



**International
Convention for the
Prevention of
Pollution from Ships
(MARPOL 73/78)**

PRACTICAL GUIDE

2015

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International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78)

Introduction

The MARPOL Convention is the main international convention covering prevention of pollution of the marine environment by ships from operational or accidental causes. It is a combination of two treaties adopted in 1973 and 1978 respectively and updated by amendments through the years.

The International Convention for the Prevention of Pollution from Ships (MARPOL) was adopted on 2 November 1973 at IMO and covered pollution by oil, chemicals and harmful substances in packaged form, sewage and garbage. The Protocol of 1978 relating to the 1973 International Convention for the Prevention of Pollution from Ships (1978 MARPOL Protocol) was adopted at a Conference on Tanker Safety and Pollution Prevention in February 1978 held in response to a spate of tanker accidents in 1976-1977. (Measures relating to tanker design and operation were also incorporated into a Protocol of 1978 relating to the 1974 Convention on the Safety of Life at Sea, 1974).

The Convention includes regulations aimed at preventing and minimizing pollution from ships - both accidental pollution and that from routine operations - and currently includes six technical Annexes. Special Areas with strict controls on operational discharges are included in most Annexes.

Annex I: Regulations for the Prevention of Pollution by Oil (entered into force 2 October 1983)

(Revised Annex I entered into force 1 January 2007).

Covers prevention of pollution by oil from operational measures as well as from accidental discharges; the 1992 amendments to Annex I made it mandatory for new oil tankers to have double hulls and brought in a phase-in schedule for existing tankers to fit double hulls, which was subsequently revised in 2001 and 2003.

Annex II: Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk (entered into force 2 October 1983)

(Revised Annex II enters into force 1 January 2007)

Details the discharge criteria and measures for the control of pollution by noxious liquid substances carried in bulk; some 250 substances were evaluated and included in the list appended to the Convention; the discharge of their residues is allowed only to reception facilities until certain concentrations and conditions (which vary with the category of substances) are complied with. In any case, no discharge of residues containing noxious substances is permitted within 12 miles of the nearest land.

Annex III: Prevention of Pollution by Harmful Substances Carried by Sea in Packaged Form (entered into force 1 July 1992)

Contains general requirements for the issuing of detailed standards on packing, marking, labelling, documentation, stowage, quantity limitations, exceptions and notifications. For the purpose of this Annex, "harmful substances" are those substances which are identified as marine pollutants in the International Maritime Dangerous Goods Code (IMDG Code) or which meet the criteria in the Appendix of Annex III.

Annex IV: Prevention of Pollution by Sewage from Ships (entered into force 27 September 2003)

Contains requirements to control pollution of the sea by sewage; the discharge of sewage into the sea is prohibited, except when the ship has in operation an approved sewage treatment plant or when the ship is discharging comminuted and disinfected sewage using an approved system at a distance of more than three nautical miles from the nearest land; sewage which is not comminuted or disinfected has to be discharged at a distance of more than 12 nautical miles from the nearest land. In July 2011, IMO adopted the most recent amendments to MARPOL Annex IV which entered into force on 1 January 2013. The amendments introduce the Baltic Sea as a special area under Annex IV and add new discharge requirements for passenger ships while in a special area.

Annex V: Prevention of Pollution by Garbage from Ships (entered into force 31 December 1988)

Deals with different types of garbage and specifies the distances from land and the manner in which they may be disposed of; the most important feature of the Annex is the complete ban imposed on the disposal into the sea of all forms of plastics.

In July 2011, IMO adopted extensive amendments to Annex V which entered into force on 1 January 2013. The revised Annex V prohibits the discharge of all garbage into the sea, except as provided otherwise, under specific circumstances.

Annex VI: Prevention of Air Pollution from Ships (entered into force 19 May 2005)

Sets limits on sulphur oxide and nitrogen oxide emissions from ship exhausts and prohibits deliberate emissions of ozone depleting substances; designated emission control areas set more stringent standards for SO_x, NO_x and particulate matter.

In 2011, after extensive work and debate, IMO adopted ground breaking mandatory technical and operational energy efficiency measures which will significantly reduce the amount of greenhouse gas emissions from ships; these measures were included in Annex VI and entered into force on 1 January 2013.

Enforcement

Any violation of the MARPOL 73/78 Convention within the jurisdiction of any Party to the Convention is punishable either under the law of that Party or under the law of the flag State. In this respect, the term "jurisdiction" in the Convention should be construed in the light of international law in force at the time the Convention is applied or interpreted.

With the exception of very small vessels, ships engaged on international voyages must carry on board valid international certificates which may be accepted at foreign ports as prima facie evidence that the ship complies with the requirements of the Convention.

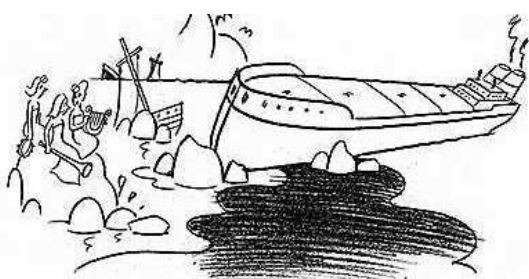
If, however, there are clear grounds for believing that the condition of the ship or its equipment does not correspond substantially with the particulars of the certificate, or if the ship does not carry a valid certificate, the authority carrying out the inspection may detain the ship until it is satisfied that the ship can proceed to sea without presenting unreasonable threat of harm to the marine environment.

Amendment Procedure

Amendments to the technical Annexes of MARPOL 73/78 can be adopted using the "tacit acceptance" procedure, whereby the amendments enter into force on a specified date unless an agreed number of States Parties object by an agreed date.

In practice, amendments are usually adopted either by IMO's Marine Environment Protection Committee (MEPC) or by a Conference of Parties to MARPOL.

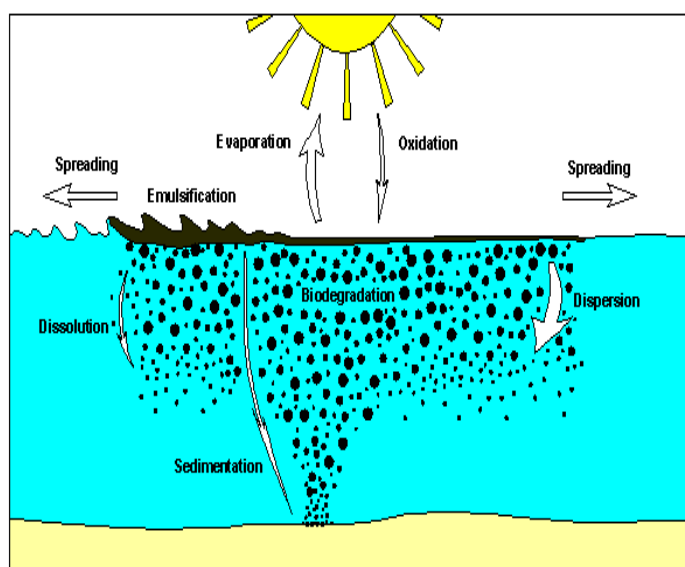
MARPOL 73/78 Annex I
Regulations for the prevention of Pollution by Oil from ships
Entered into force on 2 October 1983
Revised Annex I entered into force 1 January 2007



Waste oil generated in a ship originates from several systems, such as the sludge, slop, bilge, and ballast water system. The input of oil to the sea from ship operations is due to illegal and legal discharges. Generally, ship generated oily waste can either be delivered to shore, incinerated onboard, legally or/and illegally discharged to sea.

Oil tankers transport some 1,800 million tonnes of crude oil around the world by sea including 50 percent of U.S. oil imports (crude oil and refined products). Most of the time, oil is transported quietly and safely. Measures introduced by IMO have helped ensure that the majority of oil tankers are safely built and operated and are constructed to reduce the amount of oil spilled in the event of an accident. Operational pollution, such as from routine tank cleaning operations, has also been cut.

Behaviour of Oil at Sea



The effects of oil on marine life, are caused by either the physical nature of the oil (physical contamination and smothering) or by its chemical components (toxic effects and accumulation leading to tainting). Marine life may also be affected by clean-up operations or indirectly through physical damage to the habitats in which plants and animals live. The main threat posed to living resources by the persistent residues of spilled oils and water-in-oil emulsions ("mousse") is one of physical smothering. The animals and plants most at risk are those that could come into contact with a contaminated sea surface. Marine mammals and reptiles; birds that feed by diving or form flocks on the sea; marine life on shorelines; and animals and plants in mariculture facilities. The most toxic components in oil

tend to be those lost rapidly through evaporation when oil is spilt. Because of this, lethal concentrations of toxic components leading to large scale mortalities of marine life are relatively rare, localised and short-lived. Sub-lethal effects that impair the ability of individual marine organisms to reproduce, grow, feed or perform other functions can be caused by prolonged exposure to a concentration of oil or oil components far lower than will cause death. Sedentary animals in shallow waters such as oysters, mussels and clams that routinely filter large volumes of seawater to extract food are especially likely to accumulate oil components. Whilst these components may not cause any immediate harm, their presence may render such animals unpalatable if they are consumed by man, due to the presence of an oily taste or smell. This is a temporary problem since the components causing the taint are lost (depurated) when normal conditions are restored.

REQUIREMENTS FOR MACHINERY SPACES OF ALL SHIPS

Control of Operational Discharge of Oil

1. Discharges outside special areas

Any discharge into the sea of oil or oily mixtures from ships of 400 gross tonnage and above shall be prohibited except when all the following conditions are satisfied:

- .1 the ship is proceeding en route;
- .2 the oily mixture is processed through an oil filtering equipment meeting the requirements of this Annex;
- .3 the oil content of the effluent without dilution does not exceed 15 parts per million;
- .4 the oily mixture does not originate from cargo pump room bilges on oil tankers;
- .5 the oily mixture, in case of oil tankers, is not mixed with oil cargo residues.

2. Discharges in special areas

Any discharge into the sea of oil or oily mixtures from ships of 400 gross tonnage and above shall be prohibited except when all of the following conditions are satisfied:

- .1 the ship is proceeding en route;
- .2 the oily mixture is processed through an oil filtering equipment meeting the requirements of this Annex;
- .3 the oil content of the effluent without dilution does not exceed 15 parts per million;
- .4 the oily mixture does not originate from cargo pump room bilges on oil tankers;
- .5 the oily mixture, in case of oil tankers, is not mixed with oil cargo residues.

In respect of the Antarctic area, any discharge into the sea of oil or oily mixtures from any ship shall be prohibited.

Oil Filtering Equipment

Any ship of 400 gross tonnage and above shall be fitted with oil filtering equipment.

Oil filtering equipment shall be of a design approved by the Administration and shall be such as will ensure that any oily mixture discharged into the sea after passing through the system has an oil content not exceeding 15 parts per million. In addition, it shall be provided with alarm arrangement to indicate when this level cannot be maintained. The system shall also be provided with arrangements to ensure that any discharge of oily mixtures is automatically stopped when the oil content of the effluent exceeds 15 parts per million.

Oil Record Book, Part I - Machinery Space Operations

Every oil tanker of 150 gross tonnage and above and every ship of 400 gross tonnage and above other than an oil tanker shall be provided with an Oil Record Book Part I (Machinery Space Operations). The Oil Record Book, whether as a part of the ship's official log-book or otherwise, shall be in the Form specified in this Annex.

The Oil Record Book Part I shall be completed on each occasion, on a tank-to-tank basis if appropriate, whenever any of the following machinery space operations takes place in the ship:

- .1 ballasting or cleaning of oil fuel tanks;
- .2 discharge of dirty ballast or cleaning water from oil fuel tanks;
- .3 collection and disposal of oil residues (sludge and other oil residues);
- .4 discharge overboard or disposal otherwise of bilge water which has accumulated in machinery spaces; and
- .5 bunkering of fuel or bulk lubricating oil.

The Oil Record Book Part I, shall be kept in such a place as to be readily available for inspection at all reasonable times and, except in the case of unmanned ships under tow, shall be kept on board the ship. It shall be preserved for a period of three years after the last entry has been made.

REQUIREMENTS FOR THE CARGO AREA OF OIL TANKERS

Control of Operational Discharge of Oil

1. Discharges outside special areas

Any discharge into the sea of oil or oily mixtures from the cargo area of an oil tanker, shall be prohibited except when all the following conditions are satisfied:

- .1 the tanker is not within a special area;
- .2 the tanker is more than 50 nautical miles from the nearest land;
- .3 the tanker is proceeding en route;
- .4 the instantaneous rate of discharge of oil content does not exceed 30 litres per nautical mile;
- .5 the total quantity of oil discharged into the sea does not exceed for tankers delivered on or before 31 December 1979 1/15,000 of the total quantity of the particular cargo of which the residue formed a part, and for tankers delivered after 31 December 1979 1/30,000 of the total quantity of the particular cargo of which the residue formed a part;
- .6 the tanker has in operation an oil discharge monitoring and control system and a slop tank arrangement as required by this Annex.

The provisions of this regulation shall not apply to the discharge of clean or segregated ballast.

2. Discharges in special areas

Any discharge into the sea of oil or oily mixture from the cargo area of an oil tanker shall be prohibited while in a special area.

The provisions of this regulation shall not apply to the discharge of clean or segregated ballast.

Oil Discharge Monitoring and Control System

Oil tankers of 150 gross tonnage and above shall be equipped with an oil discharge monitoring and control system approved by the Administration.

The system shall be fitted with a recording device to provide a continuous record of the discharge in litres per nautical mile and total quantity discharged, or the oil content and rate of discharge. This record shall be identifiable as to time and date and shall be kept for at least three years. The oil discharge monitoring and control system shall come into operation when there is any discharge of effluent into the sea and shall be such as will ensure that any discharge of oily mixture is

automatically stopped when the instantaneous rate of discharge of oil exceeds that permitted by this Annex. Any failure of this monitoring and control system shall stop the discharge. In the event of failure of the oil discharge monitoring and control system a manually operated alternative method may be used, but the defective unit shall be made operable as soon as possible.

Oil Record Book, Part II - Cargo/Ballast Operations

Every oil tanker of 150 gross tonnage and above shall be provided with an Oil Record Book Part II (Cargo/Ballast Operations). The Oil Record Book Part II, whether as a part of the ship's official logbook or otherwise, shall be in the Form specified in this Annex.

The Oil Record Book Part II shall be completed on each occasion, on a tank-to-tank basis if appropriate, whenever any of the following cargo/ballast operations take place in the ship:

- .1 loading of oil cargo;
- .2 internal transfer of oil cargo during voyage;
- .3 unloading of oil cargo;
- .4 ballasting of cargo tanks and dedicated clean ballast tanks;
- .5 cleaning of cargo tanks including crude oil washing;
- .6 discharge of ballast except from segregated ballast tanks;
- .7 discharge of water from slop tanks;
- .8 closing of all applicable valves or similar devices after slop tank discharge operations;
- .9 closing of valves necessary for isolation of dedicated clean ballast tanks from cargo and stripping lines after slop tank discharge operations;
- .10 disposal of residues.

Each operation described in this regulation shall be fully recorded without delay in the Oil Record Book Part II so that all entries in the book appropriate to that operation are completed. Each completed operation shall be signed by the officer or officers in charge of the operations concerned and each completed page shall be signed by the master of ship. The entries in the Oil Record Book Part II shall be at least in English, French or Spanish. Where entries in an official language of the State whose flag the ship is entitled to fly are also used, this shall prevail in case of dispute or discrepancy.

The Oil Record Book shall be kept in such a place as to be readily available for inspection at all reasonable times and, except in the case of unmanned ships under tow, shall be kept on board the ship. It shall be preserved for a period of three years after the last entry has been made.

Slop Tanks

Oil tankers of 150 gross tonnage and above shall be provided with slop tank arrangements. In oil tankers delivered on or before 31 December 1979 any cargo tank may be designated as a slop tank.

Adequate means shall be provided for cleaning the cargo tanks and transferring the dirty ballast residue and tank washings from the cargo tanks into a slop tank approved by the Administration.

The arrangements of the slop tank or combination of slop tanks shall have a capacity necessary to retain the slop generated by tank washings, oil residues and dirty ballast residues.

The total capacity of the slop tank or tanks shall not be less than 3 per cent of the oil carrying capacity of the ship.

Oil tankers of 70,000 tonnes deadweight and above delivered after 31 December 1979, shall be provided with at least two slop tanks.

Pump-room bottom protection

This regulation applies to oil tankers of 5,000 tonnes deadweight and above constructed on or after 1 January 2007.

The pump-room shall be provided with a double bottom such that at any cross-section the depth of each double bottom tank or space shall be such that the distance h between the bottom of the pump-room and the ship's base line measured at right angles to the ship's base line is not less than specified below:

$$h = B/15(m) \text{ or}$$

$$h = 2 \text{ m, whichever is the lesser.}$$

The minimum value of $h = 1 \text{ m}$.

