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# MARPOL Implementation

Maritime Service Center  
Shanghai

# Res. MEPC.107(49) & Res. MEPC.108(49)

- MEPC 49 adopted on 2003-07-18 the following Resolutions enter into force from **2005-01-01**
- MEPC.107 - Bilge Separator
- MEPC.108 – ODM



# MEPC.107 – Bilge Water Separator

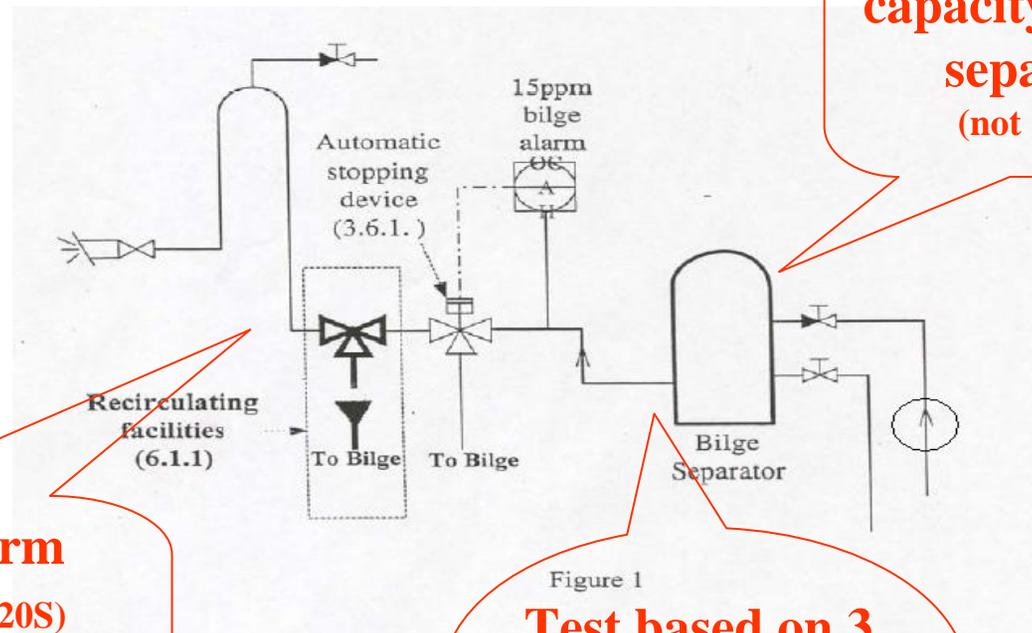
- **Resolution MEPC.107(49) – Guidelines and specifications for Pollution Prevention Equipment for Machinery Space of Ships**
- MEPC.107 will revoke MEPC.60
- **Applicability**
  - **For ships keel laid, or similar stage of construction on or after 1 January 2005; and**
  - **New installations fitted on or after 1 January 2005**



*Bilge Water Separator with Oil Content Meter*

# MEPC.107 – Bilge Water Separator

**Re-circulating facilities** should be provided, after and adjacent to the overboard outlet of the stopping device to enable testing of the system. The re-circulating facility should be so configured as to prevent, under all operating conditions, any by-pass of the oily-water-separator.



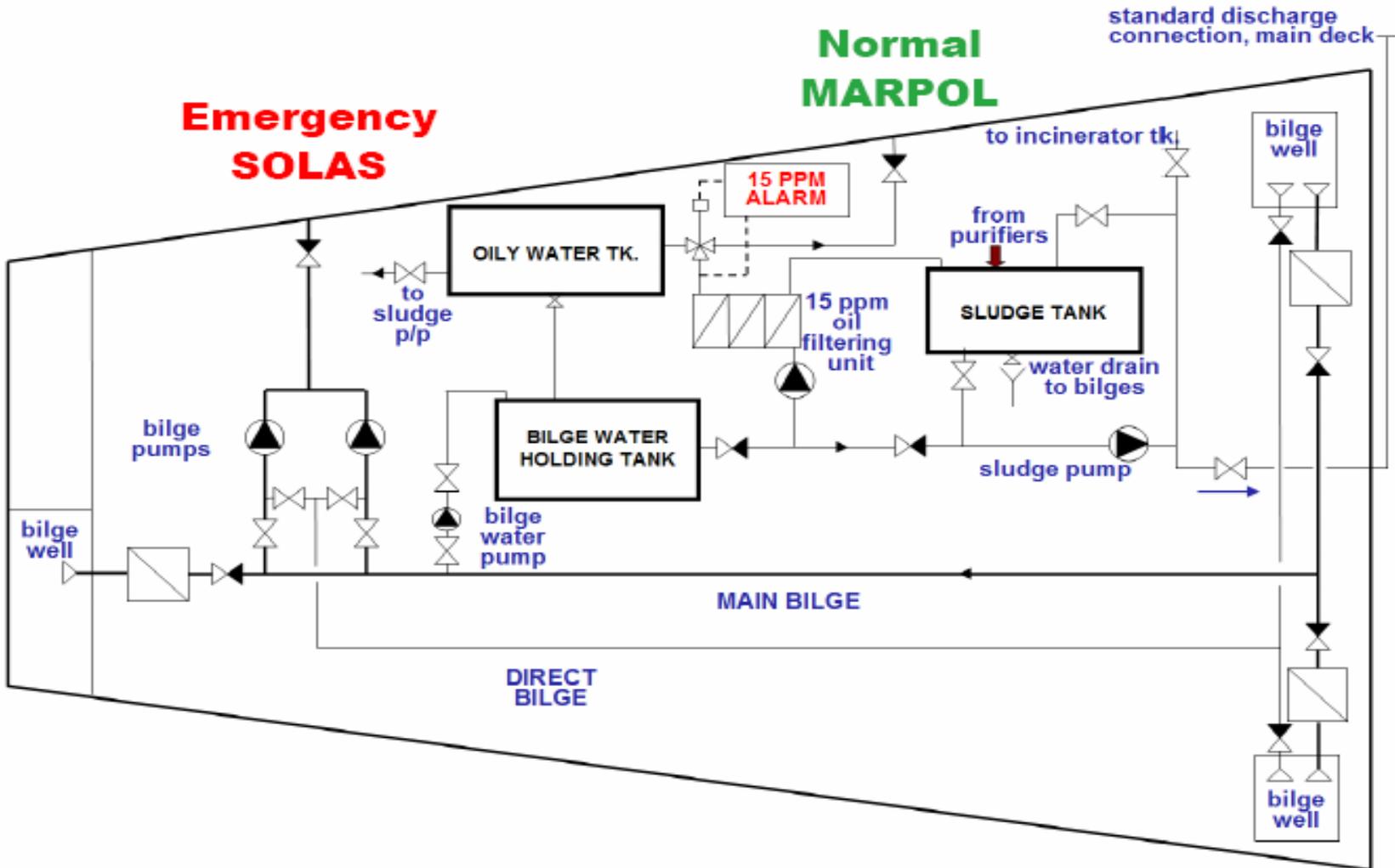
**110% of rated capacity of bilge separator (not 150%)**

