phased in over a period of time. Initially, ships subject to the Convention's ballast water requirements will be required to exchange ballast water mid-ocean. In due course these ships are required to meet a performance standard that limits the number of organisms in discharged ballast water.

1.4 Parties to the Convention are given the option to take additional measures, which are subject to criteria set out in the Convention and relevant guidelines for its uniform implementation.

1.5 The Convention consists of articles and annexes which include legal requirements, technical standards and regulations for the control and management of ships' ballast water and sediments and there are various resolutions and circulars developed by the Organization relating to it.

PART I: RIGHTS AND OBLIGATIONS

CHAPTER 2 – Structure and components of the Convention

The Convention is a legal instrument composed of various parts (preamble, articles and annex). The preamble conveys agreed principles and the articles bind the contracting Parties with the regulations set out in the annex. The Convention is supplemented by resolutions and circulars that provide technical and procedural guidance which is non-mandatory. These components are described briefly below as they are referred to in this manual.

2.1 Articles of the International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004

Article 1 – Definitions
Article 2 – General obligations
Article 3 – Application
Article 4 – Control of the transfer of harmful aquatic organisms and pathogens through ships' ballast water and sediments
Article 5 – Sediment reception facilities
Article 6 – Scientific and technical research and monitoring

Article 7 – Survey and certification
Article 8 – Violations
Article 9 – Inspection of ships
Article 10 – Detection of violations and control of ships
Article 11 – Notification of control actions
Article 12 – Undue delay to ships
Article 13 – Technical assistance, cooperation and regional cooperation
Article 14 – Communication of information
Article 15 – Dispute settlement
Article 16 – Relationship to international law and other agreements
Article 17 – Signature, ratification, acceptance, approval and accession
Article 18 – Entry into force
Article 19 – Amendments
Article 20 – Denunciation
Article 21 – Depositary
Article 22 – Languages

2.2 Annex – Regulations for the control and management of ships' ballast water and sediments

2.2.1 *Section A – General provisions*

This section includes definitions and provisions related to application, exemptions, exceptions and equivalent compliance, as follows:

Regulation A-1 Definitions
Regulation A-2 General applicability
Regulation A-3 Exceptions
Regulation A-4 Exemptions
Regulation A-5 Equivalent compliance

2.2.2 *Section B – Management and control requirements for ships*

This section highlights the requirements for ships to implement the Convention, including the timeline for transitioning to the performance standard and the locations permitted for BWE. This includes having on board and implementing a BWMP approved by the Administration (refer to Guidelines (G4)), maintaining a ballast water record book to log ballast water operations and adopting measures for sediment management (refer to Guidelines (G1)). Regulations include:

Regulation B-1 Ballast water management plan
Regulation B-2 Ballast water record book
Regulation B-3 Ballast water management for ships
Regulation B-4 Ballast water exchange
Regulation B-5 Sediment management for ships
Regulation B-6 Duties of officers and crew

2.2.3 *Section C – Special requirements in certain areas*

This section covers the process relating to additional measures that a Party, individually or jointly with other Parties, may impose on ships to prevent, reduce, or eliminate the transfer of harmful aquatic organisms and pathogens through ships' ballast water and sediments. Regulations include:

Regulation C-1	Additional measures
Regulation C-2	Warnings concerning ballast water uptake in certain areas and related flag State measures
Regulation C-3	Communication of information

Guidance can be found in Guidelines (G13).

2.2.4 *Section D – Standards for ballast water management*

This section details the standards and requirements for ballast water management. The standards include those for ballast water exchange and for biological performance, related to water quality for discharge. There are also requirements for the approval of BWMS, testing and evaluation of prototype ballast water treatment technologies, and review criteria. Regulations include:

Regulation D-1	Ballast water exchange standard
Regulation D-2	Ballast water performance standard
Regulation D-3	Approval requirements for ballast water management systems
Regulation D-4	Prototype ballast water treatment technologies
Regulation D-5	Review of standards by the Organization

2.2.5 *Section E – Survey and certification requirements for ballast water management*

This section details the requirements for the survey of ships and the issuance of an International Ballast Water Management Certificate. Regulations include:

Regulation E-1	Surveys
Regulation E-2	Issuance or endorsement of a Certificate
Regulation E-3	Issuance or endorsement of a Certificate by another Party
Regulation E-4	Form of the Certificate
Regulation E-5	Duration and validity of the Certificate

2.2.6 *Appendices to the annex*

There are two appendices to the annex to the Convention, containing a model Certificate and ballast water record book, for use by Administrations and other stakeholders.

Appendix I	Form of International Ballast Water Management Certificate
Appendix II	Form of ballast water record book

2.3 Technical guidelines

2.3.1 The following Guidelines relating to the uniform implementation of the Convention have, inter alia, been developed and adopted starting from the 53rd session of the MEPC (MEPC 53) (see also sections 21.1 and 21.2). The Guidelines are kept under review by the MEPC and are updated as new technologies emerge and additional knowledge becomes available.

.1 Guidelines for sediment reception facilities (G1);
.2 Guidelines for ballast water sampling (G2);
.3 Guidelines for ballast water management equivalent compliance (G3);
.4 Guidelines for ballast water management and the development of ballast water management plans (G4);
.5 Guidelines for ballast water reception facilities (G5);

.6 2017 Guidelines for ballast water exchange (G6);
.7 2017 Guidelines for risk assessment under regulation A-4 of the BWM Convention (G7);
.8 2017 Guidelines for approval of ballast water management systems (G8);
.9 Procedure for approval of ballast water management systems that make use of Active Substances (G9);
.10 Guidelines for approval and oversight of prototype ballast water treatment technology programmes (G10);
.11 Guidelines for ballast water exchange design and construction standards (G11);
.12 2012 Guidelines on design and construction to facilitate sediment control on ships (G12);
.13 Guidelines for additional measures regarding ballast water management including emergency situations (G13);
.14 Guidelines on designation of areas for ballast water exchange (G14); and
.15 Guidelines for port State control under the BWM Convention.

2.3.2 In addition to the above, numerous other resolutions and circulars providing further guidance have been developed by the Organization and a list of these is included in chapter 21.

2.4 Actions required

Those concerned with the ratification and implementation of the Convention should study the documents outlined in this chapter. Further study and in-depth understanding will be necessary for those concerned with particular aspects of ratification and implementation. Information on the legal and practical implementation is given in the other chapters of this manual.

CHAPTER 3 – Rights and obligations under the Convention

Many of the articles of the Convention set down definite requirements. These are in addition to the regulations of the annex and some require specific actions by the Parties. Most of the resolutions and circulars adopted and approved by the Organization relevant to the Convention are non-mandatory, however, they provide valuable technical and operational guidance that Parties are encouraged to follow.

3.1 Definitions

3.1.1 Most of the definitions contained in article 1 (Definitions) are straightforward but a number of definitions are worth mentioning, in order to make it quite clear what the Convention does and does not cover.

3.1.2 With respect to the definition of "Administration", this means the Government of the State under whose authority the ship is operating. With respect to a ship entitled to fly a flag of any State, the Administration is the Government of that State. With respect to floating platforms, including floating storage units (FSUs) and floating production storage and offloading units (FPSOs), the Administration is the Government of the coastal State over which exploration and exploitation of the sea-bed is occurring.[1]

[1] In the context of this manual "Administration" simply refers to the appropriate Government authority with responsibility for implementing and/or enforcing the requirements of a legal instrument.

3.1.3 "Ballast water" means water with its suspended matter taken on board a ship to control trim, list, draught, stability or stresses of the ship. It is to be noted that this definition focuses on the function and purpose of the water, hence not all water present in a ship falls under the definition of "ballast water" (e.g. water present in the hopper area of a dredger).

3.1.4 "Ballast water management" means any mechanical, physical, chemical and/or biological process, used either singularly or in combination to remove, render harmless or avoid the uptake or discharge of harmful aquatic organisms and pathogens within ballast water and sediments.

3.1.5 "Harmful aquatic organisms and pathogens" means aquatic organisms or pathogens which, if introduced into the sea, including estuaries, or into freshwater courses, may create hazards to the environment, human health, property or resources, impair biological diversity or interfere with other legitimate uses of such areas.

3.1.6 "Sediments" means matter settled out of ballast water within a ship.

3.1.7 "Ship" means a vessel of any type whatsoever operating in the aquatic environment and includes submersibles, floating craft, floating platforms, FSUs and FPSOs.

3.2 General obligations

3.2.1 Under article 2 (General obligations) Parties undertake to give full and complete effect to the provisions of the Convention and the annex in order to prevent, minimize and ultimately eliminate the transfer of harmful aquatic organisms and pathogens through the control and management of ships' ballast water and sediments. Parties may also take, individually or jointly with other Parties, more stringent measures, consistent with international law. Parties should ensure that ballast water management practices do not cause greater harm than they prevent to their environment, human health, property or resources, or those of other States.

3.2.2 Furthermore, the Parties shall endeavour to cooperate under the auspices of the Organization to address threats and risks to sensitive, vulnerable or threatened marine ecosystems and biodiversity in areas beyond the limits of national jurisdiction in relation to ballast water management and to avoid, as far as practicable, the uptake of ballast water with potentially harmful aquatic organisms and pathogens.

3.3 Application

3.3.1 The Convention applies to:

.1 ships entitled to fly the flag of a Party; and

.2 ships not entitled to fly the flag of a Party but which operate under the authority of a Party.

3.3.2 The Convention does not apply to:

.1 ships not designed or constructed to carry ballast water;

.2 ships of a Party which only operate in waters under the jurisdiction of that Party, unless the Party determines that the discharge of ballast water from such ships would impair or damage their environment, human health, property or resources, or those of adjacent States;

.3 ships of a Party which only operate in waters under the jurisdiction of another Party, subject to the authorization of the latter Party for such exclusion. No Party shall grant authorization if doing so would impair or damage their environment, human health, property or resources, or those of adjacent or other States. Any Party not granting such authorization shall notify the Administration of the ship concerned that this Convention applies to such ship;

.4 ships which only operate in waters under the jurisdiction of one Party and on the high seas, except for ships not granted an authorization pursuant to subparagraph .3 above, unless such Party determines that the discharge of ballast water from such ships would impair their environment, human health, property or resources, or those of adjacent or other States;

.5 any warship, naval auxiliary or other ship owned or operated by a State and used, for the time being, only on government non-commercial service. However, each Party shall ensure, by the adoption of appropriate measures not impairing operations or operational capabilities of such ships owned or operated by it, that such ships act in a manner consistent, so far as is reasonable and practicable, with the Convention; and

.6 permanent ballast water in sealed tanks on ships that is not subject to discharge.

3.3.3 With respect to ships of non-Parties to the Convention, Parties shall apply the requirements of the Convention as may be necessary to ensure that no more favourable treatment is given to such ships.

3.3.4 The Organization developed *Guidance on entry or re-entry of ships into exclusive operation within waters under the jurisdiction of a single Party* (BWM.2/Circ.52/Rev.1) and has also approved circulars on the application of the Convention to mobile offshore units and offshore support vessels (BWM.2/Circ.46 and BWM.2/Circ.44).

3.4 Control of the transfer of harmful aquatic organisms and pathogens through ships' ballast water and sediments

Each Party shall require that ships subject to the Convention comply with its requirements and shall take effective measures to ensure that those ships comply with those requirements. Furthermore, each Party shall develop national policies, strategies or programmes that promote the attainment of the objectives in the Convention for ports and waters under its jurisdiction. This includes creating a national approach to ballast water management by ships that are not subject to the Convention. The objectives of the Convention are set out in its preamble.

3.5 Sediment reception facilities

Under article 5 (Sediment reception facilities) Parties undertake to ensure that ports and terminals where cleaning or repair of ballast tanks occurs have adequate facilities for the reception of sediments. Guidance for sediment reception facilities can be found in the technical Guidelines (G1).

3.6 Scientific and technical research and monitoring

Article 6 (Scientific and technical research and monitoring) calls for Parties individually or jointly to promote and facilitate scientific and technical research on ballast water management and to monitor the effects of ballast water management in waters under their jurisdiction.

3.7 Survey and certification

Article 7 (Survey and certification) requires ships to be surveyed and certified. Other Parties should accept a certificate issued under the authority of a Party to the Convention.

3.8 Violations

The Convention requires Parties to prohibit violations and to establish sanctions under their law and take procedures against offenders. Article 8 (Violations) also requires that Administrations informed of violations shall investigate the matter. National legislation implementing the Convention should reflect these requirements and a maritime Administration is required to fulfil these obligations. The sanctions shall be adequate in severity to discourage violations.

3.9 Inspection of ships

Under article 9 (Inspection of ships) ships may be inspected by PSCOs who can verify that the ship has a valid certificate and BWMP, inspect the BWRB and/or sample the ship's ballast water. A detailed inspection may be carried out if the ship does not carry a valid certificate or there are clear grounds to justify it. In such cases, the Convention states that the Party carrying out the inspection shall take such steps as will ensure that the ship shall not discharge ballast water until it can do so without presenting a threat of harm to the environment, human health, property or resources.

3.10 Detection of violations and control of ships

If a ship is detected to have violated this Convention, the flag State, and/or the port State may take steps to warn, detain or exclude the ship. If the ship poses a threat to the environment, human health, property or resources, the Party in whose water the ship is operating shall prohibit discharges until the threat is removed. Parties to the Convention agree to cooperate in monitoring compliance with the Convention and detecting violations. A Party may also inspect a ship when it enters the ports or offshore terminals under its jurisdiction, if a request for an investigation is received from any Party, together with sufficient evidence that a ship is operating or has operated in violation of a provision in the Convention.

3.11 Notification of control actions

If an inspection indicates a violation, the ship shall be notified. A report shall be forwarded to the Administration, including any evidence of the violation. In addition, the RO responsible for the issuance of Certificates shall be notified. The port State authority concerned shall also notify the next port of call about the violation including all relevant information if it did not take necessary steps to prevent the ship from discharging ballast water.

3.12 Undue delay to ships

All possible efforts shall be made to avoid a ship being unduly detained or delayed. Where undue delay does occur, the ship is entitled to compensation for any loss or damage suffered. A competent and efficient maritime Administration is required in order to fulfil this obligation.

3.13 Technical assistance, cooperation and regional cooperation

Under article 13 (Technical assistance, cooperation and regional cooperation) Parties undertake, directly or through the Organization and other international bodies, as appropriate, in respect of the control and management of ships' ballast water and sediments, to provide

support for those Parties which request technical assistance to train personnel; to ensure the availability of relevant technology, equipment and facilities; to initiate joint research and development programmes; and to undertake other action aimed at the effective implementation of the Convention and of guidance developed by the Organization related thereto.

3.14 Communication of information

Parties to the Convention undertake to provide the Organization with information as follows (for circulation, where appropriate, to all Parties):

.1 any requirements and procedures, including laws, regulations and guidelines, for implementation of the Convention;

.2 the availability and location of any reception facilities for the environmentally safe disposal of ballast water and sediments; and

.3 requirements for information from a ship which is unable to comply with the provisions of the Convention.

3.15 Dispute settlement

Parties shall settle any dispute between them concerning the interpretation or application of the Convention using peaceful means of their own choice.

3.16 Relationship to international law and other agreements

Nothing in the Convention shall prejudice the rights and obligations of any State under customary international law as reflected in UNCLOS.

3.17 Signature, ratification, acceptance, approval and accession

The Convention is open for accession by any State. States may become Parties by ratification, acceptance, approval, or by accession.

3.18 Entry into force

Article 18 (Entry into force) provides the conditions and timing of entry-into-force of the Convention, being 12 months after the date on which not less than 30 States, the combined merchant fleets of which constitute not less than 35% of the gross tonnage of the world's merchant shipping, have either signed it without reservation as to ratification, acceptance or approval, or have deposited the requisite instrument of ratification, acceptance, approval or accession in accordance with article 17.

3.19 Amendments

Article 19 (Amendments) provides the procedures for amendments. Any Party may propose an amendment to the Convention. Proposed amendments need to be submitted to the Secretary-General of the Organization or to a conference of Parties and follow the procedure described in article 19.2.

3.20 Denunciation

The Convention may be denounced by any Party at any time after the expiry of two years from the date on which it enters into force for that Party. Denunciation shall be effected by written notification to the Depositary, to take effect one year after receipt or such longer period as may be specified in that notification.

3.21 Depositary

The Convention is deposited with the Secretary-General of the Organization.

3.22 Languages

The Convention is established in the Arabic, Chinese, English, French, Russian and Spanish languages.

CHAPTER 4 – Jurisdiction

Jurisdiction refers to the authority of the Contracting Party, exercised as flag State, port State or coastal State. Jurisdiction dictates the legal implementation and enforcement of the Convention's requirements. It is vital to distinguish between the State's competence to prescribe legislation for individual ships (legislative jurisdiction) and its competence to enforce thus prescribed legislation (enforcement jurisdiction). According to article 16 (Relationship to international law and other agreements), States' rights and obligations under international law, as reflected in UNCLOS, shall not be prejudiced by the Convention's provisions.

4.1 Flag State jurisdiction

The rule is that, exceptions applying, a ship on the high seas is subject only to the jurisdiction of its flag State. The flag State must ensure its ships conform to international rules and regulations (such as the Convention), including through a survey and certification process and through appropriate enforcement action in the case of violations. The jurisdiction of the flag State may concurrently hold with the jurisdiction of port States or coastal States, if the ship visits the waters of the latter States.

4.2 Port State jurisdiction

4.2.1 Article 8(2) requires Parties to prohibit violations of the Convention and to establish sanctions for violations within their jurisdiction, including in ports. Port States can exercise enforcement jurisdiction on those ships calling at their ports through the PSC mechanism, which provides a "safety net" with regard to ships that may be in violation of the Convention. The jurisdiction of the port State may include inspection of certificates, inspection to detect violations, detention of ships in violation, etc. The grounds for port State intervention include:

.1 on its own initiative (possibly in the context of regional cooperation);

.2 at the request of the flag State or a coastal State; and

.3 following a complaint or information by crew, trade union or other stakeholder.

4.2.2 Port States may participate in regional agreements to effectively enforce compliance (e.g. MoUs on PSC) and they may have a common enforcement mechanism. Further information can be found in chapter 6 of this manual.

4.3 Coastal State jurisdiction

4.3.1 With respect to legislative jurisdiction, article 8(2) requires Parties to prohibit violations and establish sanctions for violation in their jurisdiction. In the territorial sea, the coastal State

enjoys sovereignty and the power to apply national law, subject to conformity with international law (e.g. the right of innocent passage). In the exclusive economic zone (EEZ), the coastal State has jurisdiction with regards to the protection and preservation of the marine environment. The Convention may be applied consistent with this jurisdiction.

4.3.2 Enforcement jurisdiction of the coastal State varies for different areas (zones) of the sea (see, e.g. UNCLOS article 220).

4.4 Application of the Convention

4.4.1 Article 3 (Application) identifies the ships to which the Convention shall or shall not apply. The Organization developed *Guidance on entry or re-entry of ships into exclusive operation within waters under the jurisdiction of a single Party* (BWM.2/Circ.52) and has also approved guidance on the application of the Convention to mobile offshore units and offshore support vessels (BWM.2/Circ.46 and BWM.2/Circ.44).

4.4.2 All enforcement agencies, whether acting in a port State or coastal State capacity, must be cognizant of the fact that improper action taken by them (such as unduly delaying or detaining a ship) may lead to civil liability.

PART II: MEETING OBLIGATIONS

CHAPTER 5 – Means of meeting obligations

5.1 Participation

5.1.1 Ratification, acceptance, approval or accession to the Convention, and its subsequent implementation, require the participation of a number of stakeholders, including but not limited to:

.1 Government of a State (the political body having power to conclude international agreements)

.2 Administration – legal;

.3 Administration – maritime;

.4 shipowners and operators; and

.5 port authorities.

5.1.2 Each stakeholder should know exactly what its institutional rights, obligations and responsibilities are, including the responsibilities of its staff and the requirements to be imposed on ships and ports.

5.1.3 As previously stated, in the context of this manual, Administration refers to the appropriate Government authority with responsibility for implementing and/or enforcing the requirements of a legal instrument.

5.2 Consultation

When a State is considering ratifying, accepting, approving or acceding to the Convention, the organizations that fall within the stakeholder categories listed in paragraph 5.1 above should be consulted in order to be properly prepared to implement and enforce all of the obligations and requirements.

5.3 Government of a State

5.3.1 The political desire of a State to accept, approve, accede to or ratify the Convention is fundamental. The common principles adopted by Parties and their specific objectives in adhering to it are set out in the preamble of the Convention. Governments may wish to become parties because of:

.1 concerns relating to the environment, human health, property and resources;

.2 concerns over water quality, which affects the population, or sea areas under their jurisdiction;

.3 desire to have uniform enforcement of the Convention;

.4 benefits to their shipowners (worldwide acceptance of ships);

.5 benefits to their ports (means of control of pollution); or

.6 concern for the worldwide environment.

5.3.2 Advice to Governments may come from the public at large, from their own maritime or environmental Administration and from their maritime industry.

5.4 Administration – legal

Once the political desire has been established and a decision made to become a Party, it is necessary to consider the means of ratifying or acceding to and implementing the Convention in domestic law.

5.5 Administration – maritime

The responsible Administration will have by far the greatest administrative task in the implementation of the Convention. It is likely that this body will provide advice to the legal branch and the Government on the one hand, and will advise the shipping industry and port authorities on the other. The maritime Administration also has responsibility for matters including the approval of BWMS, the approval of BWMPs and survey and certification requirements in accordance with relevant guidelines.

5.6 Shipowners and operators

Shipowners will need to select and equip ships for their operational needs and train seafarers, especially their merchant marine officers, in order to meet the requirements of the Convention. This includes ensuring that the BWMP is being executed. An outline of these requirements is given in part IV of this manual (chapters 8 to 12) in line with the respective sections of the annex to the Convention. Further information on duties of the shipowners can be found in chapter 16.

5.7 Port authorities

Port authorities may be requested to provide adequate sediment reception facilities as described in Guidelines (G1) and ballast water reception facilities capable of handling the quality and volume of the discharged water. Guidance on provisions for port reception facilities can be found in Guidelines (G5).

5.8 Obligations

All stakeholders involved with the Convention need to consider and meet their obligations with respect to:

.1 preparation of legislation, including regulations to incorporate and implement the Convention's requirements into their domestic law;

.2 capability for sampling and analysis of ballast water;

.3 adequate science capacity, e.g. to review ballast water risk assessments to address exemptions, additional measures or early warnings;

.4 survey and certification;

.5 inspection;

.6 design and construction requirements;

.7 equipment requirements;

.8 operational requirements;

.9 documentation;

.10 procedures; and

.11 agreements with other Governments.

5.9 Developing a compliance strategy

5.9.1 Why compliance?

Under article 8.2, any violation of its requirements within the jurisdiction of any Party shall be prohibited and sanctions shall be established under the law of that Party. In accordance with this obligation, a Party will need to implement a range of monitoring, compliance and enforcement mechanisms. Enforcement of the Convention should primarily focus on preventing the transfer of harmful aquatic organisms and pathogens and not simply on apprehending and punishing violators. The extent to which education, incentives, monitoring and policing programmes are used by a State to ensure compliance with the Convention depends upon the type of jurisdiction that the State enjoys over a ship (see chapter 4).

5.9.2 Strategies for verifying compliance

5.9.2.1 An effective compliance programme should incorporate all of the following elements:

.1 compliance monitoring through routine inspections, surveys, and/or examinations (including arrangements for sampling and analysis of ballast water);

.2 reporting procedures;

.3 adequate investigations of violations reported or otherwise detected;

.4 a system of adequate sanctions in respect of violations;

.5 education and public awareness programmes; and

.6 cooperation and coordination with other Parties.

5.9.2.2 A compliance programme should be adaptable enough to allow compliance priorities to respond to prevailing circumstances. One or more of its elements may be more salient for a Party depending on key variables, including the state of the national fleet, the type of ships calling at ports of the Party, the emergence of new equipment, procedural Convention standards, the availability of human and technological resources within the Administration and the familiarity of relevant stakeholders with the Convention.

5.9.2.3 In setting priorities for a compliance strategy, the Administration should undertake an exercise to identify which ships have the highest potential for being in violation, or where a violation would be most significant.

5.9.3 Awareness

Any compliance strategy should take into consideration that resources spent on education and prevention are likely to result in increased environmental protection through compliance and will also save resources that might have been spent on prosecution. Education and prevention strategies are necessary to sensitize all potential stakeholders about how they can assist in protecting the marine environment from the transfer of harmful aquatic organisms and pathogens. In this way, they may prove a cost-effective resource for Parties with limited financial or policing resources.

5.9.4 Cooperation and coordination of PSC

Article 10.4, as well as several important resolutions, lay the ground work for the doctrine of cooperation and interchange as a mutual effort of enforcement among Parties to the Convention. Such cooperation is an important tool in fostering clarity and uniformity in implementation and compliance objectives, in collecting evidence and in enforcement procedures. Cooperation may take several forms, such as joint investigations of violations, supplying information about a particular ship, gathering evidence of a violation, and prosecutions. Reciprocal arrangements in respect of investigations and compliance monitoring will be particularly valuable for Parties which are geographically proximate and/or which share common mechanisms for enforcement. Such arrangements can be formally achieved through MoUs on PSC of which nine are in existence worldwide (see figure 1). Proper regional cooperation and exchange of boarding results among participating Administrations are an effective enforcement tool and can also reduce the requirement for individual States to board all ships.

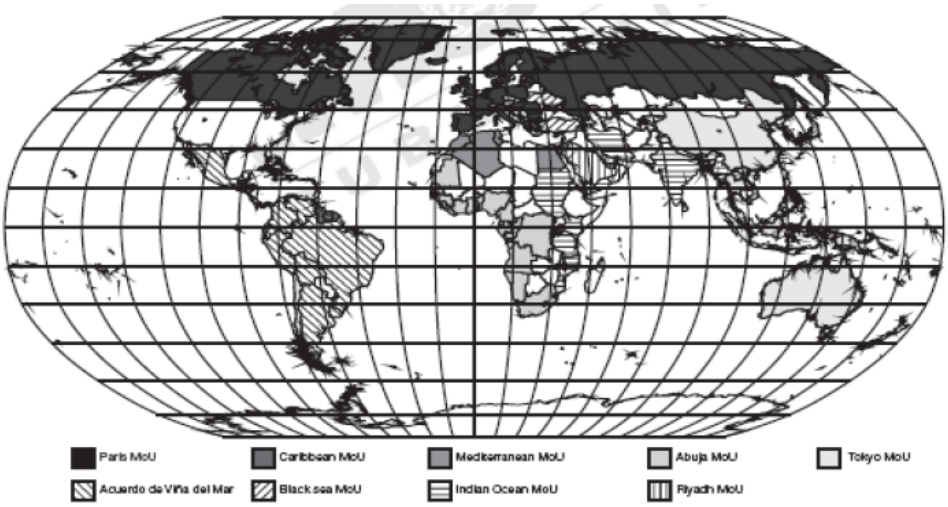

Figure 1: Overview of the nine MoUs on PSC

PART III: LEGAL ASPECTS

CHAPTER 6 – Integrating the Convention in domestic law

6.1 General

It is assumed that every Administration will have a legal department or lawyers, which may be attached to its maritime Administration or to a larger administrative department such as, for example, a Department of Transport. It is further assumed, for the purposes of this manual, that these legal officers will have primary responsibility for the legislation that is necessary to implement the Convention. Whatever the form of the Administration, it must be considered desirable for a single body to be given the overall responsibility for ratification, legislation and implementation. The legal system will vary from State to State, but the principal legal actions necessary for integrating the Convention into national law and implementation are likely to be as outlined in figure 2 and in the following paragraphs.

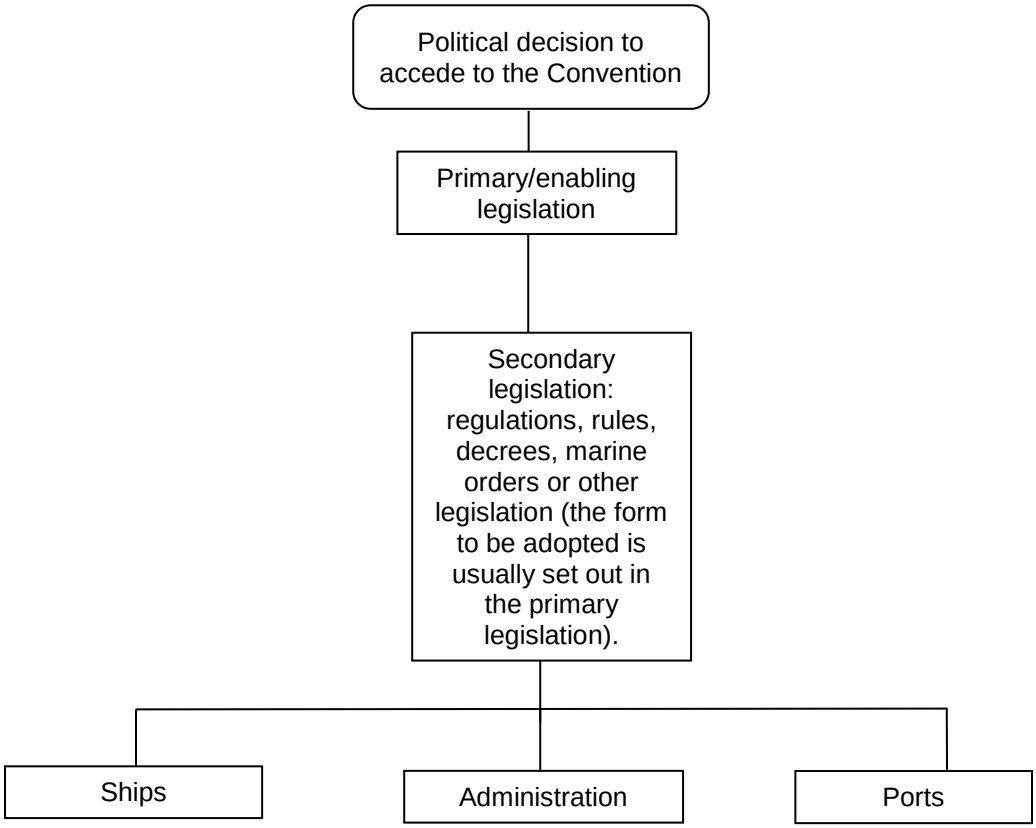

Figure 2: Integrating the Convention in domestic law and implementation

6.2 Parties to the Convention – instrument of accession

6.2.1 States may become Parties to the Convention by:

.1 signature not subject to ratification, acceptance or approval; or

.2 signature subject to ratification, acceptance, or approval, followed by ratification, acceptance or approval; or

.3 accession.

6.2.2 Ratification, acceptance, approval or accession shall be effected by the deposit of an instrument to that effect with the Secretary-General of the Organization. In acceding, Governments indicate their acceptance and approval of the Convention and their readiness to implement its requirements.

6.3 Entry into force

6.3.1 According to article 18 (Entry into force), the Convention shall enter into force 12 months after the date on which not less than 30 States, the combined merchant fleets of which constitute not less than 35% of the gross tonnage of the world's merchant shipping, have either signed it without reservation as to ratification, acceptance or approval, or have deposited the requisite instrument of ratification, acceptance, approval or accession in accordance with article 17. The requirements for entry-into-force were met on 8 September 2016 and consequently it entered into force on 8 September 2017.

6.3.2 For States that deposited an instrument of ratification, acceptance, approval or accession in respect of the Convention after the requirements for entry-into-force thereof were met (8 September 2016), but prior to the date of entry in force (8 September 2017), the ratification, acceptance, approval or accession took effect on the date of entry-into-force or three months after the date of deposit of the instrument, whichever was the later date. Any instrument of ratification, acceptance, approval or accession deposited after the date on which the Convention entered into force shall take effect three months after the date of deposit.

6.3.3 After the date on which an amendment to the Convention is deemed to have been accepted under article 19, any instrument of ratification, acceptance, approval or accession deposited shall apply to the Convention as amended.

6.3.4 As the Convention enters into force for a State three months after the deposit of an instrument of accession by that State, the implementing legislation should enter into force no later than at that time. To ensure that this will be the case, the preparation of such legislation should be initiated well in advance of the accession. This timing is obviously particularly important if the implementing legislation is to be adopted by a parliament, congress, etc.