Shipboard Oil Pollution Emergency Plan (SOPEP)

Every oil tanker of 150 gross tonnage and above and every ship other than an oil tanker of 400 gross tonnage and above shall carry on board a shipboard oil pollution emergency plan approved by the Administration.

The plan shall consist at least of:

- .1 the procedure to be followed by the master or other persons having charge of the ship to report an oil pollution incident;
- .2 the list of authorities or persons to be contacted in the event of an oil pollution incident;
- .3 a detailed description of the action to be taken immediately by persons on board to reduce or control the discharge of oil following the incident;
- .4 the procedures and point of contact on the ship for co-ordinating shipboard action with national and local authorities in combating the pollution.

All oil tankers of 5,000 tons deadweight or more shall have prompt access to computerised, shore-based damage stability and residual structural strength calculation programs.

Special Areas

Special area means a sea area where for recognized technical reasons in relation to its oceanographical and ecological condition and to the particular character of its traffic the adoption of special mandatory methods for the prevention of sea pollution by oil is required.

For the purposes of this Annex, the special areas are defined as follows:

- .1 the Mediterranean Sea area;
- .2 the Baltic Sea area;
- .3 the Black Sea area;
- .4 the Red Sea area;
- .5 the Gulfs area;
- .6 the Gulf of Aden area;
- .7 the Antarctic area;
- .8 the North West European waters include the North Sea and its approaches, the Irish Sea and its approaches, the Celtic Sea, the English Channel and its approaches and part of the North East Atlantic immediately to the west of Ireland;
- .9 the Oman area of the Arabian Sea.
- .10 Southern South African waters



Reception Facilities

Reception facilities shall be provided in:

- .1 all ports and terminals in which crude oil is loaded into oil tankers where such tankers have immediately prior to arrival completed a ballast voyage of not more than 72 hours or not more than 1,200 nautical miles;
- .2 all ports and terminals in which oil other than crude oil in bulk is loaded at an average quantity of more than 1,000 tonnes per day;
- .3 all ports having ship repair yards or tank cleaning facilities;
- .4 all ports and terminals which handle ships provided with the sludge tank(s);
- .5 all ports in respect of oily bilge waters and other residues, which cannot be discharged at sea in compliance with the Annex I;
- .6 all loading ports for bulk cargoes in respect of oil residues from combination carriers which cannot be discharged at sea in compliance with the Annex I.

LIST OF OILS

Asphalt solutions
Blending stocks
Roofers flux
Straight run residue

Gasoline blending stocks
Alkylates – fuel
Reformates
Polymer – fuel

Oils

Clarified
Crude oil
Mixtures containing crude oil
Diesel oil
Fuel oil no. 4
Fuel oil no. 5
Fuel oil no. 6
Residual fuel oil
Road oil
Transformer oil
Aromatic oil (excluding vegetable oil)
Lubricating oils and blending stocks
Mineral oil
Motor oil
Penetrating oil
Spindle oil
Turbine oil

Gasolines
Casinghead (natural)

Automotive
Aviation
Straight run
Fuel oil no. 1 (kerosene)
Fuel oil no. 1-D
Fuel oil no. 2
Fuel oil no. 2-D

Jet fuels
JP-1 (kerosene)
JP-3
JP-4
JP-5 (kerosene, heavy)
Turbo fuel
Kerosene
Mineral spirit

Distillates

Straight run
Flashed feed stocks

Naphtha
Solvent
Petroleum
Heartcut distillate oil

Gas oil

Cracked

MARPOL 73/78 Annex II
Regulations for the control of Pollution by Noxious Liquid Substances (NLS)
Entered into force on 6 April 1987
Revised Annex II entered into force 1 January 2007

Main Features of MARPOL 73/78, Annex II

Substances posing a threat of harm to the marine environment are divided into three categories, X, Y and Z. Category X substances are those posing the greatest threat to the marine environment, whilst Category Z substances are those posing the smallest threat.

Annex II prohibits the discharge into the sea of any effluent containing substances falling under these categories, except when the discharge is made under conditions which are specified in detail for each Category. These conditions include, where applicable, such parameters as:

- the maximum quantity of substances per tank which may be discharged into the sea;
- the speed of the ship during the discharge;
- the minimum distance from the nearest land during discharge;
- the minimum depth of water at sea during discharge; and
- the need to effect the discharge below the waterline.

For certain sea areas identified as “special area” more stringent discharge criteria apply. Under Annex II the special area is the Antarctic area.

Annex II requires that every ship is provided with pumping and piping arrangements to ensure that each tank designated for the carriage of Category X, Y and Z substances does not retain after unloading a quantity of residue in excess of the quantity given in the Annex. For each tank intended for the carriage of such substances an assessment of the residue quantity has to be made. Only when the residue quantity as assessed is less than the quantity prescribed by the Annex a tank may be approved for the carriage of a Category X, Y or Z substances.

In addition to the conditions referred to above, an important requirement contained in Annex II is that the discharge operations of certain cargo residues and certain tank cleaning and ventilation operations may only be carried out in accordance with approved procedures and arrangements.

To enable the requirement of the above paragraph to be met, this Procedures and Arrangements Manual contains in section 2 all particulars of the ship's equipment and arrangements, in section 3 operational procedures for cargo unloading and tank stripping and in section 4 procedures for discharge of cargo residues, tank washing, slops collection, ballasting and deballasting as may be applicable to the substances the ship is certified to carry.

By following the procedures as set out in this Manual, it will be ensured that the ship complies with all relevant requirements of Annex II to MARPOL 73/78.

Categorization of Noxious Liquid Substances and Other Substances

For the purpose of the regulations of Annex II, Noxious Liquid Substances shall be divided into four categories as follows:

1. **Category X:** Noxious Liquid Substances which, if discharged into the sea from tank cleaning or deballasting operations, are deemed to present a major hazard to either marine resources or human health and, therefore, justify the prohibition of the discharge into the marine environment;

2. **Category Y:** Noxious Liquid Substances which, if discharged into the sea from tank cleaning or deballasting operations, are deemed to present a hazard to either marine resources or human health or cause harm to amenities or other legitimate uses of the sea and therefore justify a limitation on the quality and quantity of the discharge into the marine environment;
3. **Category Z:** Noxious Liquid Substances which, if discharged into the sea from tank cleaning or deballasting operations, are deemed to present a minor hazard to either marine resources or human health and therefore justify less stringent restrictions on the quality and quantity of the discharge into the marine environment;
4. **Other Substances:** substances indicated as OS (Other Substances) in the pollution category column of chapter 18 of the International Bulk Chemical Code which have been evaluated and found to fall outside Category X, Y or Z because they are, at present, considered to present no harm to marine resources, human health, amenities or other legitimate uses of the sea when discharged into the sea from tank cleaning or deballasting operations.
The discharge of bilge or ballast water or other residues or mixtures containing only substances referred to as “Other Substances” shall not be subject to any requirements of the Annex.



Discharge provisions

The discharge into the sea of residues of substances assigned to Category X, Y or Z or of those provisionally assessed as such or ballast water, tank washings or other mixtures containing such substances shall be prohibited unless such discharges are made in full compliance with the applicable operational requirements contained in the Annex.

Before any prewash or discharge procedure is carried out in accordance with this regulation, the relevant tank shall be emptied to the maximum extent in accordance with the procedures prescribed in the Procedures and Arrangements Manual.

Procedures and Arrangements Manual (P&A Manual)

Every ship certified to carry substances of Category X, Y or Z shall have on board a Manual approved by the Administration. The Manual shall have a standard format in compliance with appendix 4 to Annex II. In the case of a ship engaged in international voyages on which the language used is not English, French or Spanish, the text shall include a translation into one of these languages.

The main purpose of the Manual is to identify for the ship's officers the physical arrangements and all the operational procedures with respect to cargo handling, tank cleaning, slops handling and cargo tank ballasting and deballasting which must be followed in order to comply with the requirements of the Annex.

Cargo Record Book (CRB)

Every ship to which Annex II applies shall be provided with a Cargo Record Book, whether as part of the ship's official logbook or otherwise, in the form specified in appendix 2 to the Annex.

After completion of any operation specified in appendix 2 to Annex II, the operation shall be promptly recorded in the Cargo Record Book.

Each entry shall be signed by the officer or officers in charge of the operation concerned and each page shall be signed by the master of the ship. The entries in the Cargo Record Book shall be at least in English, French or Spanish. Where entries in an official national language of the State whose flag the ship is entitled to fly are also used, this shall prevail in case of a dispute or discrepancy.

The Cargo Record Book shall be kept in such a place as to be readily available for inspection and, except in the case of unmanned ships under tow, shall be kept on board the ship. It shall be retained for a period of three years after the last entry has been made.

Shipboard Marine Pollution Emergency Plan for Noxious Liquid Substances

Every ship of 150 gross tonnage and above certified to carry Noxious Liquid Substances in bulk shall carry on board a shipboard marine pollution emergency plan for Noxious Liquid Substances approved by the Administration.

The plan shall consist at least of:

1. the procedure to be followed by the master or other persons having charge of the ship to report a Noxious Liquid Substances pollution incident;
2. the list of authorities or persons to be contacted in the event of a Noxious Liquid Substances pollution incident;
3. a detailed description of the action to be taken immediately by persons on board to reduce or control the discharge of Noxious Liquid Substances following the incident; and
4. the procedures and point of contact on the ship for co-ordinating shipboard action with national and local authorities in combating the pollution.

Amendments to the IBC Code

Consequential amendments to the International Bulk Chemical Code (IBC Code) were also adopted, reflecting the changes to MARPOL Annex II. The amendments incorporate revisions to the categorization of certain products relating to their properties as potential marine pollutants as well as revisions to ship type and carriage requirements following their evaluation by the Evaluation of Hazardous Substances Working Group.

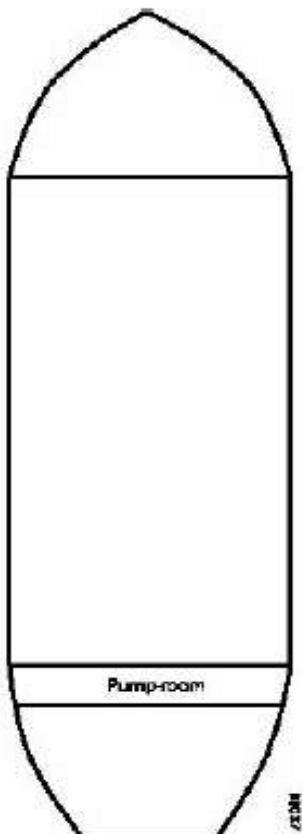
Ships constructed after 1986 carrying substances identified in chapter 17 of the IBC Code must follow the requirements for design, construction, equipment and operation of ships contained in the Code.

FORM OF CARGO RECORD BOOK FOR SHIPS CARRYING NOXIOUS LIQUID SUBSTANCES IN BULK

Name of ship.....

Distinctive number or letters.....

PLAN VIEW OF CARGO AND SLOP TANKS (to be completed on board)



Identification of the tanks	Capacity

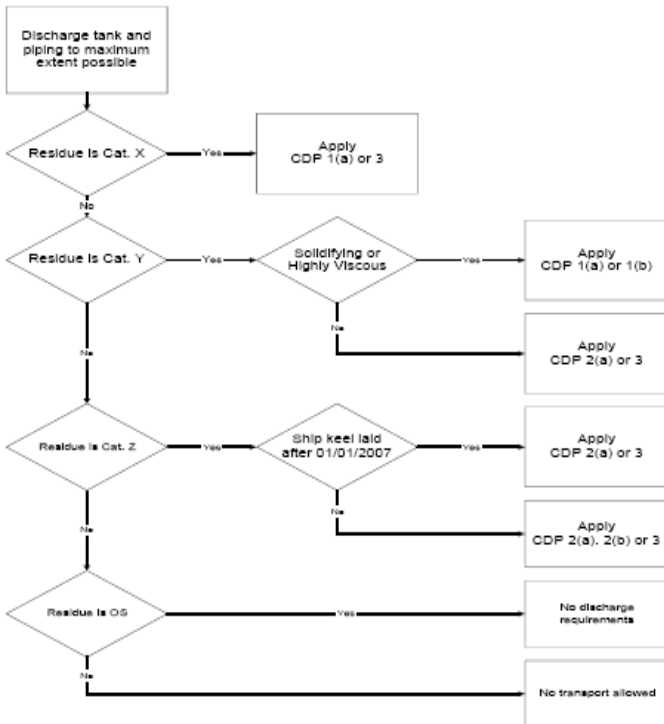
(Give the capacity of each tank in cubic metres)

FLOW DIAGRAMS -- CLEANING OF CARGO TANKS AND DISPOSAL OF TANK WASHINGS/BALLAST CONTAINING RESIDUES OF CATEGORY X,Y, AND Z SUBSTANCES

Note 1 : This flow diagram shows the basic requirements applicable to all age groups of ships and is for guidance only.

Note 2 : All discharges into the sea are regulated by Annex II.

Note 3 : Within the Antarctic area, any discharge into the sea of Noxious Liquid Substances or mixtures containing such substances is prohibited.



Cleaning and disposal procedures (CDP) (Start at the top of the column under the CDP number specified and complete each item procedure in the sequence where marked)						
No.	Operation	Procedure Number				
		1(a)	1(b)	2(a)	2(b)	3
1	Strip tank and piping to maximum extent, at least in compliance with the procedures in section 3 of this Manual	X	X	X	X	X
2	Apply prewash in accordance with Addendum B of this Manual and discharge residue to reception facility	X	X			
3	Apply subsequent wash, additional to the prewash, with: a complete cycle of the cleaning machine(s) <i>for ships built before 1 July 1994</i> a water quantity not less than calculated with "k" ³ =1.0 <i>for ships built on or after 1 July 1994</i>		X			
4	Apply ventilation procedure in accordance with Addendum C of this Manual					X
5	Ballast tanks or wash tank to commercial standards	X		X	X	X
6	Ballast added to tank		X			
7	Conditions for discharge of ballast/residue/water mixtures other than prewash:					
	.1 distance from land > 12 nautical miles	X		X	X	
	.2 ship's speed > 7 knots	X		X	X	
	.3 water depth > 25 metres	X		X	X	
	.4 Using underwater discharge (not exceeding permissible discharge rate)	X		X		
8	Conditions for discharge of ballast:					
	.1 distance from land > 12 nautical miles		X			
	.2 water depth > 25 metres		X			
9	Any water subsequently introduced into a tank may be discharged into the sea without restrictions	X	X	X	X	X

STRIPPING REQUIREMENTS

Ship details	Stripping requirements (in litres)		
	Category X	Category Y	Category Z
New Ships: keel laid after 01/01/2007	75	75	75
IBC ships until 01/01/2007	100 + 50 tolerance	100 + 50 tolerance	300 + 50 tolerance
BCH ships	300 + 50 tolerance	300 + 50 tolerance	900 + 50 tolerance
Other ships: keel-laid before 01/01/2007	N/A	N/A	Empty to the most possible extent

MARPOL 73/78 Annex III**Regulations for the prevention of Pollution by harmful substances in packaged form****Entered into force on 1 July 1992****Revised Annex III entered into force 1 October 2010****Legal Requirements**

The regulations were developed in order to identify marine pollutants so that they could be packed and stowed on board ship in such a way as to minimise accidental pollution as well as to aid recovery by using clear marks to distinguish them from other (less harmful) cargoes.

The rules on discharging harmful goods are straightforward: "Jettisoning of harmful substances carried in packaged form shall be prohibited, except where necessary for the purpose of securing the safety of the ship or saving life at sea".

The Annex states that "appropriate measures based on the physical, chemical and biological properties of harmful substances shall be taken to regulate the washing of leakages overboard, provided that compliance with such measures would not impair the safety of the ship and persons on board." (MARPOL Annex III, Regulation 7 (1))

The Annex applies to all ships carrying harmful substances in packaged form, or in freight containers, portable tanks or road and rail tank wagons.

The regulations require the issuing of detailed standards on packaging, marking, labelling, documentation, stowage, quantity limitations, exceptions and notifications, for preventing or minimizing pollution by harmful substances.

However, implementation of the Annex was initially hampered by the lack of a clear definition of harmful substances carried in packaged form. This was remedied by amendments to the International Maritime Dangerous Goods Code (IMDG Code) to include marine pollutants.

The IMDG Code was first adopted by IMO in 1965 and lists hundreds of specific dangerous goods together with detailed advice on storage, packaging and transportation. The amendments extending the Code to cover marine pollutants, which entered into force in 1991, added the identifier "marine pollutant" to all substances classed as such. All packages containing marine pollutants must be marked with a standard marine pollutant mark.

