



RULES FOR
CLASSIFICATION OF
SHIPS

NEWBUILDINGS

SPECIAL EQUIPMENT AND SYSTEMS
ADDITIONAL CLASS

PART 6 CHAPTER 12

ENVIRONMENTAL CLASS

JANUARY 2003

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CHANGES IN THE RULES

General

This booklet is a reprint of the previous edition and apart from clarifications of text and the inclusion of amendments and corrections, published in the July 2002 edition of Pt.0 Ch.1 Sec.3, no other changes have been made.

This chapter is valid until superseded by a revised chapter. Supplements will not be issued except for an updated list of minor amendments and corrections presented in Pt.0 Ch.1 Sec.3. Pt.0 Ch.1 is normally revised in January and July each year.

Revised chapters will be forwarded to all subscribers to the rules. Buyers of reprints are advised to check the updated list of rule chapters printed in Pt.0 Ch.1 Sec.1 to ensure that the chapter is current.

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SECTION 1 GENERAL REQUIREMENTS

A. Classification

A 100 Application

101 The rules in this chapter state requirements for design and equipment reducing the environmental impact from emissions to air, discharges to sea, and deliveries to shore from ships. Ships complying with the requirements in this chapter may be given the additional class notations:

CLEAN or
CLEAN DESIGN.

Guidance note:

The class notations **CLEAN** or **CLEAN DESIGN** can be applied on most ship types. However, the class notations are typically intended to be used as follows:

- **CLEAN:** For deep sea transport (newbuildings) and existing tonnage
- **CLEAN DESIGN:** For coastal and passenger transport and newbuildings.

---e-n-d---of---G-u-i-d-a-n-c-e---n-o-t-e---

102 The rules aim at attaining a ship with controlled environmental standards of design and performance. Compliance with the rules shall be verified through inspection, measurements and sampling of defined environmental parameters in accordance with the requirements of the rules in this chapter and in compliance with identified standards and guidelines.

103 Effects and parameters covered are described in B100 by reference to technical standards and installations, and their operation.

104 Environmental management systems, e.g. ISO 14000, are not part of the rules. Fulfilment of the requirements in the rules may, however, facilitate goals and improvement tasks defined through ISO 14000 implementation.

105 Special ship types and ships with unconventional propulsion machinery systems, see Table A1, will be subject to special considerations addressing specific items not covered by the standard rules. Tankers for oil smaller than 150 tons gross tonnage and other ships smaller than 400 tons gross tonnage will also be subject to special considerations.

Table A1 Ship types and propulsion machinery systems that will be especially considered

<i>Ship types</i>
Liquefied gas carriers Floating storage, production and offloading systems
<i>Propulsion machinery systems</i>
Gas turbines

106 Ship having the class notations covered by this chapter shall comply with the requirements specified in Table A2.

Table A2 Requirements for ships with class notations **CLEAN or **CLEAN DESIGN****

<i>Subject</i>	<i>Class notation</i>	
	CLEAN	CLEAN DESIGN
Ships ¹⁾ shall be enrolled in an emergency response scheme administered by the Society, or another IACS member society	Yes	Yes
Ships shall comply with the technical requirements for the class notation E0 , or EC0 , see Ch.3	Yes	Yes
Ships shall fulfil the technical requirements for bridge layout and equipment as defined for the notation, NAUT AW , see Ch.8	Not required	Yes
Ships shall be arranged and equipped with additional oil pollution prevention measures as defined for the notation, OPP-F , see Sec.3 D200	Not required	Yes
1) This requirement is not applicable for Supply Vessels and dry cargo ships of less than 3000 gross tonnage.		

A 200 Class notations

201 The class notation **CLEAN** identifies the basic requirements for controlling and limiting operational emissions and discharges. The requirements are specified in Sec.2.

202 The class notation **CLEAN DESIGN** identifies additional requirements for controlling and limiting operational emissions and discharges. In addition, this notation specifies design requirements for protection against accidents and for limiting their consequences. The requirements are specified in Sec.3.