6.4 Implementing the Convention – primary legislation

6.4.1 The Convention, as most IMO conventions, is a non-self-executing treaty which requires implementing legislation. In some legal systems, the Convention may be integrated in the existing legislation covering safety of maritime transport or protection of environment, such as Merchant Shipping Act, Biodiversity Act, Maritime Code, etc. Such legislation will typically need to be amended to incorporate the provisions of the Convention which require legislative action. On some occasions, several pieces of primary legislation will need to be amended.

6.4.2 In other systems, new legislation, specifically for the purpose of implementing the Convention, will be required. It is advisable to look at how other international maritime conventions, such as SOLAS, MARPOL or the International Convention on the Control of Harmful Anti-fouling Systems on Ships (AFS) have been implemented.

6.4.3 It is important that smooth implementation of amendments to the Convention, especially those which enter into force through the tacit acceptance procedure, and associated resolutions and recommendations be permitted.

6.5 Secondary legislation

6.5.1 As the Convention contains technical regulations, many legal systems would require secondary legislation to supplement, administer, support and enforce the primary legislation. The legal system of some States may permit regulations to be made directly under the primary legislation; others require an "order" approved by their Government or by Parliament (assembly, congress, legislative assembly, etc.) to bring the various parts of secondary legislation into effect.

6.5.2 The regulations that compose the annex to the Convention can, to a large extent, be produced as national regulations with very minor changes. However, due to varying degree of jurisdiction needing to be maintained, some of the regulations may not be straightforward to reproduce in national legislation.

6.5.3 In some systems, the primary legislation authorizes the use of incorporation by reference. Technical regulations may, this way, be incorporated into the domestic law.

This technique can be an efficient way of utilizing already existing technical regulations and standards and avoids the repetition of large volumes of technical material in legislation.

6.6 Communication of information

Pursuant to article 14 (Communication of information), Parties are obliged to report to the Organization any requirements and procedures relating to ballast water management, including their laws, regulations and guidelines on the implementation of the Convention; the availability and location of port reception facilities and requirements for information from a ship which is unable to comply with the provisions of the Convention. This information will be circulated by the Secretariat to all Parties.

CHAPTER 7 – Legal aspects of enforcement

7.1 What are violations?

7.1.1 It is important that legislation implementing the Convention establishes the elements of violations of its requirements to ensure compliance with and enforcement of its provisions.

7.1.2 Establishing what constitutes a violation of the Convention, transforming a violation into a domestic offence, characterizing it and appropriately investigating it are important aspects for Parties implementing and enforcing it. All Parties, in implementing the Convention, are required to apply its requirements so that ships of non-Parties receive no more favourable treatment than ships of Parties (see article 3.3).

7.1.3 The flag State shall ensure that ships flying its flag or operating under its authority are surveyed and certified in accordance with the regulations in the annex to the Convention (article 7 and section E of the annex) to ensure compliance.

7.1.4 Article 8.1 states that any violation of its requirements shall be prohibited and sanctions shall be established under the law of the Administration of the ship concerned, wherever the violation occurs. The Administration shall promptly inform the Party that reported the alleged violation, as well as the Organization, of any action taken. If the Administration has not taken any action within one year after receiving the information, it shall so inform the Party that reported the alleged violation.

7.1.5 Article 8.2 states that any violation of its requirements within the jurisdiction of any Party shall be prohibited and sanctions shall be established under the law of that Party. In case a violation occurs, every Party has an obligation to either cause proceedings to be taken in accordance with its law or to furnish to the Administration of the ship such information and evidence as may be in its possession that a violation has occurred.

7.1.6 Violations will be enforced based on the non-observance of the substantive provisions of the law, whether in the primary or secondary legislation and such enforcement will depend on the way these substantive provisions are drafted. It is therefore important that the domestic legislation contains a clear description of obligations applicable to ships and persons under the Convention and corresponding offences for breach of these obligations.

7.1.7 While it is recognized that States have different standards of proof under their individual legal systems, in general States should allow for the reception of a wide variety of credible evidence, including circumstantial evidence, to indicate violations of the Convention. The gathering, presentation and admitting of evidence for violations must be carefully developed by States, where practicable in cooperation with other States, for the effective enforcement of the Convention.

7.1.8 Compared to detecting violations in other international conventions (e.g. MARPOL Annex I), detecting marine organisms which exceed the ballast water performance standard (regulation D-2) may sometimes be less straightforward. Documentary evidence, such as the inspection of the BWRB, the IBWMC or the BWMP, will play a major role in detecting violations of the requirements of the Convention. However, detecting violations of the discharge standard in regulation D-2 will require scientific evidence, gathered primarily through the analysis of a ballast water discharge sample. Further information on BWE and discharge standards (regulations D-1 and D-2) can be found in chapter 11 and on sampling and analysis of ballast water can be found in chapter 13.

7.1.9 The *Guidelines for port State control under the BWM Convention* (resolution MEPC.252(67)) have been developed by the Organization to assist Governments when exercising PSC inspections under the Convention. Further information on these Guidelines can be found in chapter 19.

7.1.10 All possible efforts shall be made to avoid a ship being unduly detained or delayed. Where undue delay does occur, the ship is entitled to compensation for any loss or damage suffered.

7.2 Sanctions

7.2.1 The type of sanctions applicable to varying violations under the Convention is a matter for determination by the individual Party and may be a function of several legal, political and economic circumstances. Moreover, the approach to sanctions in civil law and in common law jurisdictions may also differ. As sanctions can be very effective as a compliance tool, it would be beneficial for States to prescribe sanctions that are in harmony with applicable systems in neighbouring States or territories. Article 8.3 of the Convention requires that the sanctions shall be adequate in severity to discourage violations. This will also help to avoid the perception that some States have less stringent sanctions than others, which may in turn insinuate a "safe haven" to the potential violator. On the other hand, sanctions may take voluntary mitigation efforts and self-reporting into account. Such a progressive system is easier and less expensive to police and preserves prosecutorial assets for larger cases where substantial harm has occurred. The ultimate objective of the Convention which is to prevent, minimize and ultimately eliminate the risks to the environment, human health, property and resources arising from the transfer of harmful aquatic organisms and pathogens, should always be borne in mind.

7.2.2 Flag States should adopt sanctions for those activities that defeat the purposes of the Convention, such as falsification of records required. It is to be noted that there are requirements for BWMS to incorporate control and monitoring equipment and to store the operational and performance data for at least 24 months. These data provide vital evidence on the operation and performance of BWMS which can be cross referenced with the BWRB entries and ship log entries to identify potential violations.

7.2.3 Sanctions for these types of violations may be deemed criminal and could thereby serve as an important tool in promoting truthfulness in reporting, monitoring and other regulatory requirements. It is important to note that swift and certain sanctions for violations will have an important deterrent effect. It is also important to note that merely providing for the imposition of sanctions in national legislation will not, on its own, achieve significant benefits. Such sanctions should be supported by effective technical procedures for gathering evidence (such as sampling and analysis of ballast water).

PART IV: IMPLEMENTING THE REGULATIONS

CHAPTER 8 – Implementing Section A (General provisions)

8.1 Definitions

8.1.1 Seven terms are defined in regulation A-1: "anniversary date", "ballast water capacity", "company", "constructed", "major conversion", "from the nearest land" and "Active Substance", which are fundamental for the comprehension of various provisions of the Convention.

8.1.2 With regard to the term "major conversion", the Organization has approved a clarification that a new installation of BWMS should not be treated as a major conversion (BWM.2/Circ.45). It also clarifies what is meant by a "change of ship type" according to regulation A-1.5.2.

8.2 General applicability

8.2.1 Regulation A-2 is a key section that provides functional requirements for the Convention to achieve its goal. It states that, except where expressly provided otherwise, the discharge of ballast water shall only be conducted through ballast water management in accordance with the provisions of the Convention.

8.2.2 More generally, section A of the annex to the Convention deals with the scope of the regulations. When implementing the Convention, a Party first has to define precisely the scope of those regulations. For example, a decision needs to be made as to whether a Government wants to use the Convention as the basis for domestic ballast water requirements, or whether it will take a different approach to satisfying article 4.2.

8.3 Exceptions

8.3.1 Exceptions are circumstances where the requirements of regulation B-3, or any measures adopted by a Party pursuant to article 2.3 and section C, may not apply. Those circumstances are:

.1 the uptake or discharge of ballast water and sediments necessary for the purpose of ensuring the safety of a ship in emergency situations or saving life at sea; or

.2 the accidental discharge or ingress of ballast water and sediments resulting from damage to a ship or its equipment:

.1 provided that all reasonable precautions have been taken before and after the occurrence of the damage or discovery of the damage or discharge for the purpose of preventing or minimizing the discharge; and

.2 unless the owner, Company or officer in charge wilfully or recklessly caused damage; or

.3 the uptake and discharge of ballast water and sediments when being used for the purpose of avoiding or minimizing pollution incidents from the ship; or

.4 the uptake and subsequent discharge on the high seas of the same ballast water and sediments; or

.5 the discharge of ballast water and sediments from a ship at the same location where the whole of that ballast water and those sediments originated and provided that no mixing with unmanaged ballast water and sediments from other areas has occurred. If mixing has occurred, the ballast water taken from other areas is subject to ballast water management in accordance with the Annex to the Convention.

8.3.2 Ships that apply exceptions can only do so when facing the situations listed above. Those ships are otherwise required to comply with all other applicable regulations of the Convention. According to the PSC Guidelines (resolution MEPC.252(67)), the use of exceptions should be recorded in the BWRB, including an appropriate reasoning that the exception was justified.

8.3.3 The first three cases in regulation A-3 are similar to those found in other maritime treaties, whereas the fourth and fifth are specific to ballast water and might raise issues to be addressed, therefore extra attention needs to be paid to them.

8.4 Exemptions

8.4.1 Regulation A-4 affords Parties the possibility, in the waters under their jurisdiction, to grant exemptions to certain ships so that they are not required to apply regulations B-3 (Ballast water management for ships) or C-1 (Additional measures).

8.4.2 While this regulation primarily addresses port State authorities, flag State authorities should be involved to address enquiries raised by port State authorities involved with the request, e.g. updating the BWMP. An exemption can only be granted if all States that may be affected by it agree that the risk assessment demonstrates there is an acceptably low risk to the environment, human health, property and resources.

8.4.3 Therefore, a Party needs to anticipate that work on its exemptions policy should be undertaken sufficiently in advance of the Convention entering into force, in order to be able to provide stakeholders with the necessary information to apply for an exemption.

8.4.4 Exemptions can be granted for a determined period, not exceeding five years, to certain ships and according to certain conditions:

.1 the ship operates exclusively between specified ports or locations;

.2 the ship takes up only ballast water coming from those specified ports or locations; and

.3 a risk assessment should be performed following Guidelines (G7) prior to the exemption request. Administrations may grant exemptions in accordance with regulation A-4 based on the SRA concept subject to consultation and agreement between States that may be affected by such exemptions.

8.4.5 Exemptions are meant to apply to individual ships or groups of similar ships on specified voyages or similar specified voyages and particular attention needs to be paid to short-sea shipping in this specific case. The exemptions are subject to intermediate review, and may need to be withdrawn where the actual risk associated with the voyage has increased substantially since the risk assessment was conducted.

8.4.6 Guidelines (G7) provide assistance in the granting of exemptions, including procedures for consulting on and granting exemptions, and for reviewing and withdrawing them. When being used these need to be adapted to the local conditions which can include both biogeography and biodiversity and these conditions should be used by the Party to define its exemptions policy and to ensure clear internal guidelines are followed in decision-making.

8.4.7 The study of an exemption request and its possible granting procedure can be developed in three stages:

.1 risk assessment (according to Guidelines (G7)) when asking for exemption;

.2 study of this assessment by all the potentially affected States concerned; and

.3 communication of any granted exemption to the Organization.

8.4.8 The Parties may undertake the risk assessment themselves in order to grant exemptions, or require the shipowner or operator to undertake it. In any event, the Party granting an exemption is responsible for evaluating the risk assessment, verifying the data and information used and ensuring the assessment is conducted in a thorough and objective manner in accordance with Guidelines (G7).

8.5 Equivalent compliance

8.5.1 A simplified application of the Convention can be used in relation to certain pleasure and search and rescue craft, in accordance with regulation A-5 and taking into account Guidelines (G3).

8.5.2 Ships should aim to comply with the Convention, but otherwise may achieve equivalent compliance instead. Amongst its provisions, Guidelines (G3) recommend, taking into account the nature of the ship, that ballast water should be exchanged prior to discharge in accordance with regulation B-4, or otherwise managed in accordance with the requirements of the Administration, in order to prevent, minimize and ultimately eliminate the transfer of harmful aquatic organisms and pathogens to the maximum extent practicable.

CHAPTER 9 – Implementing Section B (Management and control requirements for ships)

9.1 Ballast water management for ships

9.1.1 The Convention requires, inter alia, the development of individual ships' BWMPs, the maintenance of appropriate records and the compliance with certain concentration-based discharge limits which are dependent on the date of construction and ballast-water capacity of the ship in question.

9.1.2 The Convention stipulates two standards for discharged ballast water; the D-1 standard covers BWE while the D-2 standard is a ballast water performance standard. The Convention requires either the D-1 or the D-2 standard after entry into force on 8 September 2017.

9.1.3 As per resolution A.1088(28), the applicable date of compliance with the D-2 standard is that of the first IOPP renewal survey after entry into force of the Convention for all existing ships. Ships constructed after entry into force will be required to meet the D-2 standard on delivery.

9.1.4 Article 4 of the Convention (Control of the transfer of harmful aquatic organisms and pathogens through ships' ballast water and sediments) calls for Parties to:

.1 require ships to which the Convention applies flying their flag or operating under their authority to comply with the requirements of the Convention and to take effective measures to ensure that those ships comply with those requirements; and

.2 with due regard to their particular conditions and capabilities, to develop national policies, strategies or programmes for ballast water management in ports and waters under their jurisdiction that accord with, and promote, the attainment of the objectives of the Convention.

9.1.5 Compliance with the Convention can be achieved, inter alia, through the following options:

.1 as an interim measure exchange the ballast water as specified by regulation D-1 until regulation D-2 applies for the specific ship;

.2 treat the ballast water by using a type approved ballast water management system to meet the performance standard in regulation D-2; or

.3 implement other methods of ballast water management accepted as alternatives to the requirements described in regulation B-3, paragraphs 1 to 5, provided that such methods ensure at least the same level of protection to the environment, human health, property or resources, and are approved in principle by the MEPC.

9.2 BWMS and other methods

9.2.1 BWMS, treatment methods and technologies have developed rapidly in preparation for the anticipated ratification and subsequent entry into force of the Convention. Current options include:

.1 mechanical treatment, e.g. filtration, separation or destruction;

.2 physical treatment, e.g. ultraviolet light, heat treatment, deoxygenation;

.3 chemical and electrochemical treatment, i.e. making use of Active Substances;

.4 combinations of the above; and

.5 in addition, sediment management, either by separation and return to local uptake water (compliant with the Convention) or by removal for disposal.

9.2.2 Alternative methods of compliance could include discharge of ballast water to an approved reception facility. Ships shall discharge ballast water in accordance with the standards set out in section D of the Convention and in accordance with regulation B-3.

9.2.3 More information on ballast water management options for ships can be found in chapter 17.

9.3 Ballast water exchange

9.3.1 BWE allows for implementation of the Convention by initially requiring ships to carry out an exchange of ballast water taken in port or coastal areas with water from the open sea, defined as 200 nm from the nearest land whenever possible, but in all cases at least 50 nm from the nearest land, and in water at least 200 m in depth. This procedure aims at reducing

the number and viability of organisms discharged in ports or coastal areas following transportation in ballast tanks. Aquatic organisms taken up with ballast water from the open sea are likely to be far fewer in number and less capable of causing a transfer of harmful aquatic organisms and pathogens into the receiving coastal waters, particularly when these receiving waters are fresh.

9.3.2 A ship shall not be required to deviate from its intended voyage, or delay the voyage, in order to comply with any particular requirement for distances from the nearest land or water depths. A ship conducting BWE shall not be required to comply with regulation D-1 if the master reasonably decides that such exchange operation would threaten the ship's stability or in general the safety of the ship, its crew, or its passengers because of adverse weather, ship design or stress, equipment failure, or any other extraordinary condition. Further information on BWE methods can be found in chapter 17.

9.3.3 The Convention does not require the use of BWE once a ship is required to comply with the D-2 standard. The BWE standard (regulation D-1) and the ballast water performance standard (regulation D-2) are discussed further in chapter 11.

Designation of areas for BWE

9.3.4 The Organization has developed Guidelines (G14), addressing how States may designate areas, in consultation with adjacent or other States, as appropriate, where ships may conduct BWE. Generally there are four integral steps to follow in designating an area as a BWE area:

.1 identification of the area, considering the legal aspects, navigational constraints, etc.;

.2 risk assessment;

.3 designation of the area, in accordance with national and international laws and obligations; and

.4 communication to the Organization prior to implementation.

9.3.5 The use of designated ballast water exchange areas and any impacts on the aquatic environment, human health, property or resources of the port State or those of other States should be monitored and reviewed on a regular basis.

Ballast water exchange in polar areas

9.3.6 The BWMP for ships entering polar waters needs to take into account the issues related to BWE in cold environments and in particular in polar conditions. Further information can be found in the *Guidelines for ballast water exchange in the Antarctic treaty area* (resolution MEPC.163(56)) and in the Polar Code.

9.4 Sediment management

9.4.1 The Convention does not require ships to dispose of sediments; however, if they wish to do so they would have to do it in compliance with the BWMP.

9.4.2 Aquatic organisms can settle out of ballast water and can continue to exist within the sediments that accumulate within ballast water tanks. These organisms can survive for long periods after the water they were originally in has been discharged. They may thereby be transported from their natural habitat and discharged in another port or area where they may cause harm or damage to the environment, human health, property and resources.

9.4.3 Each Party to the Convention undertakes to ensure that, in ports and terminals designated by that Party where cleaning or repair of ballast tanks occurs, adequate facilities are provided for the reception of sediments. Such reception facilities shall operate without causing undue delay to ships and shall provide for the safe disposal of such sediments that does not impair or damage their environment, human health, property or resources, or those of other States.

9.4.4 Sediment management is essential for any form of ballast water management. Ships will not be able to comply with the Convention if proper disposal of sediments from ballast water management is not carried out on an adequate scale. Ships should, without compromising safety or operational efficiency, be designed and constructed with a view to minimize the uptake and undesirable entrapment of sediments, facilitate removal of sediments and provide safe access to allow for sediment removal and sampling. The Guidelines (G12) provide details on ballast water tanks and how their internal structure should be designed to avoid the accumulation of sediments.

9.4.5 Ships should, during ballasting operations, as far as practicable, make every effort to limit the uptake of ballast water with potential high concentrations of sediments.

9.5 Ballast Water Management Plan

9.5.1 The Convention requires every ship to carry a ship-specific BWMP approved by its flag State or a RO on behalf of the flag State. Regulation B-1 specifies that a BWMP shall:

.1 detail safety procedures for the ship and the crew associated with ballast water management as required by the Convention;

.2 provide a detailed description of the actions to be taken to implement the ballast water management requirements and supplemental ballast water management practices as set forth in the Convention;

.3 detail the procedures for the disposal of sediments, at sea and to shore;

.4 include the procedures for the coordination of shipboard ballast water management that involves discharge to the sea with the authorities of the State into whose waters such discharge will take place;

.5 designate the officer on board in charge of ensuring that the plan is properly implemented;

.6 contain the reporting requirements for ships provided for under the Convention; and

.7 be written in the working language of the ship. If the language used is not English, French or Spanish, a translation into one of these languages shall be included.

9.5.2 In addition to the mandatory aspects of the BWMP listed above, the guidelines also offer more details and provide a standard format for the BWMP. A BWMP should, inter alia, contain:

.1 plans/drawings and a description of the ballast system;

.2 information on ballast water sampling points and sampling procedures;

.3 operational or safety procedures and restrictions;

.4 description of the method(s) used on board for the ballast water management and sediment control, including procedures for the disposal and handling of sediments;

.5 duties of the ballast water management officer;

.6 recording requirements; and

.7 crew training and familiarization.

9.5.3 Pursuant to the Guidance set out in BWM.2/Circ.52, as revised, ships (e.g. mobile offshore units) that need to enter or re-enter into exclusive operation pursuant to article 3.2(b)-(d) should also include a procedure in their approved BWMP for thoroughly cleaning their ballast tanks, piping and equipment.

9.5.4 The BWMP should be reviewed taking into account guidelines developed by the Organization. Any changes would then need to be reapproved by the flag State or RO on behalf of the flag State. The BWMP will be available for review by PSCOs and other authorities in connection with verifying compliance with the Convention's requirements.

9.5.5 The Organization has approved relevant guidance (BWM.2/Circ.40), which recognizes that regulation B-1 requires the BWMP to take into account guidelines developed by the Organization, but does not mandate specific compliance with Guidelines (G4). Although earlier guidance in resolution A.868(20) remains in effect, Guidelines (G4) have effectively superseded it. However, for practical reasons, the MEPC decided that BWMPs approved in accordance with resolution A.868(20) should remain valid until the plan requires revision due to the installation of a BWMS.

9.6 Ballast Water Record Book

9.6.1 The Convention specifies that all ships shall have on board a BWRB, which shall at least contain the information specified in appendix II to the annex to the Convention (see regulation B-2.1). The BWRB may be in an electronic format, or integrated into other record/log book systems. Entries in the BWRB shall be signed by the officer in charge of the operation and each completed page shall be signed by the master.

9.6.2 All ballast water operations shall be fully recorded without delay and the entries in the BWRB should be made as follows:

.1 when ballast water is taken on board;

.2 whenever ballast water is circulated, transferred between tanks or treated for ballast water management purposes;

.3 when ballast water is discharged into the sea;

.4 when ballast water is discharged to a reception facility;

.5 accidental or other exceptional uptake or discharge of ballast water;

.6 additional operational procedure and general remarks;

.7 exemptions; and

.8 exceptions including emergency procedures.

9.6.3 The minimum information to be entered in the BWRB (as detailed in appendix II) includes date/time and location, port or facility of uptake (latitude/longitude), depth if out of port, as well as estimated amount of ballast water uptake or discharge in cubic metres, and whether the BWMP was implemented prior to discharge. The BWRB entries shall be maintained on board the ship for a minimum period of two years after the last entry has been made and thereafter in the Company's control for a minimum period of three years. The BWRB will be available for review by PSCOs and other authorities in connection with verifying compliance with the Convention's requirements.

9.7 Duties of officers and crew

9.7.1 Regulation B-6 states that officers and crew shall be familiar with their duties in the implementation of ballast water management particular to the ship on which they serve and shall, appropriate to their duties, be familiar with the ship's BWMP. Officers and crew engaged in ballast water operations shall be familiarized and trained in the operation of the installed BWMS and their associated duties. In addition to instructions in the general aspects of ballast water management and the requirements of the Convention, ship-specific training should include operational procedures and maintenance of the BWMS and all related safety considerations, as detailed in the BWMP and the BWMS operating manual.

9.7.2 To facilitate the implementation, administration and execution of the BWMP, a qualified and responsible officer shall be designated (regulation B-1.5). The duties of the designated officer should be specified in the BWMP; such duties could include but are not limited to:

.1 having responsibility for proper implementation of the BWMP including familiarization and training of officers and crew with ballast water management related duties;

.2 ensuring that the ballast water management operations follow procedures laid down in the BWMP;

.3 preparing the ballast water declaration/reporting form prior to arrival in port;

.4 providing assistance to crew and officers under port State control and other inspections;

.5 witnessing any sampling of ballast water that may need to be undertaken;

.6 ensuring that sediment management is implemented and carried out in accordance with the BWMP;

.7 monitoring and ensuring that the BWRB is properly kept up to date;

.8 overseeing that other ballast water management and sediment management tasks specified by the BWMP are carried out; and

.9 having operational responsibility during BWE.

9.7.3 More detailed information about the general principles of ballast water management and guidance on the structure and content of BWMP can be found in the Guidelines (G4).

CHAPTER 10 – Implementing Section C (Special requirements in certain areas)

Article 2.3 provides that nothing in the Convention shall be interpreted as preventing a Party from taking more stringent measures consistent with international law. The Convention also provides that special requirements in certain areas may be necessary to prevent, reduce or eliminate the transfer of harmful aquatic organisms and pathogens. These requirements are in addition to the prescriptive measures detailed in Section B. Section C, dealing with these special requirements, includes three regulations:

.1 Regulation C-1 (Additional measures);

.2 Regulation C-2 (Warnings concerning ballast water uptake in certain areas and related flag State measures); and

.3 Regulation C-3 (Communication of information).

Regulations C-1 and C-2, while both working towards the intent of the Convention, are different in focus. Regulation C-1 is focused on ballast water discharge and concerns the process for a Party to establish more stringent measures. Regulation C-2 is focused on ballast water uptake and requests Parties to identify and communicate the timing and location of certain areas where ballast water should not be taken up.

Section C is important to the intent of the Convention. Regulation C-1 sets out the process for a Party to implement its own additional ballast water management requirements. Ensuring that such additional measures are effectively communicated is critical to avoid confusion and ensure compliance. Regulation C-2 encourages Parties to monitor their own waters and inform ship operators when such conditions (e.g. sewage outfalls, tidal conditions, and outbreaks, infestations, or populations of harmful aquatic organisms and pathogens) may exist. It is therefore important that Parties monitor their own waters and effectively inform challenging conditions to ships.

10.1 Additional measures

10.1.1 Regulation C-1 sets out the process for a Party to introduce additional measures that may increase protection of its own waters. These are additional measures beyond the minimum measures required in Section B.

10.1.2 The development and implementation of such measures requires careful consideration. Parties are advised to consider the following as they assess additional measures:

.1 scientific evaluation of the benefits, effectiveness and potential unintended consequences of such additional measures;

.2 practicality of implementing measures that might affect ship operations;

.3 impact of such measures on port logistics; and

.4 method for compliance monitoring and enforcement of such measures.

10.1.3 A Party shall communicate its intention to establish additional measures to the Organization at least six months prior to the projected date of the implementation of the measures. Information is contained in paragraph 3 of Guidelines (G13).

10.1.4 A Party may adopt an additional measure to address an emergency or epidemic situation. In these circumstances the requirement to advise the Organization six months in advance does not apply. However, if such a measure is adopted, the Party should, as soon as possible, notify adjacent and other States that may be affected, the shipping industry in general, and ships operating in areas of concern, and the Organization. Such information should contain:

.1 the precise coordinates of the area;

.2 the need for such additional measures;

.3 a description of the additional measures;

.4 any arrangements that may be provided to facilitate ships' compliance with the additional measures; and

.5 the effective date when the measures apply and when the measure is no longer in effect.

10.2 Warnings concerning ballast water uptake in certain areas and related flag State measures

10.2.1 Regulation C-2 sets out the process for a Party to notify ships of areas within its waters where ballast water should not be taken up, e.g. in order to avoid transporting harmful aquatic organisms and pathogens to other locations. Some warnings might be temporary, while others might need to remain in effect permanently.

10.2.2 A harmful algal bloom is an example where a temporary warning may be required. Such blooms result when sunlight and nutrients encourage the rapid reproduction of algal organisms to very high concentrations. Some blooms result in potentially harmful toxins. Such blooms could have concentrations of organisms that are much higher than BWMS are designed to treat. As a result, a ship taking up ballast water where a harmful algal bloom is occurring, risks transporting that bloom to another location.

10.2.3 A sewage outfall is an example of a location where a permanent warning is appropriate. In such locations, there may regularly occur high levels of pathogens due to high nutrient levels. The result could be either the transport of such pathogens to other locations, or inhibiting the treatment process due to effects such as high levels of dissolved organic carbon.

10.2.4 The Convention provides clear guidance on the process for a Party to introduce and issue such warnings in regulation C-2.

10.3 Practical guidance for ship operators for compliance with regulations C-1 and C-2

10.3.1 Ships must comply with additional measures (regulation C-1) and should observe warnings (regulation C-2) issued by Parties. Such measures and warnings, generally described above, are subject to be issued, changed and expired as needed to provide appropriate protection. As such, ship operators and masters are advised to routinely check through their flag State and other sources, such as the port States where the ship is expected to call.

10.3.2 Guidelines (G13) provide practical guidance in a flowchart (Procedure for introducing additional measures) under regulation C-1 for a Party or Parties to use when determining if measures in addition to those in Section B of the Convention are necessary in order to prevent, reduce or eliminate the transfer of harmful aquatic organisms and pathogens through ships' ballast water and sediments (see figure 3).

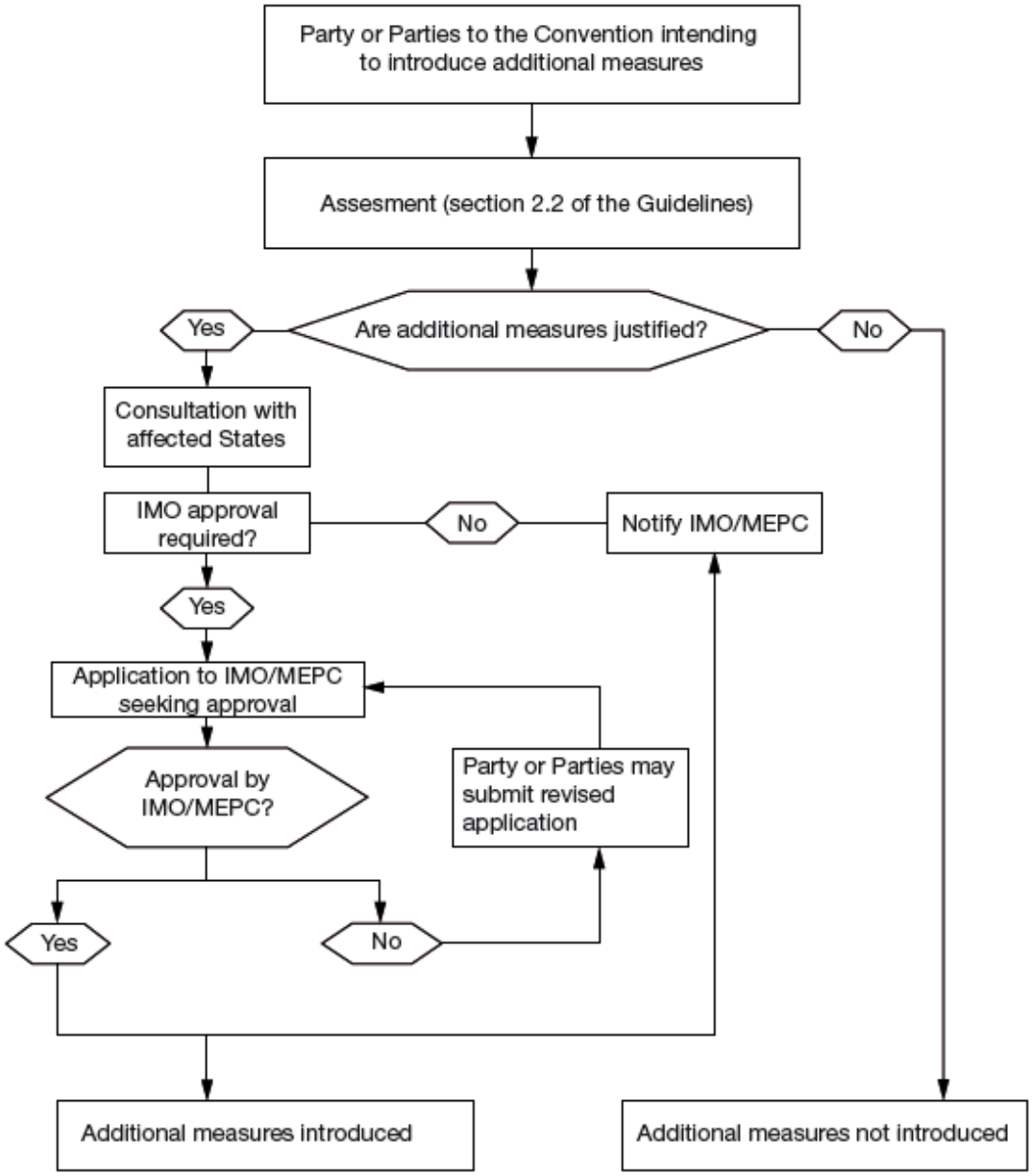

Figure 3: Flow chart – Procedure for introducing additional measures

10.3.3 Crews are advised to familiarize themselves with any requirements for record keeping and reporting associated with any additional measures, as well as any additional water quality discharge requirements (e.g. maximum allowable discharge concentrations of Active Substances, or limitations of marine ballast water discharges to fresh water recipient areas).