Annex III of MARPOL was also amended at the same time, to make it clear that "harmful substances are those substances which are identified as marine pollutants in the International Maritime Dangerous Goods Code (IMDG Code)."

International Maritime Dangerous Goods (IMDG) Code

The International Maritime Dangerous Goods (IMDG) Code was developed as a uniform international code for the transport of dangerous goods by sea covering such matters as packing, container traffic and stowage, with particular reference to the segregation of incompatible substances.

Amendments to SOLAS chapter VII (Carriage of Dangerous Goods) adopted in May 2002 make the IMDG Code mandatory from 1 January 2004.

Also in May 2002, IMO adopted the IMDG Code in a mandatory form - known as Amendment 31.



The mandatory IMDG Code incorporates certain changes relating to specific products, as well as relevant elements of the amendments to the UN Recommendations on the Transport of Dangerous Goods, Model Regulations adopted by the UN Committee of Experts on the Transport of Dangerous Goods at its twenty-first session in Geneva from 4 to 13 December 2000.

The amendments making the IMDG Code mandatory entered into force on 1 January 2004.

The Code lays down basic principles; detailed recommendations for individual substances, materials and articles, and a number of recommendations for good operational practice including advice on terminology, packing, labelling, stowage, segregation and handling, and emergency response action.

The two-volume Code is divided into seven parts:

Volume 1 contains (parts 1, 2, 4, 5, 6 and 7 of the Code) with sections on:

- general provisions, definitions, training
- Classification
- Packing and Tank Provisions
- Consignment Procedures
- Construction and Testing of packagings, IBCs, large packagings, portable tanks, MEGCs and road tank vehicles
- Transport Operations

Volume 2 contains: part 3 (Dangerous Goods List, special provisions and exceptions), appendix A (generic and N.O.S. Proper Shipping Names), appendix B (Glossary of terms) and an index.

The Supplement contains the following texts related to the IMDG Code:

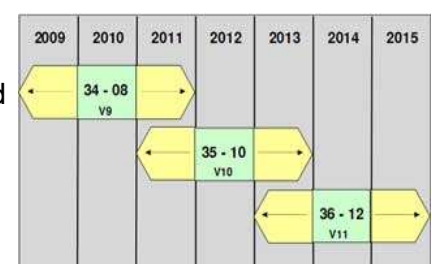
- EMS Guide
- Medical First Aid Guide
- Reporting Procedures
- Packing Cargo Transport Units
- Safe Use of Pesticides
- INF Code

The Amendment Cycle of the IMDG Code

Amendments to the IMDG Code originate from two sources; proposals submitted directly to IMO by Member States and amendments required to take account of changes to the United Nations Recommendations on the Transport of Dangerous Goods which sets the basic requirements for all the transport modes.

Every two years IMO publishes a new Amendment to the IMDG Code, incorporating changes approved by the Maritime Safety Committee (MSC). This chart shows the sequence of these Amendments. The general principle is:

- each Amendment is valid for two years
- there are alternating years for implementation
- in January of the yellow years, a new Amendment is published and can be used immediately, subject to the timing of National Competent Authority adoption
- also, during the yellow years, the preceding Amendment can also be used, so it's an overlap period
- in the green years, only the current Amendment can be used.



MARPOL 73/78 Annex IV
Regulations for the prevention of Pollution by Sewage from ships
Entered into force on 27 September 2003



The discharge of raw sewage into the sea can create a health hazard. Sewage can also lead to oxygen depletion and can be an obvious visual pollution in coastal areas - a major problem for countries with tourist industries.

The main sources of human-produced sewage are land-based - such as municipal sewers or treatment plants. However, the discharge of sewage into the sea from ships also contributes to marine pollution.

Legal Requirements

Annex IV contains a set of regulations regarding the discharge of sewage into the sea from ships, including regulations regarding the ships' equipment and systems for the control of sewage discharge, the provision of facilities at ports and terminals for the reception of sewage, and requirements for survey and certification. It also includes a model International Sewage Pollution Prevention Certificate to be issued by national shipping administrations to ships under their jurisdiction.

It is generally considered that on the high seas, the oceans are capable of assimilating and dealing with raw sewage through natural bacterial action. Therefore, the regulations in Annex IV of MARPOL prohibit the discharge of sewage into the sea within a specified distance of the nearest land, unless they have in operation an approved sewage treatment plant.

Governments are required to ensure the provision of adequate reception facilities at ports and terminals for the reception of sewage.

The Annex entered into force on 27 September 2003. A revised Annex IV was adopted on 1 April 2004 and entered into force on 1 August 2005.

The revised Annex applies to new ships engaged in international voyages of 400 gross tonnage and above or which are certified to carry more than 15 persons. Existing ships are required to comply with the provisions of the revised Annex IV five years after the date of entry into force of Annex IV, namely since 27 September 2008. The Annex requires ships to be equipped with either an approved sewage treatment plant or an approved sewage comminuting and disinfecting system or a sewage holding tank.

The discharge of sewage into the sea is prohibited, except when the ship has in operation an approved sewage treatment plant or when the ship is discharging comminuted and disinfected sewage using an approved system at a distance of more than three nautical miles from the nearest land. Sewage which is not comminuted or disinfected has to be discharged at a distance of more than 12 nautical miles from the nearest land.

In July 2011, the Marine Environment Protection Committee, at its sixty-second session, adopted the most recent amendments to MARPOL Annex IV by resolution MEPC.200(62) which entered into force on 1 January 2013. The amendment introduces the Baltic Sea as a special area under Annex IV and adds new discharge requirements for passenger ships while in a special area. The discharge of sewage from passenger ships within a special area will generally be prohibited under the new regulations, except when the ship has in operation a sewage treatment plant which shall be of a type approved by the national Administration.

Shipboard Sewage Pollution Sources

- drainage and other wastes from any form of toilets and urinals;
- drainage from medical premises (dispensary, sickbay, etc.) via wash basins, wash tubs and scuppers located in such premises;
- drainage from spaces containing living animals;
- other waste waters when mixed with the drainages defined above. (Regulations not applicable to the disposal of: drainage from dishwasher, shower, laundry, bath and washbasin drains - grey water).

Ships application

- new ships of ≥ 400 gross tons
- new ships < 400 gross tons certified to carry over 15 persons

(new ships: building contract or keel laid on/after 27 September 2003 or delivered on/after 27 September 2006)

- existing ships of ≥ 400 gross tons
- existing ships < 400 gross tons certified to carry over 15 persons (on or after 27 September 2008)

Equipment requirements

- discharge pipeline fitted with the standard discharge connection * and
- approved sewage treatment plant or
- comminuter/disinfection system with temporary means of storage or
- holding tank

* applies to all new ships contracted for construction on or after January 1, 2007

Sewage Treatment Plant

The sewage treatment plant shall be approved by the Government of the State under whose authority the ship is operating. The approval has to be in compliance with the standards and test methods developed by IMO. The international specifications for effluent standards, construction and testing of sewage treatment systems is adopted by IMO by Resolution MEPC.2(VI) on 3 December 1976.

Sewage Comminuting and Disinfecting System

The sewage comminuting and disinfecting system shall be approved by the Government of the State under whose authority the ship is operating.

Holding Tank

The holding tank shall be constructed to the satisfaction of the Government of the State under whose authority the ship is operating and shall have a means to indicate visually the amount of its contents. The holding tank shall have a capacity that is satisfied for the retention of all sewage, having regard to the operation of the ship, the number of persons on board and other relevant factors.

- An approved sewage treatment plant shall be of a type approved by the Administration, following the IMO standards and test methods * (its tests results are noted on the ISPPC and the effluent does not produce visible floating solids nor cause discoloration of the surrounding water)
- A sewage comminuting and disinfecting system approved by the Administration shall be fitted with temporary storage of sewage when the ship is less than 3 nautical miles from the nearest land
- A sewage holding tank shall: - have appropriate capacity for the retention of all sewage, - be correctly constructed with a means to indicate visually the amount of its contents, and - be equipped with the ship's discharge line to port / terminal reception facilities fitted with the standard discharge connection

* 1) Sewage treatment plant should be approved in accordance with IMO Resolution MEPC 2(VI) – December 1976 Standard

2) IMO Resolution 159(55) Adopted October 2006 is applicable for equipment installed on board on or after 1 January 2010.

Control of discharge sewage (based on the type of equipment on the ship)

The discharge of sewage into the sea is prohibited , except when:

- the ship is discharging comminuted and disinfected sewage using an approved system at a distance of more than 3 nm from the nearest land; or
- the ship is discharging sewage which is not comminuted and disinfected at a distance of more than 12 nm from the nearest land, provided that in any case, the sewage stored in holding tanks or sewage originating from spaces containing living animals, shall not be discharged instantaneously but at a moderate rate when ship is en route and proceeding at not less than 4 knots; or
- the ship is discharging sewage using an approved sewage treatment plant.

Control of discharge sewage (based on discharge distance)

- while operating within 3 nm from the nearest land discharge prohibited unless properly treated in approved sewage treatment plant
- discharge within 3-12 nm from nearest land must either: meet effluent requirements within 3 nm from nearest land or the ship is discharging comminuted and disinfected sewage using an approved comminuter/disinfection system
- discharge at a distance of more than 12 nm from nearest land must either: meet effluent requirements within 3 nm or within 3-12 nm from the nearest land or the sewage that has been stored in holding tanks shall not be discharged instantaneously but at a moderate rate when the ship is en route and proceeding at not less than 4 knots.

Exceptions

The discharge of sewage into the sea is allowed when:

- securing the safety of life or the ship; or
- the discharge of sewage is as result from damage to a ship or its equipment if all reasonable precautions have been taken before and after the occurrence of the damage, for the purpose of preventing or minimizing the discharge

Note: some countries have sewage „no discharge areas” regardless of how well it is treated.

Revised sewage standards

New sewage discharge requirements for passenger vessels within the Baltic Sea and a new sewage treatment plant performance test/standard for all ships came into force on 1 January, 2013, under MARPOL Annex IV. These apply as follows.

Passenger ship discharge requirements

In general, the discharge of sewage from existing passenger ships will be prohibited within the Baltic Sea special area on or after 1 January, 2018.

New passenger vessels will be prohibited from discharging sewage within the Baltic Sea on or after 1 January, 2016.

New vessels are those:

- for which the building contract is placed on or after 1 January 2016;
- or in the absence of a building contract, the keel of which is laid on or after 1 January 2016;
- or regardless of the building contract signing date or keel laying date the delivery of which is on after 1 January, 2018.

New performance test/standard for sewage treatment plants

Passenger ships

Passenger ships operating in the Baltic Sea or any other designated special areas intending to discharge treated sewage effluent must operate an approved sewage treatment plant which meets the stringent nitrogen and phosphorus removal standard.

- Existing passenger ships must comply on or after 1 January, 2018.
- New passenger ships must comply on or after 1 January, 2016.

All ships

The updated performance test/standard (excluding the nitrogen and phosphorus removal standard) will also apply to sewage treatment plants installed on board all ships, other than passenger vessels, on or after 1 January, 2016.



MARINE SEWAGE TREATMENT UNITS

Traditional Type II Marine Sanitation Devices

Most of a cargo and cruise ships with traditional Type II Marine Sanitation Devices (MSD), sewage is treated using biological treatment and chlorination. Some cruise ships do not treat their sewage biologically, but instead use maceration and chlorination. The treatment system typically includes aerobic biological treatment to remove biochemical oxygen demand and some nutrients, clarification and filtration to remove solids, and final chlorine disinfection to destroy pathogens. The system also may include screening to remove grit and debris. Cruise ships typically install up to four systems, allowing one or two to be placed off-line for maintenance at any one time. Cargo ships use one unit only.

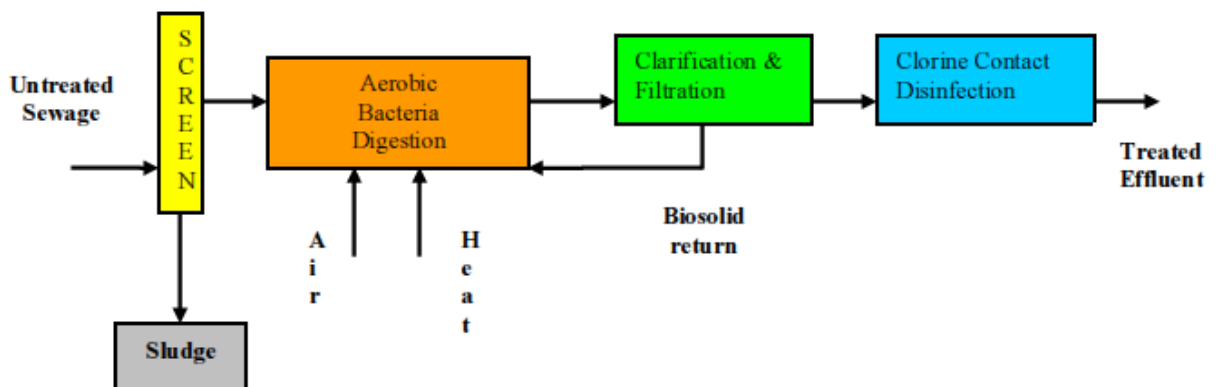


Figure 1: Simplified Schematic of Traditional Type II Marine Sanitation Device Using Biological Treatment and Chlorine Disinfection

Advanced Wastewater Treatment Systems (AWT)

To improve environmental performance, cruise lines are testing and installing wastewater purification systems that utilize advanced technologies. These onboard wastewater treatment systems are designed to result in effluent discharges that are of a high quality and purity; for example, meeting or surpassing standards for secondary and tertiary effluents and reclaimed water. Effluents meeting these high standards would not be subjected to the strict discharge limitations. AWT systems are still at the development stage. Generally advanced treatment systems utilize enhanced aerobic digestion with physical filtration to clean shipboard waste water. On some cruise vessels, sewage and often graywater are treated using AWTs. AWTs generally provide improved screening, biological treatment, solids separation (using filtration or flotation), and disinfection (using ultraviolet light) as compared to traditional Type II MSDs.

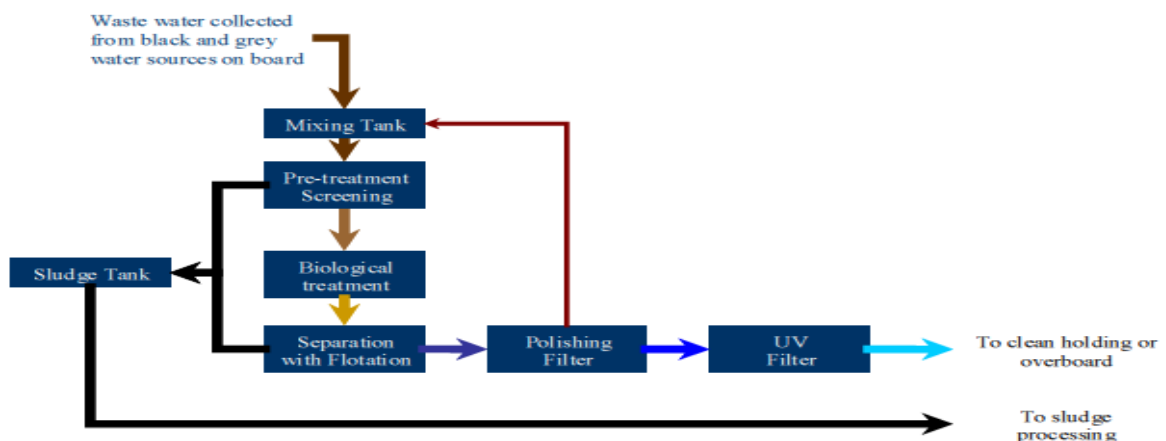


Figure 2: Simplified Schematic of Scanship Advanced Wastewater Purification System

EVAC

EVAC is a company that designs, manufactures and markets environmentally friendly waste and wastewater collection and treatment solutions for the marine industry worldwide. The Evac MBR is a single stream Advanced Waste Water Treatment system where all the waste streams are treated in one process. The Evac MBR is based on effective equalizing and mixing of the incoming waste streams, pre-treatment by screens, an aerated biotank and a membrane bioreactor. In this proposal, a nutrient removal step is added to the basic process. The Evac MBR process is fully automated and controlled through a PLC by vacuum/pressure switches, level switches, DO, TSS and pH sensors, flow meters and foam detectors.