**Response time to alarm within 5 second. (not 20S)**

**Automatic stop time within 20 seconds (not 40S)**

**Test based on 3 grades of fluids (not 2 grades)**

# Bilge System in E/R



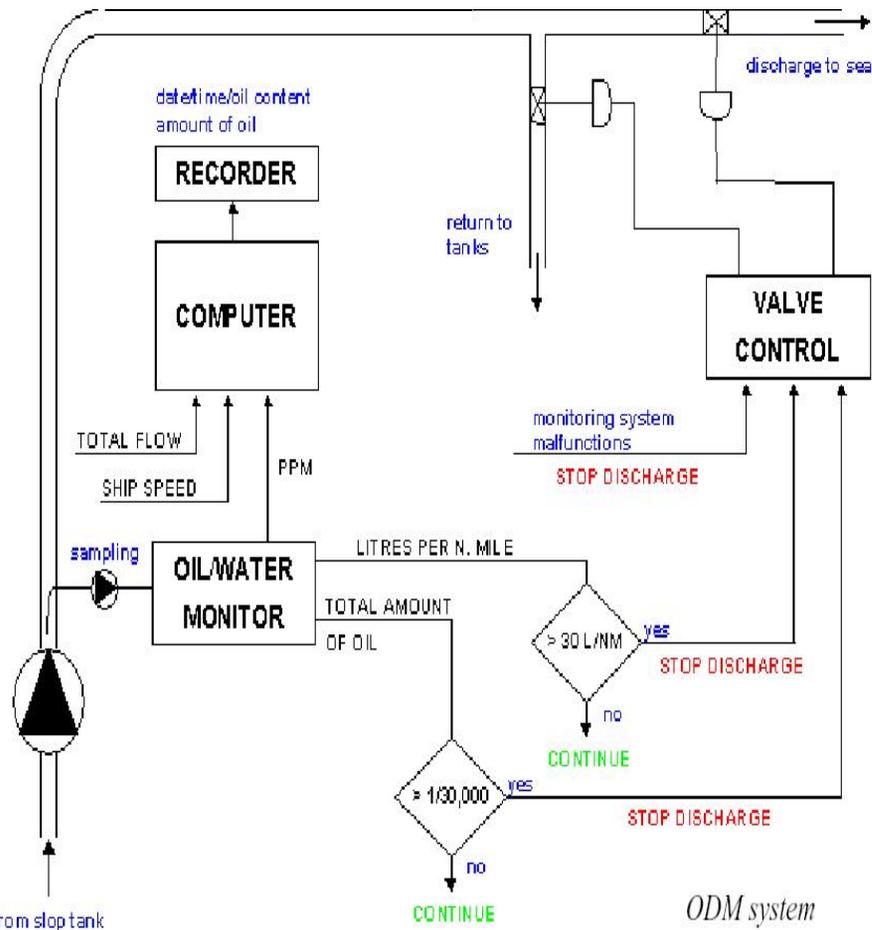
# MEPC.108 (49) - ODM

- **Resolution MEPC.108(49) – Revised Guidelines And Specifications For Oil Discharge Monitoring And Control Systems for Oil Tankers**



- **MEPC.108(49) supersedes Res.A.886**
- **MEPC.108(49) will apply to ODM which is fitted in oil tankers keel laid (or similar stage of construction) on or after 1 January 2005.**

# MEPC.108 (49) - ODM



- This standards will be applicable to all ODM. (there is no definition for category A or B)
- New ODM includes SHIP POSITION INDICATING DEVICE (consist of receiver for GNSS or radio navigation system to establish and update ship's position)
- Error of oil content meter reduced to  $\pm 10\%$  from  $\pm 20\%$ .
- Error of flow meter reduced to  $\pm 10\%$  from  $\pm 15\%$ .

# MARPOL Annex I-Reg.13G & 13H

- **Enter into force 5 April, 2005**
- **MARPOL Annex I, Reg.13G**  
Phasing out single hull tanker  
Strengthening of CAS inspection
- **MARPOL Annex I, Reg.13H**  
Prevention of oil pollution from  
oil tankers carrying heavy grade  
oil as cargo



# MARPOL Annex I-Regulation 13G

**Category 1:** Oil tankers 20 000 dwt. and above carrying crude, fuel oil, heavy diesel oil or lub.oil and oil tankers of 30 000 dwt and above carrying oil other than the above, that are not “New” oil tankers in acc. with Reg.1(26).

- **Oil tankers without SBT and PL**

- **Oil tankers contracted before 1979 or delivered before 1982.**

**Category 2:** Oil tankers 20 000 dwt. and above carrying crude, fuel oil, heavy diesel oil or lub.oil and oil tankers of 30 000 dwt and above carrying oil other than the above, that are “New” oil tankers in acc. with Reg.1(26).

- **Oil tankers with SBT and PL**

- **Oil tankers contracted after 1979 or delivered after 1982.**

**Category 3:** Oil tankers 5000 dwt. and above, but below the size limits of category 1 and 2.

# MARPOL Annex I-Regulation 13G

<b>Category of oil tanker</b>	<b>Date or year</b>
Category 1	5 April 2005 for ships delivered on 5 April 1982 or earlier 2005 for ships delivered after 5 April 1982
Category 2 & Category 3	5 April 2005 for ships delivered on 5 April 1977 or earlier 2005 for ships delivered after 5 April 1977 but before 1 Jan. 1978 2006 for ships delivered in 1978 and 1979 2007 for ships delivered in 1980 and 1981 2008 for ships delivered in 1982 2009 for ships delivered in 1983 2010 for ships delivered in 1984 or later

# MARPOL Annex I-New Regulation 13H

- Prevention of oil pollution from oil tankers carrying **heavy grade oil** as cargo.  
The regulation will apply to oil tankers of 600 tons deadweight and above carrying heavy grade oil as cargo regardless of the date of delivery.
- The regulation will not apply to double hull tankers complying with regulation 13F or regulation 13G(1)(c).
- Heavy Grade Oil is defined as:
  - a) crude oils having a density at 15°C higher than 900 kg/m<sup>3</sup>;
  - b) fuel oils having either a density at 15°C higher than 900 kg/m<sup>3</sup> or a kinematic viscosity at 50°C higher than 180mm<sup>2</sup>/s;
  - c) bitumen, tar and their emulsions

# MARPOL Annex I-New Regulation 13H

- **Double Hull Requirement** when carrying heavy grade oil
- Tankers of 5,000 dwt and above shall comply with regulation 13F not later than **5 April 2005**.
- Tankers of 600 dwt and above but less than 5,000 dwt shall be fitted with a double hull, (i.e. double bottom and double sides), complying with the dimension requirements in regulation 13F(7) not later than the date of the delivery of the vessel in 2008. This means that the option of reducing tank size to below 700 m<sup>3</sup> and having only double bottom does no longer apply to tankers carrying heavy grade oil.