CHAPTER 11 – Implementing Section D (Standards for ballast water management)

11.1 BWE standard

11.1.1 The BWE standard is set out in regulation D-1, as follows:

.1 ships performing BWE in accordance with this regulation shall do so with an efficiency of at least 95% volumetric exchange of ballast water; and

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

11.1.2 The conditions under which BWE should take place are discussed in chapters 9 and 17 of this Manual. The BWE procedures are to be included in the BWMP and approved by the flag Administration. Further details regarding BWMPs and ballast water management via the exchange method can be found in the Guidelines (G4) and (G6).

11.1.3 Sampling for compliance verification of BWE can involve checking the ballast water salinity. Additional information regarding sampling and analysis to verify compliance with regulation D-1 can be found in the *Guidance on ballast water sampling and analysis for trial use in according with the BWM Convention and Guidelines* (G2) (BWM.2/Circ.42/Rev.1).

11.1.4 A ship that will operate with BWE should be designed and constructed taking into account considerations set out in the Guidelines (G11) in order to assist compliance with regulation D-1 of the Convention. These Guidelines have been developed to give guidance to shipbuilders, ship designers, owners and operators of ships in designing safe, environmentally acceptable, technically achievable, practicable and cost-effective BWE.

11.2 Ballast water performance standard

11.2.1 Regulation D-2 of the Convention specifies the biological performance standard for ballast water discharge, but does not prescribe the method(s) a ship should use to meet the requirements. The most effective and efficient method to meet the performance standard will vary depending on various factors for each ship. The majority of ships are expected to install an approved BWMS to achieve the performance standard. Therefore, to implement and achieve the ballast water performance standard in regulation D-2, a ship's officer in charge of ballast water management shall follow the appropriate procedures specified in the approved BWMP.

11.2.2 The ballast water performance standards in regulation D-2 are summarized in table 1.

Table 1: Performance standards (regulation D-2)

Organism category	Performance standard
Organisms, size ≥ 50 µm[(a)]	< 10 viable organisms/m^3
Organisms, size ≥ 10 and < 50 µm[(a)]	< 10 viable organisms/mL
Toxicogenic *Vibrio cholerae*	< 1 cfu[(b)]/100 mL
Escherichia coli	< 250 cfu[(b)]/100 mL
Intestinal Enterococci	< 100 cfu[(b)]/100 mL

[(a)] Minimum dimension.

[(b)] cfu: Colony-forming unit.

11.2.3 Information on the approval of BWMS can be found in chapters 13 and 14 of this manual, while information on sampling both for enforcement and for type approval testing can be found in chapter 13. In addition, options available for ships to meet the ballast water performance standard, including ballast water treatment and use of other methods, are discussed in chapter 17.

11.2.4 Should sampling for verification of compliance with regulation D-2 be deemed necessary, additional information can be found in the *Guidance on ballast water sampling and analysis for trial use in according with the BWM Convention and Guidelines* (G2) (BWM.2/Circ.42/Rev.1).

11.3 Approval requirements for BWMS

11.3.1 Regulation D-3 stipulates the basis for BWMS approval and directs Administrations, manufacturers and shipowners to the guidelines and procedures developed for the approval process.

11.3.2 BWMS used in order to comply with the Convention must be approved by the Administration taking into account Guidelines (G8). In addition, BWMS that make use of Active Substances shall be approved by the Organization in accordance with Procedure (G9). Further information on the approval of BWMS can be found in chapters 14 and 15 of this Manual.

11.4 Prototype ballast water treatment technologies

11.4.1 Regulation D-4 contains provisions for the evaluation and testing of promising ballast water treatment technologies. For a ship participating in such a programme approved by the Administration, the ballast water performance standard in regulation D-2 shall not apply until five years from the date on which the ship would otherwise be required to comply or from the date of installation of this technology. Throughout this period, the treatment technology must be operated consistently and as designed.

11.4.2 Details regarding the application of regulation D-4 and a sample statement of compliance for a prototype ballast water treatment technology can be found in Guidelines (G10).

CHAPTER 12 – Implementing Section E (Survey and certification requirements for ballast water management)

Survey and certification guidelines for the purpose of complying with the Convention are provided in the *Interim Survey Guidelines under the Harmonized System of Survey and Certification* (BWM.2/Circ.7), in accordance with regulation E-1 of the Convention. After the Convention enters into force, the interim survey guidelines will be incorporated in the most recent *Survey Guidelines under the Harmonized System of Survey and Certification* (HSSC Guidelines) (at the time of writing resolution A.1053(27), as amended by resolution A.1076(28)). Readers are advised to be familiar with the content of the HSSC Guidelines and keep track of revisions.

12.1 Surveys

12.1.1 Surveys are required for all ships of 400 GT and above, excluding floating platforms, FSUs and FPSOs to which the Convention applies. The Administration shall establish appropriate measures for ships that are not subject to these provisions in order to ensure that appropriate provisions of the Convention are complied with.

12.1.2 Certificates or endorsements are to be issued indicating completion of the survey. Before the ship is put in service an initial survey is required to verify that the BWMP and the ship's structure, equipment, systems, fittings, arrangements and material or processes comply fully with the requirements of the Convention, following which the certificate is issued. Ships are also subject to annual surveys, which must occur within three months before or after each anniversary date. The intermediate survey will take place within three months before or after

the second or third anniversary date, and shall take place on one of the annual surveys as mentioned above. An additional survey, either partial or general, shall be made after any change, replacement or significant repair is made to the system. The survey should ensure that any such change, replacement, or significant repair has been effectively made, so that the ship complies with the requirements of the Convention. All surveys shall be endorsed on the certificate. The certificate must also be renewed at a full renewal survey, at a date specified by the Administration but not exceeding every five years, to verify full compliance (structure, equipment, systems, fittings, arrangements and material or processes) with the applicable requirements of the Convention. These survey requirements are outlined in figure 4.

Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Initial survey*	Annual survey	Annual or intermediate survey	Annual or intermediate survey	Annual survey	Renewal survey

* Before the ship is put in service or before the Certificate is issued for the first time.

Figure 4: Schedule for survey and certification

12.2 Certification

12.2.1 Regulations E-2 to E-5 set out the requirements with regard to the issuance and endorsement of the IBWMC, as well as its form, duration and validity. An outline of the main provisions is given in this section.

Issuance or endorsement of a Certificate

12.2.2 An IBWMC shall be issued, either by the Administration or by any person or organization duly authorized by it, after successful completion of an initial or renewal survey, in accordance with regulation E-1. In every case, the Administration assumes full responsibility for the Certificate. The Certificate shall be endorsed, again either by the Administration or by any person or organization duly authorized by it, after successful completion of an annual or intermediate survey.

12.2.3 A Certificate issued under the authority of a Party shall be accepted by other Parties as having the same validity as a Certificate issued by them. Moreover, at the request of the Administration, a ship may be surveyed and a Certificate issued or endorsed, by or under the authority of another Party. A Certificate so issued shall have the same force and receive the same recognition as a Certificate issued by the Administration.

12.2.4 With respect to ships of non-Parties, Parties shall apply the requirements of the Convention as may be necessary to ensure that no more favourable treatment is given to such ships. An IBWMC cannot be issued to a ship flying the flag of a State which is not a Party. Ships flying the flag of a non-Party may be issued with a statement or certificate of compliance with the Convention.

12.2.5 The full requirements for the issuance or endorsement of a Certificate are set out in regulations E-2 and E-3.

12.2.6 Appendix I to the annex to the Convention contains the form of the Certificate, which is to be followed when drawing up a Certificate. Regulation E-4 sets out the language requirements for the Certificate.

12.2.7 The Organization approved guidance on the issuance of the IBWMC (BWM.2/Circ.40) prior to entry into force of the Convention. It recognizes that it would be impracticable to prepare, review and approve BWMPs and survey and certify all ships of 400 GT and above within the 12-month period between the date when the conditions for entry into force have been satisfied and the actual entry-into-force date of the Convention. In light of this, the guidance sets out a process for issuing certificates prior to entry into force of the Convention.

Duration and validity of the Certificate

12.2.8 A Certificate shall be issued for a period not exceeding five years. When the renewal survey is completed, the new Certificate shall be valid to a date not exceeding five years from the date of expiry of the existing Certificate. Paragraphs 1 to 7 of regulation E-5 set out in detail the provisions regarding the duration and validity of the Certificate and the conditions and circumstances under which the validity may be extended, but in no case for a period longer than three months. Moreover, regulation E-5.8 addresses the case where an annual survey may be completed prior to three months before the anniversary date.

12.2.9 In certain cases a Certificate shall cease to be valid. This is addressed in detail in regulation E-5.9; a summary of such cases is as follows:

.1 if the ship's relevant structure, equipment, systems, fittings, arrangements and material are changed, replaced or significantly repaired and the Certificate is not endorsed;

.2 upon transfer of the ship to the flag of another State;

.3 if the relevant surveys are not completed within the specified periods; or

.4 if the Certificate is not endorsed in accordance with regulation E-1.1.

12.2.10 In addition, according to the procedure in the *Guidance on entry or re-entry of ships into exclusive operation within waters under the jurisdiction of a single Party* (BWM.2/Circ.52/Rev.1), the Certificate of a ship should be withdrawn if the ship enters or re-enters into exclusive operation pursuant to article 3.2 (b)-(d).

12.3 Recognized Organizations

12.3.1 In practice, the term RO may usually be taken to mean a classification society; however, this does not preclude the use of other organizations and the contents of this paragraph would be relevant were any to be considered. The Administration should decide which organizations it will entrust with the authority to act on its behalf for the Convention purposes. These are likely to be the same as those authorized to act under other conventions, but they may be reduced or added to as necessary. Much will depend on the size of the flag fleet, the presence or otherwise of a national classification society which can meet its needs and the classification societies normally used by ships coming onto the State's register. It is essential that ROs are clearly aware of the extent of delegation permitted. The Administration should give guidance in a written agreement stating whether the ROs are to survey to the full requirements of the Convention. Clear instructions should be issued:

.1 laying down the action to be taken in the event of temporary non-compliance with the Convention;

.2 on the interpretation of regulations;

.3 on the issuance of exemptions where this is left to the discretion of the Administration;

.4 on the approval of equipment on behalf of the Administration; and

.5 on the survey of ships not classed, and on the ready provision of information to the Administration when requested.

12.3.2 With these points in mind, an Administration may consider the service an organization is prepared and able to provide.

12.3.3 The general criteria to be met by ROs acting on behalf of a maritime Administration should include the following:

.1 the RO should have sufficient experience and skill in performing technical surveys;

.2 the RO should be represented in all regions where the ships flying the flag of the Administration operate, which requires a minimum number of personnel; and

.3 the RO should be able to fulfil a continuing quality-assurance programme.

12.3.4 MEPC 65 adopted the *Code for Recognized Organizations (RO Code)* (resolution MEPC.237(65)), which took effect on 1 January 2015. Although the RO Code does not apply directly to the BWM Convention, it provides useful information on establishing a relationship with an RO to act on behalf of a flag State in connection with statutory certification and other services, as well as guidelines for flag State oversight.

CHAPTER 13 – Ballast water sampling

To assess whether a ship is in compliance with the BWE standard (regulation D-1) or the ballast water performance standard (regulation D-2) of the Convention, samples may need to be taken and analysed.

Ballast water samples taken will need to be representative of the physical nature (related to regulations D-1 and D-2) and/or the viable organism concentration (related to regulation D-2) of the whole of the ballast water discharge. Ballast water may be many thousands of cubic metres in volume held in several different and often complex shaped tanks. In addition, water and the organisms in it may not be homogeneously distributed in a ballast water tank. Sampling needs to be executed in a way that minimizes the impact on the number of viable organisms present in the water.

To achieve consistency in on board compliance testing of ballast water, uniform protocols for sampling and analysis of ballast water are essential. BWM.2/Circ.42/Rev.1 gives guidance on ballast water sampling and analysis in accordance with the Convention and Guidelines (G2). The purpose of this guidance is to provide general recommendations on methodologies and approaches to sampling and analysis to test for compliance with the standards described in regulations D-1 and D-2, especially during the trial period until methods are agreed upon.

There are two different occasions where the sampling for the ballast water performance standard (regulation D-2) is employed:

.1 sampling for type approval testing of BWMS (BWMS) (land-based and shipboard tests); and

.2 sampling for compliance.

13.1 Sampling for type approval testing of BWMS (land-based and shipboard tests)

13.1.1 Sampling and analysis of ballast water in accordance with Guidelines (G8) is undertaken as part of the type approval process for BWMS during both shipboard and land-based test cycles. Sampling for type approval is generally discharge or uptake sampling rather than in-tank sampling.

13.1.2 Shipboard test cycles are undertaken on an installed BWMS during normal ship ballasting operations. Land-based testing is undertaken under controlled conditions at an approved testing facility. Results are measured against the ballast water performance standard (regulation D-2) and also compared to intake levels for the organisms, which must meet required challenge conditions for a valid test. Validated methods for sample collection, handling, storage and analysis should be used. Sampling for the type approval process should meet the criteria set out in Guidelines (G8) for sample sizes and replication.

13.2 Sampling for compliance

13.2.1 Sampling ballast water for compliance on ships in accordance with Guidelines (G2) may be undertaken for two reasons:

.1 to evaluate levels of viable organisms in ballast water during discharge and/or in ballast tanks; and

.2 to evaluate the physical characteristics of the water (e.g. salinity) during discharge and/or in ballast tanks.

13.2.2 Main aspects of sampling and analysis

13.2.2.1 BWM.2/Circ.42/Rev.1 provides general recommendations on methodologies and approaches for ballast water sampling and sample analysis to test for compliance with the standards described in regulations D-1 and D-2 of the Convention.

13.2.2.2 Sampling and analysis for compliance testing is a complex issue. According to Guidelines (G2), testing for compliance can be performed in two steps. As a first step, prior to a detailed analysis for compliance, an indicative analysis of ballast water discharge may be undertaken to establish whether a ship is potentially in compliance with the Convention.

13.2.2.3 When testing for compliance, the sampling protocol used should result in a representative sample of the whole discharge of the ballast water from any single tank or any combination of tanks being discharged. Representative sampling reflects the relative concentrations and composition of the populations (organisms and/or chemicals) in the volume of interest. Samples should be taken in accordance with the annex, part 1 and/or part 2 of Guidelines (G2).

13.2.2.4 There are four options to address ballast water sampling and sample analysis. Ships' ballast water may be sampled indicatively and in detail. Also, the samples taken may be analysed indicatively and in detail. The indicative options are more likely to be used to confirm gross exceedance of the D-2 standard, whereas the detailed options are more likely to be used to confirm compliance (see table 2).

Table 2: Options of ballast water sampling and analysis of samples

	Sampling	Analysis of a sample
Indicative	A small proportion of the volume of interest can be used to indicate or confirm gross exceedance of the D-2 standard. A larger proportion of the volume of interest may be sampled if required.	An indicative analysis of a ballast water sample means a compliance test that is a relatively quick indirect or direct measurement of a representative sample of the ballast water volume of interest.
Detailed	A large proportion of the volume of interest can be used to indicate and confirm compliance. A smaller proportion of the volume of interest may be sampled if required. Two different potential detailed sampling approaches can therefore be considered: (1) sampling the entire discharge from a vessel during a port visit; (2) collecting a representative sample of the ballast water being discharged during some chosen period of time, e.g. one sample or a sequence of samples.	A detailed analysis of a ballast water sample means a compliance test that is likely to be more complex than indicative analysis and is a direct measurement of a representative sample used to determine the viable organism concentration of a ballast water volume of interest.

13.2.3 Sampling locations

13.2.3.1 Sampling of ballast water may be performed at various locations on board a ship depending on the purpose. Sampling may be undertaken either from the ballast water tanks (via manholes, through sounding pipes, or through air pipes) or directly from the discharge line. In-tank sampling via manholes, sounding and air pipes should only be used in cases where BWE (regulation D-1) is monitored or for regulation D-2 when the treatment of the ballast water is executed during the uptake or in-tank during holding times. In-tank sampling for regulation D-2 must not be performed when ballast water treatment is undertaken or completed on discharge.

13.2.3.2 Obtaining a representative sample directly from a ballast tank when they vary so much in size, shape, complexity and position is challenging. Sampling from a number of different locations, both spatially and with depth and also from different tanks, should be considered. Two or more samples are preferred to single or composite samples. Detailed sampling and analysis for regulation D-2 from manholes, sounding pipes or air pipes is not recommended as it is challenging to obtain sufficient sample sizes and does not give accurate results.

13.2.3.3 The sampling of discharged ballast water, generally to verify compliance with regulation D-2 or for type approval testing of BWMS, should be done via the ballast water discharge pipe as close to the discharge point as possible. Guidelines (G8) require BWMS to have sampling points arranged in order to collect representative samples of the ship's ballast water. Guidelines (G2) recommend that sampling points should have an isokinetic pipe and valve system that allows the taking of a representative sample of ballast water from within the discharge pipe. It is recommended that the position of the sampling point be established using methods such as computational fluid dynamics.

13.2.3.4 Sampling for compliance with the BWE standard (regulation D-1) is a forensic process (i.e. it requires knowledge of source water parameters and comparison with measured parameters) that can be done in-tank or via a discharge sample point. However, it is most likely to be done in-tank prior to the discharge of ballast water.

13.2.4 Experience building phase and trial period for sampling and analysis

13.2.4.1 Ballast water sampling and analysis is still evolving and, as a result, has in some cases not been adequately validated for PSC use. Consequently, the required sampling and analysis methods are not yet integrated into PSC procedures and therefore their use in determining compliance with the Convention cannot yet be assessed.

13.2.4.2 MEPC 65 agreed in principle with recommendations related to a trial period as set out in annex 6 to document BLG 17/18 in order to trial and validate ballast water sampling approaches. The trial period could extend to three years or more as appropriate following entry into force. The results of the trial will be monitored and reviewed by the MEPC and, when appropriate, the trial will be halted or extended. The goal at the end of the trial period will be to have a suite of accepted procedures that can be used for sampling and analysing ballast water in a globally consistent way.

13.2.4.3 The *Guidance for sampling and analysis for trial use in accordance with the BWM Convention and Guidelines* (G2) (BWM.2/Circ.42/Rev.1) provides that port States should refrain from applying criminal sanctions or detaining a ship based on sampling during the trial period agreed by the Organization. This does not prevent the port State from taking preventive measures to protect its environment, human health, property or resources. The port State will retain its right to exercise enforcement jurisdiction, including sanctions and detaining ships, during the trial period if an alleged violation is proven by means other than sampling and analysis.

CHAPTER 14 – Approval of ballast water management systems (Guidelines (G8))

14.1 Regulation D-3 sets out the approval requirements for BWMS. All BWMS used to comply with the Convention must be approved by the Administration of the ship, taking into account guidelines developed by the Organization. In addition, BWMS that make use of Active Substances require the additional approval of the MEPC (see chapter 15).

14.2 MEPC 70 adopted the 2016 Guidelines (G8), aimed primarily at Administrations, or their designated bodies, in order to assess whether BWMS meet the standard described in regulation D-2 of the Convention and the approval of a system is intended to screen-out BWMS that would fail to meet the standard. Approval of a system, however, does not ensure that a given system will work on all ships or in all situations. To satisfy the Convention, a discharge must comply with the D-2 standard throughout the life of the ship.

14.3 BWMS installed on ships on or after 28 October 2020 should be approved taking into account the 2016 Guidelines (G8), while BWMS installed on board ships prior to that date should be approved taking into account either the previous Guidelines (G8) (resolution MEPC.174(58)), but preferably the 2016 Guidelines (G8). Administrations should apply the 2016 Guidelines (G8) not later than 28 October 2018 when approving BWMS, but they are encouraged to start doing so as soon as possible.

14.4 The Convention requires that BWMS used to comply the requirements must be safe in terms of the ship, its equipment and the crew. In addition, the Guidelines (G8) contain a number of technical specifications that BWMS should meet in order to obtain type approval. These include general principles that BWMS should be effective in meeting the D-2 standard and safe for the environment when used during short and long voyages, e.g. regardless of temperature. In addition, the design of BWMS should account for the fact that, regardless of the BWMS technology employed, viable organisms remaining after treatment may reproduce in the interval between treatment and discharge. The technical specifications also address matters such as the robustness of design and construction, safety considerations and the need

for risk mitigation measures with respect to any substances of a dangerous nature, maintenance arrangements, calibration, and the provision of control and monitoring arrangements, including a self-monitoring system to verify correct operation of the system.

14.5 In order to receive type approval, the manufacturer of the BWMS submits information to the type-approving Administration regarding the design, construction, operation and functioning of the BWMS. Following a readiness evaluation by the Administration, the BWMS undergoes tests in accordance with procedures described in Guidelines (G8), with specified challenge conditions (i.e. salinity, organic carbon, suspended solids and number of organisms). These tests include trials of the BWMS at a land-based test facility (where conditions are controlled), shipboard testing (to reflect actual use by ship crews during or after the voyage), environmental testing (to demonstrate the robustness of the equipment), a temperature assessment (to confirm operation at very warm and cold temperatures), and an evaluation of regrowth. During each test, the composition of the treated ballast water (analysed according to sampling and analysis procedures set out in the Guidelines (G8)) is compared to the performance standard described in regulation D-2. Successful fulfilment of the requirements and procedures outlined in the Guidelines (G8) leads to the issuance of a Type Approval Certificate by the Administration.

14.6 In addition to the standard tests identified within Guidelines (G8), the BWMS manufacturer separately identifies the key water quality and operational parameters (known as System Design Limitations (SDL)) that may affect the operation of the BWMS, and makes a claim about the values of these parameters for which the BWMS is designed to operate correctly to meet the D-2 standard. The Administration validates these claims, and then reports them on the Type Approval Certificate for information only. Because BWMS manufacturers may include a margin of error in making claims, this information should not necessarily be interpreted as the exact parameter values beyond which the BWMS is incapable of operation.

14.7 Following type approval, the type approving Administration submits a report to the Organization that includes the results of all tests and evaluations set out in Guidelines (G8). This report is made public by the Organization to provide transparency on the type approval process.

14.8 As noted, BWMS used to comply with the Convention must be approved by the Administration, taking into account Guidelines (G8). This approval may be conveyed on a Type Approval Certificate (which may be based on testing already carried out under supervision by another Administration) and/or issuance of the IBWMC.

CHAPTER 15 – Approval of ballast water management systems using Active Substances (Procedure G9)

15.1 Overview of the *Procedure for approval of ballast water management systems that make use of Active Substances (G9)*

15.1.1 The principles of the approval process are based upon regulations D-3 and D-5 which provide that BWMS should be safe for the ship, its equipment and the crew. As the technologies should not cause more environmental impact than they solve, these systems must also meet the standards of environmental acceptability. For this reason, it is required that BWMS that make use of Active Substances undergo a separate approval procedure additional to that of Guidelines (G8), as described in Procedure (G9) and the associated Methodology for the conduct of work. Procedure (G9) describes not only the technical aspects but also the role and duties of all stakeholders in the process, including manufacturers, Administrations and the Organization.

15.1.2 In support of the evaluation process a special expert group was established to advise the MEPC on the approval of such systems, namely the Ballast Water Working Group of the Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP-BWWG). GESAMP-BWWG, established in November 2005, reviews all proposals submitted to the Organization for approval of BWMS that make use of Active Substances and reports to the MEPC on whether such proposals present unreasonable risk to the environment, human health, property or resources in accordance with the criteria specified in Procedure (G9). The Group evaluates the appropriateness of the operation or design in order to prevent any unreasonable risks mentioned above caused by the use of a BWMS. However, the Group does not evaluate the biological efficacy of BWMS in accordance with Guidelines (G8). GESAMP-BWWG has also developed a *Methodology for information gathering and conduct of work of the GESAMP-BWWG* (BWM.2/Circ.13, as revised).

15.1.3 Regular updates of information on obtained Basic and Final Approvals are made in accordance with section 8.3 of Procedure (G9). The technical requirements have been revised based on experience with the approval process.

15.2 Applicability

Procedure (G9) applies to the approval of BWMS that make use of Active Substances to comply with the Convention in accordance with regulation D-3.

15.3 Definitions

Active Substances are defined by the Convention as "substances or organisms, including a virus or a fungus that have a general or specific action on or against harmful aquatic organisms and pathogens". Procedure (G9), section 2, should be referred to for additional definitions.

15.4 Procedures for approval and certification

15.4.1 Manufacturers are required to submit information on their technology in a proposal dossier to a national Administration. Administrations should check the quality and completeness in the dossiers against the applicable version of the Methodology (see paragraph 15.1.2) before the official submission of the application for Basic or Final Approval to the Organization. Eventually, approval may be granted by the MEPC based on the independent advice provided by GESAMP-BWWG.

15.4.2 In the process of GESAMP-BWWG reviewing the dossiers submitted by Administrations and reporting its findings to the Organization, they may request additional data from Administrations. The approval scheme is two-staged: Basic Approval has to be granted first, followed by Final Approval. The Group will report its evaluation of the BWMS to the MEPC. In connection with the submission of the application for approval, a fee is paid to the Organization to cover the costs incurred in respect of the scientific services provided by the Group.

15.4.3 The approval scheme for Active Substances or Preparations and BWMS that make use of Active Substances is detailed in figure 5.

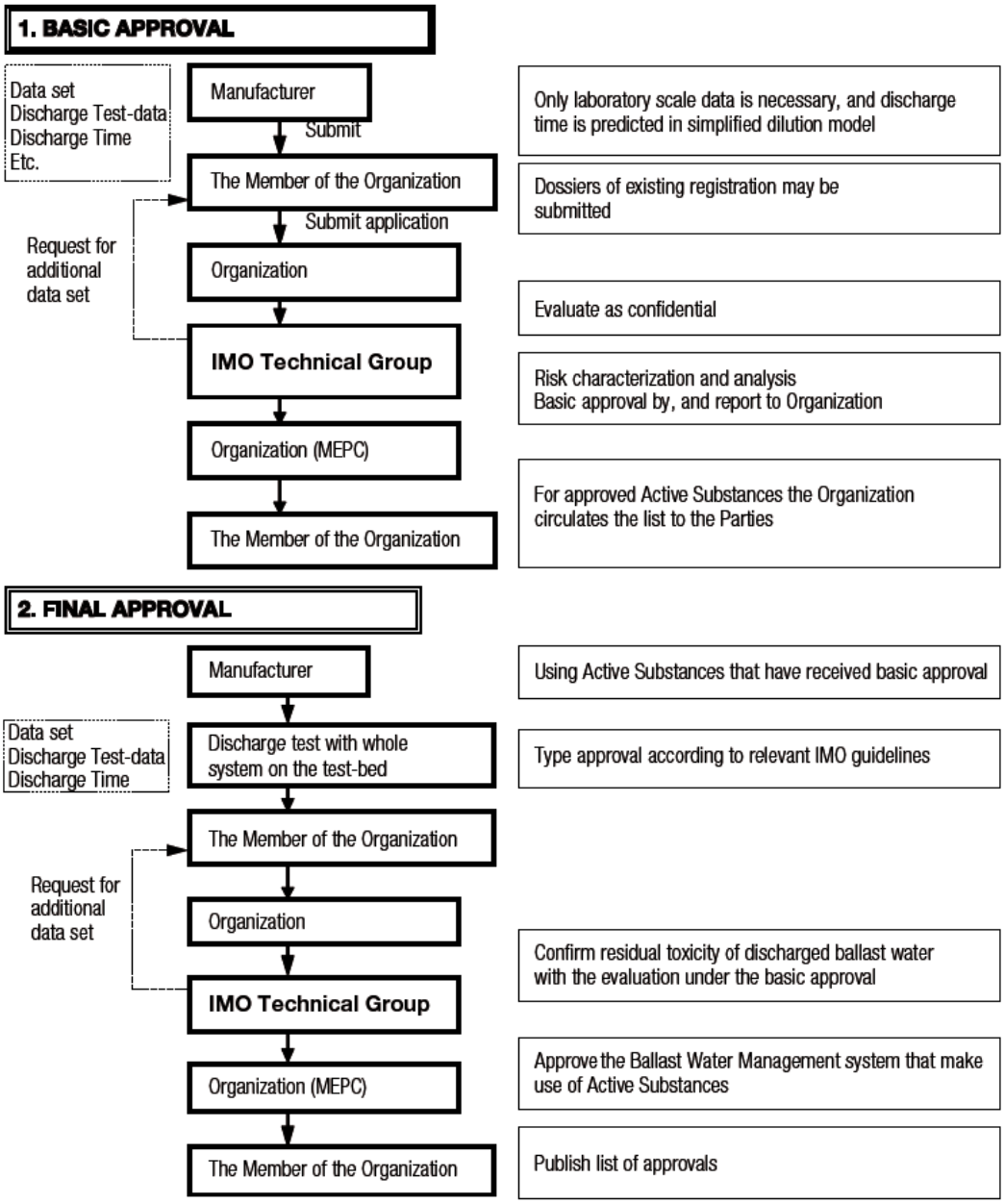

Figure 5: Approval scheme for Active Substances or Preparations and BWMS that make use of Active Substances

15.4.4 Additionally, in paragraph 8.2.1, Procedure (G9) allows that BWMS, which have already been granted Basic Approval, may be used for evaluation of multiple BWMS for Final Approval. The detailed framework of the use can be found in the *Framework for determining when a Basic Approval granted to one ballast water management system may be applied to another system that uses the same Active Substance or Preparation* (BWM.2/Circ.27).

15.5 Summary of Procedure (G9) requirements

15.5.1 Equipment manufacturers should include in their dossiers a chemical identification of chemical compounds, including Active Substances, Preparations and any other Relevant Chemicals, even those generated on board. For BWMS that make use of

Active Substances, for example BWMS using sodium hypochlorite solution, electrolysis, and/or ozonation, special attention is drawn to the formation of disinfection by-products (DBPs) due to possible effects on the environment and human health. The description of chemical compounds should include a dataset which includes physical and chemical properties, mammalian toxicity, environmental fate and effects. Following production of this information, a risk characterization should be described that is based upon information on persistency, bioaccumulation and toxicity (PBT) and specified testing on toxicity of the treated ballast water. The evaluation includes criteria on both human safety and environmental protection.

15.5.2 The requirements for Basic Approval are more general, as theoretical studies, literature data and small-scale testing can fulfil the data and information requirements. For Basic Approval, GESAMP-BWWG reviews the comprehensive proposal, along with any additional data submitted, as well as other relevant information available to the Group, and reports to the Organization.

15.5.3 For Final Approval, more detailed tests and full assessments are required, based on full-scale testing of the BWMS. The application for Final Approval should include tests performed as part of the land-based type approval process using the treated ballast water discharge and must specifically address any concerns identified and recommendations made during the consideration for Basic Approval. Results are based on tests under type approval testing under Guidelines (G8), e.g. full-scale testing. The Final Approval dossier should also confirm the evaluation carried out during Basic Approval of the risks to the ship and personnel, including consideration of the storage, handling and application of the Active Substance (also refer to BWM.2/Circ.20).

15.6 Quality assurance and quality control procedures

The testing body should implement a quality control program during testing in accordance with the recognized international standards that are acceptable to the Administration. In summary, the quality control program should consist of the following:

.1 Quality Management Plan (QMP) that addresses the quality management structure and policies of the testing body; and

.2 Quality Assurance Project Plan (QAPP) which is a project-specific technical document pertaining to the BWMS being tested, the test facility, and other testing implementation details.

15.7 Technical specifications

15.7.1 In Procedure (G9), sections 4 to 7 describe the technical requirements, while more detailed guidance on technical requirements is found in the *Methodology for information gathering and conduct of work of the GESAMP-BWWG* (BWM.2/Circ.13/Rev.3). The Methodology gives thorough guidance on all aspects needed for a complete dataset. The required data contain detailed physical and chemical properties of the Active Substance or Preparation. This includes reactivity towards materials, vapour pressure, and melting and boiling points; as well as data on effects on aquatic plants, invertebrates and fish and other biota. This in turn includes acute and chronic toxicity, endocrine disruption and carcinogenic and mutagenic effects. It should be noted that for certain substances their specific effects on sediment organisms or the bio-magnification, persistence in the food web and potential effects need to be described.