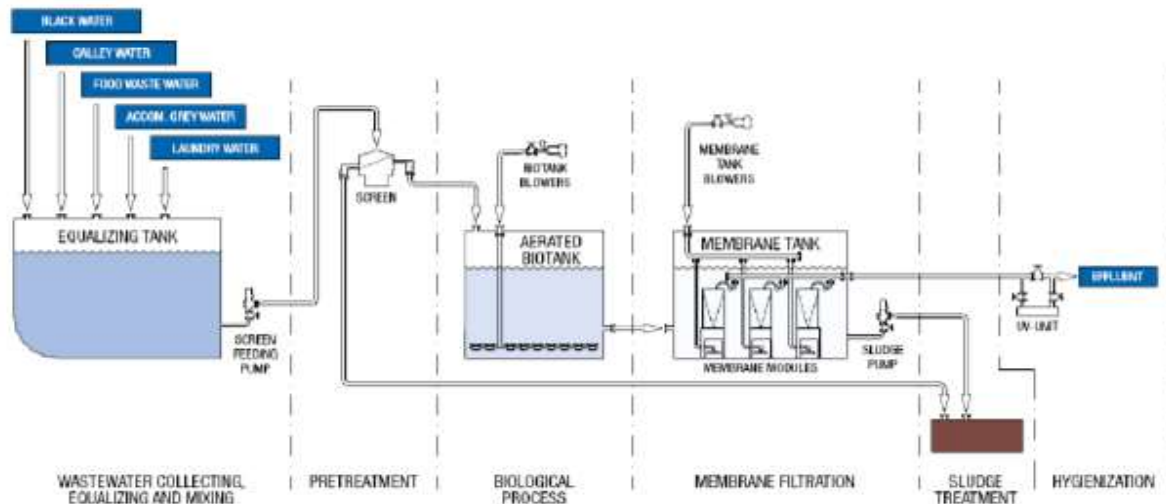


Figure 3: Basic principle of the Evac MBR single stream process (Evac, 2008)

MARPOL 73/78 Annex V**Regulations for the prevention of Pollution by Garbage from ships****Entered into force on 31 December 1988****Revised Annex V entered into force 1 January 2013****Legal Requirements**

Garbage from ships can be just as deadly to marine life as oil or chemicals.

The greatest danger comes from plastic, which can float for years. Fish and marine mammals can in some cases mistake plastics for food and they can also become trapped in plastic ropes, nets, bags and other items - even such innocuous items as the plastic rings used to hold cans of beer and drinks together.

It is clear that a good deal of the garbage washed up on beaches comes from people on shore - holiday-makers who leave their rubbish on the beach, fishermen who simply throw unwanted refuse over the side - or from towns and cities that dump rubbish into rivers or the sea. But in some areas most of the rubbish found comes from passing ships which find it convenient to throw rubbish overboard rather than dispose of it in ports.

For a long while, many people believed that the oceans could absorb anything that was thrown into them, but this attitude has changed along with greater awareness of the environment. Many items can be degraded by the seas - but this process can take months or years, as the following table shows:

Time taken for objects to dissolve at sea	
Paper bus ticket	2-4 weeks
Cotton cloth	1-5 months
Rope	3-14 months
Woollen cloth	1 year
Painted wood	13 years
Tin can	100 years
Aluminium can	200-500 years
Plastic bottle	450 years

Source: *Hellenic Marine Environment Protection Association (HELMEPA)*

The MARPOL Convention sought to eliminate and reduce the amount of garbage being dumped into the sea from ships.

Under Annex V of the Convention, garbage includes all kinds of food, domestic and operational waste, excluding fresh fish, generated during the normal operation of the vessel and liable to be disposed of continuously or periodically.

Annex V totally prohibits of the disposal of plastics anywhere into the sea, and severely restricts discharges of other garbage from ships into coastal waters and "Special Areas".

The Annex also obliges Governments to ensure the provision of reception facilities at ports and terminals for the reception of garbage.

The special areas established under Annex V are:

- the Mediterranean Sea
- the Baltic Sea Area
- the Black Sea area
- the Red Sea Area
- the Gulfs area
- the North Sea
- the Wider Caribbean Region and
- Antarctic Area

These are areas which have particular problems because of heavy maritime traffic or low water exchange caused by the land-locked nature of the sea concerned.

Although the Annex was optional, the Annex did receive sufficient number of ratifications to enter into force on 31 December 1988. Provisions to extend port State control to cover operational requirements as regards prevention of marine pollution were adopted as a new regulation 8 to the Annex in 1994 (entering into force on 3 March 1996). Like similar amendments adopted to the other MARPOL Annexes, the regulation makes it clear that port State control officers can inspect a foreign-flagged vessel "where there are clear grounds for believing that the master or crew are not familiar with essential shipboard procedures relating to the prevention of pollution by garbage".

Implementation, and enforcement, was also the focus of a further new regulation 9, adopted in 1995, which requires all ships of 400 gross tonnage and above and every ship certified to carry 15 persons or more, and every fixed or floating platform engaged in exploration and exploitation of the seabed to provide a Garbage Record Book and to record all disposal and incineration operations.

The date, time, position of ship, description of the garbage and the estimated amount incinerated or discharged must be logged and signed. The Garbage Record Book must be kept for a period of two years after the date of the last entry. This regulation does not in itself impose stricter requirements - but it makes it easier to check that the regulations on garbage are being adhered to as it means ship personnel must keep track of the garbage and what happens to it. It may also prove an advantage to a ship when local officials are checking the origin of dumped garbage - if ship personnel can adequately account for all their garbage, they are unlikely to be wrongly penalised for dumping garbage when they have not done so.

All ships of 400 gross tonnage and above and every ship certified to carry 15 persons or more will have to carry a Garbage Management Plan, to include written procedures for collecting, storing, processing and disposing of garbage, including the use of equipment on board. The Garbage Management Plan should designate the person responsible for carrying out the plan and should be in the working language of the crew.

MEPC/Circ.317 gives Guidelines for the development of garbage management plans and an Appendix to Annex V of MARPOL gives a standard form for a Garbage Record Book.

Regulation 9 came into force for new ships from 1 July 1997 and from 1 July 1998 all applicable ships built before 1 July 1997 also had to comply: all ships of 400 gross tonnage and above and every ship certified to carry 15 persons or more, and every fixed or floating platform engaged in exploration and exploitation of the seabed.

The regulation also requires every ship of 12 metres or more in length to display placards notifying passengers and crew of the disposal requirements of the regulation; the placards should be in the official language of the ship's flag State and also in English or French for ships travelling to other States' ports or offshore terminals.

Shipboard Waste Management

Every ship of 100 gross tonnage (instead of 400 GT required by the superseded MARPOL Annex V) and above, and every ship which is certified to carry 15 or more persons, shall carry a garbage management plan (based on IMO Guidelines MEPC.220(63) and in working language of the crew) containing procedures on

1. garbage minimization
2. garbage collection
3. garbage storage
4. garbage processing
5. garbage disposal
6. equipment used onboard for handling of garbage
7. the designation of the person or persons in charge for implementing the Garbage Management Plan

In addition to the Garbage Management Plan every ship of 400 gross tonnage and above and every ship which is certified to carry 15 or more persons engaged in voyages to ports which are under the jurisdiction of another Party to the Convention should maintain a Garbage Record Book in the form specified in the appendix of the revised Annex.

Generally, discharge is restricted to food wastes, identified cargo residues, animal carcasses, and identified cleaning agents and additives in washwater which are not harmful to the marine environment. Garbage discharge regulations do not apply when the discharge of garbage from a ship was a necessary action for the purpose of securing the safety of a ship and those on board or saving life at sea. In such cases an entry should be made in the Garbage Record Book, or in the ship's official log-book for ships of less than 400 gross tonnage.

According to revised MARPOL Annex V shipboard generated garbage is to be grouped into the following categories:

1. **Plastics** - Garbage that consists of or includes plastic in any form, including synthetic ropes, synthetic fishing nets, plastic garbage bags and incinerator ashes from plastic products. Garbage under this category is prohibited to be discharged at sea.
2. **Food wastes** – Spoiled or unspoiled food substances. Food wastes may be discharged at sea under specific circumstances/requirements (refer to the simplified overview of the discharge provisions of the revised MARPOL Annex V developed by IMO).
3. **Domestic Wastes** – Garbage generated mainly in the accommodation spaces on board the ship (e.g. drinking bottles, papers, cardboard etc). Garbage under this category is prohibited to be discharged at sea.
4. **Cooking Oil** – Edible oil or animal fat used for the preparation or cooking of food. Garbage under this category is prohibited to be discharged at sea.
5. **Incinerator ashes** - Ash and clinkers resulting from shipboard incinerators used for the incineration of garbage. Garbage under this category is prohibited to be discharged at sea.
6. **Operational wastes** - Solid wastes (including slurries) that are collected on board during normal maintenance or operations of a ship, or used for cargo stowage and handling. Operational wastes also includes cleaning agents and additives contained in cargo hold and external wash water that may be harmful to the aquatic environment. Operational wastes does not include grey water, bilge water, or other similar discharges essential to the operation of a ship (boiler/economizer blowdown, gas turbine washwater, machinery wastewater etc). Garbage under this category is prohibited to be discharged at sea.

7. **Cargo residues** - Remnants of any cargo which remain on the deck or in holds following loading or unloading. This category does not include cargo dust remaining on the deck after sweeping or dust on the external surfaces of the ship. Such garbage may be discharged at sea under specific circumstances/requirements (refer to the simplified overview of the discharge provisions of the revised MARPOL Annex V developed by IMO). It is essential to remember that besides other requirements (e.g. distance from shore) cargo residues in order to be discharged at sea they should not be harmful to the marine environment. Cargo residues which are considered harmful to the marine environment are classified according to the criteria of the United Nations Globally Harmonized System for Classification and Labelling of Chemicals (UN GHS) meeting parameters such as: acute aquatic toxicity category 1, chronic aquatic toxicity category, carcinogenicity, mutagenicity, reproductive toxicity etc
8. **Animal Carcasses** – Bodies of any animals that are carried on board as cargo and that die or are euthanized during the voyage. Discharge of such wastes permitted at sea under specific circumstances/requirements (refer to the simplified overview of the discharge provisions of the revised MARPOL Annex V developed by IMO).
9. **Fishing Gear** - Physical device that may be placed on or in the water or on the sea-bed with the intended purpose of capturing marine or fresh water organisms. Garbage under this category is prohibited to be discharged at sea.

These new categories represent the categories to be used for record purposes in the Garbage Record Book. The superseded MARPOL Annex V defined six categories whereas the revised annex defines nine.

Cleaning agents and additives

Cleaning agents and additives contained in hold wash water, and deck and external surface wash water are considered „operational wastes“ and are classed as garbage under MARPOL Annex V. Cleaning agent or additive is considered as not harmful for the marine environment when:

1. **The Chemical used is not a “harmful substance” in accordance with the criteria in MARPOL Annex III.** This means substances identified by criteria such as Acute (short-term) aquatic hazard, rapidly or non-rapidly degradable substances for which there are adequate chronic toxicity data available and substances for which adequate chronic toxicity data are not available.
2. **The Chemical used does not contain any components which are known to be carcinogenic, mutagenic or reprotoxic (CMR).** In order to identify such components the GESAMP list can be used.

To sum up the above, when a ship is discharging chemicals agents from hold wash water to the sea and records such action to the Garbage Record Book then the ship should be able at any time to provide evidence that the cleaning agent or additive used was not harmful to the environment. Such evidence may be provided by the chemicals' manufacturer under the form of signed and dated statements providing information that the chemical/product meets the criteria for not being harmful to the marine environment. This might form part of a Safety Data Sheet or be a stand-alone document. Of course the same applies for the cargo that was previously stored within the hold, meaning that hold wash water and cargo residues cannot be discharged if the previous cargo contained within the ship's hold was not declared as not being harmful to the marine environment according to Section 4.2 of the International Maritime Solid Bulk Cargoes (IMSBC) Code.

In case garbage is mixed with or contaminated by other garbage which have different discharge requirements, the more stringent requirements shall apply. For example, if a vessel is sailing within a special area and has mixed comminuted food waste with food waste that is no comminuted then according to the revised MARPOL Annex V regulations the vessel should not discharge the food waste mixture to the sea.

Incinerators

Marine incinerators are predominantly designed for intermittent operation, hand fired and fed by hand. The ash or vapor may be hazardous.

Attention is drawn to the separate, but related requirements, of MARPOL Annex VI which entered into force on 19 May 2005 and requires that all shipboard incinerators installed on or after 01 January 2000 on ships that are flying the flag of MARPOL Annex VI signatory State to be approved by the Administration based on the requirements contained in IMO Resolution MEPC 76(40) on Standard Specification for Shipboard Incinerators. Such incinerators must also be operated within the limits laid down in Appendix IV of MARPOL Annex VI. Annex VI prohibits the incineration of MARPOL Annex I, II & III cargo residues, related contaminated packing materials, polychlorinated biphenyls (PCBs), garbage contaminated with more than traces of heavy metals and refined petroleum products containing halogen compounds. The incineration of sewage sludge and sludge oil, generated during the normal operation of the ship, is allowed in main or auxiliary power plant or boilers under Annex VI, but incineration by such methods is banned in ports, harbours and estuaries.

Incinerators installed prior to 01 January 2000 on board ships flying the flag of MARPOL Annex VI signatory State may still be used after entry into force of MARPOL Annex VI. Incinerators installed on board ships after 01 January 2000, which may have already been approved by the Administration to resolutions MEPC.59(33) or MEPC.76(40) specifications, may still be used after entry into force of MARPOL Annex VI. Incinerators installed on vessels solely engaged in domestic trade may be exempted from the 01 January 2000 deadline but only up to entry into force of the Annex.

The ash from the combustion of plastic products which may contain heavy metal or other residues which can be toxic is not to be discharged into the sea. Such ashes should be retained on board, where possible, and discharged at port reception facilities.

Due to the potential environmental and health effects from combustion of byproducts e.g. scraped paint, impregnated wood and PVC-based plastics, special precaution is required.

Storage

Garbage collected from various areas throughout the ship should be delivered to designated processing or storage locations. Garbage that must be returned to port for disposal may require long-term storage depending on the length of the voyage or availability of port reception facilities. Garbage should be stored in a manner which avoids health and safety hazards.

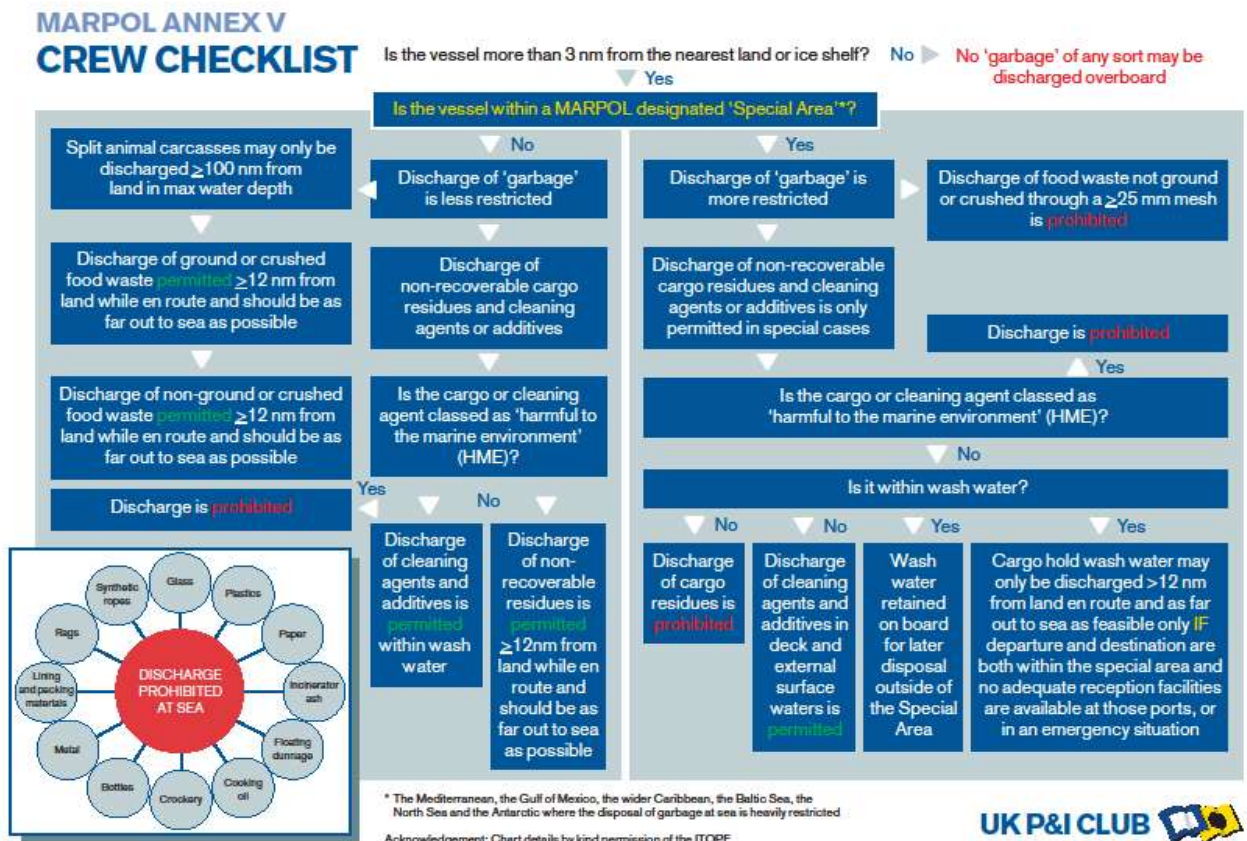
Separate cans, drums, boxes, bags or other containers should be used for shortterm (disposable garbage) and throughout the voyage (non-disposable garbage) storage.