# Double Hull –The Solution to avoid Pollution !?



# MARPOL Annex IV

- Regulations for the prevention of **pollution by sewage** from ships are set to enter into force in **27 September 2003**



# MARPOL Annex IV

- A type approved sewage treatment plant, or.
- An approved comminuting and disinfection system + temporary storage tank when the ship is less than 3 nautical miles from nearest land, or
- A holding tank of sufficient capacity and
- Standard Discharge Connection.



# Revised MARPOL Annex IV

- **Enter into force 1 August, 2005**  
Revised text of Annex IV Resolution MEPC.88(44)
- Revised contents such as;
- *Sewage means:*
  - (a) drainage and other wastes from any **form of toilets** and urinals;

# Revised MARPOL Annex IV

- *Application*
  1. new ships of **400 gross tonnage** and above; and
  2. new ships of less than 400 gross tonnage which are certified to carry more **than 15 persons**; and
  3. existing ships of 400 gross tonnage and above, five years after the date of entry into force of this Annex; and
  4. existing ships of less than 400 gross tonnage which are certified to carry more than 15 persons, five years after the date of entry into force of this Annex.

# Revised MARPOL Annex IV

- *Standard Discharge Connections*
  - For ships in dedicated trades, i.e. passenger ferries, may be fitted with a discharge connection, such as **quick connection couplings**.
- *Discharge of Sewage*
  - discharging comminuted and disinfected sewage at a distance of more than **3 nautical miles** from the nearest land
- *Form of certificate has been changed*

# Revised MARPOL Annex V

- MEPC.116(51) on 1 April 2004
- Amendments to the appendix to Annex V of MARPOL 73/78 with a view to facilitating the entry into force on **1 August 2005**.
- Garbage category "4" in Section 3 of the Form of Garbage Record Book is amended as follows :  
*4. Cargo residues*
- Paragraph 4.1 (a)(ii) of Section 4 in the Form of Garbage Record Book is amended as follows :  
*(ii) position of the ship (latitude and longitude). Note for cargo residue discharges, including discharge start and stop positions.*
- The NOTE included in the Record of Garbage Discharge is amended by adding the following sentence:  
***DISCHARGE OF CARGO RESIDUES REQUIRE START AND STOP POSITION TO BE RECORDED***

# Revised MARPOL Annex I



- Enter into force 1 January, 2007
- The layout of the Annex has been totally changed, and outdated text has also been excluded.

# Revised MARPOL Annex I

## Contents

### **CHAPTER 1 GENERAL**

- Regulation 1 Definitions
- Regulation 2 Application
- Regulation 3 Exemptions and waivers
- Regulation 4 Exceptions
- Regulation 5 Equivalents



### **CHAPTER 2 SURVEYS AND CERTIFICATION**

- Regulation 6 Surveys
- Regulation 7 Issue or endorsement of certificate
- Regulation 8 Issue or endorsement of certificate by another government
- Regulation 9 Form of certificate
- Regulation 10 Duration and validity of certificate
- Regulation 11 Port State control on operational requirements

# Revised MARPOL Annex I

## CHAPTER 3 REQUIREMENTS FOR MACHINERY SPACES OF ALL SHIPS

### *Part A Construction*

Regulation 12 Tanks for oil residues (sludge)

Regulation 13 Standard discharge connection

### *Part B Equipment*

Regulation 14 Oil filtering equipment

### *Part C Control of operational discharge of oil*

Regulation 15 Control of discharge of oil

Regulation 16 Segregation of oil and water ballast and carriage of oil in forepeak tanks

Regulation 17 Oil Record Book, Part I - Machinery space operations



# Revised MARPOL Annex I

## CHAPTER 4 REQUIREMENTS FOR THE CARGO AREAS OF OIL TANKERS

### *Part A Construction*

Regulation 18 Segregated ballast tanks

Regulation 19 Double hull and double bottom requirements for oil tankers delivered on or after 6 July 1996

Regulation 20 Double hull and double bottom requirements for oil tankers delivered before 6 July 1996

Regulation 21 Prevention of oil pollution from oil tankers carrying heavy grade oil as cargo

Regulation 22 Pump-room bottom protection

Regulation 23 Accidental oil outflow performance

Regulation 24 Damage assumptions

Regulation 25 Hypothetical outflow of oil

Regulation 26 Limitations of size and arrangement of cargo tanks

Regulation 27 Intact stability

Regulation 28 Subdivision and damage stability

Regulation 29 Slop tanks

Regulation 30 Pumping, piping and discharge arrangement

# Revised MARPOL Annex I

## *Part B Equipment*

Regulation 31 Oil discharge monitoring and control system

Regulation 32 Oil/water interface detector

Regulation 33 Crude oil washing requirements

## *Part C Control of operational discharge of oil*

Regulation 34 Control of discharge of oil

Regulation 35 Crude oil washing operations

Regulation 36 Oil Record Book, Part II - Cargo/ballast operations



# Revised MARPOL Annex I

## CHAPTER 5 PREVENTION OF OIL POLLUTION ARISING FROM AN OIL POLLUTION INCIDENT

Regulation 37 Shipboard oil pollution emergency plan

## CHAPTER 6 RECEPTION FACILITIES

Regulation 38 Reception facilities

## CHAPTER 7 SPECIAL REQUIREMENTS FOR FIXED OR FLOATING PLATFORMS

Regulation 39 Special requirements for fixed or floating platforms

## APPENDICES TO ANNEX I

Appendix I List of oils

Appendix II Form of IOPP Certificate

Appendix III Form of Oil Record Book

## UNIFIED INTERPRETATIONS

Appendix 1

Appendix 2

Appendix 3

Appendix 4

Appendix 5

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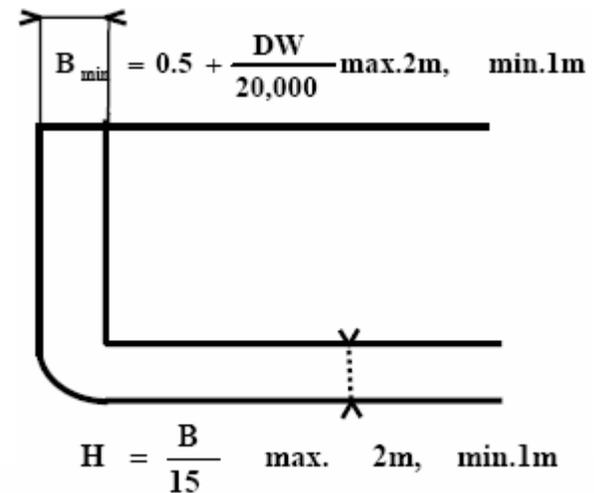
# Revised MARPOL Annex I