15.7.2 The Methodology additionally outlines the mammalian toxicity data that should be submitted for approval. In summary, the topics include acute toxicity, effects on skin and eye, repeated-dose toxicity, chronic toxicity, developmental and reproductive toxicity, carcinogenicity, mutagenicity/genotoxicity and toxicokinetics.

15.7.3 For compounds that are commonly described in ballast water treatment, data is gathered in a database held by the Organization, available through GISIS. For compounds identified in the database, no other data needs to be added in the proposal, unless it is scientifically justified.

15.7.4 Using these data, a risk characterization is conducted by including a hazard identification. Other elements are dose (what concentrations are expected) and exposure (what is the intensity, frequency and exposure to an agent). All information leads to risk characterization (how does the data lead to a quantification of risks).

15.7.5 Based upon information on persistency, bioaccumulation and toxicity (PBT), the risk for environmental effects is characterized in combination with actual testing on the toxicity of treated ballast water. Environmental concentrations at receiving water would be calculated with the Marine Antifoulant Model for PEC calculation for Ballast Water (MAMPEC-BW 3.0), using the dataset and measurements from the testing. The resulting environmental concentrations are compared to safety thresholds, e.g. predicted no effect concentrations (PNEC). Human exposure scenario (HES) models were developed to compare the exposure to human based thresholds, e.g. Derived No-effect Levels (DNEL) and/or Derived Minimal Effect Levels (DMEL).

15.7.6 As mentioned in section 14.5 above, the requirements for Basic Approval are more general and the data may be derived from theoretical studies, literature data and may include small-scale testing to fulfil data requirements. For Final Approval, toxicity testing is specified in detail and should be derived in combination with ballast water management system efficacy testing for Guidelines (G8) type approval. Following the risk assessment, several risk mitigation or risk management options may be included. For example, specific requirements exist on the methods to monitor the Maximum Allowable Discharge Concentration (MADC) of Active Substances.

15.8 Typical documentation requirements for the approval process

For a submission to the Organization, all data reports and references are included in the actual dossier. For example, this includes full test reports from chemical and toxicological laboratories, data sources and technical information on systems (refer to BWM.2/Circ.37).

15.9 Appendix to Procedure (G9)

The appendix provides Administrations with an approval scheme for BWMS that make use of Active Substances, outlining the Basic and Final Approval process (see figure 5 above).

CHAPTER 16 – Duties of shipowners

16.1 Duties and obligations

16.1.1 The shipowner's and operator's duties and obligations under the Convention include ensuring that ships have the ability at all times to be compliant with the requirements set up in the Convention by implementing a BWMP. These include, but are not limited to, meeting the applicable BWE or performance standards (regulations D-1 or D-2, respectively) and undertaking sediment management, if sediments are to be discharged.

16.1.2 Alternatively, if exceptions or exemptions have been granted to the ship (refer to sections 8.3 and 8.4 of this manual), the shipowner and operator must ensure that they are properly documented and entered into the BWRB. It is to be noted that exceptions are situation specific, hence record keeping and communication is the only way of demonstrating compliance. In contrast, exemptions are required to be granted by the Administration prior to the intended voyage(s).

16.1.3 In order to ensure a proper implementation of the BWMP, an officer on board must be designated in a timely manner and provided with necessary training.

16.1.4 All ships to which the Convention applies must have on board the following:

.1 a ship-specific BWMP approved by the Administration;

.2 a valid IBWMC, if the ship is of 400 GT and above; and

.3 a BWRB.

16.1.5 If the ship has a BWMS, it must be approved in accordance with Guidelines (G8) and, if applicable, Procedure (G9).

16.2 Complying with the Convention

In order to comply with the Convention, the shipowner and operator must ensure that:

.1 all shipboard ballast operations are safely executed in accordance with one of the available options available under the Convention, e.g. in compliance with regulation D-1 or D-2, as applicable; by application of any other approved methods (regulation B-3.7); by participation in a programme approved by the Administration to test and evaluate prototype technologies (regulation D-4); or in accordance with any exception or exemption granted under the Convention (regulations A-3 and A-4);

.2 the on-board BWMS, if applicable, is fitted with sampling points located in suitable and accessible areas;

.3 a competent officer is assigned for ballast water management and the officer and crew are trained in order to carry out their respective ballast water management duties;

.4 all ballast water and sediment operations are carried out in accordance with the ship's BWMP with due regard to the safety of the ship, its cargo and crew;

.5 the BWMS, if installed, is operated and maintained in accordance with the manufacturer's instructions and provided with sufficient spares and consumables, as required;

.6 the BWRB is correctly maintained and kept up to date at all times; and

.7 the BWRB entries shall be maintained on board the ship for a minimum period of two years after the last entry has been made and thereafter in the Company's control for a minimum period of three years.

16.3 Training of the crew

16.3.1 Shipowners must ensure, in accordance with regulation B-6 (Duties of officers and crew), that the officers and crew are properly trained and competent to carry out their assigned ballast water management duties and functions.

16.3.2 The training of the crew may include, but not be limited to, the following:

.1 introduction to ballast water management;

.2 familiarization with the ship's BWMP and assigned duties;

.3 emergency procedures, including exposure to chemicals, if used;

.4 operation and maintenance of the ship's BWMS, if fitted; and

.5 making entries and record keeping in the ship's BWRB.

16.3.3 Officers and crew involved in the shipboard ballast operations and the operation and maintenance of the BWMS have to be competent in their specific assigned duties.

16.3.4 Ideally the training and familiarisation for the Convention and associated tasks should be included in the Company's Safety Management System (SMS). The detailed framework for managing the risks incurred by the use of chemicals (i.e. Active Substances and Preparations) can be found in BWM.2/Circ.27.

CHAPTER 17 – Ballast water management options available for ships

The Convention defines two ballast water management standards:

.1 regulation D-1 specifies the BWE standard; and

.2 regulation D-2 specifies the ballast water performance standard.

17.1 Ballast water exchange

17.1.1 BWE aims at reducing the number and viability of organisms discharged at ports and in coastal waters following transportation in ballast tanks. BWE has to meet the BWE standard as per regulation D-1 described in chapter 10.

17.1.2 Three methods of BWE are detailed in Guidelines (G6):

.1 sequential method – a ballast tank is first emptied and then refilled with replacement ballast water to achieve at least a 95% volumetric exchange;

.2 flow-through method – replacement ballast water is pumped into a ballast tank allowing water to flow through overflow or other arrangements. At least three times the tank volume of each tank shall be considered to meet the standard; and

.3 dilution method – replacement ballast water is filled (pumped) through the top of the ballast tank with simultaneous discharge from the bottom at the same flow rate and maintaining a constant level in the tank throughout the ballast exchange operation. At least three times the tank volume is to be pumped through the tank.

17.1.3 The designation of areas for BWE is discussed in chapter 8 of this Manual.

17.2 Ballast water treatment

17.2.1 Once subject to it, pursuant to regulation B-3, a ship shall be required to meet the performance standard of regulation D-2. The most common approach is the installation of a shipboard BWMS.

17.2.2 There are different BWMS available and in development. Generally these technologies can be categorized into three types based on their primary mechanism: mechanical, physical and chemical.

17.2.1 Mechanical treatment

17.2.1.1 Mechanical treatment can be done, for example, by filtration, cyclonic separation and electro-mechanical separation. Mechanical treatment is generally only done at intake and is not influenced by the length of the voyage.

17.2.1.2 Screen and disk filters can be used at ballast water intake to reduce sediment and organisms. Mesh sizes of these filter screens vary and the smaller the mesh size the more will be filtered prior to intake. Filters with a mesh size of 50 µm or less are commonly applied in BWMS to contribute to achieving the standard described in regulation D-2.

17.2.1.3 Most filters are self-cleaning with back flushing cycles. Waste water from the back flush is discharged directly overboard. Together with the resistance of the filter this self-cleaning procedure will form pressure drops and affect the flow rate negatively.

17.2.1.4 Cyclonic separation uses centrifugal forces to separate solid particles from water. However, this is only possible with particles having a specific gravity higher than that of water. Electro-mechanical separation works with a flocculent injection that attaches to the sediment and organisms. Solid particles are then removed by filtration and magnetic separation.

17.2.1.5 Mechanical treatment is often used in conjunction with physical and/or chemical treatment methods (see below).

17.2.2 Physical treatment

17.2.2.1 Physical treatment can be done, for example, by ultraviolet irradiation (UV), de-oxygenation, cavitation and ultrasound.

17.2.2.2 UV is used to eliminate or damage organisms (phytoplankton, zooplankton, human pathogens and bacteria) to such extent that they are not able to reproduce. The effectiveness is dependent on the turbidity and the transmittance rate in water. Most BWMS that use UV irradiation combine it with prior mechanical treatment. Often UV treatment is performed at intake and discharge of ballast water.

17.2.2.3 Removing dissolved oxygen in the ballast water is called de-oxygenation and affects aerobic organisms (i.e. those that require oxygen). Oxygen is replaced by inert gases (often nitrogen). Although de-oxygenation can be positive in order to prevent corrosion, it is important to use inert gas, which does not react chemically, to avoid any oxidative or hydrolytic effects. De-oxygenation may require a longer tank holding time, which should be considered when having a fleet employed on short voyages.

17.2.2.4 In the shipping industry, cavitation normally negatively affects materials and should be prevented. However, if controlled, the cavitation method can be used in order to damage membranes of organisms, ensuring that they are not able to reproduce when discharged into the environment. Care should be taken to protect against the possible effects of hydrodynamic forces and ultrasonic oscillations on materials and the environment, including humans. This treatment can be applied on long and short voyages and is often combined with another physical treatment method.

17.2.3 Chemical treatment

17.2.3.1 Ballast water can be chemically treated by administering chemicals (Active Substances) or Preparations, or by producing Active Substances on board (see chapter 14 for more information). Care should be taken when using disinfectant Active Substances; they can kill living organisms in the water but also affect humans. Commonly used Active Substances are sodium hypochlorite, ozone and hydrogen peroxide, which are expressed as TRO. Sodium hypochlorite can also be generated on board by using an electrolytic cell and having enough salinity in the ballast water. Active Substances should be depleted or be neutralized before discharging into the environment. The MADC of the concentrations of the Active Substances and neutralizing agents, if any, are to be listed in the Type Approval Certificate of the BWMS.

17.2.3.2 Classification societies normally impose strict installation guidelines in cases of BWMS that make use of chemical treatment and/or could emit dangerous gases/liquids.

17.2.4 Combinations of treatment techniques

Treatment technologies can be combined and differ in rate of application, holding time, power consumption and effects on other ship equipment or structures. A combination of different treatments can reduce the limitations of an individual technology. Therefore, many BWMSs use a combination of two or more technologies, e.g. filtration combined with UV, filtration combined with chemical injection/ electro-chlorination, etc.

17.3 Discharge to a reception facility

17.3.1 The Organization has developed Guidelines (G5) addressing the issue. The availability of ballast water reception facilities in ports to receive, process and redistribute ballast water is an important tool in implementing the Convention. Shore facilities would be responsible for and capable of managing the ballast water to meet the required standards. Discharging to a shore facility could also facilitate sediment management under the Convention. Many ports lack the necessary infrastructure to accommodate the intake or supply of ballast water to and from the ship. A floating reception facility (e.g. BWTBoat) is a ballast water reception facility as described in regulation B-3.6 and Guidelines (G5) and does not need approval in accordance with regulation B-3.7 to receive ballast water.

17.3.2 Ballasting and deballasting activities are running in parallel with the ships' loading and unloading operations. Any disturbance in the flow of ballast water will immediately affect these operations. Finally, the flow in ballast water is not in an equilibrium for each port or region, which implies a net in- or outflow to/from certain regions in the world. Nevertheless, for certain areas or ports shore facilities could be a feasible option, in particular in environmentally sensitive areas.

17.3.3 There are other factors such as engineering, operational and logistics affecting the feasibility of using a shore facility or a floating facility. The above issues must be carefully considered before proceeding, along with paying due attention to the differences in regulatory considerations.

17.4 Other methods

Other methods of ballast water management may also be accepted, provided that such methods ensure at least the same level of protection to the environment, human health, property or resources and are approved in principle by the MEPC. The Organization has developed guidance with regard to the criteria to be used for such evaluations, which can be found in the *Procedure for approving other methods of ballast water management in accordance with regulation B-3.7 of the BWM Convention* (resolution MEPC.206(62)).

17.5 Application of the Convention to offshore support vessels

17.5.1 The Organization has agreed on common procedures for application of the Convention to OSVs as set out in BWM.2/Circ.44. Operationally, these vessels differ from the operational models associated with deep-sea trading ships by being designed to operate in near-coastal waters characterized by carrying materials to facilities and vessels working in offshore energy fields.

17.5.2 The purpose of these procedures is to provide options available for complying with the requirements of the Convention.

17.6 Application of the Convention to mobile offshore units

17.6.1 The Organization has agreed on common procedures for application of the Convention to mobile offshore units as set out in BWM.2/Circ.46. The procedures are divided into operations at the location of operation and during transit to other areas.

17.6.2 BWM.2/Circ.52/Rev.1 provides guidance on entry or re-entry into exclusive operation pursuant to articles 3.2(b)-(d), which will assist Administrations with respect to situations including ships (e.g. mobile offshore units) that may be assigned to extended operations in waters under the jurisdiction of a single Party following an international voyage or voyages. This Guidance sets out a process for ceasing application of the Convention to a ship in such circumstances.

17.7 Application of the Convention to hopper dredgers

The Organization has agreed on the applicability of the Convention to hopper dredgers as set out in BWM.2/Circ.32. Hoppers are not considered to be ballast tanks because the hopper wall forms part of the ship's hull, therefore water in the hopper is considered as outboard water.

PART V: TECHNICAL ASPECTS OF ENFORCEMENT

CHAPTER 18 – Non-compliance detection and response

After entry into force of the Convention, there will be two standards enforced for ships depending on the applicability regime. Detection of non-compliance will be based on the applicable exchange or performance standards (regulation D-1 or D-2, respectively) and the method of achieving the respective standards.

Non-compliance with regulation D-1 (BWE standard) may be difficult to detect without conducting a salinity check of the discharge sample. If some other method (regulation B-3.7) is used by a ship then the detection may not be possible without discharge sample analysis. However, such other methods may entail key performance indicators that provide a fair assessment of possible compliance.

The technological advancements in the field of detection and monitoring pave the way for indicative analysis of ballast water discharges. These direct or indirect monitoring tools may be useful in identifying gross exceedance of the D-2 standards.

18.1 Detection

A BWMS approved in accordance with Guidelines (G8) will include a continuous self-monitoring function during the period in which the BWMS is in operation that should record the proper functioning or failure of the BWMS. When risk of non-compliance is envisaged,

the ballast water may not be safe to discharge and the port of call should be notified. Prevention should always be the first aim. If the situation is beyond the stage of prevention then contingency planning becomes an actual need. Such contingency measures are to be identified and included in the approved BWMP. Further guidance can be found in Guidelines (G4).

18.2 Response – contingency measures

18.2.1 Contingency measures to meet the challenges of either polluted (with residual Active Substances) or not at all (or not adequately) disinfected ballast water are best placed on shore and preferably in the port of call.

18.2.2 The Organization's guidance for emergency situations (BWM.2/Circ.17), although specifically targeted at a risk of release of harmful organisms and pathogens, nevertheless contains several items that also apply for pollution. An emergency response should take into account the nature of the pollution (what chemicals and/or contaminants and at which expected quantities), the natural characteristics of the area of release and the contingency capacity of the country or region likely to be affected. In order to minimize damage and to enable rapid normalization of the operation of ports and ships, industry cooperation will be needed at the time of the emergency. Although this is perceived as a rather complex operation, in practice, such measures are likely to be simple and may only be identifiable for situations where ballast water discharges from certain ships need to be prevented.

18.2.3 If polluted, contaminated or ineffectively treated ballast water is accidentally or intentionally released, then ways to mitigate the damage have to be identified. Again the characteristics of the contamination and of the area(s) affected are crucial, together with knowledge of the contingency preparedness in the area. A risk assessment may be needed. It is also needed to notify all stakeholders of an emergency situation; according to BWM.2/Circ.17, this should be the responsibility of an appointed (lead) agency overseeing the emergency situation and procedures.

18.2.4 As to mitigation measures, much can be learnt from pollution response knowledge from other sources of pollution in dissolved form, such as dissolved chemicals. It is unlikely that pollution resulting from ballast water operations will be in solid or oily form; hence techniques to contain such sources of pollution (such as booms around the spill or discharge) will not be applicable.

18.2.5 Support from shore-based contingency measures, such as initiatives facilitated by ports, should strongly be encouraged. If such shore-based facilities are not available, as an interim measure, the port State should identify locations where BWE can take place. Identification of such exchange areas need to be conducted with a comprehensive risk assessment.

CHAPTER 19 – Guidance for Port State Control

19.1 PSC refers to the inspection of foreign ships in national ports of a Party to verify that the condition of the ship and its equipment comply with the requirements of the national/ international regulations and that the ship is manned and operated in compliance with those rules.

19.2 A ship to which the Convention applies may be subject to inspection for the purpose of determining whether the ship is in compliance with the Convention, in accordance with article 9. Article 8 requires that sanctions be established for violating the Convention, while article 10 of the Convention provides for warnings, detentions and exclusions. Article 10 also sets out control actions that shall be taken by a Party if a ship poses a threat to the environment, human health, property and resources. Article 11 sets out mandatory notifications where a sanction, detention, warning, exclusion or control action has been used.

19.3 Irrespective of the methods applied to manage ballast water (see chapter 17), the discharged water should meet the quality standard as indicated in regulation D-1 for BWE or D-2 for ballast water performance, as applicable. It is the obligation of PSC or other designated authorities to ensure adequate control and, when required, inspection of the BWRB and management practices.

19.4 The Organization developed *Guidelines for port State control under the BWM Convention* (resolution MEPC.252(67)) intended to be used to verify compliance with the requirements; these guidelines are not intended to limit the rights the port State has in verifying compliance with the Convention. The PSC inspection can be described as a four-stage process:

.1 the first stage, the "initial inspection", should focus on documentation and ensuring that an officer has been nominated for ballast water management on board the ship and to be responsible for the BWMS, and that the officer has been trained and knows how to operate it;

.2 the second stage – the "more detailed inspection" where the operation of the BWMS is checked and the PSCO clarifies whether the BWMS has been operated adequately according to the BWMP and the self-monitored operational indicators verified during type approval procedures. Undertaking a detailed inspection is dependent on the conditions of article 9.2 of the Convention;

.3 the third stage – sampling is envisaged to occur during this stage of PSC which relies on indicative analysis, to identify whether the ship is meeting the ballast water management performance standard described in regulation D-2, or whether detailed analysis is necessary to ascertain compliance; and

.4 the fourth stage, if necessary, incorporates detailed analysis to verify compliance with the D-2 standard.

19.5 If a ship is found to be in violation of the Convention, the PSCO may take steps to warn, detain or exclude the ship or grant such a ship permission to leave in order to discharge ballast water elsewhere (such as a designated BWE area) or to undertake repairs. In exercising his/her functions, the PSCO should use professional judgement to determine whether to detain the ship until any noted deficiencies are corrected or to permit the ship to sail with deficiencies, which do not pose an unreasonable threat of harm to the marine environment.

PART VI: ORGANIZATION

CHAPTER 20 – Training of personnel

20.1 Consideration of training requirements for personnel

20.1.1 The need for training of personnel for the purpose of implementing the Convention depends on several factors and will need to be assessed by each State. This is a matter for the marine Administration and the environmental protection authorities, its national shipping industry and other stakeholders to explore.

20.1.2 The following points need to be considered:

.1 Are the Administration's own staff sufficiently conversant with the Convention and relevant guidelines?

.2 Are the staff of the maritime Administration technically competent to fulfil their obligations?

.3 Do more appropriately qualified staff need to be recruited and trained?

.4 Are the national shipowners conversant with the Convention?

.5 What training do ships' masters and crew need?

20.1.3 In exploring the possibilities for training, the following options may be considered:

.1 cooperation with other, more experienced, maritime Administrations;

.2 raising the technical competence of the Administration staff to an adequate standard by training or recruitment or both;

.3 organizing national seminars/courses or regional training schemes for surveyors, inspectors, administrators, lawyers, shipowners, masters and crew, possibly through the Organization's Integrated Technical Cooperation Programme, and taking also advantage of the available training materials developed by e.g. the GloBallast Partnerships project and the e-CME ballast water compliance monitoring and enforcement project of the World Maritime University;

.4 taking advantage of learning opportunities at the World Maritime University, especially for those capable of benefiting and subsequently returning to responsible positions in the maritime Administration and shipping industry;

.5 including the Convention in the curriculum for seafarers' courses and examinations for certificates; and

.6 requesting shipowners to arrange training for senior ship officers to ensure that they are aware of the on-board procedures and legislation.

20.2 Administration personnel

20.2.1 A training programme is necessary to make administrative and inspection personnel knowledgeable about the requirements of the Convention and also to make flag State surveyors suitably trained in surveying ships for technical compliance with ballast water management. Inspection personnel must also be made knowledgeable about ballast water stripping operations. Further, it is of the utmost importance that all involved stay informed on any amendments to the various guidelines and guidance documents.

20.2.2 In most cases consideration should be given to conveying this information in the national language. It is recommended however to provide adequate information to local instructors in the first instance. Combined training activities, in which experienced instructors initially work in parallel with local instructors, teaching courses for administrative and inspection personnel, may be beneficial. Such training should concentrate both on the content of the Convention in general and on practical surveying procedures.

20.2.3 The timing for such training must be adjusted to suit the planned entry into force of the requirements in the acceding State, so that sufficient time is given for thorough introduction to the practical requirements, but also that the content of the instructions is not forgotten while the actual implementation is still being prepared. When the schedule for the accession and implementation of the Convention has been decided, such training should be initiated. It may be necessary to engage outside instructors to cover both theoretical and practical aspects of inspection.

20.3 Ships' officers

In addition to general awareness on the protection of the marine environment, ships' officers need instructions about the requirements and regulations of the Convention as a whole and instructions regarding the handling and operation of the equipment being installed on board ships in particular. For experienced officers this additional information could be given in relatively short courses.

20.4 Main topics to form part of a ballast water management training programme

.1 articles and regulations of the Convention;

.2 guidelines accompanying the Convention;

.3 BWMP development, implementation and operation;

.4 ballast water management safety procedures;

.5 safety procedures for BWE operations, if applicable;

.6 ballast water management techniques and methodologies;

.7 how to operate and maintain a BWMS;

.8 national and regional requirements;

.9 BWRB keeping;

.10 safety procedures for sediment control and handling; and

.11 handling, storage and preparation of chemicals and Active Substances.

The training procedures should cover crew familiarization and training of relief crews, and the training should be fully documented and correspond to the training requirements specified in the BWMP. More detailed information concerning crew training provisions can be found in Part B of Guidelines (G4).

CHAPTER 21 – Guidelines, circulars and other IMO instruments relevant to the Convention

A number of the regulations contained in the annex of the Convention require procedures, equipment, etc., to be based on guidelines developed by the Organization. Some of these guidelines exist as separate publications. A complete up-to-date list of resolutions and BWM circulars can be found on the IMO website (www.imo.org).

21.1 Guidelines for the uniform implementation of the Convention

.1 *Guidelines for sediment reception facilities (G1)* (resolution MEPC.152(55))

.2 *Guidelines for ballast water sampling (G2)* (resolution MEPC.173(58))

.3 *Guidelines for ballast water management equivalent compliance (G3)* (resolution MEPC.123(53))

.4 *Guidelines for ballast water management and development of ballast water management plans (G4)* (resolution MEPC.127(53))

.5 *Guidelines for ballast water reception facilities (G5)* (resolution MEPC.153(55))

.6 *2017 Guidelines for ballast water exchange (G6)* (resolution MEPC.288(71), superseding resolution MEPC.124(53))

.7 *2017 Guidelines for risk assessment under regulation A-4 of the BWM Convention (G7*) (resolution MEPC.289(71), superseding resolution MEPC.162(56))

.8 *2016 Guidelines for approval of ballast water management systems (G8)* (resolution MEPC.279(70), superseding resolution MEPC.174(58))

.9 *Procedure for approval of ballast water management systems that make use of Active Substances (G9)* (resolution MEPC.169(57))

.10 *Guidelines for approval and oversight of prototype ballast water treatment technology programmes (G10)* (resolution MEPC.140(54))

.11 *Guidelines for ballast water exchange design and construction standards (G11)* (resolution MEPC.149(55))

.12 *2012 Guidelines on design and construction to facilitate sediment control on ships (G12)* (resolution MEPC.209(63))

.13 *Guidelines for additional measures regarding ballast water management including emergency situations (G13)* (resolution MEPC.161(56))

.14 *Guidelines on designation of areas for ballast water exchange (G14)* (resolution MEPC.151(55))

21.2 Other Guidelines related to the implementation of the Convention

.1 *The experience-building phase associated with the BWM Convention* (resolution MEPC.290(71))

.2 *Guidelines for port State control under the BWM Convention* (resolution MEPC.252(67))

.3 *Information reporting on type approved ballast water management systems* (resolution MEPC.228(65))

.4 *Procedure for approving other methods of ballast water management in accordance with regulation B-3.7 of the BWM Convention* (resolution MEPC.206(62))

.5 *Guidelines for ballast water exchange in the Antarctic treaty area* (resolution MEPC.163(56))

.6 *Application of the international convention for the control and management of ships' ballast water and sediments, 2004* (resolution A.1088(28))

21.3 Circulars related to the implementation of the Convention

.1 *Application of the Convention to ships operating in sea areas where ballast water exchange in accordance with regulations B-4.1 and D-1 is not possible* (BWM.2/Circ.63)

.2 *Guidance on contingency measures under the BWM Convention* (BWM.2/Circ.62)

.3 *Guidance on methodologies that may be used for enumerating viable organisms for type approval of ballast water management systems* (BWM.2/Circ.61)

.4 *Guidance on entry or re-entry of ships into exclusive operation within waters under the jurisdiction of a single Party* (BWM.2/Circ.52/Rev.1)

.5 *Application of the BWM Convention to Mobile Offshore Units* (BWM.2/Circ.46)

.6 *Clarification of "major conversion" as defined in regulation A-1.5 of the BWM Convention* (circular BWM.2/Circ.45)

.7 *Options for ballast water management for Offshore Support Vessels in accordance with the BWM Convention* (BWM.2/Circ.44)

.8 *Amendments to the Guidance for Administrations on the type approval process for ballast water management systems in accordance with Guidelines (G8)* (BWM.2/Circ.28) (BWM.2/Circ.43)

.9 *Guidance on ballast water sampling and analysis for trial use in accordance with the BWM Convention and Guidelines (G2)* (BWM.2/Circ.42/Rev.1)

.10 *Issuance of Ballast Water Management Certificates prior to entry into force of the BWM Convention and Ballast Water Management Plans* approved according to resolution A.868(20) (BWM.2/Circ.40)

.11 Information that should be made available in proposals for approval of ballast water management systems in accordance with the *Procedure for approval of ballast water management systems that make use of Active Substances (G9)* (BWM.2/Circ.37)

.12 *Guidance on scaling of ballast water management systems* (BWM.2/Circ.33)

.13 *Applicability of the Ballast Water Management Convention to hopper dredgers* (BWM.2/Circ.32)

.14 *Framework for determining when a Basic Approval granted to one ballast water management system may be applied to another system that uses the same Active Substance or Preparation* (BWM.2/Circ.27)

.15 *Engineering Questionnaire on Ballast Water Management Systems* (BWM.2/Circ.21)

.16 *Guidance to ensure safe handling and storage of chemicals and preparations used to treat ballast water and the development of safety procedures for risks to the ship and crew resulting from the treatment process* (BWM.2/Circ.20)

.17 *Guidance document on arrangements for responding to emergency situations involving ballast water operations* (BWM.2/Circ.17)

.18 *Methodology for information gathering and conduct of work of the GESAMP-BWWG* (BWM.2/Circ.13, as revised)

.19 *Harmonized implementation of the Guidelines for approval of Ballast Water Management Systems (G8)* (BWM.2/Circ.8)

.20 *Interim Survey Guidelines for the purpose of the International Convention for the Control and Management of Ships' Ballast Water and Sediments under the Harmonized System of Survey and Certification* (resolution A.948(23)) (BWM.2/Circ.7).

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ANNEX 19

DRAFT ASSEMBLY RESOLUTION

CODE FOR THE TRANSPORT AND HANDLING OF HAZARDOUS AND NOXIOUS LIQUID SUBSTANCES IN BULK ON OFFSHORE SUPPORT VESSELS (OSV CODE)

THE ASSEMBLY,

RECALLING Article 15(j) of the Convention on the International Maritime Organization concerning the functions of the Assembly in relation to regulations and guidelines regarding maritime safety and the prevention and control of marine pollution from ships,

RECALLING ALSO that regulation 11.2 of Annex II to the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto, calls for guidelines to be developed by the Organization on the basis of which Administrations shall establish appropriate measures in respect of ships other than chemical tankers carrying noxious liquid substances in bulk identified in chapter 17 of the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemical in Bulk, in order to minimize the uncontrolled discharge into the sea of such substances,

RECALLING FURTHER that it adopted, by resolution A.673(16), *Guidelines for the transport and handling of limited amounts of hazardous and noxious liquid substances in bulk on offshore support vessels* (LHNS Guidelines),

RECOGNIZING the need to improve the provisions of the LHNS Guidelines in light of the evolution of the offshore industry and experience gained from implementing them,

HAVING CONSIDERED the recommendations of the Maritime Safety Committee, at its ninety-eighth session, and the Marine Environment Protection Committee, at its seventy-first session,

1 ADOPTS the Code for the Transport and Handling of Hazardous and Noxious Liquid Substances in Bulk on Offshore Support Vessels (OSV Chemical Code), set out in the annex to the present resolution;

2 INVITES Governments to take action to implement the OSV Chemical Code from [1 July 2018];

3 AUTHORIZES the Maritime Safety Committee and the Marine Environment Protection Committee to keep the OSV Chemical Code under review and update it as may be necessary;

4 SUPERSEDES resolution A.673(16).

ANNEX

CODE FOR THE TRANSPORT AND HANDLING OF HAZARDOUS AND NOXIOUS LIQUID SUBSTANCES IN BULK ON OFFSHORE SUPPORT VESSELS (OSV CHEMICAL CODE)

TABLE OF CONTENTS

PREAMBLE

1 This Code has been developed for the design, construction and operation of offshore support vessels which transport hazardous and noxious liquid substances in bulk for the servicing and resupplying of offshore platforms, mobile offshore drilling units and other offshore installations, including those employed in the search for and recovery of hydrocarbons from the sea-bed.

2 This Code has been developed in accordance with the requirements set forth in regulation 11.2 of MARPOL Annex II and in recognition of the need for standards which provide an alternative to the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (IBC Code) and the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC Code) for offshore support vessels.

3 The basic philosophy of this Code is to apply standards contained in the IBC Code and the IGC Code to the extent that is practicable and reasonable taking into account the unique design features and service characteristics of offshore support vessels.

4 The *Guidelines for the design and construction of offshore supply vessels, 2006* (resolution MSC.235(82), as amended) are also applicable to offshore support vessels subject to this Code.

5 It is recognized that the technology of the offshore industry is complex and subject to continued evolution as is evidenced by the growing need for specialized vessels such as well-stimulation vessels. To meet the needs of the industry, this Code should not remain static. Therefore, the Organization will periodically review this Code, taking into account both experience and technical development. Amendments to this Code involving provisions for new cargoes will be circulated periodically as new cargoes are proposed for carriage and the provisions are developed.

CHAPTER 1 – GENERAL

To provide an international standard for the safe carriage, by sea in bulk, of chemicals by setting the design and construction standards of vessels involved in such carriage and the equipment, so as to minimize the risks to the vessel, its crew and the environment, having regard to the nature of the products including flammability, toxicity, asphyxiation, corrosivity and reactivity.

1.1 Application

1.1.1 This Code applies to offshore support vessels engaged in the carriage of the products identified in 1.1.9, regardless of size or voyage.