All processed and unprocessed garbage which must be stored for any length of time should be in tight, securely covered containers.

Food wastes and associated garbage which are returned to port and which may carry disease or pests should be kept separate from garbage which does not contain such food wastes. Both types of garbage should be in separate, clearly marked containers to avoid incorrect disposal and treatment on land.

Placards

All vessels of 12 metres or more in length are required to display placards which provide information about garbage laws. The placards should be visible in areas where garbage may be generated and in full view of crew and passengers. The wording for the placards should be similar to the following example:



Training

Training should be provided for all crew members who are involved in operating the garbage processing equipment, and handling and disposing of garbage as part of their operational responsibilities. Such a program should be reviewed annually and should define what constitutes garbage and the applicable regulations for handling and disposal.

Material for training could include posters, brochures, photographs and video tapes.

FORM OF GARBAGE RECORD BOOK

Name of ship _____
Distinctive number or letters _____
IMO No. _____
Period _____ From _____ To _____

Introduction

In accordance with Regulation 10 of Annex V of the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 (MARPOL) a record is to be kept of each discharge operation or completed incineration. This includes discharges into the sea, to reception facilities, or to other ships, as well as the accidental loss of garbage.

Garbage and garbage management

Garbage means all kinds of food wastes, domestic wastes and operational wastes, all plastics, cargo residues, incinerator ashes, cooking oil, fishing gear, and animal carcasses generated during the normal operation of the ship and liable to be disposed of continuously or periodically except those substances which are defined or listed in other Annexes to the present Convention. Garbage does not include fresh fish and parts thereof generated as a result of fishing activities undertaken during the voyage, or as a result of aquaculture activities which involve the transport of fish including shellfish for placement in the aquaculture facility and the transport of harvested fish including shellfish from such facilities to shore for processing.

The Guidelines for the Implementation of Annex V of MARPOL should also be referred to for relevant information.

Description of the garbage

Garbage is to be grouped into categories for the purposes of the Garbage Record Book (or ship's official log-book) as follows:

- A. Plastics
- B. Food wastes
- C. Domestic wastes (e.g., paper products, rags, glass, metal, bottles, crockery, etc.)
- D. Cooking oil
- E. Incinerator Ashes
- F. Operational wastes
- G. Cargo residues
- H. Animal Carcass(es)
- I. Fishing gear

Entries in the Garbage Record Book

1. Entries in the Garbage Record Book shall be made on each of the following occasions:

1.1 When garbage is discharged to a reception facility ashore or to other ships:

- Date and time of discharge
- Port or facility, or name of ship
- Categories of garbage discharged
- Estimated amount discharged for each category in cubic metres
- Signature of officer in charge of the operation.

1.2 When garbage is incinerated:

- Date and time of start and stop of incineration
- Position of the ship (latitude and longitude) at the start and stop of incineration
- Categories of garbage incinerated
- Estimated amount incinerated in cubic metres
- Signature of the officer in charge of the operation.

1.3 When garbage is discharged into the sea in accordance with regulations 4, 5 or 6 of MARPOL Annex V:

- Date and time of discharge
- Position of the ship (latitude and longitude). Note: for cargo residue discharges, include discharge start and stop positions.
- Category of garbage discharged
- Estimated amount discharged for each category in cubic metres
- Signature of the officer in charge of the operation.

1.4 Accidental or other exceptional discharges or loss of garbage into the sea, including in accordance with regulation 7 of Annex V of MARPOL:

- Date and time of occurrence
- Port or position of the ship at time of occurrence (latitude, longitude and water depth if known)
- Categories of garbage discharged or lost
- Estimated amount for each category in cubic metres
- The reason for the discharge or loss and general remarks.

Amount of garbage

The amount of garbage on-board should be estimated in cubic metres, if possible separately by category. The Garbage Record Book contains many references to estimated amount of garbage. It is recognised that the accuracy of estimating amounts of garbage is left to interpretation. Volume estimated will differ before and after processing (e.g. shredding, compacting, incinerating, etc.).

RECORD OF GARBAGE DISCHARGES

Name of ship _____

Distinctive number or letters _____

IMO No. _____

Garbage Categories

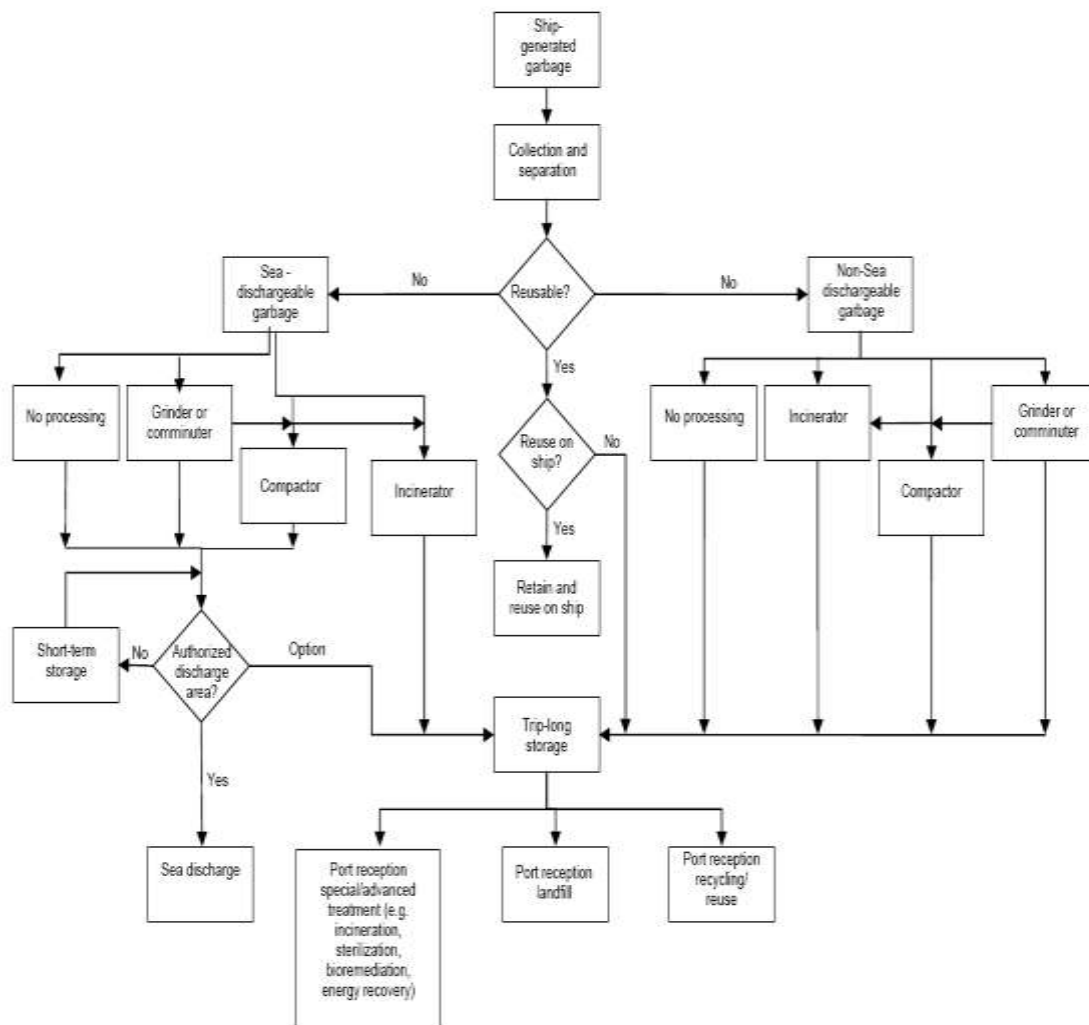
- A. Plastics
- B. Food wastes
- C. Domestic wastes (e.g. paper products, rags, glass, metal, bottles, crockery, etc.)
- D. Cooking oil
- E. Incinerator ashes
- F. Operational wastes
- G. Cargo residues
- H. Animal carcass(es)
- I. Fishing gear

Date / Time	Position of the Ship/ Remarks (e.g., acci- dental loss)	Category	Estimated Amount Discharged into Sea or incinerated (m ³)	to Sea	to Reception Facility	Incineration	Certification / Signature

Master's Signature: _____ Date: _____



OPTIONS FOR SHIPBOARD HANDLING AND DISPOSAL OF GARBAGE



MARPOL 73/78 Annex VI
Regulations for the prevention of Air Pollution from ships
Entered into force on 19 May 2005
Revised Annex VI entered into force 1 July 2010

Application




Apply to all ships of 400 gross tons and above which have to carry an International Air Pollution Prevention Certificate (IAPP Certificate). This certificate must be on board at delivery for a ship constructed (keel laid) after 19 May 2005. For ships constructed before this date, the IAPP certificate must be on board at the first scheduled dry-docking after 19 May 2005, but not later than 19 May 2008. Ships of less than 400 tons still have to comply with the legislation where applicable, but in their case the Administration may establish appropriate measures in order to ensure that Annex VI is complied with.

Regulations:

- Regulation 12: Ozone depleting substances (ODS)
- Regulation 13: Nitrogen oxides (NOx)
- Regulation 14: Sulphur oxides and Particulate Matter (SOx)
- Regulation 15: Volatile organic compounds (VOC)
- Regulation 16: Shipboard incineration
- Regulation 17: Reception Facilities
- Regulation 18: Fuel oil quality and availability

Emission Pollutants

The U.S. EPA and IMO regulate specific exhaust emission components as prescribed in 40 CFR and MARPOL Annex VI, respectively. Table, shown below, is a summary of these components and respective reduction solutions.

Exhaust Gas Components	Why Bad?	Primary: Engine-Internal Solutions	Secondary: Off-Engine Solutions	Fuel Solutions
Nitrogen Oxides NOx  NO NO ₂	Ground ozone formation Respiratory issues Acid rain	Reduce temperature during the combustion process Exhaust Gas Recirculation (EGR)	Aftertreatment technology (e.g. SCR)	Natural Gas
Sulfur Oxides (SOx) 	Respiratory issues Acid rain	Fuel injection control	Aftertreatment technology (e.g. Scrubbers)	Natural Gas, Low Sulfur Fuels, Bio-Fuels
Particulate Matter (PM) 	Air pollution Respiratory and heart issues	Fuel injection control	Aftertreatment technology (e.g. DPF)	Natural Gas, Low Sulfur Fuels, Bio-Fuels
Hydrocarbons (HC)	Volatile Organic Compounds (VOCs)	Fuel injection control and engine maintenance	Oxidation Catalyst	Natural Gas
Carbon Monoxide (CO)	Toxic Ground ozone formation	Fuel injection control Low load avoidance	Oxidation Catalyst	Natural Gas
Carbon Dioxide (CO₂)	Greenhouse Gas/ Global warming	Various measures reducing total fuel consumption per ton-mile		

Ozone Depleting Substances (Regulation 12)

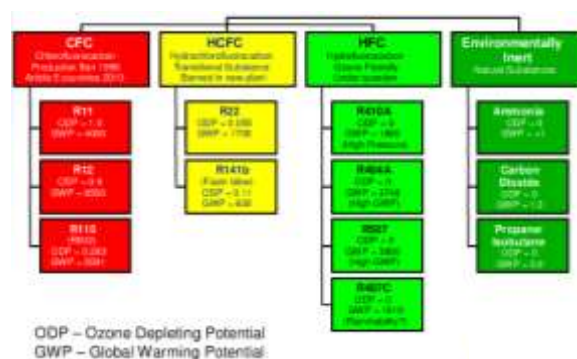
Chlorofluorocarbons or CFCs (also known as Freon) are non-toxic, non-flammable and non-carcinogenic. They contain atoms of fluorine, carbon and chlorine. CFCs are widely used as coolants in refrigeration and air conditioners, as solvents in cleaners, particularly for electronic circuit boards, as a blowing agents in the production of foam (for example fire extinguishers), and as propellants in aerosols. Emissions of CFCs from the world shipping fleet were estimated at 3000-6000 tons for the year 1990 - equivalent to around 1-3 percent of annual global emissions. It is anticipated that these would show a significant reduction in CFC emissions on account of the phase out of these substances as a consequence of the Montreal Protocol.

Hydrochlorofluorocarbons or HCFCs are compounds containing carbon, hydrogen, chlorine and fluorine. Industry and the scientific community view certain chemicals within this class of compounds as acceptable temporary alternatives to CFCs. The HCFCs have shorter atmospheric lifetimes than CFCs and deliver less reactive chlorine to the stratosphere where the ozone layer is found. It is expected that HCFC chemicals will contribute much less to stratospheric ozone depletion than CFCs. Because they still contain chlorine and have the potential to destroy stratospheric ozone, they are viewed only as temporary replacements for the CFCs. Current international legislation has mandated production caps for HCFCs.

Hydrofluorocarbons (HFCs) are compounds containing carbon, hydrogen, and fluorine. Certain chemicals within this class of compounds are viewed by industry and the scientific community as acceptable alternatives to CFCs and HCFCs on a long-term basis. Because the HFCs contain no chlorine they do not directly affect stratospheric ozone. Concern over global warming effects may make it necessary to regulate production and use of these compounds at some point in the future. Such restrictions have been proposed in the Kyoto Protocol.

Halons are gases containing bromine, which breaks down ozone in the stratosphere. Halons are used primarily in fire extinguishers. Although the use of halons in developed countries has been phased out since 1996, the atmospheric concentration of these potent, ozone destroyers is still rising because of their long atmospheric lifetimes. To date halons have accounted for about 5% of global ozone depletion. The production and consumption of new halons has already ceased under the terms of the Montreal Protocol. However, whilst replacements have been developed these cannot be used in existing systems, which can only be maintained with recycled halons using surplus material from redundant installations. Halon emissions from shipping for the year 1990 were estimated to be 300-400 tons, or around 10 percent of world total. It is anticipated that these would show a significant reduction in halon emissions on account of the phase out of these substances as a consequence of the Montreal Protocol. Ozone depleting halons are of key concern; although "alternative" media are seldom without environmental impact and should also be included in any inventory.

Annex VI prohibits deliberate emissions of ozone depleting substances, which include halons and chlorofluorocarbons (CFCs). New installations containing ozone-depleting substances are prohibited on all ships. But new installations containing hydro-chlorofluorocarbons (HCFCs) are permitted until 1 January 2020.



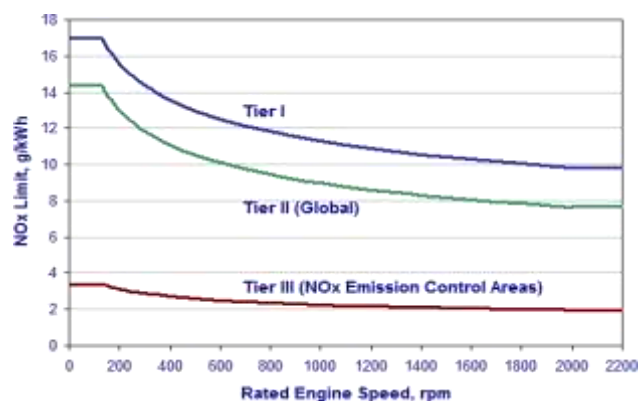
Nitrogen Oxides (NO_x) (Regulation 13)

Nitrogenous oxides (NO_x) include NO, NO₂ and other oxides of nitrogen. The main NO_x, Nitrogen dioxide (NO₂) is a reddish brown, highly reactive gas that is formed in the ambient air through the oxidation of nitric oxide (NO). The major sources of man-made NO_x emissions are high-temperature combustion processes.

NO_x plays a major role in the formation of ground level Ozone by the reaction with VOC under the influence of sunlight. Nitrogen oxides also contribute to the formation of acid rain and to a wide range of environmental effects, including potential changes in the composition and competition of some species of vegetation in wetland and terrestrial systems, visibility impairment, acidification of freshwater bodies, eutrophication (i.e., explosive algae growth leading to a depletion of oxygen in the water) of estuarine and coastal waters and increases in levels of toxins harmful to fish and other aquatic life. NO_x also presents a serious health threat.