- **Reg.22 Pump-room bottom protection**
- Regulation applies to oil tankers of 5,000 tons deadweight and above constructed on or after 1 January 2007.
- Pump-room shall be provided with a double bottom such that the distance  $h$  between the bottom of the pump-room and the ship's base line measured not less than specified below:

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

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

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



# Revised MARPOL Annex I

- **Reg.23 Accidental oil outflow performance**
- Accidental oil outflow performance calculations for oil tankers delivered on or after 1 January 2010.
- **Reg.30.7 Pumping, piping and discharge arrangement – 1 Jan 2010**
- Sea chest that is permanently connected to the cargo pipeline system, shall be equipped with both a sea chest valve and an inboard isolation valve. In addition to these valves, the sea chest shall be capable of isolation from the cargo piping system whilst the tanker is loading, transporting or discharging cargo.

# Revised MARPOL Annex II

- MEPC 52nd session adopted the revised Annex II to MARPOL as well as the revised IBC Code.
- Both revisions will enter into force on 1 January 2007.
- A 4-category system with pollution categories X, Y and Z and OS (Other Substances).

# Revised MARPOL Annex II

## Quantity of residues

After 2007-01-01

Until 2007-01-01

X cat.            75 L + prewash            100 L+50 L+ prewash

Y cat.            75 L                            100 L + 50 L

Z cat.            75 L                            300 L + 50 L

OS                Not Applicable

# Revised MARPOL Annex II

## Discharge standards

X cat. Prewashed + The resulting residues shall be discharged to a reception facility until the concentration of the substance below 0.1% by weight. After then, follow Y cat. standard.

Y cat. Speed : 7 Knot  
& Distance from nearest land : 12 miles

Z cat. Depth of water : 25 m  
Under water discharge

But for ships constructed before 1 January 2007, under water discharge of Z cat. substances is not mandatory.

OS Not Applicable

# Revised MARPOL Annex II

- Vegetable oils are, in general, under the revised Annex II and IBC Code required to be carried by chemical tankers in cargo tanks meeting **Ship Type 2 requirements as Pollution Category Y** substances with a maximum cargo quantity of 3000 m<sup>3</sup> in any one cargo tank.
- An exemption clause in revised Annex II regulation 4.1.4 does, however, give the Administrations a possibility to **accept carriage in chemical tankers Ship Type 3**, without restrictions on the quantity in each tank, provided the tanks have **double hull and the stripping requirements** as well as the other operational requirements of Annex II for a Category Y product are complied with.

# Revised IBC Code

- Ch.6, Special requirement for **materials** has been removed. The shipper of the cargo is responsible for providing compatibility information to the ship operator.
- Ch.11, **Fire protection and fire extinction** has been changed in line with the latest SOLAS Ch.II-2.
- Ch.17, Summary of has been minimum requirements modified in accordance with **new categorizations** of cargoes.

# IAFS Convention - banning TBT

## TBT (Tri Butyl Tin)

### Anti fouling effect:

- effective against algae, barnacles and molluscs
- self polishing when bonded to polymer base

### Environmental effect:

- introduced into food chain
- shell deformations in oysters and sex changes in welks
- genetic affects in marine species
- slow break down in sediments



# IAFS Convention - banning TBT

- Agreed to prohibit application from **1 January 2003** or, from entry into force of the convention
- Proposed to prohibit presence of TBT anti-fouling coating on hull from **January 2008**:
  - Full removal, or
  - Application of “**sealer coat**”



# IAFS Convention - banning TBT

- Entry into force :
- 25 States, 25% of fleet (current status: 8 States, 9.36%)
- So, 1 January 2003 application ban is not applicable.
- However, the dates for the total ban of TBT, (2008), may still be applicable.
- Owners may have to take the prohibition into account at the first scheduled dry-docking after 2003.
- EU is considering a early implementation.



# New Convention on Ballast Water Management

- Introduction of invasive marine species into new environments may cause collapse of existing ecosystems
- Transportation by ballast water, attached to hulls or other
- Approximately  $12 \cdot 10^9$  t of ballast water per year
- Estimated: at any time, about 4500 different species are carried around the world
- BW is essential to the safe and efficient operation of ships



# New Convention on Ballast Water Management

- IMO Res. A 868 (20)
- “Guidelines for the control and management of ship’s ballast water to minimise the transfer of harmful aquatic organisms and pathogens”
- **International Convention for the Control and Management of ship’s Ballast Water and Sediments**
- Diplomatic conference 2004-02-09/13
- Entry into force: 12 month after
- 30 countries representing
- 35 % of world merchant fleet ratified