1.1.2 This Code should also apply when the cargoes indicated in 1.1.9 are a part of a blending or production process of cargoes used in the search and exploitation of seabed mineral resources on board vessels used to facilitate such operations.

1.1.3 Unless expressly provided otherwise, this Code applies to offshore support vessels (OSVs), the keels of which are laid or which are at the stage where:

.1 construction identifiable with the vessel begins; and

.2 assembly has commenced comprising at least 50 tonnes or 1% of the estimated mass of all structural material, whichever is less;

on or after [1 July 2018].

1.1.4 Existing OSVs, the keel of which were laid or which were at a similar stage of construction on or after 19 April 1990 and before the date specified in 1.1.3, may be permitted to carry products as being assigned for carriage on a type 2 ship in the IBC Code, provided that they comply with this Code, except for the stability provisions in chapter 2 of this Code, and subject to the satisfaction of the Administration.

1.1.5 A vessel, irrespective of the date of construction, which is converted for the carriage of bulk liquids subject to this Code on or after the date specified in 1.1.3 should be treated as a vessel constructed on the date on which such conversion commences. An offshore support vessel which transports a cargo subject to this Code and undergoes modification for the transport of additional cargoes falling under this Code should not be considered as a vessel which has undergone a conversion.

1.1.6 This Code applies only in the case of bulk carriage involving transfer of the cargo to or from its containment which forms part of the vessel or remains on board.

1.1.7 For requirements regulating the transport of dangerous goods and marine pollutants in packaged form, including transport of dangerous goods in portable tanks, refer to the International Maritime Dangerous Goods Code (IMDG Code).

1.1.8 This Code applies in addition to the *Guidelines for the design and construction of Offshore Supply Vessels* (resolution MSC.235(82), as amended). Where this Code sets forth alternative safety standards, the standards in this Code should be applied.

1.1.9 Products which may be carried subject to this Code are:

.1 products which are listed in chapters 17 or 18 of the IBC Code and the latest edition of the MEPC.2/Circular (Provisional categorization of liquid substances in accordance with MARPOL Annex II and the IBC Code) and their related references to chapters 15 and 19; or

.2 oil-based/water-based mud containing mixtures of products listed in chapters 17 and 18 of the IBC Code and the MEPC.2/Circular; or

.3 liquid carbon dioxide (high purity and reclaimed quality) and liquid nitrogen; or

.4 contaminated backloads.

1.1.10 For a product proposed for carriage in bulk, but not listed in chapters 17 or 18 of the IBC Code, the Administration and port Administrations involved in such carriage should prescribe the suitable preliminary conditions for the carriage, having regard to the criteria for hazard evaluation of bulk chemicals. For the evaluation of the pollution hazard of such a product and assignment of its pollution category, the procedure specified in regulation 6.3 of MARPOL Annex II should be followed. The Organization should be notified of the preliminary conditions for consideration for inclusion of the product in the IBC Code.

1.2 Definitions

The following definitions apply unless expressly provided otherwise (additional definitions are given in individual chapters).

1.2.1 *Accommodation spaces* are those spaces used for public spaces, corridors, lavatories, cabins, offices, hospitals, cinemas, games and hobbies rooms, barber shops, pantries containing no cooking appliances and similar spaces.

1.2.2 *Administration* means the Government of the State whose flag the vessel is entitled to fly.

1.2.3 *Anniversary date* means the day and the month of each year, which will correspond to the date of expiry of the Certificate of Fitness.

1.2.4 *Backload* means contaminated bulk liquids, taken on board a vessel offshore, for transport either back to shore or to alternate offshore site.

1.2.5 *Blending additives* means small amounts of liquid substances used during blending of products or production processes of cargoes for use in the search and exploitation of seabed mineral resources on board vessels used to facilitate such operations.

1.2.6 *Breadth (B)* means the maximum breadth of the vessel, measured amid vessels to the moulded line of the frame in a vessel with a metal shell and to the outer surface of the hull in a vessel with a shell of any other material. The breadth (B) should be measured in metres.

1.2.7 *Cargo area* is that part of the offshore support vessel where:

.1 a pollution hazard only substance having a flashpoint exceeding 60°C and not defined as toxic, is likely to be present and includes cargo tanks, portable tanks used as deck cargo tanks, slop tanks, cargo pump-rooms, pump-rooms adjacent to cargo tanks and enclosed spaces in which pipes containing cargoes are located. Areas on open deck are not considered part of the cargo area.

.2 a safety hazard substance having a flashpoint exceeding 60°C and not defined as a toxic, is likely to be present and includes cargo tanks, portable tanks used as deck cargo tanks, slop tanks, cargo pump-rooms, pump-rooms adjacent to cargo tanks, hold spaces in which independent tanks are located, cofferdams surrounding integral tanks, enclosed spaces in which pipes containing cargoes are located and the following deck areas:

.1 within 3 m of cargo tank installed on deck or portable tanks used as deck cargo tanks;

.2 areas on open deck, or semi-enclosed spaces on deck, within 3 m of any cargo tank access outlet;

.3 areas on open deck over an integral tank without an overlaying cofferdam plus the open deck area extending transversely and longitudinally for a distance of 3 m beyond each side of the tank;

.4 areas on open deck, or semi-enclosed spaces on deck, within 3 m of cargo manifold valve, cargo valve, cargo pipe flange, except spaces within the 3 m zone that are separated by an enclosed bulkhead to the minimum height as given in 1.2.7.2.6;

.5 areas on open deck, or semi-enclosed spaces on open deck above and in the vicinity of any cargo tank vent outlet intended for the passage of large volumes of vapour mixture during cargo loading, within a vertical cylinder of unlimited height and 3 m radius upon the centre of the outlet, and within a hemisphere of 3 m radius below the outlet;

.6 areas on the open deck within spillage coamings surrounding cargo manifold valves and 3 m beyond these, up to a height of 2.4 m above the deck; and

.7 compartments for cargo hoses.

.3 a substance having a flashpoint not exceeding 60°C, or defined as toxic or vapours of such cargo, is likely to be present and includes cargo tanks, portable tanks used as deck cargo tanks, slop tanks, cargo pump-rooms, pump-rooms adjacent to cargo tanks, hold spaces in which independent tanks are located, cofferdams surrounding integral tanks, enclosed spaces in which pipes containing cargoes are located and the following deck areas:

.1 within 3 m of cargo tank installed on deck or portable tanks used as deck cargo tanks;

.2 areas on open deck, or semi-enclosed spaces on deck, within 4.5 m of gas or vapour outlet, cargo manifold valve, cargo valve, cargo pipe flange, cargo pump-room ventilation outlets and cargo tank openings for pressure release provided to permit the flow of small volumes of gas or vapour mixtures caused by thermal variation;

.3 areas on open deck, or semi-enclosed spaces on open deck above and in the vicinity of any cargo gas outlet intended for the passage of large volumes of gas or vapour mixture during cargo loading,

within a vertical cylinder of unlimited height and 10 m radius centred upon the centre of the outlet, and within a hemisphere of 10 m radius below the outlet;

.4 areas on open deck, or semi-enclosed spaces on deck, within 3 m of cargo pump-room entrances, cargo pump-room ventilation inlet, openings into cofferdams;

.5 areas on the open deck within spillage coamings surrounding cargo manifold valves and 3 m beyond these, up to a height of 2.4 m above the deck;

.6 compartments for cargo hoses; and

.7 within the hose landing area.

1.2.8 *Cargo control station* means a location that is manned during cargo transfer operations for the purpose of directing or controlling the loading or unloading of cargo.

1.2.9 *Cargo pump-room* is a space containing pumps and their accessories for the handling of the products covered by this Code.

1.2.10 *Cofferdam* is the isolating space between two adjacent steel bulkheads or decks. This space may be a void space or a ballast space.

1.2.11 *Control stations* are those spaces in which vessels' radio or main navigating equipment or the emergency source of power is located or where the fire-recording or fire-control equipment is centralized. This does not include special fire-control equipment which can be most practically located in the cargo area.

1.2.12 *Conversion* means a vessel in an un-related service modified for use as an offshore support vessel. Special Purpose Ships (operated under the SPS Code) in support related service configurations are not considered "in an unrelated service".

1.2.13 *Dangerous chemicals* means any liquid chemicals designated as presenting a safety hazard, based on the safety criteria for assigning products to chapter 17 of the IBC Code.

1.2.14 *Dangerous goods* mean the substances, materials and articles covered by the IMDG Code.

1.2.15 *Deadweight* means the difference in metric tons between the displacement of an offshore support vessel in water of a density of 1.025 at the load waterline corresponding to the assigned summer freeboard and the lightweight of the vessel.

1.2.16 *Deck spread* means portable tanks, piping, equipment, processing equipment and control stations secured to the vessel by permanent means and used in the operation of the vessel.

1.2.17 *Density* is the ratio of the mass to the volume of a product, expressed in terms of kilograms per cubic metre. This applies to liquids, gases and vapours.

1.2.18 *Flashpoint* is the temperature in degrees Celsius at which a product will give off enough flammable vapour to be ignited. Values given in the Code are those for a "closed cup test" determined by an approved flashpoint apparatus.

1.2.19 *Hazardous substance* is any substance either listed in chapter 17 of the International Bulk Chemical Code or having a hazard more severe than one of the minimum hazard criteria given in criteria for hazard evaluation of bulk chemicals as approved by the Organization.

1.2.20 *Hold space* is the space enclosed by the vessels' structure in which an independent cargo tank is situated.

1.2.21 *Hose landing area* means an area on the main deck, except those in compartments for cargo hoses, where cargo hoses of substances having a flashpoint not exceeding 60°C and/or defined as toxic are located during cargo transfer.

1.2.22 *Independent* means that a piping or venting system, for example, is in no way connected to another system and that there are no provisions available for the potential connection to other systems.

1.2.23 *International Bulk Chemical Code* (IBC Code) means the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (resolutions MSC.4(48) and MEPC.19(22), as amended).

1.2.24 *International Gas Carrier Code* (IGC Code) means the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (resolution MSC.5(48), as amended).

1.2.25 *IMDG Code* means the International Maritime Dangerous Goods Code (resolution MSC.122(75), as amended).

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

1.2.27 *Lightweight* means the displacement of an offshore support vessel in metric tons without cargo, fuel, lubricating oil, ballast water, fresh water and feed water in tanks, consumable stores, crew and their effects.

1.2.28 *Machinery spaces of category A* are those spaces and trunks to such spaces which either 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 or any oil fired equipment other than boilers, such as inert gas generators, incinerators, etc.

1.2.29 *Machinery spaces* are machinery spaces of category A and other spaces containing propulsion machinery, boilers, oil fuel units, steam and internal combustion engines, generators and major electrical machinery, oil filling station, refrigerating, stabilizing, ventilation and air conditioning machinery, and similar spaces, and trunks to such spaces.

1.2.30 *MARPOL* means the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto, as amended.

1.2.31 *Noxious liquid substance* means any substance indicated in the Pollution Category column of chapter 17 or 18 of the International Bulk Chemical Code, or the current MEPC.2/Circular or provisionally assessed under the requirements of regulation 6.3 of MARPOL Annex II as falling into categories X, Y or Z.

1.2.32 *Offshore portable tank* means a portable tank specially designed for repeated use for transport of dangerous goods to, from and between offshore facilities. An offshore portable tank is designed and constructed in accordance with the *Guidelines for the approval of containers handled in open seas* (MSC/Circ.860).

1.2.33 *Offshore support vessels (OSVs)* are:

.1 multi-mission vessels which are primarily engaged in the transport of stores, materials and equipment to and from mobile offshore drilling units, fixed and floating platforms and other similar offshore installations; or

.2 multi-mission vessels, including well-stimulation vessels, but excluding mobile offshore drilling units, derrick barges, pipe-laying barges and floating accommodation units, which are otherwise primarily engaged in supporting the work of offshore installations.

1.2.34 *Oil fuel unit* is the equipment used for the preparation of oil fuel for delivery to an oil fired boiler, or equipment used for the preparation for delivery of heated oil to an internal combustion engine, and includes any oil pressure pumps, filters and heaters dealing with oil at a gauge pressure of more than 0.18 MPa.

1.2.35 *Open deck* is defined as an open or semi-enclosed space on cargo deck or inside of the cargo rail. Semi-enclosed spaces are those spaces that either:

.1 are open at two ends; or

.2 have an opening at one end, and are provided with adequate natural ventilation effective over their entire length through permanent openings distributed in the side plating or deckhead or from above, the openings having a total area of at least 10% of the total area of the space sides.

1.2.36 *Organization* is the International Maritime Organization (IMO).

1.2.37 *Permeability of a space* means the ratio of the volume within that space which is assumed to be occupied by water to the total volume of that space.

1.2.38 *Pollution hazard only substance* means a substance having an entry only of "P" in *column d* in chapter 17 of the IBC Code.

1.2.39 *Port Administration* means the appropriate authority of the country for the port where the vessel is loading or unloading.

1.2.40 *Portable tank* means a multimodal tank used for the transport of dangerous goods.

1.2.41 *Propulsion shaft tunnel* is the tunnel or space in which the mechanical transfer of power to a propulsion unit is run.

1.2.42 *Public spaces* are those portions of the accommodation spaces which are used for halls, dining rooms, lounges and similar permanently enclosed spaces.

1.2.43 *Pump-room* is a space, located in the cargo area, containing pumps and their accessories for the handling of ballast and oil fuel.

1.2.44 *Recognized standards* are applicable international or national standards acceptable to the Administration or standards laid down and maintained by an organization which comply with the standards adopted by the Organization and which are recognized by the Administration.

1.2.45 *Safety hazard substance* means a substance having an entry of "S" or "S/P" in *column d* in chapter 17 of the International Bulk Chemical Code.

1.2.46 *Separate* means that a cargo piping system or cargo vent system, for example, is not connected to another cargo piping or cargo vent system.

1.2.47 *Service spaces* are those spaces used for galleys, pantries containing cooking appliances, lockers, mail and specie rooms, store-rooms, workshops other than those forming part of the machinery spaces and similar spaces and trunks to such spaces.

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

1.2.49 *Underdeck access way* is a passage passing through the underdeck cargo area without being part of the cargo area providing access to essential areas for operation of the vessel, such as thruster room, propulsion room, steering gear room. The access way may be used to route non-cargo piping and cabling.

1.2.50 *Vapour pressure* is the equilibrium pressure of the saturated vapour above a liquid expressed in Pascal (Pa) at a specified temperature.

1.2.51 *Void space* is an enclosed space in the cargo area external to a cargo tank, other than a hold space, ballast space, oil fuel tank, cargo pump-room, pump-room, or any space in normal use by personnel.

1.2.52 *Well-stimulation vessel* means an offshore support vessel with specialized equipment and industrial personnel that deliver products and services directly into a well-head.

1.3 Equivalents

1.3.1 Where this Code requires that a particular fitting material, appliance, apparatus, item of equipment or type thereof should be fitted or carried on an OSV, or that any particular provision should be made, or any procedure or arrangement should be complied with, the Administration may allow any other fitting, material, appliance, apparatus, item of equipment or type thereof to be fitted or carried, or any other provision, procedure or arrangement to be made in that vessel, if it is satisfied by trial thereof or otherwise that such fitting, material, appliance, apparatus, item of equipment or type thereof or that any particular provision, procedure or arrangement is at least as effective as that required by this Code. However, the Administration may not allow operational methods or procedures to be made an alternative to a particular fitting, material, appliance, apparatus, item of equipment, or type thereof, which are prescribed by this Code, unless such substitution is specifically allowed by this Code.

1.3.2 Where the Administration allows any fitting, material, appliance, apparatus, item of equipment, or type thereof, or provision, procedure, or arrangement, or novel design or application to be substituted, it should communicate to the Organization the particulars thereof together with a report on the evidence submitted so that the Organization may circulate the same to other Parties to SOLAS or MARPOL, for the information of their officers.

1.4 Surveys and certification

1.4.1 Following a satisfactory initial survey of an OSV, the Administration or its duly authorized organization should issue a certificate, the model form of which is set out in appendix 1, suitably endorsed to certify compliance with the provisions of this Code. If the language used is not English, French or Spanish, the text should include the translation into one of these languages. The certificate should indicate the cargoes regulated by this Code that the vessel is permitted to carry with any relevant carriage conditions and should have a period of validity not exceeding five years.

1.4.2 The certificate issued under this Code should have the same force and receive the same recognition as the certificate issued under regulation 7 of Annex II of MARPOL and regulations VII/10 and VII/13 of SOLAS, as amended.

1.4.3 The validity of the certificate referred to in 1.4.1 should be subject to the renewal, intermediate, annual, and additional surveys required by the IBC Code, the IGC Code and MARPOL Annex II.

CHAPTER 2 – VESSEL SURVIVAL CAPABILITY AND LOCATION OF CARGO TANKS

To ensure that the cargo tanks are located in protected location(s) for the event of minor hull damage and that the vessel can survive the assumed flooding conditions.

2.1 General

2.1.1 OSVs, subject to this Code should survive the normal effects of flooding following assumed hull damage caused by some external force. In addition, to safeguard the vessel and the environment, the cargo tanks should be protected from penetration in the case of minor damage to the vessel resulting, for example, from contact with a jetty or an offshore installation, and given a measure of protection from damage in the case of collision or stranding, by locating them at specified minimum distances inboard from the vessel's shell plating. Both the assumed damage and the proximity of the cargo tanks to the vessel's shell should be dependent upon the degree of hazard presented by the products to be carried.

2.1.2 The design standards of this chapter should be applied according to the ship type required for cargoes containing mixtures and individual products indicated in chapter 17 of the IBC Code and the latest edition of the MEPC.2/Circular.

2.1.3 OSVs subject to this Code may be designed without cargo tank capacity limitation; however, the requirements of this chapter will be applied according to the ship type classified in the IBC Code and quantity of products carried on any single voyage.

2.1.4 If a vessel is intended to carry more than one product listed in chapter 17 of the IBC Code and the latest edition of the MEPC.2/Circular, the standard of damage should correspond to that product having the most stringent ship type provision. The provisions for the location of individual cargo tanks, however, need only be applied based upon the vessel types related to the respective products certified to be carried.

2.1.5 The provisions for cargo ships in SOLAS chapter II-1, parts B, B-1, B-2 and B-4, should apply to vessels covered by this Code, except that SOLAS regulations II-1/6 to II-1/7-3 should not be applied, unless expressly provided otherwise.

2.2 Freeboard and intact stability

2.2.1 OSVs subject to this Code may be assigned the minimum freeboard permitted by the International Convention on Load Lines in force.

2.2.2 The intact stability of the vessel in all seagoing conditions should comply with the International Code on Intact Stability, 2008 (resolution MSC.267(85), as amended).

2.2.3 Solid ballast should not normally be used in double-bottom spaces in the cargo area. Where, however, because of stability considerations, the fitting of solid ballast in such spaces becomes unavoidable, then its disposition should be governed by the need to ensure that the impact loads resulting from bottom damage are not directly transmitted to the cargo tank structure.

2.2.4 The master of the vessel should be supplied with a loading and stability information booklet. This booklet should contain details of typical service and ballast conditions, provisions for evaluating other conditions of loading and a summary of the vessel's survival capabilities. In addition, the booklet should contain sufficient information to enable the master to load and operate the vessel in a safe and seaworthy manner. All OSVs of 500 gross tonnage and above should comply with SOLAS regulation II-1/5-1.

2.2.5 OSVs subject to 2.6.1 and those vessels with a length of 80 m or more subject to 2.6.2 should be fitted with a stability instrument[1], capable of verifying compliance with intact and damage stability provisions, approved by the Administration having regard to the performance standards recommended by the Organization[2].

2.3 Non-cargo discharges below the freeboard deck

2.3.1 The provision and control of valves fitted to non-cargo discharges led through the shell from spaces below the freeboard deck or from within superstructures and deck-houses on the freeboard deck fitted with weathertight doors should comply with the requirements of the relevant regulation of the International Convention on Load Lines in force, except that the choice of valves should be limited to:

.1 one automatic non-return valve with a positive means of closing from above the freeboard deck; or

.2 where the vertical distance from the summer load waterline to the inboard end of the discharge pipe exceeds 0.01*L*, two automatic non-return valves without positive means of closing, provided that the inboard valve is always accessible for examination under service conditions.

2.3.2 For the purpose of this chapter, "summer load line" and "freeboard deck" have the meanings as defined in the International Convention on Load Lines in force.

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1 Refer to the IBC Code, paragraphs 2.2.6 and 2.2.7.

2 Refer to part B of chapter 4 of the International Code on Intact Stability, 2008 (resolution MSC.267(85), as amended); section 4 of the *Guidelines for the Approval of Stability Instruments* (MSC.1/Circ.1229, as amended); and the technical standards defined in part 1 of the *Guidelines for verification of damage stability requirements for tankers* (MSC.1/Circ.1461).

2.3.3 The automatic non-return valves referred to in 2.3.1.1 and 2.3.1.2 should be fully effective in preventing admission of water into the vessel, taking into account the sinkage, trim and heel in survival provisions in 2.8, and should comply with recognized standards.

2.4 Conditions of loading

Damage survival capability should be investigated on the basis of loading information submitted to the Administration for all anticipated conditions of loading and variations in draught and trim for the conditions for cargoes which the vessels is certified to carry. Conditions where the offshore support vessel is not carrying products covered by this Code, or is carrying only residues of such products, need not be considered for the purpose of this Code.

2.5 Flooding assumptions

2.5.1 The provisions of 2.8 should be confirmed by calculations which take into consideration the design characteristics of the vessel; the arrangements, configuration and contents of the damaged compartments; the distribution, relative densities and the free surface effects of liquids; and the draught and trim for all conditions of loading.

2.5.2 The permeability of spaces assumed to be damaged should be as follows:

Spaces	**Permeability**
Appropriated to stores	0.60
Occupied by accommodation	0.95
Occupied by machinery	0.85
Voids	0.95
Intended for consumable liquids	0 to 0.95*
Intended for other liquids	0 to 0.95*
Intended for dry cargo	0.95

* The permeability of partially filled tanks should be consistent with the amount of liquid carried in the tank.

2.5.3 Wherever damage penetrates a tank containing liquids it should be assumed that the contents are completely lost from that compartment and replaced by salt water up to the level of the final plane of equilibrium.

2.5.4 Every watertight division within the maximum extent of damage defined in 2.6.1 and 2.6.2 and considered to have sustained damage in positions given in 2.7 should be assumed to be penetrated. Where damage less than the maximum is being considered in accordance with 2.6.3, only watertight divisions or combinations of watertight divisions within the envelope of such lesser damage should be assumed to be penetrated:

.1 where a transverse watertight bulkhead is located within the transverse extent of assumed damage and is stepped in way of a double bottom or side tank by more than 3.05 m, the double bottom or side tanks adjacent to the stepped portion of the transverse watertight bulkhead should be considered as flooded simultaneously; and

.2 if the distance between the transverse planes passing through the nearest stepped portions of the bulkheads is less than the longitudinal extent of damage given in 2.6.1 and 2.6.2, only one of these bulkheads should be regarded as effective.

2.5.5 The vessel should be so designed as to keep unsymmetrical flooding to the minimum consistent with efficient arrangements.

2.5.6 Equalization arrangements requiring mechanical aids such as valves or cross-levelling pipes, if fitted, should not be considered for the purpose of reducing an angle of heel or attaining the minimum range of residual stability to meet the provisions of 2.8 and sufficient residual stability should be maintained during all stages where equalization is used. Spaces which are linked by ducts of large cross-sectional area may be considered to be common.

2.5.7 If pipes, ducts, trunks or tunnels are situated within the assumed extent of damage penetration, as defined in 2.6, arrangements should be such that progressive flooding cannot thereby extend to compartments other than those assumed to be flooded for each case of damage.

2.5.8 For vessels subject to 2.6.1 the buoyancy of any superstructure directly above the side damage should be disregarded. The unflooded parts of superstructures beyond the extent of damage, however, may be taken into consideration provided that:

.1 they are separated from the damaged space by watertight divisions and the provisions of 2.8.2.2 in respect of these intact spaces are complied with; and

.2 openings in such divisions are capable of being closed by remotely operated sliding watertight doors and unprotected openings are not immersed within the minimum range of residual stability required in 2.8; however, the immersion of any other openings capable of being closed weathertight may be permitted.

2.6 Damage assumptions

2.6.1 For vessels carrying more than 1200 m^3 of products classified in the IBC Code as requiring type 3 ship or type 2 ship, or more than 150 m^3 of products classified in the IBC Code as requiring type 1 ship, the assumed maximum extent of damage should be:

.1 Side damage

	Longitudinal extent	**Transverse extent**	**Vertical extent**
	$1/3L^{2/3}$	*B*/5 (measured inboard from the vessel's side at right angles to the centreline at the level of the summer load line)	Upwards without limit measured from the moulded line of the bottom shell plating at centreline

.2 Bottom damage

	Location of damage	Longitudinal extent	Transverse extent	Vertical extent
.1	Within 0.3*L* measured from the forward perpendicular	$1/3L^{2/3}$	*B*/6	B/15 or 6 m, whichever is less measured from the moulded line of the bottom shell plating at centreline (see 2.9.2)
.2	Any other part of the vessel	$1/3L^{2/3}$ or 5 m, whichever is less	*B*/6 or 5 m, whichever is less	B/15 or 6 m, whichever is less measured from the moulded line of the bottom shell plating at centreline (see 2.9.2)

2.6.2 For vessels carrying not more than 1200 m^3 of products classified in the IBC Code as requiring type 3 ship or type 2 ship, and no more than 150 m^3 of products classified in the IBC Code as requiring type 1 ship the assumed maximum extent of damage should be:

Side damage

	Vessel length	Longitudinal extent	Transverse extent	Vertical extent
.1	24≤*L*≤43 m	0.1*L*	760 mm (measured inboard from the vessel's side at right angles to the centreline at the level of the summer load line)	From the underside of the cargo deck, or continuation thereof, downward for the full depth of the vessel
.2	43<*L*<80 m	3 m + 0.03*L*	760 mm (measured inboard from the vessel's side at right angles to the centreline at the level of the summer load line)	From the underside of the cargo deck, or continuation thereof, downward for the full depth of the vessel
.3	80≤*L*≤100 m	$1/3L^{2/3}$	*B*/20, but not less than 760 mm (measured inboard from the vessel's side at right angles to the centreline at the level of the summer load line)	From the underside of the cargo deck, or continuation thereof, downward for the full depth of the vessel
.4	*L*>100 m	$1/3L^{2/3}$	*B*/15, but not less than 760 mm (measured inboard from the vessel's side at right angles to the centreline at the level of the summer load line)	From the underside of the cargo deck, or continuation thereof, downward for the full depth of the vessel

2.6.3 If any damage of a lesser extent than the maximum damage specified in 2.6.1 or 2.6.2 would result in a more severe condition, such damage should be considered.

2.6.4 A transverse watertight bulkhead extending from the vessel's side to a distance inboard no less than the transverse extent of damage indicated in 2.6.2 measured at the level of the summer load line joining longitudinal watertight bulkheads may be considered as a transverse watertight bulkhead for the purpose of the damage calculations in 2.6.2.

2.7 Standard of damage

Vessels should be capable of surviving damage with the assumptions in 2.5 and 2.6 determined by the following standards:

.1 a vessel that carries more than 150 m^3 of ship type 1 products should be assumed to sustain damage described in 2.6.1 anywhere along the length;

.2 a vessel with a length (*L*) greater than 150 m that carries more than 1200 m^3 of ship types 2 and 3 products should be assumed to sustain damage described in 2.6.1 anywhere along the length;

.3 a vessel with a length (*L*) of 150 m or less that carries more than 1200 m^3 of ship types 2 and 3 products and no more than 150 m^3 of ship type 1 products should be assumed to sustain damage described in 2.6.1 anywhere along the length except involving bulkheads bounding a machinery space of category A;

.4 a vessel with a length (*L*) greater than 100 m that carries 800 m^3 or more but no more than 1200 m^3 of ship types 2 and 3 products and no more than 150 m^3 of ship type 1 products should be assumed to sustain damage described in 2.6.2 anywhere along the length and should also comply with SOLAS regulations II-1/6 to II-1/7-3 (probabilistic damage stability standard for a cargo ship);

.5 a vessel with a length (*L*) of 100 m or less that carries 800 m^3 or more but no more than 1200 m^3 of ship types 2 and 3 products and no more than 150 m^3 of ship type 1 products should be assumed to sustain damage described in 2.6.2 anywhere along the length;

.6 a vessel with a length (*L*) greater than 100 m that carries less than 800 m^3 of ship types 2 and 3 products and no more than 150 m^3 of ship type 1 products should be assumed to sustain damage described in 2.6.2 anywhere along the length between transverse watertight bulkheads and should also comply with SOLAS regulations II-1/6 to II-1/7-3 (probabilistic damage stability standard for a cargo ship); and

.7 a vessel with a length (*L*) of 100 m or less that carries less than 800 m^3 of ship types 2 and 3 products and no more than 150 m^3 of ship type 1 products should be assumed to sustain damage described in 2.6.2 anywhere along the length between transverse watertight bulkheads.

2.8 Survival requirements

2.8.1 Vessels subject to this Code should be capable of surviving the assumed damage specified in 2.6 to the standard provided in 2.7 in a condition of stable equilibrium and should satisfy the following criteria.

2.8.2 For vessels subject to 2.6.1:

.1 in any stage of flooding:

.1 the waterline, taking into account sinkage, heel and trim, should be below the lower edge of any opening through which progressive flooding or downflooding may take place. Such openings should include air pipes and openings which are closed by means of weathertight doors or hatch covers and may exclude those openings closed by means of watertight manhole covers and watertight flush scuttles, small watertight cargo tank hatch covers which maintain the high integrity of the deck, remotely operated watertight sliding doors, and sidescuttles of the non-opening type;

.2 the maximum angle of heel due to unsymmetrical flooding should not exceed 25°, except that this angle may be increased to 30° if no deck immersion occurs; and

.3 the residual stability during intermediate stages of flooding should never be significantly less than that required by 2.8.2.2;

.2 at final equilibrium after flooding:

.1 the righting-lever curve should have a minimum range of 20° beyond the position of equilibrium in association with a maximum residual righting lever of at least 0.1 m within the 20° range; the area under the curve within this range should not be less than 0.0175 m radians. Unprotected openings should not be immersed within this range unless the space concerned is assumed to be flooded. Within this range, the immersion of any of the openings listed in 2.8.2.1 and other openings capable of being closed weathertight may be permitted; and

.2 the emergency source of power should be capable of operating.

2.8.3 For vessels subject to 2.6.2:

.1 the final waterline, taking into account sinkage, heel and trim, should be below the lower edge of any opening through which progressive flooding may take place. Such openings should include air pipes and those which are capable of being closed by means of weathertight doors or hatch covers and may exclude those openings closed by means of watertight manhole covers and flush scuttles, small watertight cargo tank hatch covers which maintain the high integrity of the deck, remotely operated watertight sliding doors and sidescuttles of the non-opening type;

.2 in the final stage of flooding, the angle of heel due to unsymmetrical flooding should not exceed 15°. This angle may be increased up to 17° if no deck immersion occurs; and

.3 the stability in the final stage of flooding should be investigated and may be regarded as sufficient if the righting-lever curve has, at least, a range of 20° beyond the position of equilibrium in association with a maximum residual righting lever of at least 100 mm within this range. Unprotected openings should not become immersed at an angle of heel within the prescribed minimum range of residual stability unless the space in question has been included as a floodable space in calculations for damage stability. Within this range, immersion of any openings referred to in 2.8.3.1 and any other openings capable of being closed weather tight may be authorized.

2.9 Location of cargo tanks

2.9.1 Cargo tanks should be located at the following distances inboard:

.1 cargo tanks for IBC Code ship type 1 products: from the side shell plating, not less than the transverse extent of damage specified in 2.6.1.1.1, and from the moulded line of the bottom shell plating at centreline, not less than the vertical extent of damage specified in 2.6.1.2.1, and nowhere less than 760 mm from the shell plating. This provision does not apply to tanks for diluted slops arising from tank washing;

.2 cargo tanks for IBC Code ship type 2 products: from the moulded line of the bottom shell plating at centreline, not less than the vertical extent of damage specified in 2.6.1.2, and nowhere less than 760 mm from the shell plating. This provision does not apply to tanks for diluted slops arising from tank washing; and

.3 cargo tanks for IBC Code ship type 3 products: nowhere less than 760 mm from the shell plating. This provision does not apply to tanks for diluted slops arising from tank washing.