The control of diesel engine NO_x emissions is achieved through the survey and certification requirements leading to the issue of an Engine International Air Pollution Prevention (EIAPP) Certificate and the subsequent demonstration of in service compliance in accordance with the requirements of the mandatory, regulations 13.8 and 5.3.2 respectively, NO_x Technical Code 2008 (resolution MEPC.177(58)).

Tier	Ship construction date on or after	Total weighted cycle emission limit (g/kWh) n = engine's rated speed (rpm)		
		n < 130	n = 130 - 1999	n ≥ 2000
I	1 January 2000	17.0	45.n-0.2 e.g. 720 rpm – 12.1	9.8
II	1 January 2011	14.4	44.n-0.23 e.g. 720 rpm – 9.7	7.7
III	1 January 2016	3.4	9.n-0.2 e.g. 720 rpm – 2.4	2.0



Tier I standards, defined in the 1997 version of Annex VI, apply to a diesel engine which is installed on a ship constructed on or after 1st January 2000 and prior to 1st January 2011, and represents the 17g/KW standard.

For Tier II, defined together with Tier III in the Annex VI amendments adopted in 2008, NO_x emission levels for a diesel engine installed on a ship constructed on or after 1st January 2011 are reduced to 14.4 g/kWh. For Tier III, NO_x emission levels for a diesel engine installed on a ship constructed on or after 1st January 2016 are reduced to 3.4 g/kWh when the ship is operating in a designated ECA. Outside a designated ECA, Tier II limits apply.

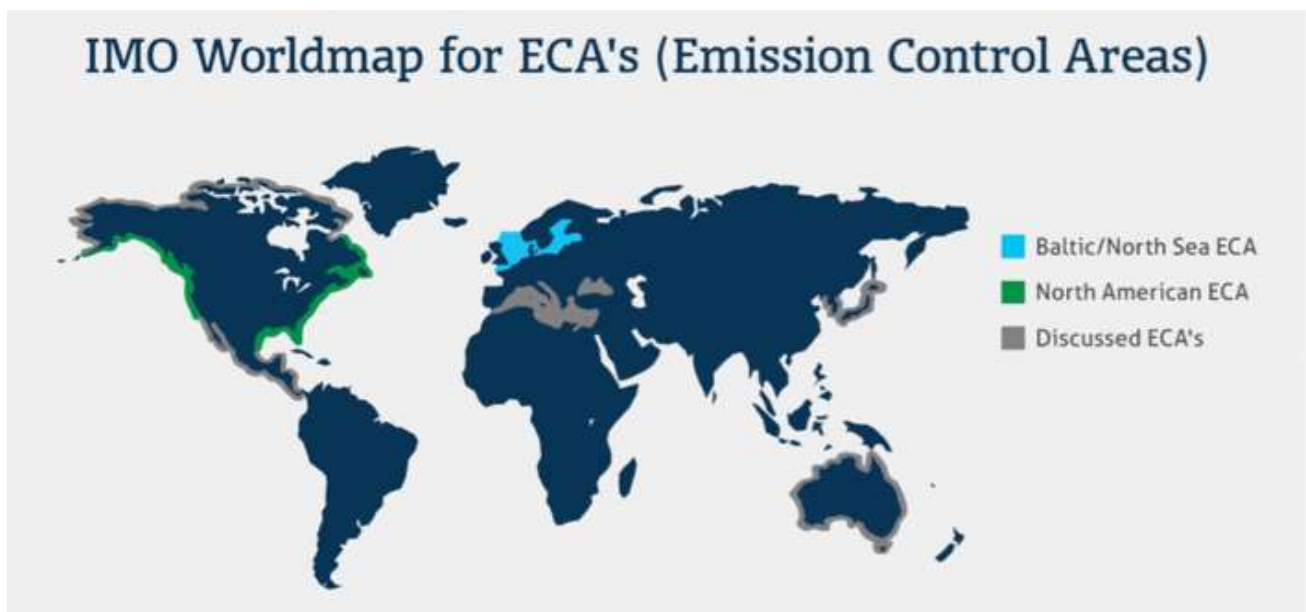
The same Tier I limits will apply to those existing marine diesel engine with a power output of more than 5,000 kW and a per-cylinder displacement at or above 90 litres installed on a ship constructed between 1st January 1990 and 1st January 2000. A certified approved method must be provided following the requirements set in the NO_x Technical Code.

The NO_x Technical Code provides, “mandatory procedures for the testing, survey and certification of marine diesel engines which will enable engine manufacturers, shipowners and administrations to ensure that all applicable marine diesel engines comply with the relevant limiting emission values of NO_x as specified within regulation 13 of Annex VI”.

The IMO Marine Environment Protection Committee at its 66th session agreed to set the Tier III requirements to be applied to the marine diesel engines installed on:

- ships constructed on or after 1st January 2016 and which operate in the North American ECA or the United States Caribbean Sea ECA, both designated for the control of NO_x emissions.
- ships constructed on or after the date of adoption by the committee of a new ECA, or a later date as may be specified in the amendment designating the new NO_x Tier III ECA.

The amendments will come into force on 1st September 2015.



Strict IMO 2016 regulation prescribe NO_x limits less than 2 g/kWh compared with 17 g/kWh in 2000.

Sulphur oxides and Particulate Matter (SO_x) (Regulation 14)

Sulphur oxide gases are formed when fuel containing sulphur (mainly, coal and oil) is burned and during metal smelting and other industrial processes. Sulphur dioxide (SO₂), the main sulphur oxide gas is a colourless, non-flammable gas with a penetrating odour that irritates the eyes and air passages. It reacts on the surface of a variety of airborne solid particles, is soluble in water and can be oxidised within airborne water droplets.

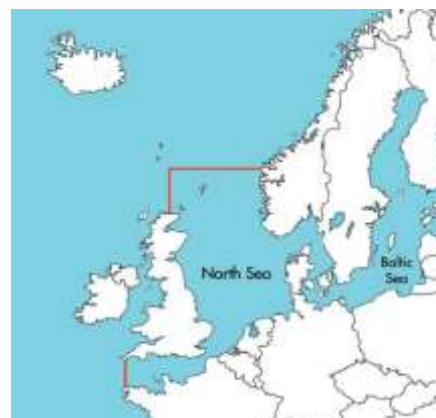
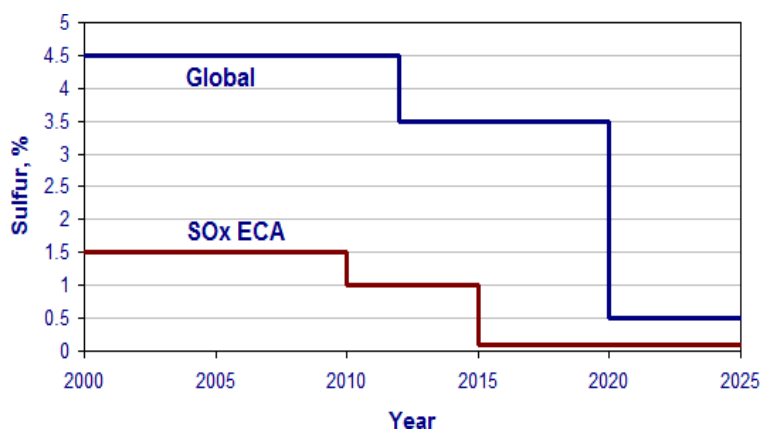
SO_x and particulate matter emission controls apply to all fuel oil, as defined in regulation 2.9, combustion equipment and devices onboard and therefore include both main and all auxiliary engines together with items such boilers and inert gas generators. These controls divide between those applicable inside Emission Control Areas (ECA) established to limit the emission of SO_x and particulate matter and those applicable outside such areas and are primarily achieved by limiting the maximum sulphur content of the fuel oils as loaded, bunkered, and subsequently used onboard. These fuel oil sulphur limits (expressed in terms of % m/m - that is by weight) are subject to a series of step changes over the years, regulations 14.1 and 14.4:

Outside an ECA established to limit SO _x and particulate matter emissions	Inside an ECA established to limit SO _x and particulate matter emissions
4.50% m/m prior to 1 January 2012	1.50% m/m prior to 1 July 2010
3.50% m/m on and after 1 January 2012	1.00% m/m on and after 1 July 2010
0.50% m/m on and after 1 January 2020*	0.10% m/m on and after 1 January 2015

* depending on the outcome of a review, to be concluded in 2018, as to the availability of the required fuel oil, this date could be deferred to 1 January 2025.

The ECA established are:

- Baltic Sea area - as defined in Annex I of MARPOL (SO_x only);
- North Sea area - as defined in Annex V of MARPOL (SO_x only);
- North American area (entered into effect 1 August 2012) - as defined in Appendix VII of Annex VI of MARPOL (SO_x, NO_x and PM); and
- United States Caribbean Sea area (in effect from 1 January 2014) - as defined in Appendix VII of Annex VI of MARPOL (SO_x, NO_x and PM).



Most ships which operate both outside and inside these ECA will therefore operate on different fuel oils in order to comply with the respective limits. In such cases, prior to entry into the ECA, it is required to have fully changed-over to using the ECA compliant fuel oil, regulation 14.6, and to have onboard implemented written procedures as to how this is to be undertaken. Similarly change-over from using the ECA compliant fuel oil is not to commence until after exiting the ECA. At each change-over it is required that the quantities of the ECA compliant fuel oils onboard are recorded, together with the date, time and position of the ship when either completing the change-over prior to entry or commencing change-over after exit from such areas. These records are to be made in a logbook as prescribed by the ship's flag State, in the absence of any specific requirement in this regard the record could be made, for example, in the ship's Annex I Oil Record Book.

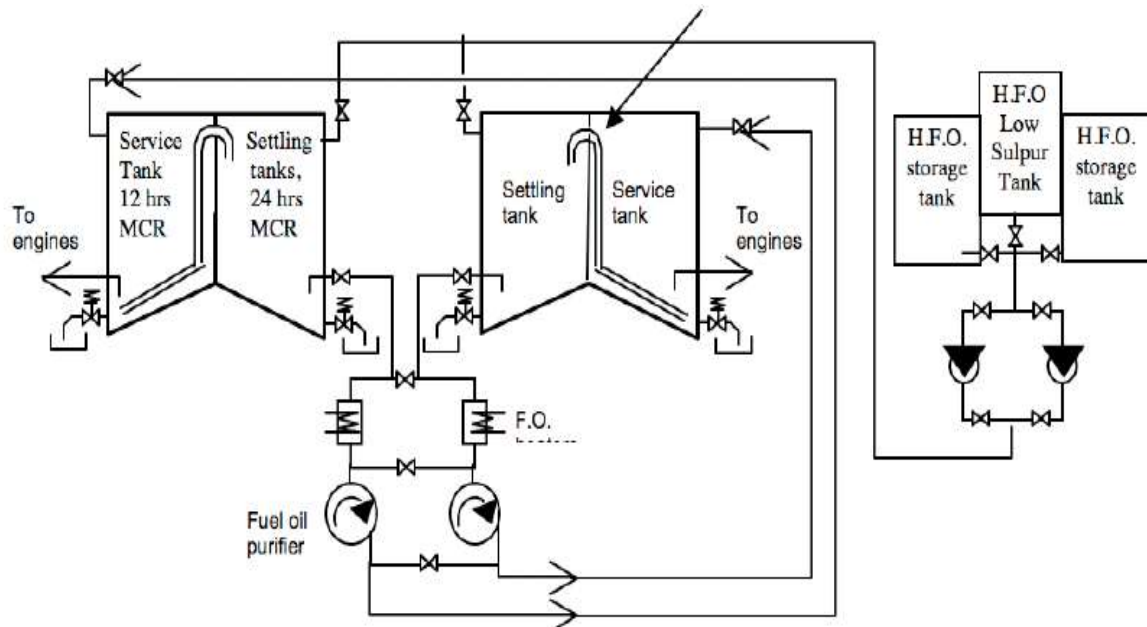
Operational/Design matters

- Fuel system segregation - storage capacity/tanks
- Segregated cylinder lube oil tanks may be required to cover the different range of sulphur content fuels
- Sufficient time for fuel change over is required prior to entry into an Emission Control Area
- Recording procedures in log book and monitoring (Reg.14.6)
- More complex system and therefore more susceptible to errors - an Integrated Fuel Management System will be essential
- Planning of voyages - selection of bunker ports and trade routes to ensure correct fuel onboard prior to entering an ECA (Reg.18.2.1.1)

Emissions*	Efficiency*
SOx	90+%
NOx	5%
Particulates	80%

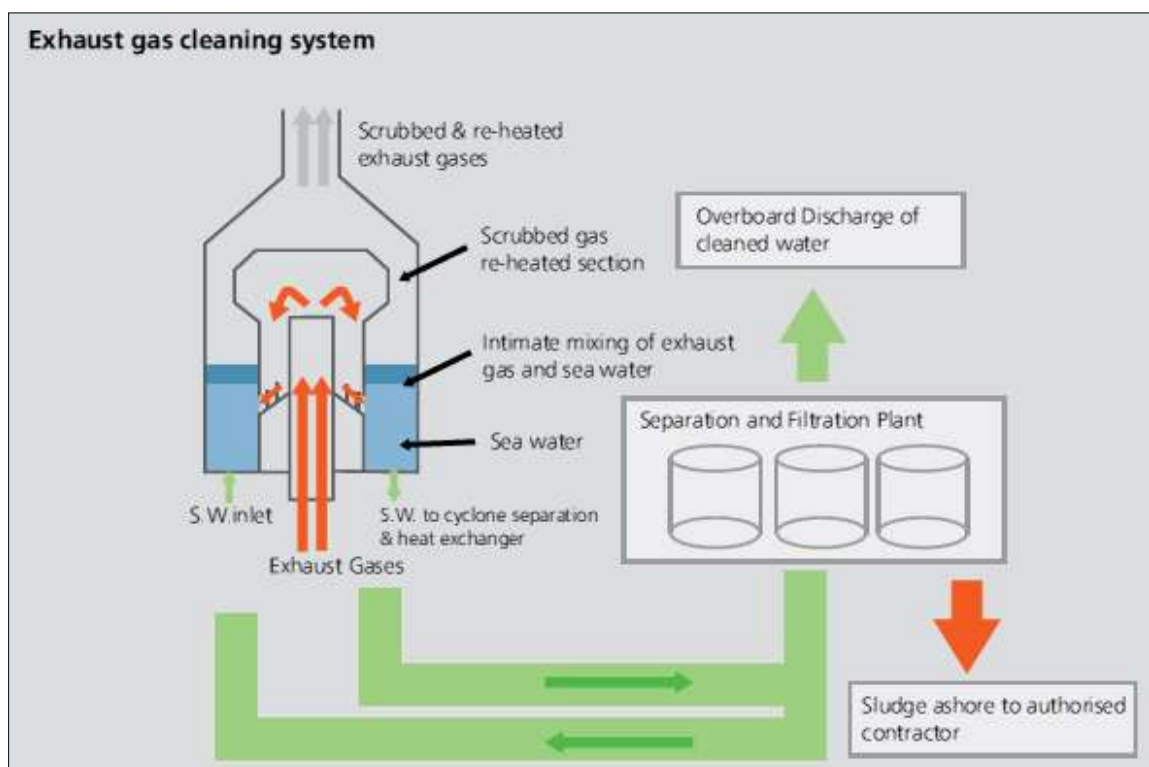
Handling of different fuels

Possible arrangement for additional fuel oil tanks



Exhaust Gas Cleaning Systems

- An alternative to low SO_x fuel
- Compliance demonstrated on the basis of the SO₂ (ppm)/CO₂ (% v/v) ratio
- Guidelines MEPC.184(59)
- Considerations: space, initial cost, availability
- Operation and maintenance
- Class/Port Authorities inspection required
- Party to approve
- Extensive research currently underway
- A number of systems being considered/tested
- Trial results show emissions reduction in the order of 90+%
- Shown to be effective at reducing SO_x, particulates and other harmful gases



Volatile organic compounds (VOC) (Regulation 15)

Volatile Organic Compounds or VOCs are organic chemicals that easily vaporize at room temperature. They are called organic because they contain carbon in their molecular structures. VOCs have no colour, smell, or taste. VOCs include a very wide range of individual substances, such as hydrocarbons (for example benzene and toluene), halocarbons and oxygenates. Hydrocarbon VOCs are usually grouped into methane (CH₄) and other non-methane VOCs (NMVOC).

VOC is generated during combustion, and handling of oil products, whereas the latter is the most significant emission source related to shipping. The petroleum sector is the most important European source of emissions of VOCs due to loading of crude oil onto tankers generating large quantities of VOCs.

Related to shipping of petroleum cargoes the first VOC emissions occur when the liquid cargo entering the tanks of the ship displaces the original tank atmosphere during loading. In addition to the VOC in the tank prior to loading, variable amounts of VOC will be released from the incoming cargo during loading.