# New Convention on Ballast Water Management

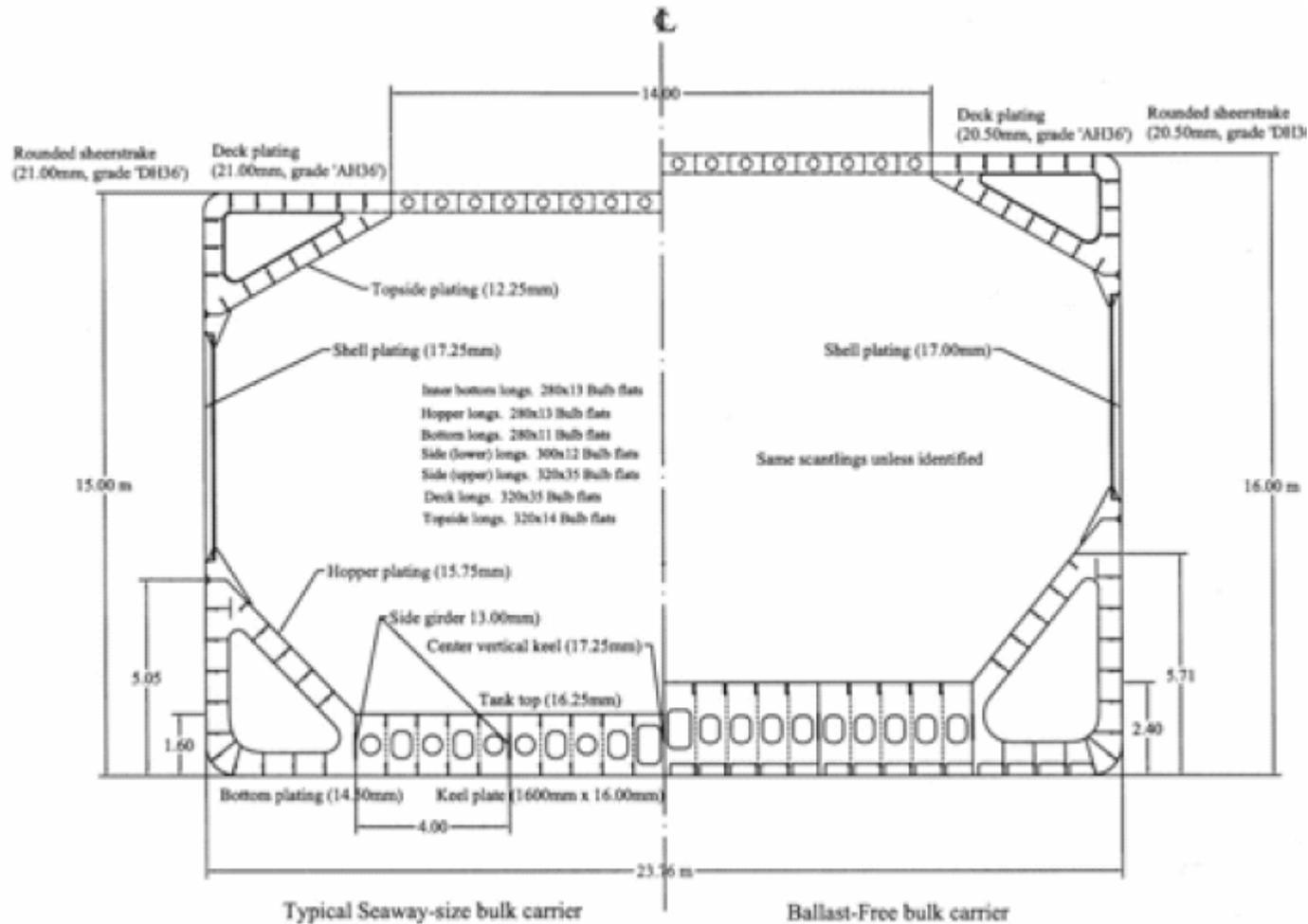
- Problem areas of BW exchanges:
  - Only 95 % of ballast water is exchanged
  - Aquatic species may survive despite of frequent water exchanges



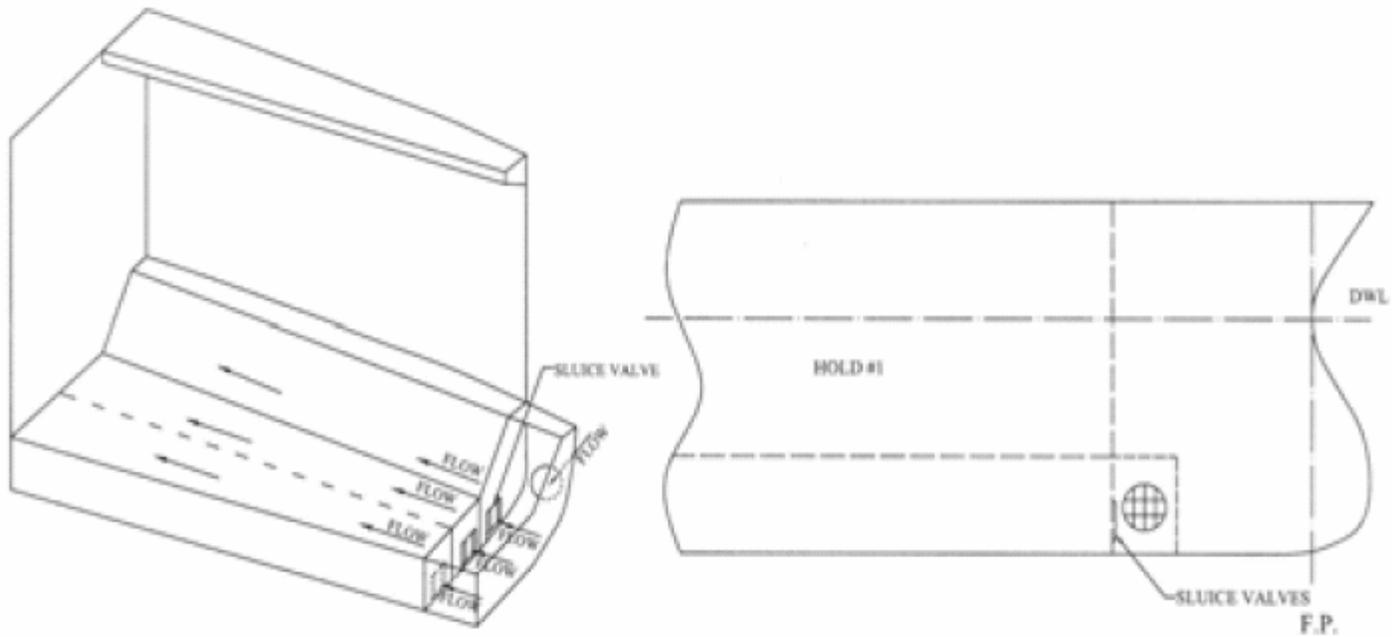
# New Convention on Ballast Water Management

- Acceptable ballast water management methods have been given more exact dates as follows;
- The main impact of these requirements is that **ballast water exchange will be phased out** as an acceptable method for complying with the Convention during a period of time from 2009 to 2016, depending on ballast water capacity and date of delivery of the vessel.
- After this, **ballast water treatment** will be the only remaining option for complying with the Convention.

# Concept of Ballast-Free Ship



# Concept of Ballast-Free Ship



*Forward plenum and collision bulkhead arrangement of the ballast-free ship concept carrier.*

# Protection of Fuel Tanks

- Draft new MARPOL regulation on the **protection of fuel tanks** set out in the document DE 47/WP.3.
- This regulation shall apply to all ships with an **aggregate oil fuel capacity of more than 600 m3**.
- The keels of which are laid or which are at a similar stage of **construction on or after 1 February 2008**.