2.9.2 Suction wells installed in cargo tanks for IBC Code ship types 2 and 3 products may protrude below the inner bottom plating provided that such wells are as small as practicable and the protrusion below the inner bottom plating does not exceed 25% of the depth of the double bottom or 350 mm, whichever is less. Where there is no double bottom, the protrusion of the suction well of independent tanks below the upper limit of bottom damage should not exceed 350 mm. Suction wells installed in accordance with this paragraph may be ignored in determining the compartments affected by damage.

CHAPTER 3 – VESSEL DESIGN

To ensure that the cargo containment and handling system are located so that the consequences of any release of cargo will be minimized, and to provide safe access for operation and inspection. This chapter describes the minimum containment and handling provisions for all liquid cargoes. Additional provisions for those products with higher levels of hazard are described in chapter 4.

3.1 Cargo segregation

3.1.1 Tanks containing cargoes, residues of cargoes or mixtures containing cargoes subject to this Code should be segregated from machinery spaces as defined in 1.2.28 and 1.2.29, accommodation and service spaces and from drinking water and stores for human consumption by means of a cofferdam, void space, cargo pump-room, pump-room, empty

tank, oil fuel tank, or other similar space.[3] On-deck stowage of permanently attached deck tanks or installing independent tanks in otherwise empty hold spaces should be considered as satisfying this provision.

3.1.1.1 For pollution hazards only substances having a flashpoint exceeding 60°C, the segregation provisions need only be met for accommodations spaces, drinking water and stores for human consumption.

3.1.2 Cargoes, residues of cargoes or mixtures containing cargoes, which react in a hazardous manner with other cargoes or oil fuels should:

.1 be segregated from such other cargoes or oil fuels by means of a cofferdam, void space, cargo pump-room, pump-room, empty tank, or tank containing a mutually compatible cargo;

.2 have separate pumping and piping systems which should not pass through other cargo tanks containing such cargoes, unless encased in a tunnel; and

.3 have separate tank venting systems.

3.1.3 Cargo piping should not pass through any accommodation, service spaces or machinery space of category A.

3.1.4 If cargo piping systems or cargo venting systems are required to be separated, this separation may be achieved by the use of design or operational methods. Operational methods should not be used within a cargo tank or a cofferdam surrounding the cargo tanks, if entering of the cofferdam is required, and should consist of one of the following types:

.1 removing spool pieces or valves and blanking the pipe ends;

.2 arrangements of two spectacle flanges in series, with provisions for detecting leakage into the pipe between the two spectacle flanges; and

.3 blind flange valve with double shut-off and with provisions for detecting leakage in valve body.

3.1.5 Pumps, ballast lines, vent lines and other similar equipment serving ballast tanks should be separated from similar equipment serving cargo tanks and of cargo tanks themselves.

3.1.6 For access to all spaces, the minimum spacing between cargo tank boundaries and adjacent vessels' structure should be 600 mm.

3.1.7 Cargo tanks other than those certified to carry substances subject to the provisions of chapter 4 may extend to the deck plating. Where cargo is handled on the deck area above a cargo tank, the cargo tank may not extend to the deck plating unless a continuous permanent deck sheathing of min 50 mm of wood or other suitable material of equivalent thickness and construction is fitted.

3.1.8 Cargoes subject to this Code should not be carried in either the fore or aft peak tanks.

[3] Refer to the interpretation of SOLAS regulation II-2/4.5.1 (MSC/Circ.1120).

3.2 Accommodation, service and machinery spaces and control stations

3.2.1 Accommodation or service spaces or control stations should not be located within the cargo area.

3.2.2 For a vessel certified to carry safety hazard substances, entrances, air inlets and openings to accommodation, service and machinery spaces and control stations may be accepted in bulkheads facing the cargo deck area if they are spaced outside the deck area defined in 1.2.7.2.

3.2.3 Propulsion shafts may be routed through cargo pump-rooms.

3.3 Access to spaces in the cargo area

3.3.1 Unless expressly provided otherwise in chapter 4, the following should apply:

.1 for pollution hazard only substances at least one access to cargo tanks should be direct from the open deck and designed such as to ensure their complete inspection;

.2 for safety hazard substances at least one access to each cargo tank, cofferdams and other spaces in the cargo area should be direct from the open deck and designed such as to ensure their complete inspection; and

.3 access to double bottom spaces within the cargo area may be through a cargo pump-room, pump-room, deep cofferdam, pipe tunnel or similar dry compartments with their own direct access from open deck, subject to consideration of ventilation aspects. Where cofferdams are provided over integral tanks, small trunks may be used to penetrate the cofferdam.

3.3.2 For accesses defined in 3.3.1 and 4.1.8 through horizontal openings, hatches or manholes, the dimensions should be sufficient to allow a person with a self-contained air-breathing apparatus and protective equipment to ascend or descend any ladder without obstruction and also to provide a clear opening to facilitate the hoisting of an injured person from the bottom of the space. The minimum clear opening should be not less than 600 mm by 600 mm.

3.3.3 For accesses defined in 3.3.1 and 4.1.8 through vertical openings, or manholes providing passage through the length and breadth of space, the minimum clear opening should be not less than 600 mm by 800 mm at a height of not more than 600 mm from the bottom shell or deck plating, unless gratings or other footholds are provided.

3.3.4 Smaller dimensions may be approved, if at least one main access defined in 3.3.1 and 4.1.8 has dimensions not less than required in 3.3.2 and 3.3.3, respectively. The main access should clearly be identified in an access plan.

3.3.5 Cargo pump-rooms should be so arranged as to ensure unrestricted access to all valves necessary for cargo handling for a person wearing the required personal protective equipment.

CHAPTER 4 – SPECIAL REQUIREMENTS FOR PRODUCTS WITH A FLASHPOINT NOT EXCEEDING 60°C, TOXIC PRODUCTS AND ACID

To ensure that the designs of the vessels are such that the consequences of any release of liquid cargo with severe safety hazards will be minimized, and to provide protection to the vessel and crew from fire, toxic vapour and corrosive substances. The provisions in this chapter are additional to the general provisions of chapter 3 of this Code.

4.1 General requirements for products with a flashpoint not exceeding 60°C, toxic products or acids

4.1.1 Unless expressly provided otherwise, the provisions of this section are applicable to products with a flashpoint not exceeding 60°C, toxic products and acids. These provisions are additional to the general provisions of this Code.

4.1.2 Cargo tanks certified for products or residues of products subject to the provisions of this chapter should be segregated from machinery spaces, propulsion shaft tunnels, solid bulk cargo and underdeck access way if fitted, by means of a cofferdam[4], void space, cargo pump-room, empty tank or other similar space.

4.1.3 Cargo tanks certified for products subject to the provisions of this chapter need to be separated from the deck plating by cofferdams.

4.1.4 Cargo piping should not pass through any underdeck access way or machinery spaces.

4.1.5 Discharge arrangements for ballast or fresh water sited immediately adjacent to cargo tanks certified for products or residues of products subject to the provisions of this chapter should be outside machinery spaces and accommodation spaces. Filling arrangements may be in the machinery spaces provided that such arrangements ensure filling from main deck level and non-return valves are fitted.

4.1.6 Bilge pumping systems serving spaces where cargoes or residues of cargoes may occur are to be independent from systems serving spaces outside such areas and are to be entirely situated within the area related to cargos subject to this chapter. The bilge system serving these spaces should be operable from outside the cargo area.

4.1.7 In order to guard against the danger of hazardous vapours, due consideration should be given to the location of air intakes and openings into accommodation, passageways, service and machinery spaces and control stations in relation to cargo piping and cargo vent systems as defined in 1.2.7.

4.1.8 All access to cargo tanks, cofferdams, void spaces, cargo pump-room, pump-room, empty tank, or other spaces adjacent to cargo tanks certified for products subject to the provisions of this chapter, should be direct from the open deck and such as to ensure their complete inspection. The dimensions of the accesses should be in accordance with 3.3.2 to 3.3.4.

4.1.9 High walkways should not be located within the cargo area as defined in 1.2.7.3.3.

4.2 Products with a flashpoint not exceeding 60°C

4.2.1 The provisions of this section are applicable to products with a flashpoint not exceeding 60°C. These provisions are in addition to the general provisions of chapter 3 of this Code.

4.2.2 Unless they are spaced at least 7 m away from the deck area as defined in 1.2.7.3 entrances, air inlets and openings to accommodation, service and machinery spaces and control stations should not face the cargo deck area. Doors to spaces not having access to accommodation, service and machinery spaces and control stations, such as cargo control stations and store-rooms, may be permitted within the such deck area, provided the boundaries of the spaces are insulated to A-60 standard. When arranged within such deck

[4] Refer to the interpretation of SOLAS regulation II-2/4.5.1 (MSC/Circ.1120).

area, windows and sidescuttles facing the deck area should be of a fixed (non-opening) type. Such sidescuttles in the first tier on the main deck should be fitted with inside covers of steel or equivalent material.

4.3 Toxic products

4.3.1 The provisions of this section are applicable to toxic products. These provisions are additional to the general provisions of chapter 3 of this Code and to the special requirements in section 15.12 of the IBC Code.

4.3.2 Unless they are spaced at least 15 m away from the deck area as defined in 1.2.7.3 entrances, air inlets and openings to accommodation, service and machinery spaces and control stations should not face the deck area. Doors to spaces not having access to accommodation, service and machinery spaces and control stations, such as cargo control stations and store-rooms, may be permitted within such deck area, provided the boundaries of the spaces equivalent gas tightening to A-60 standard. Wheelhouse doors and wheelhouse windows may be located within the limits specified above so long as they are so designed that a rapid and efficient gas – and vapour-tightening of the wheelhouse can be ensured. Windows and sidescuttles facing the deck area and on the sides of the superstructures and deck-houses within the limits specified above should be of the fixed (non-opening) type. Such sidescuttles in the first tier on the main deck should be fitted with inside covers of steel or equivalent material.

4.3.3 For a vessel certified to carry toxic products only subject to the requirements of 15.12.3 and 15.12.4 of the IBC Code, entrances, air inlets and openings to accommodation, service and machinery spaces and control stations may be accepted in bulkheads facing the cargo deck area if they are spaced outside the deck area as defined in 1.2.7.3.

4.3.4 Cargo tanks certified to carry toxic products should be fitted with fixed tank washing arrangements. Other arrangement allowing cleaning of the tank(s) without the need for personnel to enter during the cleaning process may be fitted, if proper safety equipment is used.

4.3.5 The cargo deck area should be such to promote natural ventilation and to prevent toxic gas from accumulate in closed or partly closed spaces on deck. A high closed cargo rail in the stern are prohibited. However, if proper natural ventilation can be documented, higher aft bulwark/cargo rail may be accepted.

4.3.6 Means to minimize the range of a possible leak in the hose landing area on main deck should be provided. Example of means may be transverse gutter bars on both sides of the hose landing area in way of the loading stations.

4.3.7 The set point of the pressure side of the P/V-valves should be set at minimum 0.6 bar gauge.

4.4 Acids

4.4.1 The provisions of this section are applicable to acids. These provisions are additional to the general provisions of this Code and to the special requirements in section 15.11 of the IBC Code.

4.4.2 Floors or decks under acid storage tanks and pumps and piping for acid should have a lining or coating of corrosion-resistant material extending up to a minimum height of 500 mm on the bounding bulkheads or coamings. Hatches or other openings in such floors or decks should be raised to a minimum height of 500 mm; however, where the Administration determines that this height is not practicable, a lesser height may be required.

4.4.3 Flanges or other detachable pipe connections should be covered by spray shields.

4.4.4 Portable shield covers for connecting the flanges of the loading manifold should be provided. Drip trays of corrosion-resistant material should be provided under loading manifolds for acids.

4.4.5 Spaces for acid storage tanks and acid pumping and piping should be provided with drainage arrangements of corrosion-resistant materials.

4.4.6 Deck spills should be kept away from accommodation and service areas by means of a permanent coaming of suitable height and extension.

CHAPTER 5 – CARGO CONTAINMENT

To ensure the safe containment of cargo under all design and operating conditions having regard to the nature of the cargo carried.

5.1 Definitions

5.1.1 *Independent tank* means a cargo-containment envelope, which is not contiguous with, or part of, the hull structure. An independent tank is built and installed so as to eliminate whenever possible (or in any event to minimize) its stressing as a result of stressing or motion of the adjacent hull structure. An independent tank is not essential to the structural completeness of the vessels' hull.

5.1.2 *Integral tank* means a cargo-containment envelope which forms part of the vessels' hull and which may be stressed in the same manner and by the same loads which stress the contiguous hull structure and which is normally essential to the structural completeness of the vessels' hull.

5.1.3 *Gravity tank* means a tank having a design pressure not greater than 0.07 MPa gauge at the top of the tank. A gravity tank may be independent or integral. A gravity tank should be constructed and tested according to recognized standards, taking account of the temperature of carriage and relative density of the cargo.

5.1.4 *Pressure tank* means a tank having a design pressure greater than 0.07 MPa gauge. A pressure tank should be an independent tank and should be of a configuration permitting the application of pressure-vessel design criteria according to recognized standards.

5.2 Tank type requirements for individual products

5.2.1 Requirements for both installation and design of tank types for individual products are shown in *column f* in the table of chapter 17 of the IBC Code.

5.2.2 Instead of the use of permanently attached cargo deck-tanks complying with the requirements of the IBC Code, portable tanks meeting the construction requirements of the IMDG Code or other portable tanks specifically approved by the Administration, may be used for cargoes indicated in 1.1.9, provided that the provisions of chapter 17 are complied with. The applicable tank instruction for the products listed as dangerous goods in the IMDG Code should apply. Products with pollution hazard only and a flashpoint above 60°C falling within the scope of this Code, but for which the IMDG Code is not applicable, when carried in packaged form, should be shipped under the tank instruction and special tank requirements as included in the IMDG Code for goods with UN number 3082.

CHAPTER 6 – CARGO TRANSFER

To ensure the safe handling of all cargoes, under all normal operating conditions and foreseeable emergency conditions, to minimize the risk to the vessel, its crew and the environment, having regard to the nature of the products involved. This will:

.1 ensure the integrity of integral liquid product tanks, piping systems and cargo hoses;

.2 prevent the uncontrolled transfer of cargo; and

.3 ensure reliable means to fill and empty the cargo tank.

6.1 Piping scantlings

6.1.1 Subject to the conditions stated in 6.1.4, the wall thickness (t) of pipes should not be less than:

$t = (t_O+b+c) / (1-a/100)$ (mm)

where:

t_O = theoretical thickness

$t_O = P \times D/(2Ke+P)$ (mm)

with

P = design pressure (bar) referred to in 6.1.2

D = outside diameter (mm)

K = allowable stress (MPa) referred to in 6.1.5

e = efficiency factor equal to 1.0 for seamless pipes and for longitudinally or spirally welded pipes, delivered by approved manufacturers of welded pipes, which are considered equivalent to seamless pipes when non-destructive testing on welds is carried out in accordance with recognized standards. In other cases, an efficiency factor of less than 1.0, in accordance with recognized standards, may be required depending on the manufacturing process.

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

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

with

r = mean radius of the bend (mm)

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

A = negative manufacturing tolerance for thickness (%).

6.1.2 The design pressure P in the formula in 6.1.1 is the maximum gauge pressure to which the system may be subjected in service, taking into account the highest set pressure on the relief valve on the system.

6.1.3 Piping and piping-system components which are not protected by a relief valve, or which may be isolated from their relief valve, should be designed for at least the greatest of:

.1 piping systems or components, which may contain some liquid, the saturated vapour pressure at 45°C;

.2 the pressure setting of the associated pump discharge relief valve;

.3 the scantlings' maximum possible total pressure head at the outlet of the associated pumps when a pump discharge relief valve is not installed; and

.4 systems or components which may be separated from their relief valves and which contain only vapour at all times: the superheated vapour pressure at 45°C, assuming an initial condition of saturated vapour in the system at the system operating pressure and temperature.

6.1.4 The design pressure should not be less than 1 MPa gauge except for open-ended lines, where it should be not less than 0.5 MPa gauge.

6.1.5 For pipes, the allowable stress K to be considered in the formula in 6.1.1 is the lower of the following values:

R_m/A or R_e/B

where:

R_m = specified minimum tensile strength at ambient temperature (MPa).

R_e = specified minimum yield stress at ambient temperature (MPa). If the stress-strain curve does not show a defined yield stress, the 0.2% proof stress applies.

A and B should have values of at least A = 2.7 and B = 1.8.

6.1.5.1 The minimum wall thickness should be in accordance with recognized standards.

6.1.5.2 Where necessary for mechanical strength to prevent damage, collapse, excessive sag or buckling of pipes due to weight of pipes and content and to superimposed loads from supports, vessel deflection or other causes, the wall thickness should be increased over that required by 6.1.1 or, if this is impracticable or would cause excessive local stresses, these loads should be reduced, protected against or eliminated by other design methods.

6.1.5.3 Flanges, valves and other fittings should be in accordance with recognized standards, taking into account the design pressure defined under 6.1.2.

6.1.5.4 For flanges not complying with a standard, the dimensions for flanges and associated bolts should be to the satisfaction of the Administration.

6.2 Piping fabrication and joining details

6.2.1 The provisions of this section apply to piping inside and outside the cargo tanks. However, relaxations from these provisions may be accepted in accordance with recognized standards for open-ended piping and for piping inside cargo tanks except for cargo piping serving other cargo tanks.

6.2.2 Cargo piping should be joined by welding except:

.1 for approved connections to shutoff valves and expansion joints; and

.2 for any practical vessel building and pipe corrosion protection limits taking into account the provisions as stated in 6.2.5 and 6.3 in relation to any additional flanged connections, the use of flanged connections should be limited as far as possible.

6.2.3 Cargo piping for products or residues of products which are subject to the provisions of chapter 4 should be joined by welding.

6.2.4 The following direct connections of pipe lengths without flanges may be considered:

.1 butt-welded joints with complete penetration at the root may be used in all applications;

.2 slip-on welded joints with sleeves and related welding having dimensions in accordance with recognized standards should only be used for pipes with an external diameter of 50 mm or less. This type of joint should not be used when crevice corrosion is expected to occur; and

.3 screwed connections, in accordance with recognized standards, should only be used for accessory lines and instrumentation lines with external diameters of 25 mm or less.

6.2.5 Expansion of piping should normally be allowed for by the provision of expansion loops or bends in the piping system:

.1 bellows, in accordance with recognized standards and installed in an easily accessible location, may be specially considered; and

.2 slip joints should not be used.

6.2.6 Welding, post-weld heat treatment and non-destructive testing should be performed in accordance with recognized standards.

6.3 Flange connections

6.3.1 Flanges should be of the welded-neck, slip-on or socket-welded type. However, socket welded type flanges should not be used with an external diameter above 50 mm.

6.3.2 Flanges should comply with recognized standards as to their type, manufacture and test.

6.4 Test requirements for piping

6.4.1 The test provisions of this section apply to piping inside and outside cargo tanks. However, relaxations from these provisions may be accepted in accordance with recognized standards for piping inside tanks and open-ended piping.

6.4.2 After assembly, each cargo piping system should be subject to a hydrostatic test to at least 1.5 times the design pressure. When piping systems or parts of systems are completely manufactured and equipped with all fittings, the hydrostatic test may be conducted prior to installation aboard the vessel. Joints welded on board should be hydrostatically tested to at least 1.5 times the design pressure.

6.4.3 After assembly on board, each cargo piping system should be tested for leaks to a pressure depending on the method applied.

6.5 Piping arrangements

6.5.1 Cargo piping should not be installed under deck between the out-board side of the cargo containment spaces and the skin of the vessel unless clearances required for damage protection (see 2.9) are maintained; but such distances may be reduced where damage to the pipe would not cause release of cargo provided that the clearance required for inspection purposes is maintained.

6.5.2 Cargo piping located below the main deck may run from the tank it serves and penetrate tank bulkheads or boundaries common to longitudinally or transversally adjacent cargo tanks, ballast tanks, empty tanks, pump-rooms or cargo pump-rooms provided that inside the tank it serves it is fitted with a stop-valve operable from the weather deck and provided cargo compatibility is ensured in the event of piping failure. As an exception, where a cargo tank is adjacent to a cargo pump-room, the stop valve operable from the weather deck may be situated on the tank bulkhead on the cargo pump-room side, provided an additional valve is fitted between the bulkhead valve and the cargo pump. A totally enclosed hydraulically operated valve located outside the cargo tank may, however, be accepted, provided that the valve is:

.1 designed to preclude the risk of leakage;

.2 fitted on the bulkhead of the cargo tank which it serves;

.3 suitably protected against mechanical damage;

.4 fitted at a distance from the shell as required for damage protection; and

.5 operable from the weather deck.

6.5.3 If a cargo pump serves more than one tank, a stop valve should be fitted in the line to each tank.

6.5.4 Cargo piping installed in pipe tunnels should also comply with the provisions of 6.5.1 and 6.5.2. Pipe tunnels should satisfy all tank provisions for construction, location and ventilation and electrical hazard provisions. Cargo compatibility should be ensured in the event of a piping failure. The tunnel should not have any other openings except to the weather deck and cargo pump-room or pump-room.

6.5.5 Cargo piping passing through bulkheads should be so arranged as to preclude excessive stresses at the bulkhead and should not utilize flanges bolted through the bulkhead.

6.5.6. In order to prevent any generation of static electricity, the outlets of filling lines should be led as low as possible in the tanks, except for vessels intended to carry pollution hazard only substances having a flashpoint exceeding 60°C or oil products having a flashpoint exceeding 60°C.

6.6 Cargo-transfer control systems

6.6.1 For the purpose of adequately controlling the cargo, cargo-transfer systems should be provided with:

.1 one stop-valve capable of being manually operated on each tank filling and discharge line, located near the tank penetration; if an individual deep well pump is used to discharge the contents of a cargo tank, a stop-valve is not required on the discharge line of that tank;

.2 one stop valve and break-away fitting at each cargo-hose connection; and

.3 remote shutdown devices for all cargo pumps and similar equipment should be capable of being activated from a dedicated cargo control location which is manned at the time of cargo transfer and from at least one other location outside the cargo area and at a safe distance from it. Cargo controls located in the vessel wheelhouse are acceptable as one of the cargo control locations.

6.6.2 For certain products, additional cargo-transfer control requirements are shown in *column o* in the table of chapter 17 of the IBC Code.

6.6.3 Pump discharge pressure gauges or readouts should be provided outside the cargo pump-room.

6.7 Vessels' cargo hoses

6.7.1 Liquid and vapour hoses used for cargo transfer should be compatible with the cargo and suitable for the cargo temperature.

6.7.2 Hoses subject to tank pressure or the discharge pressure of pumps should be designed for a bursting pressure not less than 5 times the maximum pressure the hose will be subjected to during cargo transfer.

6.7.3 Drip trays for collecting cargo residues in cargo lines and hoses should be provided in the area of pipe and hose connections under the manifold area.

6.7.4 Each type of cargo hose, complete with end-fittings, should be prototype tested at a normal ambient temperature with 200 pressure cycles from zero to at least twice the specified maximum working pressure. After this cycle pressure test has been carried out, the prototype test should demonstrate a bursting pressure of at least 5 times its specified maximum working pressure at the extreme service temperature. Hoses used for prototype testing should not be used for cargo service. Thereafter, before being placed in service, each new length of cargo hose produced should be hydrostatically tested at ambient temperature to a pressure not less than 1.5 times its specified maximum working pressure but not more than two-fifths of its bursting pressure. The hose should be stencilled or otherwise marked with the date of testing, its specified maximum working pressure and, if used in services other than the ambient temperature services, its maximum and minimum service temperature, as applicable. The specified maximum working pressure should not be less than 10 bar gauge.

CHAPTER 7 – CARGO TANK VENTING

To protect cargo containment systems from harmful over-pressure or under-pressure at all times.

7.1 General

7.1.1 All cargo tanks should be provided with a venting system appropriate to the cargo being carried and these systems should be independent of the air pipes and venting systems of all other compartments of the vessel. Tank venting systems should be designed so as to minimize the possibility of cargo vapour accumulating about the decks, entering accommodation, service and machinery spaces and control stations and, in the case of flammable vapours, entering or collecting in spaces or areas containing sources of ignition. Tank venting systems should be arranged to prevent entrance of water into the cargo tanks.

7.1.2 The venting systems should be connected to the top of each cargo tank and, as far as practicable, the cargo vent lines should be self-draining back to the cargo tanks under all normal operational conditions of list and trim. Where it is necessary to drain venting systems above the level of any pressure/vacuum valve, capped or plugged drain cocks should be provided.

7.1.3 Provision should be made to ensure that the liquid head in any tank does not exceed the design head of the tank. Suitable high-level alarms, overflow control systems or spill valves, together with gauging and tank filling procedures, may be accepted for this purpose. Where the means of limiting cargo tank overpressure includes an automatic closing valve, the valve should comply with the appropriate requirements of 15.19 of the IBC Code.

7.1.4 Tank venting systems should be designed and operated so as to ensure that neither pressure nor vacuum created in the cargo tanks during loading or unloading exceeds tank design parameters. The main factors to be considered in the sizing of a tank venting system are as follows:

.1 design loading and unloading rate;

.2 gas evolution during loading: this should be taken account of by multiplying the maximum loading rate by a factor of at least 1.25;

.3 density of the cargo vapour mixture;

.4 pressure loss in vent piping and across valves and fittings; and

.5 pressure/vacuum settings of relief devices.

7.1.5 Tank vent piping connected to cargo tanks of corrosion-resistant material or to tanks which are lined or coated to handle special cargoes as required by chapter 15 of the IBC Code, should be similarly lined or coated or constructed of corrosion-resistant material.

7.1.6 The master should be provided with the maximum permissible loading and unloading rates for each tank or group of tanks consistent with the design of the venting systems.

7.2 Types of tank venting systems

7.2.1 An open tank venting system is a system which offers no restriction except for friction losses to the free flow of cargo vapours to and from the cargo tanks during normal operations. An open venting system may consist of individual vents from each tank, or such individual vents may be combined into a common header or headers, with due regard to cargo segregation. In no case should shutoff valves and all other means of stoppage, including spectacle blanks and blank flanges be fitted either to the individual vents or to the header.

7.2.2 A controlled tank venting system is a system in which pressure- and vacuum-relief valves or pressure/vacuum valves are fitted to each tank to limit the pressure or vacuum in the tank. A controlled venting system may consist of individual vents from each tank or such individual vents on the pressure side only as may be combined into a common header or headers, with due regard to cargo segregation. In no case should shut-off valves and all other means of stoppage, including spectacle blanks and blank flanges be fitted either above or below pressure- or vacuum-relief valves or pressure/vacuum valves. Provision may be made for bypassing a pressure- or vacuum-relief valve or pressure/vacuum valve under certain operating conditions provided that the requirement of 7.2.6 is maintained and that there is suitable indication to show whether or not the valve is bypassed.

7.2.3 Controlled tank venting systems should consist of a primary and a secondary means of allowing full flow relief of vapour to prevent over-pressure or under-pressure in the event of failure of one means. Alternatively, the secondary means may consist of pressure sensors fitted in each tank with a monitoring system in the vessels' cargo control room or position from which cargo operations are normally carried out. Such monitoring equipment should also provide an alarm facility which is activated by detection of over pressure or under pressure conditions within a tank.

7.2.4 The outlets of a controlled tank venting system should direct the vapour discharge upwards in the form of unimpeded jets and the position should be arranged at a height of not less than 6 m above the weather deck.

7.2.5 The outlet height referred to in 7.2.4 may be reduced to 3 m above weather deck provided that high-velocity venting valves of an approved type with an exit velocity of at least 30 m/s, are fitted.

7.2.6 Controlled tank venting systems fitted to tanks to be used for cargoes having a flashpoint not exceeding 60°C should be provided with devices to prevent the passage of flame into the cargo tanks. The design, testing and locating of the devices should comply with the provisions of the Administration, which should contain at least the standards adopted by the Organization.

7.2.7 In designing venting systems and in the selection of devices to prevent the passage of flame for incorporation into the tank venting system, due attention should be paid to the possibility of the blockage of these systems and fittings by, for example, the freezing of cargo vapour, polymer build up, atmospheric dust or icing up in adverse weather conditions. In this context it should be noted that flame arresters and flame screens are more susceptible to blockage. Provisions should be made such that the system and fittings may be inspected, operationally checked, cleaned or renewed as applicable.

7.2.8 Pressure tanks should be fitted with pressure relief devices that are so designed as to direct the discharge away from personnel and have a set pressure and capacity which is in accordance with standards acceptable to the Administration taking into account the design pressure referred to in 6.1.5.

7.3 Venting requirements for individual products

Venting requirements for individual products are shown in *column g* and additional requirements in *column o* in the table of chapter 17 of the IBC Code.

7.4 Cargo tank gas-freeing

7.4.1 The arrangements for gas-freeing cargo tanks used for cargoes other than those for which open venting is permitted should be such as to minimize the hazards due to the dispersal of flammable or toxic vapours in the atmosphere and to flammable or toxic vapour mixtures in a cargo tank. Accordingly, gas-freeing operations should be carried out such that vapour is initially discharged:

.1 through the vent outlets specified in 7.2.4 and 7.2.5; or

.2 through outlets at least 2 m above the cargo tank deck level with a vertical exit velocity of at least 30 m/s maintained during the gas-freeing operation; or

.3 through outlets at least 2 m above the cargo tank deck level with a vertical exit velocity of at least 20 m/s which are protected by suitable devices to prevent the passage of flame.

When the flammable vapour concentration at the outlets has been reduced to 30% of the lower flammable limit and, in the case of a toxic product, the vapour concentration does not present a significant health hazard, gas-freeing may thereafter be continued at cargo tank deck level.

7.4.2 The outlets referred to in 7.4.1.2 and 7.4.1.3 may be fixed or portable pipes.

7.4.3 In designing a gas-freeing system in conformity with 7.4.1, particularly in order to achieve the required exit velocities of 7.4.1.2 and 7.4.1.3, due consideration should be given to the following:

.1 materials of construction of system;

.2 time to gas-free;

.3 flow characteristics of fans to be used;

.4 the pressure losses created by ducting, piping, cargo tank inlets and outlets;

.5 the pressure achievable in the fan driving medium (e.g. water or compressed air); and

.6 the densities of the cargo vapour/air mixtures for the range of cargoes to be carried.

CHAPTER 8 – ELECTRICAL INSTALLATIONS

To ensure electrical installations are designed so as to minimize the risk of fire and explosion from flammable products; and ensure availability of electrical generation and distribution systems relating to the safe carriage, handling and conditioning of cargoes.

8.1 General requirements

8.1.1 The provisions of this chapter are applicable to vessels carrying cargoes which are inherently, or due to their reaction with other substances, flammable or corrosive to the electrical equipment, and should be applied in conjunction with applicable electrical requirements of part D of chapter II-1 of SOLAS.

8.1.2 Electrical installations should be such as to minimize the risk of fire and explosion from flammable products. Appropriate precautions should be taken to recognizing the risks that might be associated with deterioration of the electrical system and equipment from environment created by the products.

8.1.3 Electrical installation should be in accordance with standards acceptable to the Organization[5].

8.1.4 Electrical equipment or wiring should not be installed in hazardous areas unless essential for operational purposes or safety enhancement.

8.1.5 Where electrical equipment is installed in hazardous areas as provided in 8.1.4 it should be selected, installed and maintained in accordance with standards not inferior to those acceptable to the Organization[5]. Equipment for hazardous areas should be evaluated and certified or listed by an accredited testing authority or notified body recognized by the Administration. Automatic isolation of non-certified equipment on detection of a flammable gas should not be accepted as an alternative to the use of certified equipment.

8.1.6 To facilitate the selection of appropriate electrical apparatus and the design of suitable electrical installations, hazardous areas are divided into zones in accordance with recognized standards[5].

8.1.7 The lighting system in hazardous areas should be divided between at least two branch circuits. All switches and protective devices should interrupt all poles or phases and should be located in a non-hazardous area.

8.2 Electrical requirements for individual products

Electrical requirements for individual products are shown in *column i* in the table of chapter 17 of the IBC Code.