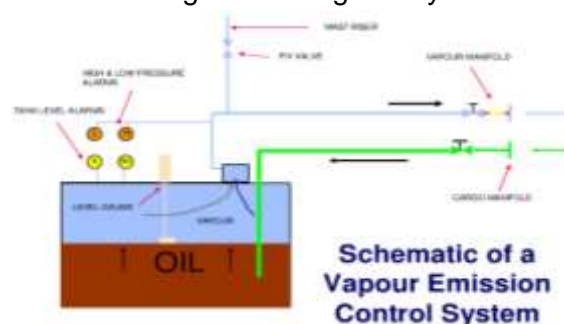
Following the loading, the ship commences the loaded voyage. During the voyage, additional gas may be released from the cargo. Gas release may contribute to tank pressure exceeding the pressure relief valves limit and tank gas containing VOC is emitted.

During unloading inert gas is added to the cargo tanks. There will normally be very limited or no emissions during unloading. But the adding of inert gas will affect the amount of VOC in the tanks after unloading completion. Most of the remaining VOC will be emitted during the loading operation.

VOC from tankers are regulated in ports or terminals. The relevant Government designates which ports and terminals at which VOC emissions from tankers are to be regulated. A vapour emission control system approved by the governments shall be ensured. The vapour emission control system can be installed onboard the tankers. Terminals which have installed vapour emission control systems in accordance with its regulation may accept existing tankers which are not fitted with vapour collection systems for a period of three years after terminal notification submission.

This regulation only applies to tankers. However, this regulation also applies to gas carriers only if the types of loading and containment system allow safe retention of non-methane VOCs on board or their safe return ashore.

There are two aspects of VOC control within this regulation. In the first, regulations 15.1 - 15.5 and 15.7, control on VOC emitted to the atmosphere in respect of certain ports or terminals is achieved by a requirement to utilize a vapour emission control system (VECS). Where so required, both the shipboard and shore arrangements are to be in accordance with MSC/Circ.585 "Standards for vapour emission control systems". The second aspect of this regulation, regulation 15.6, requires that all tankers carrying crude oil have an approved and effectively implemented ship specific VOC Management Plan covering at least the points given in the regulation. Guidelines in respect of the development of these plans is given by resolution MEPC.185(59) and related technical information on systems and operation of such arrangements is given by circular MEPC.1/Circ.680.



Shipboard Incineration (Regulation 16)

Each incinerator installed on board a ship on or after 1 January 2000 shall meet the requirements contained in appendix IV to this Annex. Each incinerator shall be approved by the Administration taking into account the standard specifications for shipboard incinerators refer to resolution MEPC 76(40) „Standard specification for shipboard incinerators”.

Shipboard incineration of the following substances shall be prohibited:

- Annex I, II and III cargo residues of the present convention and related contaminated packing materials;
- Polychlorinated biphenyls (PCBs);
- Garbage, as defined in Annex V of the present Convention, containing more than traces of heavy metals;
- Refined petroleum products containing halogen compounds;
- Sewage and sludge oil not generated on board;
- Exhaust gas cleaning system residues.

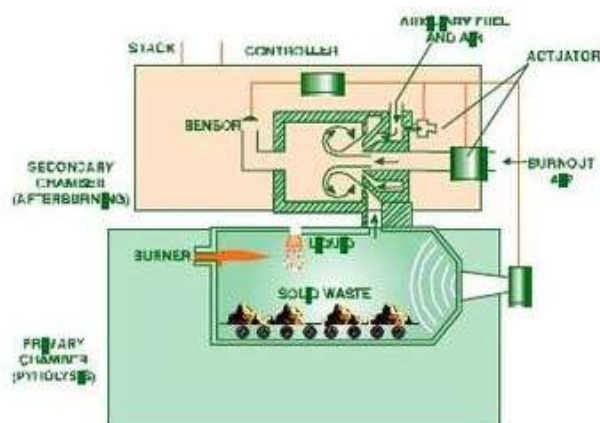
Regulation 16 permits incineration of:

- PVC - plastics (where type approved to do so) (Reg.16.3)
- Sewage sludge and sludge oil permitted in boilers but not when in ports, harbours and estuaries (Reg.16.)
- Incinerators installed before 24 May 2005 on domestic shipping can be excluded by the Administration (Reg. 16.6.2)
- Operating manual, training, and temperature control (Reg. 16.7 - 16.9)

Regulation 16.6 generally requires that incinerators installed on ships constructed on or after 1 January 2000 or units which are installed on existing ships on or after that date are to Type Approved in accordance with resolution MEPC.76(40) - as modified by resolution MEPC.93(45) - Standard specification for shipboard incinerators. For these incinerators operating manuals are to be maintained onboard, regulation 16.7, and training as to their correct operation is to be given, regulation 16.8. Regulation 16.9 requires that operation is such that the stated temperatures are achieved in order to ensure complete incineration.

Personnel responsible for operation of any incinerator shall be trained and capable of implementing the guidance provided in the manufacturer's operating manual.

Monitoring of combustion flue gas outlet temperature shall be required at all times and waste shall not be fed into a continuous feed shipboard incinerator when the temperature is below the minimum allowed temperature of 850°C. For batch-loaded shipboard incinerators, the unit shall be designed so that the temperature in the combustion chamber shall reach 600°C within five minutes after start-up.



Reception Facilities (Regulation 17)

Parties obliged to provide facilities without causing delay for:

- Reception of ODS in ship repair yards (Reg.17.1.1)
- Reception of Exhaust Gas Cleaning System residues (Reg.17.1.2)

Reception of ODS in ship breaking facilities (Reg.17.1.3)

If unable to provide reception facilities then Party shall inform IMO (Reg.17.2 & 17.3)

Fuel oil quality and availability (Regulation 18)

In general this regulation is not directed to ships, rather to fuel oil suppliers and their control by the appropriate authorities together with other regulatory aspects. In particular the requirements of regulations 18.1, 18.2, 18.4, 18.5, 18.8.2, 18.9 and 18.10, together with aspects of regulations 18.8.1, should be seen as supportive of regulation 14 in respect of those aspects which are outside the control of the ship owner.

Regulations 18.6 and 18.8.1 have specific ship (for those that are required to have IAPP Certificates) related actions concerning the retention onboard of the bunker delivery notes for a period of not less than 3 years following delivery, subject to any relaxation afforded by application of regulation 18.11, and the retention, under the ship's control (therefore not necessarily onboard although they should be readily accessible if so required by the relevant authorities), of the representative fuel oil samples until the subject fuel oil is substantially consumed but for not less than 12 months from the date of delivery. These requirements apply irrespective of whether or not compliance with regulation 14 - SO_x and particulate matter emission control - is complied with by means of bunkering fuel oils which do not exceed the stated limits.

The guidelines for the sampling of fuel oil for determination of compliance with MARPOL Annex VI have been updated to take into account the revised Annex VI, resolution MEPC.182(59). Paragraphs 8 and 9 of those guidelines refer to specific actions to be taken by the ship. It should be noted that local legislation covering the control of fuel oil suppliers in respect of Annex VI related issues may not directly follow all aspects as given in these guidelines, such as fuel oil sampling location, since they are only recommendatory to the regulating authority. In the case of sampling location, the relevant authority may have accepted other equivalent arrangements and which are duly controlled as required.

It is however necessary that oversight by the ship is applied both to the bunker delivery note and the representative fuel oil sample. In accordance with the revised guidelines for port State control under the revised MARPOL Annex VI, resolution MEPC.181(59), paragraphs 2.1.1.12 and 2.1.5 where the bunker delivery note does not contain the information as given in appendix V of revised Annex VI or the representative sample has not been drawn, labeled or sealed in accordance with the relevant guidelines that is to be duly documented and advised to the ship's flag State Administration with copies to the bunkering port authorities and the bunker supplier with a further copy retained onboard together with any relevant commercial documentation.

In this regard it must be accepted that there will be bunkering ports located in countries which are not Parties to Annex VI and therefore, apart from commercial considerations, there is no direct requirement for them to comply with the various requirements of regulation 18. Hence it is usual for ship owners, when ordering bunkers, to at least insert clauses to the effect that the fuel oil supply process is to be in accordance with the requirements of Annex VI and with specified maximum sulphur content appropriate to the particular intended future area of operation.

The other aspect of regulation 18 which may have an effect on ship owners is the fuel oil availability clause, regulation 18.2 which provides for the situation where there is a local non-availability of the required fuel oil - essentially fuel oil which does not meet the required maximum sulphur limit as

given in regulation 14. As given, the ship owner must have made his best efforts to attempt to obtain the required fuel oil and that this should be taken into account by Parties when considering what action to take, or not to take, in the case of a ship using non-compliant fuel oil.

Regulations 18.9 together with regulations 18.1, 18.3, 18.4 and 18.5 in the first instance refer to the local control of fuel oil suppliers while regulations 18.7, 18.8.2 - and hence appendix VI - and 18.10 refer to the application of port State controls.

Information to be included in the bunker delivery note

MARPOL Annex VI requires that the following information be included in the bunker delivery note provided to the receiving ship:

- Name and IMO number of receiving ship
- Port
- Date of commencement of delivery
- Name, address and telephone number of marine fuel oil supplier
- Product name(s)
- Quantity (metric tons)
- Density at 15°C (kg/m³)*
- Sulphur content (% m/m)**
- A declaration signed and certified by the fuel oil supplier's representative that the fuel oil supplied is in conformity with regulation 14(1) or (4)(a) and regulation 18(1) of this Annex.

* Fuel oil should be tested in accordance with ISO 3675
 ** Fuel oil should be tested in accordance with ISO 8754

Bunker Delivery Note

MARPOL Annex VI requires that the following information be included in the bunker delivery note provided to the receiving ship. There is no specific format for a bunker delivery note. Bunker suppliers may therefore use their own stationery provided that all the required information is included.

Name and IMO number of receiving ship: _____
 Port: _____
 Date of commencement of delivery: _____
 Name, address and telephone number of marine fuel oil supplier: _____

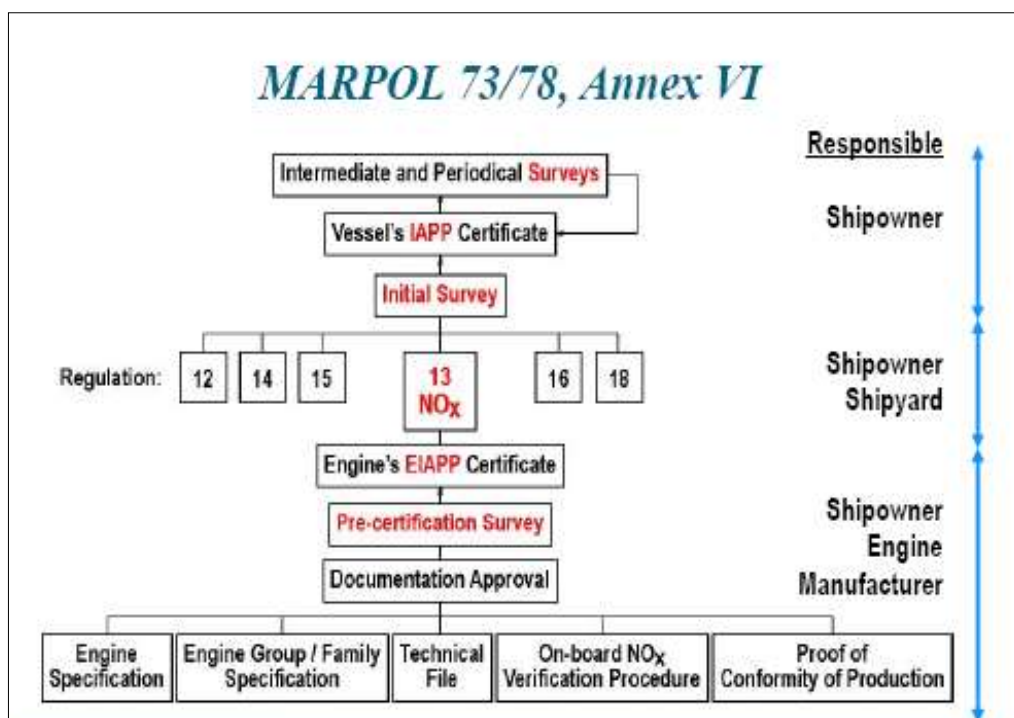
Product name(s)	Quantity (metric tons)	Density at 15°C (kg/m ³) Fuel oil should be tested in accordance with ISO 3675	Sulphur content (% m/m) Fuel oil should be tested in accordance with ISO 8754

Declaration
 I, the fuel oil supplier's representative hereby declare that the fuel oil supplied is in conformity with regulation 14(1) or (4)(a) and regulation 18(1) of MARPOL Annex VI.

Name: _____ Signature: _____ Date: _____

There is no specific format for a bunker delivery note. Bunker suppliers may therefore use their own stationery provided that all the required information is included.

Certification procedure and responsibilities



Energy Efficiency Regulations Entered into force on 1 January 2013

Applicability

Every ship of 400 gross tonnage and above and every fixed floating drilling rig and other platforms Update on the requirements of the Energy Efficiency regulations contained in Chapter 4 of MARPOL Annex VI, which entered into force on 1 January, 2013. This follows amendments made at recent IMO MEPC (Marine Environment Protection Committee) meetings.

The three key requirements of the regulations are:

- Energy Efficiency Design Index (EEDI)
- Ship Energy Efficiency Management Plan (SEEMP)
- International Energy Efficiency Certificate (IEEC).

EEDI

The EEDI reflects the amount of CO₂ generated per tonne-mile (cargo carrying capacity). It constitutes a uniform approach to calculation of a ship's energy efficiency during the design and build of new ships and will be used to control CO₂ levels emitted by future new ships by encouraging improvements in ship design. The calculation and verification of EEDI is covered by IMO Resolutions MEPC.212(63) and MEPC.214(63) respectively.

SEEMP

The SEEMP is an operational measure that establishes a mechanism to improve the energy efficiency of a vessel in a cost-effective manner. It incorporates best practices for fuel efficient vessel operation, and urges the owner/operator at each stage of the plan to consider new technologies and practices when seeking to optimise the performance of a vessel. IMO guidelines on developing a SEEMP are contained in Resolution MEPC.213(63).

IEEC

The IEEC is a statutory certificate covering both the SEEMP and EEDI. The certificate is valid for the life of the ship unless it undergoes major conversion, a change of flag or withdrawal from service.

How the regulations will apply

The energy efficiency regulations entered into force on 1 January, 2013. The SEEMP apply to all ships of 400 gt and above while the EEDI only apply to new ships, excluding those with diesel-electric, steam turbine or hybrid propulsion systems.

The initial implementation phase of the EEDI (phase 0) apply to each new ship:

- For which the building contract is placed on or after 1 January, 2013; or
- In the absence of a building contract, the keel of which is laid or which is at a similar stage of construction, on or after 1 July, 2013; or
- The delivery of which is on or after 1 July, 2015.

Flag administrations may waive the requirements for up to four years from these dates. The application dates of further phases of the EEDI for new ships will be implemented according to Unified Interpretations to MARPOL Annex VI (see MEPC.1/Circ.795).

The regulation relating to the reduction of EEDI for specific new ship types applies as shown in Table 1 below and will require these ships to have an „attained EEDI” (i.e., actual verifiable values)

equal to or less than the „required EEDI” values (i.e., determined using reference lines) for each EEDI implementation phase. The EEDI will need to be calculated for passenger ships and ro-ro ships (cargo, passenger and vehicle carriers) but will not initially be subject to regulatory limits. The regulation will only apply to other ship types and sizes when the technical methods for calculating their EEDI have been developed.

Ship type	Size	Phase 0 1 January, 2013	Phase 1 1 January, 2015	Phase 2 1 January, 2020	Phase 3 1 January, 2025 onwards
Bulk carrier	20,000 dwt and above	0	10	20	30
	10,000 - 20,000 dwt	n/a	0 – 10*	0 – 20*	0 – 30*
Gas tanker	10,000 dwt and above	0	10	20	30
	2,000 - 10,000 dwt	n/a	0 – 10*	0 – 20*	0 – 30*
Tanker	20,000 dwt and above	0	10	20	30
	4,000 - 20,000 dwt	n/a	0 – 10*	0 – 20*	0 – 30*
Container ship	15,000 dwt and above	0	10	20	30
	10,000 - 15,000 dwt	n/a	0 – 10*	0 – 20*	0 – 30*
General cargo ship	15,000 dwt and above	0	10	15	30
	3,000 - 15,000 dwt	n/a	0 – 10*	0 – 15*	0 – 30*
Refrigerated cargo carrier	5,000 dwt and above	0	10	15	30
	3,000 - 5,000 dwt	n/a	0 – 10*	0 – 15*	0 – 30*
Combination carrier	20,000 dwt and above	0	10	20	30
	4,000 - 20,000 DWT	n/a	0 – 10*	0 – 20*	0 – 30*

Table 1: Percentage reduction rate for required EEDI versus EEDI reference line

* Reduction factor to be linearly interpolated between the two values dependent upon vessel size. The lower value of the reduction factor is to be applied to the smaller ship size.