# Protection of Fuel Tanks

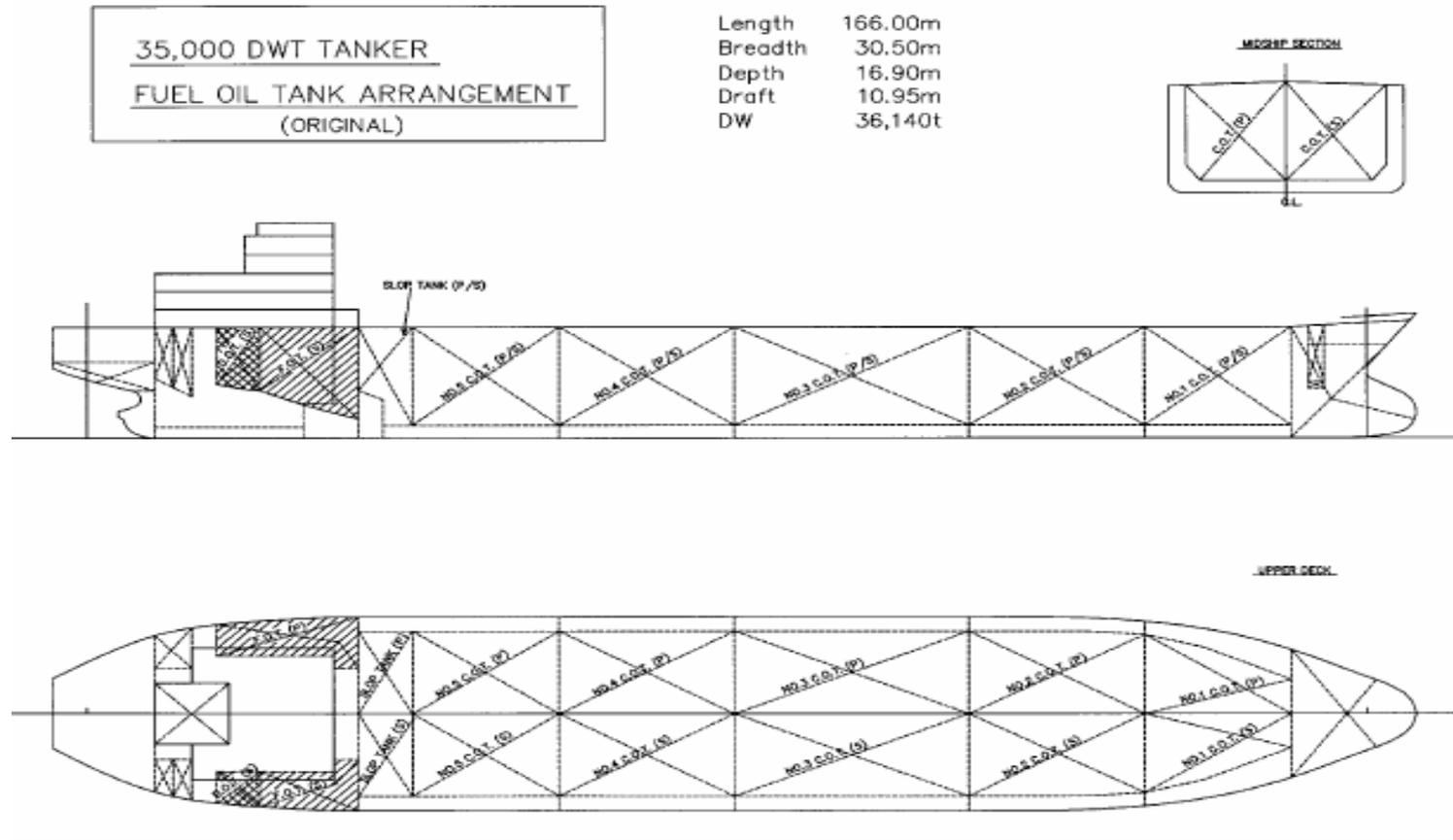


Fig. 1.1 Fuel Oil Tank Arrangement (Original design)