CHAPTER 9 – FIRE FIGHTING REQUIREMENTS

To ensure that suitable systems are provided to protect the vessel and crew from fire in the cargo area.

9.1 Application

9.1.1 For the carriage of liquids covered by this Code, the requirements for tankers in chapter II-2 of SOLAS should apply to vessels covered by this Code, irrespective of tonnage, including vessels of less than 500 GT, except that:

.1 regulations 10.8 (cargo tank protection) and 10.9 (protection of cargo pump-rooms in tankers) should not be applied;

.2 the provisions of 9.3 of this Code should be applied in lieu of regulation 10.8 (cargo tank protection);

.3 the provisions of 9.2 of this Code should be applied in lieu of regulation 10.9 (protection of cargo pump-rooms in tankers);

[5] Reference is made to the recommendations published by the International Electrotechnical Commission, in particular to Publication IEC 60092-502: 1999.

.4 regulation 4.5.1.1 (i.e. positioning of machinery spaces aft of cargo tanks, slop tanks, cargo pump-rooms and cofferdams), regulation 4.5.1.2 (i.e. the requirements for location of the main cargo control station), regulations 4.5.1.4 (combination carriers) and 4.5.2.1 (access to accommodations, boundary bulkheads) to 4.5.2.3 (windows facing cargo area) need not be applied;

.5 with regard to regulation 9.2.4.1, the Administration may permit use of a method other than *IC* as defined in regulation 9.2.3.1.1.1;

.6 for spaces other than cargo pump-room spaces, the requirements of regulation 9.2.3 (cargo vessels except tankers) may be applied in lieu of those in regulation 9.2.4.2. Additionally, regulation 9.2.4.2.5 (A-60 standard) need not be applied provided that the exterior boundaries of superstructures and deckhouses enclosing accommodation and including any overhanging decks which support such accommodation are spaced outside the cargo deck area defined in 1.2.7.3;

.7 regulations 4.5.3 (cargo tank venting), 4.5.4 (ventilation), 4.5.7 (gas measurement) and 4.5.8 (air supply to double hull spaces and double bottom spaces) need not be applied where alternative arrangements are provided, having due regard to the provisions of this Code;

.8 for vessels below 2,000 GT, regulations 10.2 (water supply systems), 10.4 (fixed fire-extinguishing systems) and 10.5 (fire-extinguishing arrangements in machinery spaces) should apply as they would apply to cargo vessels of 2,000 GT and over;

.9 regulation 4.5.10 should apply to vessels of 500 GT and over, replacing "hydrocarbon gases" by "flammable vapours" in the regulation; and

.10 regulations 13.3.4 (EEBDs) and 13.4.3 (EEBDs) should apply to vessels of 500 GT and over.

9.1.2 Notwithstanding the provisions of 9.1.1, vessels engaged solely in the carriage of products which are identified in chapter 17 of the IBC Code as non-flammable (entry "NF" in *column i* of the table of minimum requirements) need not comply with requirements for tankers specified in SOLAS chapter II-2, provided that they comply with the requirements for cargo vessels of that chapter, except that regulation 10.7 (fire-extinguishing arrangements in cargo spaces) need not apply to such vessels and 9.2 and 9.3, hereunder, need not apply.

9.1.3 For vessels engaged solely in the carriage of products with a flashpoint exceeding 60°C (entry "Yes" in *column i* of the table of minimum requirements), the requirements of SOLAS chapter II-2 may apply as specified in regulation II-2/1.6.4 (tankers carrying petroleum products with a flashpoint exceeding 60°C) in lieu of the provisions of this chapter.

9.1.4 For vessels engaged in both carriage of products with a flashpoint exceeding 60°C and products with a flashpoint not exceeding 60°C, the provisions of 9.2 and 9.3 are only applicable to the cargo areas and pump-rooms in connection with the tanks for carriage of products with a flashpoint not exceeding 60°C. Further, the requirement for tankers, given in SOLAS chapter II-2 as given in 9.1.1 above, is only applicable to cargo areas, cargo space, cargo tanks, pump-rooms, control stations and other spaces in connection with the tanks for carriage of products with a flashpoint not exceeding 60°C.

9.2 Cargo pump-rooms

9.2.1 The cargo pump-room of any vessel to which the provisions of 9.1.4 apply should be provided with a fixed carbon dioxide fire-extinguishing system as specified in SOLAS regulation II-2/10.9.1.1. A notice should be exhibited at the controls stating that the system is only to be used for fire-extinguishing and not for inerting purposes, due to the electrostatic ignition hazard. The alarms referred to in SOLAS regulation II-2/10.9.1.1.1 (safe alarms) should be safe for use in a flammable cargo vapour/air mixture. For the purpose of this requirement, an extinguishing system should be provided which would be suitable for machinery spaces. However, the amount of gas carried should be sufficient to provide a quantity of free gas equal to 45% of the gross volume of the cargo pump-room in all cases.

9.2.2 Cargo pump-rooms of vessels which are dedicated to the carriage of a restricted number of cargoes should be protected by an appropriate fire-extinguishing system approved by the Administration.

9.2.3 If cargoes are to be carried which are not suited to extinguishment by carbon dioxide or equivalent media, the cargo pump-room should be protected by a fire-extinguishing system consisting of either a fixed pressure water spray or high expansion foam system. The International Certificate of Fitness should reflect this conditional requirement.

9.3 Protection of the cargo area

9.3.1 Every vessel should be provided with a fixed deck foam system in accordance with the provisions of 9.3.2 to 9.3.8.

9.3.2 The system should be located and sized to supply simultaneously foam to the deck area as defined in 1.2.7.3 through .5 and .7.

9.3.3 All parts of the areas are to be protected by either fixed foam monitor(s) or fixed nozzles or a combination of both.

9.3.4 In case of foam monitors, one monitor may be sufficient and the distance from the monitor to the farthest extremity of the protected area should not be more than 75% of the monitor throw in still air conditions. The monitor(s) should be in a location that is not above the cargo tanks and is readily accessible and operable in the event of fire in the areas protected.

9.3.5 The deck foam system should be capable of simple and rapid operation. The main control station for the system should be suitably located outside of the cargo area, adjacent to the accommodation spaces and readily accessible and operable in the event of fires in the areas protected.

9.3.6 Application rate should be 10 *l*/min/m^2 with sufficient supply for at least 30 min for tanks without an overlying cofferdam and 20 min for tanks with an overlying cofferdam. Water supply to the fixed foam fire extinguishing system should be in addition to the water supply required for the vessels fire main.

9.3.7 The foam concentrates should be compatible with the cargo carried.

9.3.8 In addition, the vessel should carry in a readily available position, at cargo deck level, two portable foam applicator units with at least four portable 20 *l* containers with foam concentrate, for use with water supplied by the vessels fire main.

9.4 Special requirements

All fire-extinguishing media determined to be effective for each product are listed in *column ℓ* in the table of chapter 17 in the IBC Code. Refer to the MSDS for each product to be carried.

CHAPTER 10 – MECHANICAL VENTILATION IN THE CARGO AREA

To ensure that arrangements are provided for enclosed spaces in the cargo area to control the accumulation of flammable and/or toxic vapours.

10.1 Application

10.1.1 For vessels to which this Code applies, the provisions of this chapter replace the requirements of SOLAS regulations II-2/4.5.2.6 and 4.5.4.1.

10.1.2 However, for products addressed under 9.1.3, except acids and products for which 15.12 and/or 15.17 of the IBC Code applies, SOLAS regulations II-2/4.5.2.6 and 4.5.4.1 may apply in lieu of the provision of 10.2 of this chapter.

10.1.3 For non-flammable products addressed under 9.1.2, except acids and products for which 15.12 and/or 15.17 of the IBC Code applies, the provisions for permanent installations in 10.3 may apply for spaces required to be entered during normal cargo handling operations.

10.2 Spaces normally entered during normal cargo handling operations

10.2.1 Cargo pump-rooms, spaces containing cargo handling equipment and other enclosed spaces where cargo vapours may accumulate should be fitted with fixed mechanical ventilation systems, capable of being controlled from outside such spaces. The ventilation should be run continuously to prevent the accumulation of toxic vapours. A warning notice requiring the use of such ventilation prior to entering should be placed outside the compartment.

10.2.2 Mechanical ventilation inlets and outlets should be arranged to ensure sufficient air movement through the space to avoid accumulation of toxic or asphyxiant vapours, and to ensure a safe working environment.

10.2.3 The ventilation system should have a capacity of not less than 30 changes of air per hour, based upon the total volume of the space.

10.2.4 Where a space has an opening into an adjacent more hazardous space or area, it should be maintained at an over-pressure. It may be made into a less hazardous space or non-hazardous space by over-pressure protection in accordance with standards acceptable to the Organization[6].

10.2.5 Ventilation systems should be permanent and should normally be of extraction type. Extraction from above and below the floor plates should be possible.

10.2.6 Ventilation intakes should be so arranged as to minimize the possibility of recycling hazardous vapours from any ventilation discharge opening.

10.2.7 Ventilation ducts serving hazardous areas should not be led through accommodation, service and machinery spaces or control stations.

[6] Refer to IEC 60092-502:1999.

10.2.8 Electric motors driving fans should be placed outside the ventilation ducts that may contain flammable vapours. Ventilation fans should not produce a source of ignition in either the ventilated space or the ventilation system associated with the space. For hazardous areas, ventilation fans and ducts, adjacent to the fans, should be of non-sparking construction, as defined below:

.1 impellers or housing of non-metallic construction, with due regard being paid to the elimination of static electricity;

.2 impellers and housing of non-ferrous materials;

.3 impellers and housing of austenitic stainless steel; and

.4 ferrous impellers and housing with not less than 13 mm design tip clearance.

10.2.9 Any combination of an aluminium or magnesium alloy fixed or rotating component and a ferrous fixed or rotating component, regardless of tip clearance, is considered a sparking hazard and should not be used in these places.

10.2.10 Where fans are required by this chapter, full required ventilation capacity for each space should be available after failure of any single fan or spare parts should be provided comprising a motor, starter spares and complete rotating element, including bearings of each type.

10.2.11 Protection screens of not more than 13 mm square mesh should be fitted to outside openings of ventilation ducts.

10.2.12 Where spaces are protected by over-pressure the ventilation should be designed and installed in accordance with standards acceptable to the Organization[6].

10.3 Spaces not normally entered

Enclosed spaces where cargo vapours may accumulate should be capable of being ventilated to ensure a safe environment when entry into them is necessary. This should be capable of being achieved without the need for prior entry. For permanent installations, the capacity of eight air changes per hour should be provided and for portable systems, the capacity of 16 air changes per hour. Fans or blowers should be clear of personnel access openings, and should comply with 10.2.8.

CHAPTER 11 – INSTRUMENTATION AND AUTOMATION SYSTEMS

To ensure that the instrument and automation systems provide for the safe carriage and handling of cargoes.

11.1 General

11.1.1 Each cargo tank should be provided with a means for indicating level.

11.1.2 If loading and unloading of the vessel is performed by means of remotely controlled valves and pumps, all controls and indicators associated with a given cargo tank should be concentrated in at least one cargo control station.

11.1.3 Instruments should be tested to ensure reliability under the working conditions and recalibrated at regular intervals. Test procedures for instruments and the intervals between recalibration should be in accordance with manufacturer's recommendations.

11.2 Level indicators for cargo tanks

11.2.1 Each cargo tank should be fitted with liquid level gauging device(s), arranged to ensure a level reading is always obtainable whenever the cargo tank is operational. The device(s) should be designed to operate throughout the design pressure range of the cargo tank and at temperatures within the cargo operating temperature range.

11.2.2 Where the installation of liquid level gauging devices are impractical due to the properties of the cargo, such as liquid muds, a visual means of indicating the cargo tank level should be provided for cargo loading operations, subject to approval by the Administration.

11.2.3 Where only one liquid level gauge is fitted it should be arranged so that it can be maintained in an operational condition without the need to empty or gas-free the tank.

11.2.4 Cargo tank liquid level gauges may be of the following types, subject to special requirements for particular cargoes shown in *column j* in the table of chapter 17 of the IBC Code:

.1 open device: which makes use of an opening in the tanks and may expose the gauge to the cargo or its vapour. An example of this is the ullage opening;

.2 restricted device: which penetrates the tank and which, when in use, permits a small quantity of cargo vapour or liquid to be exposed to the atmosphere. When not in use, the device is completely closed. The design should ensure that no dangerous escape of tank contents (liquid or spray) can take place in opening the device; and

.3 closed device: which penetrates the tank, but which is part of a closed system and keeps tank contents from being released. Examples are the float-type systems, electronic probe, magnetic probe and protected sight-glass. Alternatively, an indirect device which does not penetrate the tank shell and which is independent of the tank may be used. Examples are weighing of cargo, pipe flowmeter.

11.3 Overflow control

The requirements of 15.19 of the IBC Code are applicable where specific reference is made in *column o* in the table of chapter 17 thereof, and are in addition to the provisions for gauging devices as stated in 11.2.

11.4 Vapour detection

11.4.1 Vessels carrying toxic or flammable products or both should be equipped with at least two instruments designed and calibrated for testing for the specific vapours in question. If such instruments are not capable of testing for both toxic concentrations and flammable concentrations, then two separate sets of instruments should be provided.

11.4.2 Vapour-detection instruments may be portable or fixed. If a fixed system is installed, at least one portable instrument should be provided.

11.4.3 When toxic-vapour-detection equipment is not available for some products which require such detection, as indicated in *column k* in the table of chapter 17 of the IBC Code, the Administration may exempt the vessel from the requirement, provided an appropriate entry is made on the Certificate of Fitness. When granting such an exemption, the Administration should recognize the necessity for additional breathing-air supply and an entry should be made on the Certificate of Fitness drawing attention to the requirements of 14.2.7 and 16.4.2.2 of the IBC Code.

11.4.4 Vapour-detection requirements for individual products are shown in *column k* in the table of chapter 17 of the IBC Code.

CHAPTER 12 – POLLUTION PREVENTION REQUIREMENTS

To ensure control of pollution from noxious liquid substances from offshore support vessels.

12.1 Each vessel certified to carry noxious liquid substances should be provided with a Cargo Record Book, a Procedure and Arrangements Manual and a Shipboard Marine Pollution Emergency Plan developed for the vessel in accordance with MARPOL Annex II and approved by the Administration.

12.2 Discharge into the sea of residues of noxious liquid substances permitted for carriage under this Code, tank washings, or other residues or mixtures containing such substances, is prohibited. Any discharges of residues and mixtures containing noxious liquid substances should be to port reception facilities. As a consequence of this prohibition, there are no requirements for efficient stripping and underwater discharge arrangements in MARPOL Annex II.

CHAPTER 13 – LIFE-SAVING APPLIANCES AND ARRANGEMENTS

To ensure that life-saving appliances and arrangements are provided in such a way to protect the life and safety of personnel on OSVs, having regard to the nature and volume of cargo carried.
For vessels carrying more than 1,200 m^3 of cargoes with a flashpoint not exceeding 60°C or carrying cargoes emitting toxic vapours or gasses, the requirements for chemical tankers of SOLAS chapter III should apply.

CHAPTER 14 – PERSONNEL PROTECTION

To ensure that protective equipment is provided for crew members, taking into account both routine operations or emergency situations and possible short-term or long-term effects of the product being handled.

14.1 Protective equipment

14.1.1 Suitable protective equipment, including eye protection to a recognized national or international standard, should be provided for protection of crew members engaged in normal cargo operations, taking into account the characteristics of the products being carried.

14.1.2 Personal protective and safety equipment required in this chapter should be kept in suitable, clearly marked lockers located in readily accessible places. Special arrangements should apply to contaminated clothing as appropriate.

14.2 First aid equipment

14.2.1 A stretcher that is suitable for hoisting an injured person from spaces below deck should be kept in a readily accessible location.

14.2.2 The vessel should have on board medical first aid equipment, including oxygen resuscitation equipment, based on the provisions of the Medical First Aid Guide for use in accident involving dangerous goods (MFAG) for the cargoes listed on the Certificate of Fitness.

14.3 Safety equipment

14.3.1 Vessels carrying cargoes for which "15.12", "15.12.1" or "15.12.3" is indicated in *column o* in the table of chapter 17 of the IBC Code should have on board sufficient but not less than three complete sets of safety equipment, each permitting personnel to enter a gas-filled compartment and perform work there for at least 20 min. Such equipment should be in addition to that required by SOLAS regulation II-2/10.10.

14.3.2 Each complete set of safety equipment should consist of:

.1 one self-contained positive pressure air breathing apparatus incorporating full face mask, not using stored oxygen and having a capacity of at least 1,200 *l* of free air. Each set should be compatible with that required by SOLAS regulation II-2/10.10;

.2 protective clothing, boots and gloves to a recognized standard;

.3 steel cored rescue line with belt; and

.4 explosion proof lamp.

14.3.3 For the safety equipment required in 14.3.1, all vessels should carry either:

.1 one set of fully charged spare air bottles for each breathing apparatus;

.2 a special air compressor suitable for the supply of high-pressure air of the required purity;

.3 a charging manifold capable of dealing with sufficient spare air bottles for the breathing apparatus; or

.4 fully charged spare air bottles with a total free air capacity of at least 6,000 *l* for each breathing apparatus on board in excess of the requirements of SOLAS regulation II-2/10.10.

14.3.4 A cargo pump-room on vessels carrying cargoes which are subject to the requirements of 15.18 of the IBC Code or cargoes for which in *column k* in the table of chapter 17 thereof toxic-vapour-detection equipment is required but is not available should have either:

.1 a low-pressure line system with hose connections suitable for use with the breathing apparatus required by 14.3.1. This system should provide sufficient high-pressure air capacity to supply, through pressure-reduction devices, enough low-pressure air to enable two men to work in a gas-dangerous space for at least 1 h without using the air bottles of the

breathing apparatus. Means should be provided for recharging the fixed air bottles and the breathing apparatus air bottles from a special air compressor suitable for the supply of high-pressure air of the required purity; or

.2 an equivalent quantity of spare bottled air in lieu of the low-pressure air line.

14.3.5 Safety equipment as required by 14.3.2 should be kept in a suitable clearly marked locker in a readily accessible place near the cargo pump-room or cargo area.

14.3.6 The breathing apparatus should be inspected at least once a month by a responsible officer, and the inspection recorded in the vessels' log-book. The equipment should be inspected and tested by an expert at least once a year.

14.4 Emergency equipment

14.4.1 Vessels carrying cargoes, for which "Yes" is indicated in *column n* of chapter 17 of the IBC Code, should be provided with suitable respiratory and eye protection sufficient for every person on board for emergency escape purposes, subject to the following:

.1 filter-type respiratory protection is unacceptable;

.2 self-contained breathing apparatus should have at least a duration of service of 15 min; and

.3 emergency escape respiratory protection should not be used for firefighting or cargo handling purposes and should be marked to that effect.

14.4.2 One or more suitably marked decontamination showers and eyewash stations should be available on deck, taking into account the size and layout of vessel. The showers and eyewashes should be operable in all ambient conditions.

CHAPTER 15 – OPERATIONAL REQUIREMENTS

To ensure that all crew members involved in cargo operations have sufficient information about cargo properties and operating the cargo system so they can conduct cargo operations safely.

15.1 General

15.1.1 The quantity of a cargo required to be carried should be in accordance with the requirements in 16.1.1 and 16.1.2 of the IBC Code.

15.1.2 Tanks carrying liquids at ambient temperatures should be so loaded as to avoid the tank becoming liquid-full during the voyage, having due regard to the highest temperature which the cargo may reach.

15.1.3 When carrying cargo requiring controlled venting in *column g* in the table of chapter 17 of the IBC Code, the access to any surrounding areas in the horizontal plane and upwards of the vent outlet should be restricted within a 4 m horizontal zone.

15.2 Cargo information

15.2.1 A copy of this Code and the IBC Code, or national regulations incorporating the requirements of this Code and the IBC Code, should be on board every vessel covered by this Code.

15.2.2 Any cargo offered for bulk shipment should be indicated in the shipping documents by the product name, under which it is listed in chapter 17 or 18 of the IBC Code or the latest edition of MEPC.2/Circular or under which it has been provisionally assessed. Where the cargo is a mixture, an analysis indicating the dangerous components contributing significantly to the total hazard of the product should be provided, or a complete analysis if this is available. Such an analysis should be certified by the manufacturer or by an independent expert acceptable to the Administration.

15.2.3 Information should be on board, and available to all concerned, giving the necessary data for the safe carriage of the cargo in bulk. Such information should include a cargo stowage plan, to be kept in an accessible place, indicating all cargo on board, including each dangerous chemical carried:

.1 a full description of the physical and chemical properties, including reactivity, necessary for the safe containment of the cargo;

.2 action to be taken in the event of spills or leaks;

.3 countermeasures against accidental personal contact;

.4 fire-fighting procedures and fire-fighting media; and

.5 procedures for cargo transfer, tank cleaning, gas-freeing and ballasting.

15.2.4 For those cargoes required to be stabilized or inhibited, the cargo should be refused if the certificate required by these paragraphs is not supplied.

15.2.5 If sufficient information, necessary for the safe transportation of the cargo, is not available, the cargo should be refused.

15.2.6 Where *column o* in the table of chapter 17 of the IBC Code refers to this paragraph, the cargo's viscosity at 20°C should be specified on a shipping document, and if the cargo's viscosity exceeds 50 mPa·s at 20°C, the temperature at which the cargo has a viscosity of 50 mPa·s should be specified in the shipping document.

15.2.7 Where *column o* in the table of chapter 17 of the IBC Code refers to this paragraph, the cargo's melting point should be indicated in the shipping document.

15.3 Personnel training[7]

15.3.1 All personnel should be adequately trained in the use of protective equipment and have basic training in the procedures appropriate to their duties necessary under emergency conditions.

[7] Refer to parts A and B of the Seafarers' Training, Certification and Watchkeeping (STCW) Code.

15.3.2 Personnel involved in cargo operations should be adequately trained in handling procedures.

15.3.3 Officers should be trained in emergency procedures to deal with conditions of leakage, spillage or fire involving the cargo and a sufficient number of them should be instructed and trained in essential first aid for cargoes carried, based on the guidelines developed by the Organization[8].

15.4 Opening of and entry into cargo tanks

15.4.1 During handling and carriage of cargoes producing flammable and/or toxic vapours or when ballasting after the discharge of such cargo, or when loading or unloading cargo, cargo tank lids should always be kept closed. With any hazardous cargo, cargo tank lids, ullage and sighting ports and tank washing access covers should be open only when necessary.

15.4.2 Enclosed space entry should be planned and conducted in a safe manner, taking into account, as appropriate, the guidance provided in the recommendations developed by the Organization[9].

15.4.3 Personnel should not enter such spaces when the only hazard is of a purely flammable nature, except under the close supervision of a responsible officer[10].

15.5 Simultaneous carriage of deck cargo and products

15.5.1 Deck cargo and products covered by this Code should not be loaded or unloaded simultaneously.

15.5.2 Notwithstanding the provisions of 15.5.1, deck cargo and pollution hazard only products having a flashpoint exceeding 60°C, may be loaded or unloaded simultaneously provided that:

.1 each operation is defined and assigned to qualified personnel dedicated to that specific operation;

.2 a safe working distance between the operations on board is observed; and

.3 the procedures, plans and instructions on board identify specific criteria for when the simultaneously performed operations should not be conducted.

15.5.3 During loading or unloading operations covered by this Code only personnel engaged in cargo operation should be permitted to be in the cargo deck area; personnel not engaged in cargo operation should be minimized in the adjacent open main deck.

8 Refer to the IMO/WHO/ILO Medical First Aid Guide for Use in Accidents Involving Dangerous Goods (MFAG), as amended.

9 Refer to the *Revised recommendations for entering enclosed space aboard ships* (resolution A.1050(27)).

10 Refer to the IMO/WHO/ILO Medical First Aid Guide for Use in Accidents Involving Dangerous Goods (MFAG), as amended, which provides advice on the treatment of casualties in accordance with the symptoms exhibited as well as equipment and antidotes that may be appropriate for treating the casualty, and to the relevant provisions of parts A and B of the Seafarers' Training, Certification and Watchkeeping (STCW) Code.

15.5.4 For toxic cargoes, cargo tank pressure indication including audible and visual alarms situated at cargo control station and cargo area should meet the following:

.1 arrangement is to be in accordance with the alternative means as defined in 7.2.3, with the activation point for over/under-pressure to be set at 110% and 90%, respectively of the P/V-valve setting;

.2 an independent audible and visual pressure alarm, set to be activated at 90% of the P/V-valve opening set pressure, is to be fitted to warn crew of imminent vapour release; and

.3 the arrangement in subparagraph 2 is capable of being deactivated during loading.

15.5.5 During loading of toxic cargoes, deck cargo should not be located in the cargo deck area as defined in 1.2.7.3. Once a cargo loading operation is completed, deck cargo may be carried in the area defined in 1.2.7.3.3, provided that the area in 1.2.7.3.2 is kept free from deck cargo and relevant cargo deck areas clearly marked.

CHAPTER 16 – BACKLOADING OF CONTAMINATED BULK LIQUIDS

To ensure that arrangements and procedures are provided to control potential accumulation of hydrogen sulphide, an explosive atmosphere, and other potential hazardous of cargoes back loaded from the installation.

16.1 Preamble

16.1.1 Backloading of contaminated bulk liquids could present a threat to human health and to the marine environment.

16.1.2 Contaminated backloads should therefore be:

.1 transported and handled in accordance with the provisions of this Code; and

.2 returned to shore for treatment or disposal.

16.2 General

16.2.1 Unless expressly provided otherwise, this chapter should apply to new and existing vessels.

16.2.2 The provisions of this chapter should apply in conjunction with all other provisions of this Code.

16.2.3 For the carriage of contaminated backloads, the requirements in chapter 17 of the IBC Code should apply as described in 16.4.4.

16.2.4 Contaminated bulk liquids should not contain traces of hydrogen sulphide (H_2S) prior to or during loading of the cargo.

16.2.5 Even if the test carried out before back-loading indicate that H_2S is not present and that the contaminated bulk liquid has a flashpoint exceeding 60°C, a separation of the chemical components may occur during the voyage, resulting in a release of hydrogen sulphide and corresponding lowering the flashpoint to 60°C or less.

16.2.6 Hydrogen sulphide (H_2S) detection equipment should be provided onboard vessels carrying contaminated backloads prone to H_2S formation. It should be noted that scavengers and biocides, when used, may not be a 100% effective in controlling the formation of H_2S.

16.2.7 Contaminated bulk liquids should not contain radioactive materials which are subject to the applicable requirements for such materials.

16.3 Documentation

16.3.1 In lieu of the cargo information specified in 15.2.3, the shipper and/or owner of the contaminated bulk liquids should provide the master or his representative with information as required in 16.3.2 prior to backloading.

16.3.2 Information of the contaminated bulk liquid should be confirmed in writing by the appropriate analysis form. An example of the analysis form is set out in appendix 2. The information of the contaminated bulk liquid should at least include:

.1 sample description;

.2 descriptions of the components in the mixture; name, concentration and Material Safety Data Sheet (MSDS), if available;

.3 flashpoint (ºC);

.4 hydrogen sulphide (H_2S) level (ppm)[11];

.5 lower explosive limit (LEL) level (%);

.6 oxygen level (%);

.7 pH;

.8 bulk specific gravity (kg/m^3);

.9 water content (% volume);

.10 oil content (% volume);

.11 solids content (% volume);

.12 date and time of the analysis;

.13 details of any treatment to remove or prevent the formation of H_2S;

.14 any other relevant information; and

.15 conclusions of the test results; including confirmation that the components of the mixtures are compatible.

[11] H_2S level should be 0 ppm.

16.4 Operation

16.4.1 Responsibilities

16.4.1.1 The master should not accept loading of any contaminated bulk liquid which is not properly documented in accordance with 16.3.

16.4.1.2 The master should ascertain that the contaminated bulk liquid is within the safe limits of the vessel and tanks, especially with regard to the flashpoint of the specific liquid, before back-loading commences.

16.4.1.3 The responsibility for ensuring that cargoes are properly prepared for carriage on board the vessel rests with the shipper and/or owner of the cargoes concerned.

16.4.2 Carriage requirements

16.4.2.1 Contaminated bulk liquids should be carried in accordance with the applicable minimum carriage requirements for contaminated bulk liquids specified in chapter 17 of the IBC Code or the latest edition of the MEPC.2/Circular.

16.4.2.2 In addition to provisions as specified in 16.4.2.1, H_2S and LEL gas detection is required for carriage of contaminated bulk liquid as follows:

.1 fixed vapour detection instruments with audible and visual alarms to indicate H_2S and LEL levels exceeding 5 ppm and 10% respectively, installed in the venting system of the relevant tanks; and

.2 portable instruments for all personnel on the working deck.

16.4.3 H_2S precaution

16.4.3.1 Contaminated bulk liquid should be discharged from the vessel as soon as possible, preferably at the first port of call.

16.4.3.2 The need to clean the dirty tanks should be reviewed on each voyage to minimize the risk of biological activity and H_2S build up from any residue.

16.4.3.3 Prior to back-loading to a dirty tank, the potential for biological activity resulting in H_2S in the dead volume and sludge should be considered. The offshore analysis of the previous contaminated bulk liquid should be compared with analyses of a sample representative for the liquid when unloading.

16.4.3.4 If H_2S or flammable vapour is detected during loading of contaminated bulk liquids the transfer should be stopped immediately.

16.4.3.5 Vessels-specific procedures of measures to be taken when H_2S is detected during loading, transport, discharge and cleaning of contaminated bulk liquids should be included in the vessel's Safety Management System.

16.4.4 Contaminated backloads

16.4.4.1 Based on the information contained in 16.3.2, the entry for "offshore contaminated bulk liquid P" in chapter 17 of the IBC Code should be used for backloads that:

.1 are pollutant only and do not present any safety hazards[12] or where the pre-backloading tests do not indicate any safety hazards (the backload may contain components with safety hazards, as long as they are so diluted that the final mixture presents no safety hazard);

.2 have a flashpoint greater than 60°C; or

.3 do not have the potential of becoming more hazardous during transport.

16.4.4.2 Based on the information contained in 16.3.2, the entry for "offshore contaminated bulk liquid S" in chapter 17 of the IBC Code should be used for backloads that:

.1 have been treated to remove or prevent breakout of H_2S;

.2 are expected to present both pollution and safety hazards or where the initial pre-backloading tests indicate a potential or actual safety hazard;

.3 may contain substances with a flashpoint not exceeding 60°C;

.4 have the potential of becoming more hazardous during transport; or

.5 are to be backloaded to a dirty tank, the content of which has not been analysed.

CHAPTER 17 – DISCHARGING AND LOADING OF PORTABLE TANKS ON BOARD

To ensure the safe handling of all cargoes to and from portable tanks which forms part of the vessel or remains on board, under all normal operating conditions and foreseeable emergency conditions, to minimize the risk to the vessel, its crew and the environment, having regard to the nature of the products involved.

17.1 Preamble

17.1.1 This Code applies only in the case of bulk carriage involving transfer of the cargo to or from its containment. The carriage of dangerous goods in packaged form is regulated under SOLAS chapter VII Part A and should comply with the relevant requirements of the IMDG Code. The IMDG Code is also applicable for environmentally hazardous substances in packaged form under MARPOL Annex III. 4.2.1 of the IMDG Code provides "portable tanks shall not be filled or discharged while they remain on board".

17.1.2 The current operation practice is to carry portable tanks in two ways:

.1 offshore portable tanks and their contents are loaded and off-loaded to the offshore installation by the use of a crane, in which case the IMDG Code applies; or

[12] Safety hazards are defined in paragraph 21.3.1 of the IBC Code.

.2 offshore portable tanks and portable tanks are loaded with their contents onto a vessel by crane or filled whilst on board and used as deck tanks in a "deck spread". Then the contents are pumped to the offshore installation or to the seabed. These tanks can also be used to receive backloads from the installation and will be secured to the deck, in which case the cargo is shipped under this Code.