Calculation and verification of EEDI

For each new ship, a Technical File containing data to support the calculation of the EEDI value will be required to be submitted. Supporting information will include model test results, machinery and equipment certificates and evidence to support minimum power requirements. EEDI verification must be carried out by an authorised Recognised Organization (RO) at both the design stage (pre-verification), including witnessing of model tests, and during ship construction and sea trials (final verification), and the EEDI Technical File must be retained onboard. Verification at speed trials will require speed runs to be conducted at a minimum of three points.

Verification of SEEMP

A SEEMP should be provided on all ships of 400 gt and above and for existing ships it should be provided at the IEEC initial survey. It can be part of the Safety Management System (SMS) and the ISM audit, but does not need to be approved by the flag or RO. The SEEMP can either be hard copy or electronic.

Issue of the IEEC

The IEEC will be issued following verification of the SEEMP and, if applicable, the EEDI. The IEEC should be issued on delivery for “new” ships, and no later than the first MARPOL Annex VI (Air) intermediate or renewal survey after 1-January- 2013, whichever is first, for “existing” ships. The EEDI and SEEMP will be required to be maintained onboard throughout the ship’s life. Although the verification will take place at a MARPOL Annex VI (Air) survey, the survey requirements associated with the issue of an IEEC are not part of the MARPOL Annex VI (Air) survey and failure to comply with IEEC requirements will not affect the validity of the International Air Pollution Prevention Certificate.



Summary of Discharge Standards – MARPOL 73/78

Notes:

The table below provides a summary only. The text of the Convention should be consulted in order to obtain full details of the discharge requirements before undertaking any waste discharge at sea.

Different discharge standards apply in designated “Special Areas”. The text of the Convention should be consulted if details are required.

The term “from the Nearest Land” means from the baseline from which the territorial sea of the territory in question is established in accordance with international law.

Annex I

TABLE I OIL TANKERS OF ALL SIZES Discharge of oil from the area of the cargo tank including pump room Regulation 34 of Annex I MARPOL 73/78	
In Special Areas OR outside Special Areas but within 50 nautical miles (nm) from the nearest land	ANY DISCHARGE IS PROHIBITED with the exception of clean or segregated ballast
Outside Special Areas but more than 50 nm from the nearest land	ANY DISCHARGE IS PROHIBITED, with the exception of clean or segregated ballast, or except when: <ol style="list-style-type: none"> 1. the tanker is proceeding en route, and 2. the instantaneous rate of discharge of oil does not exceed 30 litres/nm, and 3. the total quantity of oil discharged into the sea <ul style="list-style-type: none"> - does not exceed - for tankers delivered on or before 31 December 1979 - 1/15,000 of the total quantity of the particular cargo of which the residue formed a part - and - for tankers delivered after 31 December 1979 - 1/30,000 of the total quantity of the particular cargo of which the residue formed a part, and 4. the tanker has in operation an oil discharge monitoring and control system and a slop tank arrangement as required by regulations 29 and 31, respectively.

TABLE II
ALL SHIPS OF 400 GROSS TONNAGE AND ABOVE

Discharge of oil from machinery spaces
Regulation 15A and B of Annex I MARPOL 73/78

In respect of the Antarctic area, any discharge into the sea of oil or oily mixtures from any ships shall be prohibited.

Discharges in Special Areas.	<p>ANY DISCHARGE OF OIL OR OILY MIXTURES IS PROHIBITED except when:</p> <ol style="list-style-type: none"> 1. the ship is proceeding en route, and 2. the oil content of the effluent without dilution does not exceed 15 ppm, and 3. the oily mixture is processed through an oil filtering equipment meeting the requirements of regulation 14.7 of this Annex (oil content of the effluent does not exceed 15 ppm, alarm arrangement and automatic 15 ppm stopping device are in place), and 4. the oily mixture is not mixed with cargo pump room bilges or, in case of oil tankers, with oil cargo residues.
Discharges outside Special Areas	<p>ANY DISCHARGE OF OIL OR OILY MIXTURES IS PROHIBITED except when:</p> <ol style="list-style-type: none"> 1. the ship is proceeding en route, and 2. the oil content of the effluent without dilution does not exceed 15 ppm, and 3. the oily mixture is processed through an oil filtering equipment meeting the requirements of regulation 14 this Annex, and 4. the oily mixture is not mixed with cargo pump room bilges or, in case of oil tankers, with oil cargo residues.

TABLE III
SHIPS OF LESS THAN 400 GROSS TONNAGE

Discharge of oil from machinery spaces
Regulation 15C of Annex I MARPOL 73/78

In the case of a ship of less than 400 gross tonnage, oil and all oily mixtures shall either be retained on board for subsequent discharge to reception facilities or

discharged into the sea in accordance with the following provisions:

ANY DISCHARGE OF OIL OR OILY MIXTURES IS PROHIBITED except when:

1. the ship is proceeding en route, and
2. the ship has in operation equipment of a design approved by the Administration that ensures that the oil content of the effluent without dilution does not exceed 15 ppm, and
4. the oily mixture is not mixed with cargo pump room bilges or, in case of oil tankers, with oil cargo residues.

Annex II

Discharge of cargo residues. Regulation 13, Annex II, MARPOL 73/78

Before any prewash or discharge procedure is carried out in accordance with this regulation, the relevant tank shall be emptied to the maximum extent in accordance with the procedures prescribed in the Manual.

In the Antarctic area, any discharge into the sea of Noxious Liquid Substances or mixtures containing such substances is prohibited	
Category	
X, Y, and Z	<ul style="list-style-type: none"> - ship is proceeding en route - minimum speed 7 kn (self-propelled) or 4 kn (not self-propelled) - not less than 12 nm from the nearest land - discharge below the waterline - minimum water depth 25 metres
and	
X	<p>The tank must be prewashed before the ship leaves the port. The resulting residues must be discharged to a reception facility until the concentration of the substance in the effluent to such facility is at or below 0.1% by weight; remaining tank washings must be discharged to the reception facility until the tank is empty.</p> <p>Any water subsequently introduced into the tank may be discharged into the sea in accordance with the above criteria.</p>
Y High-viscosity or solidifying substances, Regulation 1, nos. 15 and 17, Annex II	<p>A prewash procedure as specified in Appendix 6 of Annex II must be applied. The residue/water mixture generated during the prewash must be discharged to a reception facility until the tank is empty.</p> <p>Any water subsequently introduced into the tank may be discharged into the sea in accordance with the above criteria.</p>
Y and Z	<p>If the unloading of a substance of Category Y or Z is not carried out in accordance with the Manual, a prewash has to be carried out before the ship leaves the port of unloading. The resulting tank washings of the prewash must be discharged to a reception facility.</p>

Annex III

MARPOL Harmful Packaged Substances (Annex III)	
Jettisoning of harmful packaged substances into the sea	Prohibited, except where necessary for the purpose of securing the safety of the ship or saving life at sea

Annex IV

Discharge regulations according to Annex IV, MARPOL 73/78

A) Application according to Regulation 2:

- ships of 400 GT and above
- ships of less than 400 GT which are certified to carry more than 15 persons

B) Mandatory equipment according to Regulations 9 and 10:

- Sewage treatment plant of a type approved by the Administration in compliance with IMO criteria
- Comminuting and disinfecting system approved by the Administration fitted with facilities for the temporary storage of sewage when the ship is less than 3 nm from the nearest land, or
- holding tank of a capacity to the satisfaction of the administration, having regard to the operation of the ship, the number on persons on board, and provided with a means to indicate visually the amount of its contents

The flanges for discharge connections must have the dimensions specified in Regulation 10, Annex IV, MARPOL 73/78.

C) Discharge requirements according to Regulation 11:

Under the provisions of Regulation 11, para. 1, Annex IV MARPOL 73/78, the discharge of sewage into the sea is prohibited, except when the following requirements are met:

Discharge of:		
sewage from treatment plants Regulation 11, para. 1, no. 2	comminuted and disinfected sewage Regulation 11, para. 1, no. 1	not comminuted or disinfected sewage Regulation 11, para. 1, no. 1
<ul style="list-style-type: none"> - test results of the treatment plant are laid down in the ship's International Sewage Pollution Prevention Certificate - effluent does not produce visible floating solids nor cause discoloration of the surrounding water 	<ul style="list-style-type: none"> - at a distance of more than 3 nm from the nearest land - Sewage originating from holding tanks, or sewage originating from spaces containing live animals is discharged at a moderate rate while the ship is proceeding en route at a speed not less than 4 knots 	<ul style="list-style-type: none"> - at a distance no less than 12 nm from nearest land - Sewage originating from holding tanks, or sewage originating from spaces containing live animals is discharged at a moderate rate while the ship is proceeding en route at a speed not less than 4 knots

Annex V

Type of garbage	Ships outside special areas	Ships within special areas	Offshore platforms (more than 12 nm from land) and all ships within 500 m of such platforms
Food waste comminuted or ground	Discharge permitted ≥ 3 nm from the nearest land, en route and as far as practicable	Discharge permitted ≥ 12 nm from the nearest land, en route and as far as	Discharge permitted
Food waste not comminuted or ground	Discharge permitted ≥ 12 nm from the nearest land, en route and as far as	Discharge prohibited	Discharge prohibited
Cargo residues ¹ not contained in wash water	Discharge permitted ≥ 12 nm from the nearest land, en route and as far as practicable	Discharge prohibited	Discharge prohibited
Cargo residues ¹ contained in wash water		Discharge permitted ≥ 12 nm from the nearest land, en route, as far as practicable and subject to two additional conditions ²	Discharge prohibited
Cleaning agents and additives ¹ contained in cargo hold wash water	Discharge permitted	Discharge permitted ≥ 12 nm from the nearest land, en route, as far as practicable and subject to two additional conditions ²	Discharge prohibited
Cleaning agents and additives ¹ in deck and external surfaces wash water		Discharge permitted	Discharge prohibited
Carcasses of animals carried on board as cargo and which died during the voyage	Discharge permitted as far from the nearest land as possible and en route	Discharge prohibited	Discharge prohibited
All other garbage including plastics, synthetic ropes, fishing gear, plastic garbage bags, incinerator ashes, clinkers, cooking oil, floating dunnage, lining and packing materials, paper, rags, glass, metal, bottles, crockery and similar refuse	Discharge prohibited	Discharge prohibited	Discharge prohibited
Mixed garbage	When garbage is mixed with or contaminated by other substances prohibited from discharge or having different discharge requirements, the more stringent requirements shall apply		

1. These substances must not be harmful to the marine environment.

2. According to regulation 6.1.2 of MARPOL Annex V the discharge shall only be allowed if: (a) both the port of departure and the next port of destination are within the special area and the ship will not transit outside the special area between these ports (regulation 6.1.2.2); and (b) if no adequate reception facilities are available at those ports (regulation 6.1.2.3).

Annex VI**Air Emissions - Applies to all vessels**

Sub-Category	Discharge Conditions
Ozone-depleting substances	Prohibited
Nitrogen Oxides	<p>- Operation of diesel engines >130kW prohibited unless engine is certified to meet prescribed emission standards.</p> <p>- New Engines:</p> <ul style="list-style-type: none"> • Tier I - 17 g/kW from 1 January 2000 • Tier II - 14.4 g/kW from 1 January 2011 • Tier III - 3.4 g/kW from 1 January 2016 (in Emission Control Areas (ECA)) <p>Existing Engines (installed on ship on or between 1 January 1990 to 1 January 2000)</p> <ul style="list-style-type: none"> • 17g/kW for diesel engine with power output >5000kW and displacement per cylinder => 90 litres • Approved method by Administration
Sulphur Oxides	<p>- Sulphur content of fuel oil not to exceed 4.5%. **</p> <p>- From 1 January 2012, sulphur content of fuel oil not to exceed 3.5% **</p> <p>- From 1 January 2020 sulphur content of fuel oil not to exceed 0.5% **</p> <p>Inside ECAs the sulphur maximum limits in the fuel are (According to Regulation 14.4):</p> <ul style="list-style-type: none"> • 1.00% on and after 1st July 2010 • 0.10% on and after 1st January 2015 <p style="text-align: center;">OR</p> <p>Alternative of above rules is to use a exhaust gas cleaning system or other technological methods onboard ships to reduce total sulphur emission from auxiliary and main propulsion engines to less than or equal to:</p> <p style="text-align: center;">6.0g SO_x/kwh.</p> <p>** Fuel oil to be purchased from a registered supplier</p>
Incinerators	<p>- Incinerators installed after 1 January 2000 must be type approved and certified to meet prescribed emission standards</p> <p>- Do not use within port limits</p>

MARPOL 73/78 Special Areas

Special areas under MARPOL 73/78 are as follows:

Special Areas	Adopted	Date of Entry into Force	In Effect From
Annex I: Oil			
Mediterranean Sea	2 Nov 1973	2 Oct 1983	2 Oct 1983
Baltic Sea	2 Nov 1973	2 Oct 1983	2 Oct 1983
Black Sea	2 Nov 1973	2 Oct 1983	2 Oct 1983
Red Sea	2 Nov 1973	2 Oct 1983	*
"Gulfs" area	2 Nov 1973	2 Oct 1983	1 Aug 2008
Gulf of Aden	1 Dec 1987	1 Apr 1989	*
Antarctic area	16 Nov 1990	17 Mar 1992	17 Mar 1992
North West European Waters	25 Sept 1997	1 Feb 1999	1 Aug 1999
Oman area of the Arabian Sea	15 Oct 2004	1 Jan 2007	*
Southern South African waters	13 Oct 2006	1 Mar 2008	1 Aug 2008
Annex II: Noxious Liquid Substances			
Antarctic area	30 Oct 1992	1 July 1994	1 July 1994
Annex IV: Sewage			
Baltic Sea	15 Jul 2011	1 Jan 2013	**
Annex V: Garbage			
Mediterranean Sea	2 Nov 1973	31 Dec 1988	1 May 2009
Baltic Sea	2 Nov 1973	31 Dec 1988	1 Oct 1989
Black Sea	2 Nov 1973	31 Dec 1988	*
Red Sea	2 Nov 1973	31 Dec 1988	*
"Gulfs" area	2 Nov 1973	31 Dec 1988	1 Aug 2008
North Sea	17 Oct 1989	18 Feb 1991	18 Feb 1991
Antarctic area (south of latitude 60 degrees south)	16 Nov 1990	17 Mar 1992	17 Mar 1992
Wider Caribbean region including the Gulf of Mexico and the Caribbean Sea	4 Jul 1991	4 Apr 1993	1 May 2011

Special Areas	Adopted	Date of Entry into Force	In Effect From
Annex VI: Prevention of air pollution by ships (Emission Control Areas)			
Baltic Sea (SOx)	26 Sept 1997	19 May 2005	19 May 2006
North Sea (SOx)	22 Jul 2005	22 Nov 2006	22 Nov 2007
North American (SOx, and NOx and PM)	26 Mar 2010	1 Aug 2011	1 Aug 2012
United States Caribbean Sea ECA (SOx, NOx and PM)	26 Jul 2011	1 Jan 2013	1 Jan 2014

* The Special Area requirements for these areas have not yet taken effect because of lack of notifications from MARPOL Parties whose coastlines border the relevant special areas on the existence of adequate reception facilities (regulations 38.6 of MARPOL Annex I and 5(4) of MARPOL Annex V).

** The new special area requirements, which entered into force on 1 January 2013, will only take effect upon receipt of sufficient notifications on the existence of adequate reception facilities from Parties to MARPOL Annex IV whose coastlines border the relevant special area (regulation 13.2 of the revised MARPOL Annex IV, which was adopted by resolution MEPC.200(62) and which entered into force on 1 January 2013).

References

1. European Environmental Agency (2010), Accidental and illegal discharges of oil by ships at sea
2. DNV, Technologies for reduction of pollution from ships, DNV report 99-2033
3. IMO, Prevention of Pollution by Garbage from Ships
4. IMO, Prevention of Pollution by Sewage from Ships
5. IMO, ANNEX VI of MARPOL 73/78, Regulations for the Prevention of Air Pollution from Ships and NOx Technical Code
6. DNV, Regulations for the Prevention of Air Pollution from Ships, Technical and Operational Implications
7. IMO, Interim Guidelines for Voluntary Ship CO2 Emission Indexing for Use in Trials
8. The Bundesamt für Seeschifffahrt und Hydrographie (Federal Maritime and Hydrographic Agency) - <http://www.bsh.de/en>