# Protection of Fuel Tanks

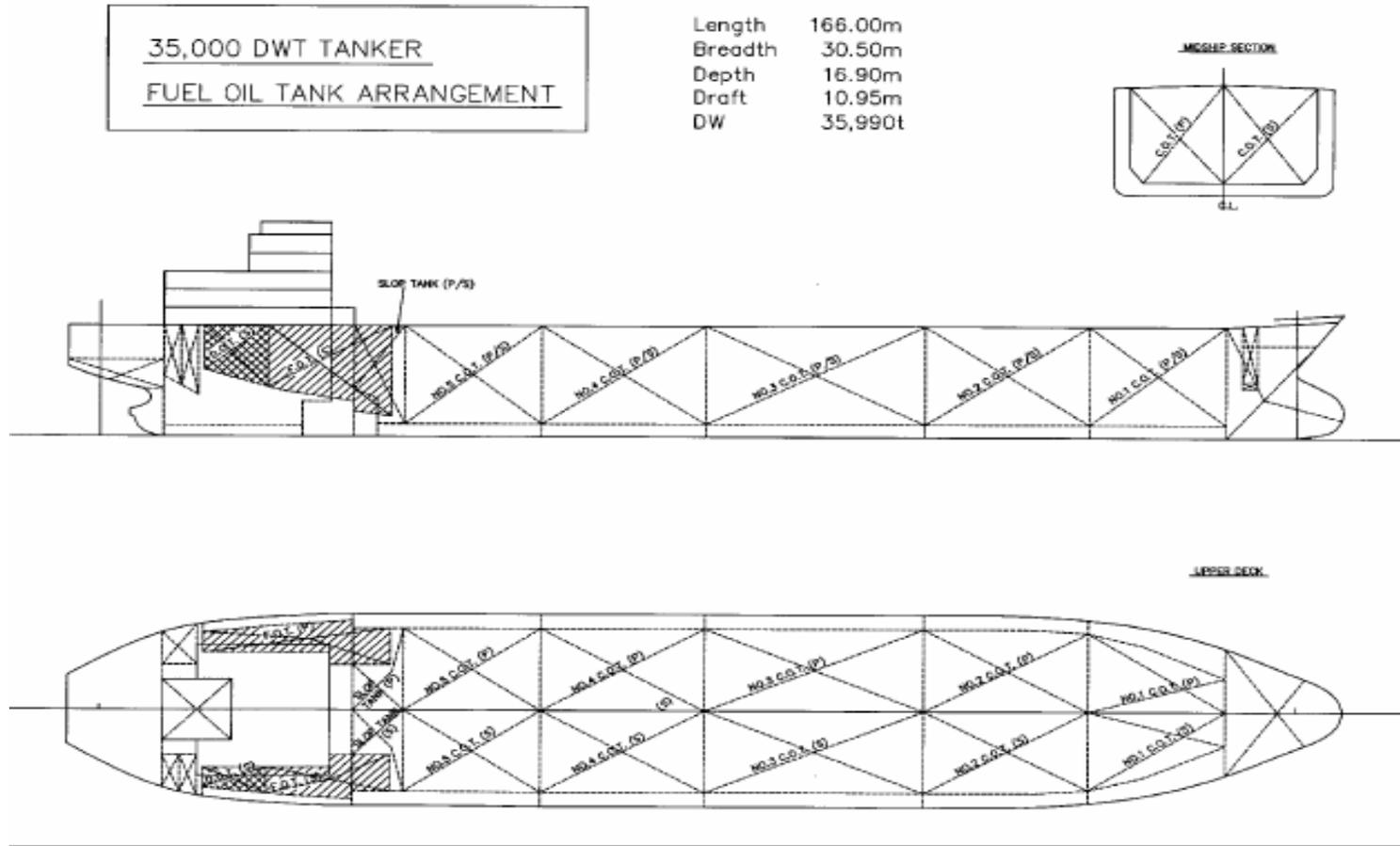


Fig.1.2 Fuel Oil Tank Arrangement (Modified Design)

# MARPOL Annex VI

- **Enter into force 19 May, 2005**
- Regulations for the **Prevention of Air Pollution** from Ships
- Requires all ships of 400 gross ton or above, and platforms and drilling rigs engaged in voyages
- Ships constructed (keel laid) before 2005-05-19 are required to comply with Annex VI on the first scheduled dry docking after this date, but in no case later than 2008-05-19.

# MARPOL Annex VI

- In order to obtain an International Air Pollution Prevention (IAPP) certificate
  - Ozone depleting substances from refrigerating plants and fire fighting equipment
  - Nitrogen Oxides (NO<sub>x</sub>) from diesel engines and EIAPP certification
  - Sulphur Oxides (SO<sub>x</sub>) in fuel
  - Volatile Organic Compound Emissions from cargo tanks of oil tankers
  - Shipboard Incineration
  - Fuel oil quality

# MARPOL Annex VI

- **OZONE DEPLETING SUBSTANCES**
- Prohibited ozone-depleting substances (Halons, CFC & HCFCs (e.g. R22), on all ships
- New installations containing HCFCs are permitted until 1 January 2020
- Halons in fire extinguishing systems and equipment is already prohibited

# MARPOL Annex VI



- **NITROGEN OXIDES (NO<sub>x</sub>) & EIAPP CERTIFICATION**
- *each diesel engine with a power output of more than 130 kW which is installed on a ship constructed on or after **1 January 2000***
- *each diesel engine with a power output of more than 130 kW which undergoes a major conversion on or after 1 January 2000*
- This regulation does not apply to:
  - *Emergency diesel engines,*
  - *Engines installed in life boats or for any equipment intended to be used solely in case of emergency*
  - *Boilers*

# MARPOL Annex VI



## Sulphur Oxides (SO<sub>x</sub>)

Global Sulphur Cap: 4.5%

Sox Emission Control Area (SECA),

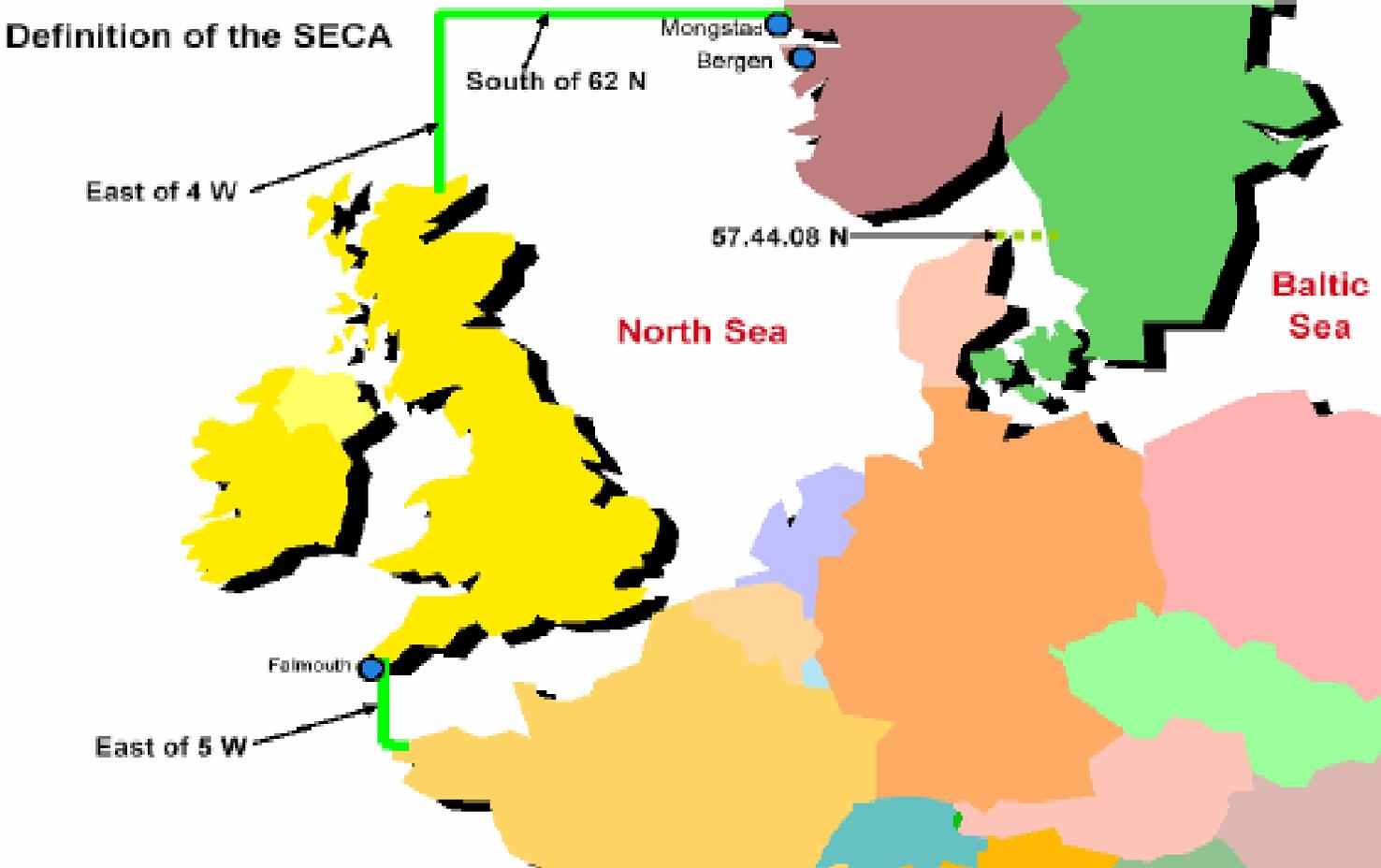
SECA Sulphur Cap: 1.5%

End-of-pipe alternative: 6.0 g SO<sub>x</sub>/kWh

SECA's:

- The Baltic 2006-05-19
- North sea (2007-10)

# MARPOL Annex VI



# MARPOL Annex VI

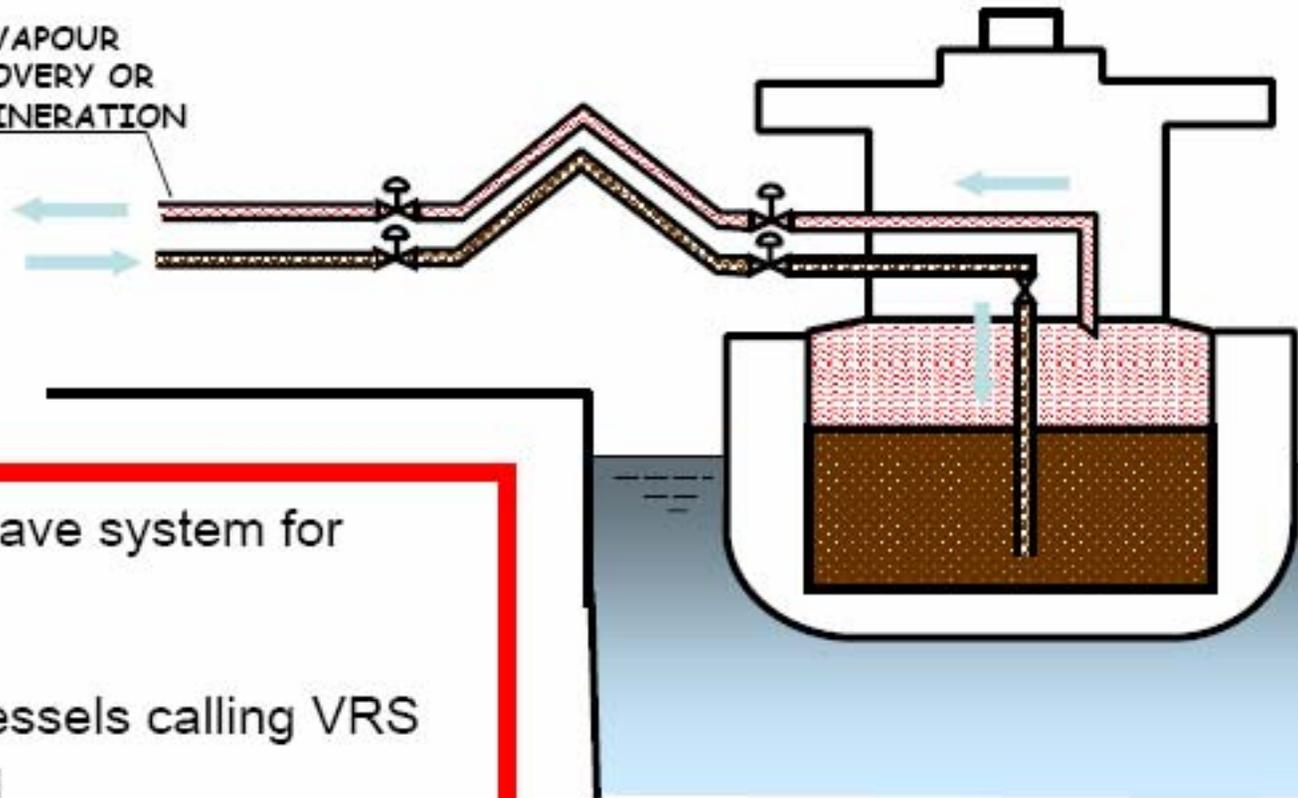
- **VOLATILE ORGANIC COMPOUND (VOC)**
- Emissions of volatile organic compounds (VOCs) from tankers may be regulated in its ports and terminals.
- All tankers which are to operate in such designated ports or terminals shall be provided with an approved **vapour collection system**, and shall use such system during the loading of such cargoes.

# MARPOL Annex VI



## Vapour Return System

TO VAPOUR  
RECOVERY OR  
INCINERATION



Several terminals have system for vapour return.

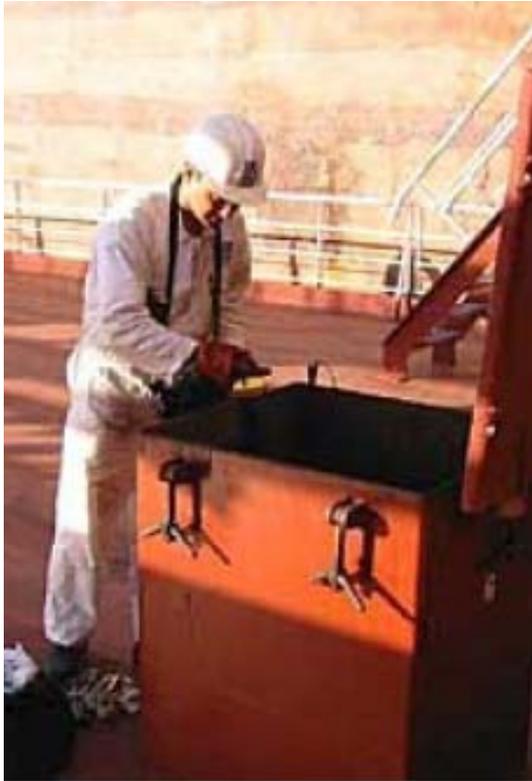
VRS required for vessels calling VRS terminals, Annex VI

# MARPOL Annex VI

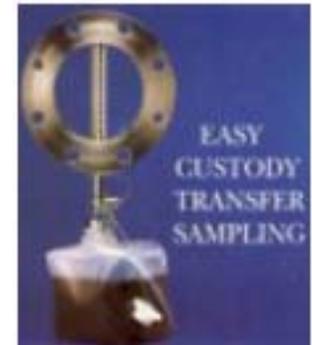


- **SHIPBOARD INCINERATION**
- Incinerators installed onboard after 1. January 2000 must be type approved, according to Resolution MEPC.76(40), and Resolution MEPC.93(45)
- Incineration prohibited :
  - Annex I, II & III Cargo residues
  - PCB

# MARPOL Annex VI



- **FUEL OIL QUALITY**
  - Free from inorganic acids
  - Not include chemical waste
  - Within NO<sub>x</sub> and Sox limits
  - Bunker notes to be kept on board for 3 years
  - Sample to be kept until substantially consumed and not less than 12 months



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# Thank You for Listening !!