17.2 General

17.2.1 This chapter applies when using offshore portable tanks and portable tanks allowed under 5.2.2.

17.2.2 A portable tank, for the purpose of this section, means a multimodal tank used for the transport of dangerous goods of class 1 and classes 3 to 9. The portable tank includes a shell fitted with service equipment and structural equipment necessary for the transport of dangerous substances. The portable tank should be capable of being filled and discharged without the removal of its structural equipment. It should possess stabilizing members external to the shell, and should be capable of being lifted when full. It should be designed primarily to be loaded onto a vehicle or vessel and should be equipped with skids, mountings or accessories to facilitate mechanical handling. Road tank-vehicles, rail tank-wagons, non-metallic tanks and intermediate bulk containers are not considered to fall within the definition for portable tanks.

17.2.3 The provisions of this chapter should apply in conjunction with all other provisions of this Code.

17.2.4 Chemicals, including blending additives, transported in portable deck tanks which are considered to fall outside the scope of 1.1.9 may be carried in limited amounts in accordance with provisions acceptable to the Administration. The aggregate amount of such chemicals which may be transported should not exceed 10% of the vessel's maximum authorized quantity of products subject to this Code. An individual tank should contain no more than 10 m^3 of these chemicals. The discharge of these chemicals into the sea from OSVs is prohibited.

17.3 Arrangement of deck spread

17.3.1 All pumping equipment, processing equipment, pipe work, valves and hoses should be compatible with the substances being transferred.

17.3.2 Pipe work connecting deck spread tanks to bulk tanks within the cargo area of the vessel should have two valve separation and should comply with the provisions of chapter 6 of this Code.

17.3.3 In addition to the cargo segregation required by chapters 3 and 4, the general stowage and segregation requirements given in chapter 7 of the IMDG Code should apply. The segregation requirements may be relaxed subject to approval by the Administration.

17.3.4 Cargo tank vent systems of portable tanks allowed under 5.2.2 should be to the satisfaction of the Administration, taking into account the requirements of chapter 6 of the IMDG Code.

17.3.5 Arrangements of products with a flashpoint not exceeding 60°C, toxic products and acids should comply with the provisions in chapter 4, as applicable.

17.3.6 Deck spills should be kept away from accommodation and service areas by means of a coaming of suitable height and extension.

17.4 Shipment of cargo in portable tanks used as deck tanks

17.4.1 A procedure for the carriage of portable tanks should be completed and submitted to the Administration or any organization recognized by it, for consideration and approval prior to arranging the deck spread. A model format for the procedure is set out in appendix 3.

17.4.2 The portable tank should be physically secured to the vessel, in accordance with the vessels' Cargo Securing Manual to prevent loss in the event of an incident whilst at sea. The arrangements for securing the portable tanks to the vessel should be of such strength to withstand the forces likely to be encountered during the voyage to and from the area of operation.

17.4.3 The portable tank(s) and pumping system should be monitored regularly on the sea passage to ensure the physical security of the portable tanks.

17.4.4 The pipe work and valves should be secured to prevent movement.

17.4.5 The loading and unloading of the portable tanks should not be undertaken at the same time as other deck cargo is being handled.

17.4.6 Portable tank(s) should be filled through a manifold system.

17.4.7 Discharge into the sea of portable tank contents, residues, tank washings, or other residues or mixtures containing such substances, is prohibited. Any discharges of residues and mixtures containing noxious liquid substances should be to port reception facilities.

CHAPTER 18 – CARRIAGE OF LIQUEFIED GASES

To ensure that the vessel's design, arrangement and operational procedures are such as to minimize the risk to the vessel, its crew and the environment, when carrying liquefied gases in bulk.

18.1 General requirements

18.1.1 The provisions of this chapter should apply when liquid carbon dioxide (high purity and reclaimed quality) and liquid nitrogen are carried.

18.1.2 The Administration may allow adjustments to specific requirements in the IGC Code regarding the cargo containment, materials of construction, vent system for cargo containment and cargo transfer, taking into account existing industry standards and practices, if it is as least as effective as that required by the IGC Code.

18.1.3 Unless expressly provided otherwise, these provisions are additional to the general provisions of this Code.

18.1.4 In regard to the provisions connected to the cargo area, the vessel survival capability and location of the cargo tanks, liquid carbon dioxide (high purity and reclaimed quality) and liquid nitrogen should be regarded as a safety hazard substance with type 2 ship having a flashpoint exceeding 60°C and not defined as a toxic.

18.1.5 The liquid carbon dioxide (high purity and reclaimed quality) and liquid nitrogen should be carried in accordance with the applicable minimum carriage requirements specified in chapter 19 of the IGC Code and the special requirements specified in chapter 17 of the IGC Code for respective product.

18.2 Accommodation, service and machinery spaces and control stations

Unless they are spaced at least 7 m away from the deck area as defined in 1.2.7.2, entrances, air inlets and openings to accommodation, service and machinery spaces and control stations should not face the cargo deck area. Doors to spaces not having access to accommodation, service and machinery spaces and control stations, such as cargo control stations and store-rooms, may be permitted within such deck area, provided the boundaries of the spaces equivalent gas tightening to A-60 standard. Wheelhouse doors and wheelhouse windows may be located within the limits specified above as long as they are so designed that a rapid and efficient gas and vapour tightening of the wheelhouse can be ensured. Windows and sidescuttles facing the deck area and on the sides of the superstructures and deck-houses within the limits specified above should be of the fixed (non-opening) type. Such sidescuttles in the first tier on the main deck should be fitted with inside covers of steel or equivalent material.

18.3 Cargo containment

The cargo tank should be in accordance with chapter 4 of the IGC Code. The design and testing of the tanks for liquid nitrogen should be as required for independent tanks type C.

18.4 Materials of construction

Material of construction should comply with the requirements of chapter 6 of the IGC Code.

18.5 Vent system for cargo containment

Vent system for cargo containment should comply with the requirements of chapter 8 of the IGC Code.

18.6 Cargo transfer

18.6.1 The cargo transfer system should comply with the requirements of chapter 5 of the IGC Code.

18.6.2 Drip trays resistant to cryogenic temperatures should be provided at manifolds transferring liquefied gases or at other flanged connections in the liquefied gas system.

18.7 Vapour detection

Each enclosed space used for handling or storage of a liquefied gas should be fitted with a sensor continuously monitoring the oxygen content of the space and an alarm indicating low oxygen concentration. For semi-enclosed spaces portable equipment may also be acceptable.

18.8 Gauging and level detection

The gauging and level detection arrangements should comply with the requirements of chapter 13 of the IGC Code.

18.9 Emergency shutdown system

18.9.1 Emergency shut-off valves should be provided in liquid outlet lines from each liquefied gas tank. The controls for the emergency shut-off valves should meet the provisions given in 6.6.1.3 for remote shutdown devices.

18.9.2 In the case of transfer operations involving pressures in excess of 5 MPa, arrangements for emergency depressurizing and disconnection of the transfer hose should be provided. The controls for activating emergency depressurization and disconnection of the transfer hose should meet the provisions given in 6.6.1.3 for remote shutdown devices.

18.10 Personnel protection

Vessels carrying liquefied gases should have on board safety equipment in accordance with 14.3.

18.11 Carriage on open deck

Instead of the use of permanently attached deck-tanks, portable tanks meeting the design of independent tanks type C may be used provided that the provisions of section 17.3 are complied with.

18.12 Carriage of other liquefied gases listed in chapter 19 of the IGC Code

18.12.1 This Code does not consider liquefied gases other than liquid carbon dioxide (high purity and reclaimed quality) and liquid nitrogen. When a vessel is intended for carriage of other liquefied gases listed in chapter 19 of the IGC Code, flag Administration and coastal State Administrations involved should take appropriate steps to ensure implementation of the relevant requirements of the IGC Code, taking into account the unique design features and service characteristics of the vessel, as well as the limitation. Furthermore, additional provisions should be established based on the principles of this Code as well as recognized standards that address specific risks not envisaged by it. Such risks may include, but not be limited to:

.1 fire and explosion;

.2 evacuation;

.3 extension of hazardous areas;

.4 pressurized gas discharge to shore;

.5 high-pressure gas venting;

.6 process upset conditions;

.7 storage and handling of flammable refrigerants;

.8 continuous presence of liquid and vapour cargo outside the cargo containment system;

.9 tank over-pressure and under-pressure;

.10 vessel-to-vessel transfer of liquid cargo; and

.11 collision risk during berthing manoeuvres.

18.12.2 The Organization should be notified of the conditions for carriage prescribed by the flag Administration and coastal State Administrations involved, so that the specific liquefied gases may be considered for inclusion in this Code.

APPENDIX 1

MODEL FORM OF CERTIFICATE OF FITNESS

CERTIFICATE OF FITNESS

(Official seal)

Issued under the provisions of the

CODE FOR THE TRANSPORT AND HANDLING OF HAZARDOUS AND NOXIOUS LIQUID SUBSTANCES IN BULK ON OFFSHORE SUPPORT VESSELS
(OSV CODE)
(resolution [A.…(30)])

under the authority of the Government of

……
(full official designation of country)

by ……
(full designation of the competent person or organization recognized by the Administration)

Particulars of vessel[1]

Name of vessel .....

Distinctive number or letters .....

IMO number[2] .....

Port of registry .....

Gross tonnage .....

Date on which keel was laid or on which the vessel was at a similar stage of construction or (in the case of a converted vessel) date on which conversion to offshore support vessel was commenced

……

The vessel also complies fully with the following amendments to the Code:

……

……

[1] Alternatively, the particulars of the vessel may be placed horizontally in boxes.

[2] In accordance with the *IMO ship identification number scheme*, adopted by the Organization by resolution A.1078(28).

The vessel is exempted from compliance with the following provisions of the Code:

……

……

THIS IS TO CERTIFY:

1 That the vessel has been surveyed in accordance with the provisions of 1.4 of the Code;

2 That the survey showed that the construction and equipment of the vessel and the condition thereof are in all respects satisfactory and that the vessel complies with the relevant provisions of the Code;

3 That the vessel has been provided with a Manual in accordance with Appendix 4 of Annex II of MARPOL as called for by regulation 14 of Annex II, and that the arrangements and equipment of the vessel prescribed in the Manual are in all respects satisfactory;

4 That the vessel meets the requirements for the carriage in bulk of the following products, provided that all relevant operational requirements of the Code and MARPOL Annex II are observed:

Product	Conditions of carriage (tank numbers, etc.)	Pollution Category
Continued on attachment 1, additional signed and dated sheets[3]. Tank numbers referred to in this list are identified on attachment 2, signed and dated tank plan.		

5 That, in accordance with 1.3, the provisions of the Code are modified in respect of the vessel in the following manner:

……

6 That the vessel should be loaded:

.1 in accordance with the loading conditions provided in the approved loading manual, stamped and dated..... and signed by a responsible officer of the Administration, or of an organization recognized by the Administration[3];

.2 in accordance with the loading limitations appended to this Certificate[3].

[3] Delete as appropriate.

Where it is required to load the vessel other than in accordance with the above instruction, then the necessary calculations to justify the proposed loading conditions should be communicated to the certifying Administration who may authorize in writing the adoption of the proposed loading condition[4].

This Certificate is valid until (dd/mm/yyyy) ……..……[5]
subject to surveys in accordance with 1.4 of the Code.

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 authority, as appropriate)

Notes on completion of Certificate:

1 The Certificate can be issued only to vessels entitled to fly the flags of States which are both a Contracting Government to SOLAS and a Party to MARPOL.

2 Products: products listed in 1.1.9 of the Code, or which have been evaluated by the Administration in accordance with 1.1.10 of the Code should be listed. In respect of the latter "new" products, any special provisions provisionally prescribed should be noted.

3 Products: the list of products the vessel is suitable to carry should include the noxious liquid substances of category Z which are not covered by the IBC Code and should be identified as "IBC Code chapter 18 Category Z".

[4] Instead of being incorporated in the Certificate, this text may be appended to the Certificate if signed and stamped.

[5] Insert the date of expiry, as specified by the Administration, which should not exceed 5 years from the date of initial survey or the periodical survey.

ENDORSEMENT FOR ANNUAL AND INTERMEDIATE SURVEYS

THIS IS TO CERTIFY that at a survey required by 1.5.2 of the IBC Code the vessel was found to comply with the relevant provisions of the Code.

Annual survey: Signed .....
(Signature of duly authorized official)

Place .....

Date *(dd/mm/yyyy)* .....

(Seal or stamp of the Authority, as appropriate)

Annual/Intermediate[3] survey: Signed .....
(Signature of duly authorized official)

Place .....

Date *(dd/mm/yyyy)* .....

(Seal or stamp of the Authority, as appropriate)

Annual/Intermediate[3] survey: Signed .....
(Signature of duly authorized official)

Place .....

Date *(dd/mm/yyyy)* .....

(Seal or stamp of the Authority, as appropriate)

Annual survey: Signed .....
(Signature of duly authorized official)

Place .....

Date *(dd/mm/yyyy)* .....

(Seal or stamp of the Authority, as appropriate)

[3] Delete as appropriate.

ANNUAL/INTERMEDIATE SURVEY IN ACCORDANCE WITH 1.5.6.8.3 OF THE IBC CODE

THIS IS TO CERTIFY that, at an annual/intermediate[3] survey in accordance with 1.5.6.8.3 of the IBC Code, the vessel was found to comply with the relevant requirements of the Convention:

Signed .....
(Signature of duly authorized official)

Place .....

Date *(dd/mm/yyyy)* .....

(Seal or stamp of the Authority, as appropriate)

ENDORSEMENT TO EXTEND THE CERTIFICATE IF VALID FOR LESS THAN 5 YEARS WHERE 1.5.6.3 OF THE IBC CODE APPLIES

The vessel complies with the relevant requirements of the Convention, and this Certificate should, in accordance with 1.5.6.3 of the IBC Code, be accepted as valid until .....

Signed .....
(Signature of duly authorized official)

Place .....

Date *(dd/mm/yyyy)* .....

(Seal or stamp of the Authority, as appropriate)

ENDORSEMENT WHERE THE RENEWAL SURVEY HAS BEEN COMPLETED AND 1.5.6.4 OF THE IBC CODE APPLIES

The vessel complies with the relevant requirements of the Convention, and this Certificate should, in accordance with 1.5.6.4 of the IBC Code, be accepted as valid until .....

Annual survey: Signed .....
(Signature of duly authorized official)

Place .....

Date *(dd/mm/yyyy)* .....

(Seal or stamp of the Authority, as appropriate)

[3] Delete as appropriate.

ENDORSEMENT TO EXTEND THE VALIDITY OF THE CERTIFICATE UNTIL REACHING THE PORT OF SURVEY OR FOR A PERIOD OF GRACE WHERE 1.5.6.5 OR 1.5.6.6 OF THE IBC CODE APPLIES

This Certificate should, in accordance with 1.5.6.5/1.5.6.6[3] of the IBC Code, be accepted as valid until .....

Signed .....
(Signature of duly authorized official)

Place .....

Date *(dd/mm/yyyy)* .....

(Seal or stamp of the Authority, as appropriate)

ENDORSEMENT FOR ADVANCEMENT OF ANNIVERSARY DATE WHERE 1.5.6.8 OF THE IBC CODE APPLIES

In accordance with 1.5.6.8 of the IBC Code, the new anniversary date is .....

Signed .....
(Signature of duly authorized official)

Place .....

Date *(dd/mm/yyyy)* .....

(Seal or stamp of the Authority, as appropriate)

In accordance with 1.5.6.8 of the IBC Code, the new anniversary date is .....

Signed .....
(Signature of duly authorized official)

Place .....

Date *(dd/mm/yyyy)* .....

(Seal or stamp of the Authority, as appropriate)

[3] Delete as appropriate.

ATTACHMENT 1
TO THE CERTIFICATE OF FITNESS

Continued list of products to those specified in section 4, and their conditions of carriage.

Products	Conditions of carriage (tank numbers, etc.)	Pollution Category

Date .....
(dd/mm/yyyy)
(as for Certificate)

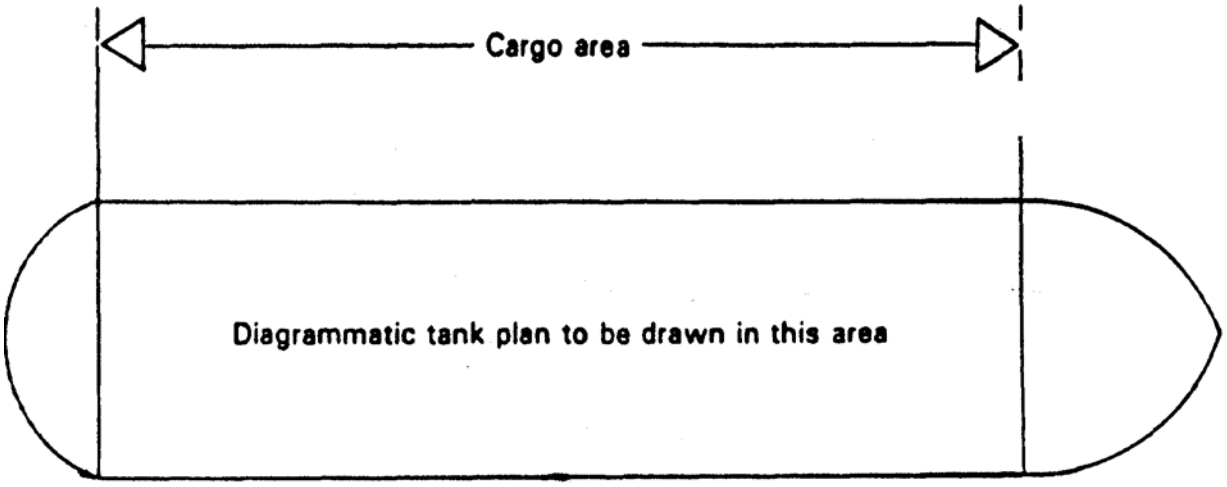
.....
(Signature of official issuing the Certificate and/or seal of issuing authority)

ATTACHMENT 2
TO THE CERTIFICATE OF FITNESS

TANK PLAN (specimen)

Name of vessel: .....

Distinctive number or letters: .....



Date .....
(dd/mm/yyyy)
(as for Certificate)

.....
(Signature of official issuing the Certificate and/or seal of issuing authority)

APPENDIX 2

GUIDELINES FOR TESTING PRIOR TO BACKLOADING

1 General

1.1 The results of these tests will allow the master, through confirmation with the attached checklist, to establish if the backload is acceptable for carriage on board the vessel. Acceptance is based on the reported analytical data and the measured physical properties, the known nature of the chemical composition and the previous cargo carried in the vessels tanks. A generic risk assessment should be available on board the vessel and updated when new information and circumstances become apparent. Offshore installation crew should be aware that in certain circumstances the master of the vessel may require advice from the vessels onshore technical advisors and that a response from onshore may take time to receive.

1.2 Recognizing the relatively complex nature of the cargo, the material intended for back loading should be subjected to a series of test to provide an indicative overview of the constituent composition and reactive properties of the material.

1.3 The tests carried out prior to back-loading should reflect the conditions in the vessels tanks, i.e. there will be no agitation and no forced ventilation unless specifically required/requested.

1.4 If there is any doubt regarding the result of the test, the test should be repeated and reviewed.

2 Testing prior to backloading

2.1 Flashpoint

The minimum acceptable flashpoint of 60°C (Pensky Martin closed cup method or equivalent) is applicable to wet bulk waste. Sampling should be set up to detect the worst case situation, particularly where there is potential for crude oil or condensate contamination where the oil will rise to the surface of the tank. Base oils typically have flashpoints in the range of 70 to 100°C. If the only oil component in a bulk waste is base oil then the flashpoint cannot be lower than that of the base oil itself. If the flashpoint is relatively low (60 to 70°C) an explanation should be provided before the analysis form is presented to the vessels master. Prior to sampling, the material should be left without agitation for at least 30 min and then surface sampled.

2.2 Lower Explosive Limit (LEL)

The LEL gas detector will confirm potential flashpoint issues. The noxious gas test is modified to simulate the unvented vessels tanks. The sample is placed in a closed container with a sampling port on top and left to equilibrate for 30 min. A tube is then connected from the port to the gas analyser and the sample is analysed. The flashpoint and LEL results should be consistent with each other. LEL gas meters are normally set so that the alarm goes off in the range of 10 to 20% LEL methane equivalent. Any number above 25% would be considered high. Other gases potentially present can have a different LEL range than methane.

2.3 Hydrogen sulphide (H_2S)

2.3.1 H_2S most commonly arises from the activity of sulphate reducing bacteria (SRB). SRB will become active provided there is a "food" source and low oxygen conditions.

This would be typical of stagnant oil-contaminated fluid stored for a long time. H_2S is an extremely poisonous gas which is heavier than air. The maximum exposure limit is 10 ppm over an 8 hour period. Offshore sensors and routine offshore analysis methods will detect if H_2S is a potential problem in backloads. In the event of a positive test another sample should be collected to confirm the result. If this second result is positive further work may be required to determine the source of the H_2S. The sample should be taken from below the surface of the unagitated tank. Most oil will be in the top layer and will give a worst case oil content.

2.3.2 As a precaution, treatment of the material may be required. The SRB organisms thrive in a pH range of 5.5 to 8.0. The lower the pH the greater the breakout of H_2S. The backload can be treated on the installation to prevent breakout of H_2S in the vessel tanks. Biocides kill the bacteria but do not remove dissolved H_2S. H_2S scavengers will remove dissolved H_2S but do not stop biological activity. Caustic soda will raise the pH and prevent H_2S gas breakout. In the event that H_2S is detected, tests should be carried out offshore to determine the best treatment prior to backloading. After treatment a final H_2S test should be carried out to confirm zero H_2S and noted on the analysis form before the hose is connected to the vessel for back-loading.

2.4 pH

The pH of seawater is typically 8.3. Oil mud is alkaline and could raise the pH slightly. Cement contaminant is highly alkaline. In general alkaline pH (above 7) protects from corrosion. Highly alkaline materials can be caustic and require care in handling. Cement and sodium silicate can lead to high pH value. Low pH (less than 4) is highly acidic and an explanation should be provided on the analysis form. Acids such as citric acid or acidic chemicals such as hydrochloric acid can lead to low pH. It should be noted that pH less than 9 means that H_2S will already have broken out as a gas.

2.5 Retort analysis (solids, water, oil volume %)

This should match the estimated composition (volume %) on the analysis form. It should be noted that it may be difficult to get representative samples if the liquid tends to separate. Some divergence is expected, e g. if oil is noted as 5%, the range could be 3 to 10%. If separation is likely a range is preferred, e.g. 5 to 10%. The solids component can form a residue in the vessel tank and be a potential location for SRB activity and H_2S.

2.6 Specific gravity (SG)

The specific gravity of common water based fluids cover the range of 1.03 (seawater), sodium chloride (1.2), and calcium chloride (1.33). Rarely used brines such as caesium formate can reach an SG of 2.2. Oil mud is typically 1.1 to 1.5, but can exceed 2.0. Mixtures will have intermediate values, most tending towards 1.03 as seawater is the major component. It should be noted that if mixtures separate the top half can have a different density than the bottom half.

EXAMPLE OF THE ANALYSIS FORM[6]

TO BE COMPLETED AND PROVIDED TO OSV MASTER PRIOR TO BACKLOADING			
Sample description		Sample reference	
Vessel		Date	
Offshore asset		Producer	
Well name & number		Waste company	
Total number of barrels		Waste note number	

WASTE COMPONENTS			
Component Name	**Concentration**	**Units**	**MSDS Available**
		% Volume	
		% Volume	
		% Volume	
		% Volume	
		% Volume	
		% Volume	
		% Volume	
		% Volume	

LABORATORY ANALYSIS RESULTS				
Test	**Method**	**Units**	**Results**	**Range of Results / Guidance**
Salinity (Chloride)	Titration	mg / l		
Flash Point	Closed cup Flashpoint	ºC		Should be **>60ºC** to backload If flashpoint is low (**<70ºC**) then explanation should be provided

[6] Refer to the *Guidelines for Offshore Marine Operations (GOMO)*, developed by a group of organizations, and other industry standard of best practices.

TO BE COMPLETED AND PROVIDED TO OSV MASTER PRIOR TO BACKLOADING				
Gas test (H_2S)	Gas meter	ppm		**Should be zero** Indication of bacterial activity
Gas test (LEL)		%		**<25%**, ideally zero. Meter alarm typically set to 10 ~ 20% LEL. Should be consistent with flashpoint
Gas test (Oxygen)		%		
pH	pH meter			4 ~ 11 is acceptable range for OSV tank coatings. **SHOULD** be 9.5 ~ 10.5 to keep any H_2S in solution
Water	Retort	% Volume		
Oil content	Retort	% Volume		Confirm retort report agrees with appendix 10 – F, Section 4 components and waste consignment note.
Solids	Retort	% Volume		Confirm retort report agrees with appendix 10 – F, Section 4 components and waste consignment note.
Bulk specific gravity		S.G.		**<2.5** If >2.5 seek further guidance on vessel capability
Appearance				
Odour				
Date and time of analysis				
CONCLUSIONS				

Analysis to be conducted by person competent to do so	**Comments (Yes / No / Details)**
This liquid has been analysed as per GOMO appendix 10 – F and it is my opinion that it is safe for carriage in a standard clean OSV bulk tank.	
This liquid has been analysed as per GOMO appendix 10 – F and will be loaded into a tank with residues / existing cargo. Compatibility has been risk assessed and found to be safe for carriage.	

TO BE COMPLETED AND PROVIDED TO OSV MASTER PRIOR TO BACKLOADING				
H_2S Avoidance				
Details of mandatory wet bulk waste treatment with biocide (chemical / quantity)				
Details of wet bulk waste treatment in order to produce pH of between 9.5 and 10.5 (chemical / quantity)				
Has waste handling facility been informed of volume and ETA onshore? (Yes / No)				
Does the waste handling facility have the capability to take off the waste at the first port call (Yes / No)				
	Name	**Signature**		**Date**
Analyst				
Operations Representative				

APPENDIX 3

MODEL FORMAT FOR THE PROCEDURE FOR THE DISCHARGING AND LOADING OF PORTABLE TANKS CONTAINING DANGEROUS GOODS CARRIED AS DECK TANKS ON OFFSHORE SUPPORT VESSELS

Table of contents

1 PURPOSE

1.1 The purpose of this Procedure is to identify the arrangements and equipment required to enable compliance with MARPOL Annex II and the IMDG Code, and to identify for the vessels' officers all operational procedures with respect to cargo handling, tank cleaning, slops handling, ballasting and deballasting, which should be followed in order to comply with the requirements of MARPOL Annex II.

1.2 This Procedure covers all marine transportation aspects of the shipment for the products identified in the cargo list of the Certificate of Fitness issued, and in accordance with chapter 16 of this Code describing the provisions of loading, sea passage, offshore discharge; return voyage and the subsequent unloading of those tanks to shore.

1.3 This Procedure should include:

.1 summary covering description of the intended offshore campaign;

.2 related discharge permits from local water jurisdictions;

.3 Material Safety Data Sheets;

.4 sea fastening arrangements and calculations;

.5 deck arrangements and pipeline drawing; and

.6 portable tank information and details.

2 APPLICATION

This Procedure applies to all personnel on OSVs involved in the handling and discharging/loading of the products listed in the cargo list of the Certificate of Fitness issued, and in accordance with chapter 17 of this Code. It is intended to be an informative document for those involved in the safe management of the installed deck spread and for the Administration concerned with enforcing safe working practices whilst these operations are being conducted.

3 REFERENCES, DEFINITIONS AND RESPONSIBILITIES

3.1 References

The proposed operations should be carried out in accordance with the following:

.1 International Maritime Dangerous Goods (IMDG) Code, as amended

The IMDG Code, as amended is used as a basis for national regulations in pursuance of their obligation under SOLAS chapter VIII and MARPOL Annex III. Observance of the Code harmonizes the practices and procedures followed in the carriage of dangerous goods by sea and ensures compliance with the mandatory requirements of SOLAS and MARPOL Annex III.

.2 Guidelines for the Design and Construction of Offshore Supply Vessel, 2006

These Guidelines have been developed for the design and construction of new offshore supply vessels with a view to promoting the safety of such vessels and their personnel, recognizing the unique design features and service characteristics of these vessels;

These Guidelines furthermore provide a standard of safety equivalent to the relevant requirements of SOLAS, and in particular to the stability criteria of the Code on Intact Stability for all Types of Ships Covered by IMO Instruments (IS Code), as amended.

.3 International Bulk Chemical (IBC) Code

The IBC Code was adopted by the Marine Environment Protection Committee of the Organization by resolution MEPC.19(22), as amended, provided that such amendments are adopted and brought into force in accordance with the requirements of article 16 of MARPOL concerning amendment procedures applicable to an appendix to an annex.

.4 Code for the Transport and Handling of Hazardous and Noxious Liquid Substances in Bulk on Offshore Support Vessels.

3.2 Definitions

3.2.1 *Dangerous goods* are those substances (including mixtures and solutions) and articles subject to the requirements of the IMDG Code assigned to one of the Classes 1-9 according to the hazard or the most predominant of the hazards present.

3.2.2 *Marine pollutants* are environmentally hazardous substances identified as marine pollutants in the IMDG Code and are considered a threat to marine life, and are carried under the provision of MARPOL Annex III.

3.3 Responsibilities

3.3.1 The OSV should be in compliance with section 17.3 of this Code.

3.3.2 Master: The Master of the supply vessel involved in the transportation is responsible for all activities carried out on his vessel. He has the authority to stop any operation he considers to be unsafe, which puts personnel or his vessel at risk or which could pollute the environment.

3.3.3 Specialist operator: The specialist operator, if required, will be the person/contractor responsible for the cargo transfer operations with regards to the deck spread. He will be additional to the normal vessel crew, and directly responsible to the Master.

4 DESCRIPTION OF THE DECK SPREAD EQUIPMENT AND ARRANGEMENTS

4.1 General arrangements of deck spread

4.1.1 This should contain a brief description of the cargo deck area of the vessel with the main features of the portable tanks and their positions on the deck taking into consideration the definition of "cargo area" in 1.2.7 of this Code.

4.1.2 Brief description of the physical arrangements for the securing of the portable tanks, pipelines and other equipment to the deck of the vessel should also contain details of deck protection systems, etc.

4.1.3 Description of deck spread pumping and piping arrangements

This section should contain a description of the pumping and piping arrangements. Line or schematic drawings should be provided showing the following and be supported by textual explanation where necessary:

.1 cargo piping arrangements with diameters;

.2 cargo piping arrangements that cross connect to the vessels bulk tanks;

.3 cargo pumping arrangements with pump capacities;

.4 location of suction points of cargo lines and valve position for every portable tank;

.5 stripping or blowing back arrangements;

.6 quantity and pressure of nitrogen or carbon dioxide required for line blowing and inerting if applicable; and

.7 tank ventilation arrangements and position of vent outlets, etc.

4.1.4 Description of the portable tank ventilation systems

This section should contain a description of the portable tank ventilation system and details to prevent accumulation of vapours on the deck area, based on the properties of the tank contents.

4.1.5 Description of securing arrangements of tanks and pipelines

This section should contain a description of securing arrangements of tanks and pipelines.

4.2 Discharging and loading operations of portable tanks

This section should contain a description and operational procedures in respect to the loading and discharging of the portable tank whilst on board the vessel and are supported by text regarding the following:

.1 inerting systems if required when carrying low flashpoint products;

.2 suitable firefighting media determined to be effective for the substance being carried will be provided and available for immediate use during the transfer operation;

.3 spillage clean up material specific to the substance, if required, is available in the event of an incident;

.4 personal protective equipment, if required, will be provided for the operator loading the portable tank. This will be worn at all times, by those involved, during cargo handling operations. Equipment supplied should be in addition to equipment required when carrying dangerous good; and

.5 emergency procedures in the event of an incident.

4.3 Additional operational information

This section should contain additional details and description of the operational procedures involved when the deck spread is in operation and should cover the following points;

.1 procedures to be followed in the event of a spillage and the disposal of the clean-up material;

.2 details of the blow back system and whether the residues are to be blown to the installation or to the tanks on deck;

.3 details of the process that will be carried out on board when the deck spread is in operation;

.4 emergency shut-down procedures for the deck spread; and

.5 details of the hose coupling arrangements to the installation and method of quick release.

Attachments:

The following attachments should be prepared:

1. summary covering description of the intended offshore campaign;
2. related discharge permits from local water jurisdictions;
3. material safety data sheets;
4. sea fastening arrangements and calculations;
5. deck arrangements and pipeline drawing; and
6. portable tank information and details.