A 300 Covered areas

301 The areas covered by the class notations are given in Sec.2 and Sec.3, respectively.

302 A summary of the requirements is given in Table A3.

Table A3 Comparison between requirements for CLEAN or CLEAN DESIGN		
<i>Subject</i>	<i>Class notation</i>	
	CLEAN	CLEAN DESIGN
Fuel oils	All fuel oils intended for use onboard shall meet the requirements in MARPOL 73/78/97, Annex VI reg. 18.1. This shall not preclude incorporation of small amounts of additives intended to improve performance. See Sec.2 B100	As for CLEAN .
Fuel oil management plan and log	In accordance with MARPOL 73/78/97, Annex VI, reg. 18.3 and 18.4. See Sec.2 B100	As for CLEAN .
NO _x limits	Maximum acceptable emissions are defined by MARPOL 73/78/97, Annex VI reg. 13.3 See Sec.2 B200	Maximum acceptable emissions 60% of those defined for CLEAN See Sec.3 B200
SO _x	Fuel oil carried onboard: maximum sulphur 3.0 %, alternatively maximum 12.0 g SO _x /kWh Fuel oil used in ports and SO _x -controlled areas: maximum sulphur: 1.5 %, alternatively maximum 6.0 g SO _x /kWh See Sec.2 B200 and B300	As for CLEAN , however: Fuel oil used in ports and SO _x -controlled areas: maximum sulphur: 0.5%, alternatively maximum 2.0 g SO _x /kWh See Sec.3 B200 and B300
Refrigerants	Ozone depleting not permitted, e.g.: CFC, HCFC. The following are permitted: — HFC — Natural refrigerants (NH ₃ / CO ₂) GWP < 3500 ODP = 0 See Sec.2 B400	As for CLEAN , however: GWP < 1890 ODP = 0 See Sec.3 B400
Vapour emission control (Tankers)	According to IMO Standards for Vapour Emission Control Systems (MSC/Circ.585) Technical requirements as for class notation VCS-2 . See Sec.2 B500	As for CLEAN .
Fire fighting substances	GWP < 4000 See Sec.2 B600	GWP < 1650 See Sec.3 B600
Incinerator	If installed, to be type approved in accordance with IMO res. MEPC.76(40). All use shall be recorded in Garbage Record Book See Sec.2 B700	Shall be installed. Requirements as for CLEAN . Alternative solutions to avoid discharge to sea may be considered. See Sec.3 B700
Double hull in the cargo tank area	Ships with class notations Tanker for Oil or Tanker for Chemicals shall have a double skin arrangement in the cargo area equivalent to that described by MARPOL 73/78, Annex I, reg. 13F See Sec.2 C100	As for CLEAN
Tanker for chemicals	The maximum allowable remaining cargo quantity shall be 0.1 m ³ for pollution category B, and 0.3 m ³ for pollution category C. See Sec.2 C200	The maximum allowable remaining cargo quantity shall be 0.05 m ³ for pollution categories B and C. See Sec.3 C200
Tanker for oil, ballast / cargo tanks	MARPOL 73/78, Annex I, reg. 13F to be complied with See Sec.2 C100	100 % segregated ballast tanks. Cargo tanks to have smooth surfaces and be equipped with cargo wells for efficient stripping. See Sec.3 C200
Tanker for oil, COW efficiency	Ref. Class Notation Tanker for Oil See Sec.2 C204	COW efficiency shall be such that coverage of at least 96 % is obtained. See Sec.3 C204
Tanker for oil/chemicals: Gutter plates with increased height	Gutter plates to reduce the likelihood of cargo spill on main deck in cargo area reaching the sea are to be fitted. Dimensional criteria are given in Sec.2 C300	As for CLEAN .
Tanker for oil/chemicals: Deck drainage system	Main deck in cargo area to be fitted with a closed drainage system for use during cargo operations. See Sec.2 C300	As for CLEAN .
Tanker for oil/chemicals: Cargo manifold / drip and spill trays	Drip/spill trays shall have arrangements for draining. Dimensional criteria are given in Sec.2 C300	Spill tray dimensions as for CLEAN . In addition, the drainage system shall be of a closed type. See Sec.3 C300
Tanker for oil/chemicals: Cargo hose support	Means to adequately support hoses in way of ship's side abreast of manifolds. The support shall preferably be arranged as a horizontal curved plate or pipe section. See Sec.2 C300	As for CLEAN .

Table A3 Comparison between requirements for CLEAN or CLEAN DESIGN (Continued)		
<i>Subject</i>	<i>Class notation</i>	
	CLEAN	CLEAN DESIGN
Other ships carrying oil containing liquids in bulk	Arrangements as specified for oil bunkering arrangements to be fitted, including high level alarms and spill/drip trays. See Sec.2 C300	As for CLEAN .
Oil bunkering arrangement	Fuel oil, lubricating oil and other oil bunker tanks shall be equipped with high level alarm to prevent overfilling. Fuel oil, lubricating oil and other oil bunkering stations, vent and overflow pipes and other areas where spillage may occur shall be fitted with spill/drip trays See Sec.2 C400	As for CLEAN . In addition, the drainage system shall be of a closed type. See Sec.3 C400
Ballast water	Approved ballast water management plan according to IMO res. A.868(20), Guidelines for the Control and Management of Ship's Ballast Water to Minimise the Transfer of Harmful Organisms and Pathogens. See Sec.2 C500	As for CLEAN .
Bilge water	15 ppm alarm and automatic stopping device according to MARPOL 73/78, Annex I, reg. 16(2)(5). Equipment to be certified in accordance with MARPOL 73/78, Annex I, reg. 16 See Sec.2 C600	Holding tank with facilities for delivery to shore. Obligation for delivery to shore (shall be documented by oil record book). Requirements to 15 ppm alarm and automatic stopping device as for CLEAN . See Sec.3 C600
Garbage	Management plan and record book according to MARPOL 73/78, Annex V. See Sec.2 C700	As for CLEAN . Additionally, see Sec.3 C702.
Sewage.	Sewage handling in accordance with MARPOL 73/78 Annex IV See Sec.2 C800	As for CLEAN . Additionally, sewage treatment to be implemented and sewage treatment system to be approved. See Sec.3 C800
Grey water treatment/holding tank	Not required	Required for passenger ships. See Sec.3 C804
Paint/antifouling	The ship is to carry a Statement of Compliance with International Convention on the Control of Harmful Anti Fouling Systems. See Sec.2 C900	As for CLEAN .
Fuel oil tanks in protective location	Not required	Required See Sec.3 D100
Alternate means of propulsion	Not required	Required See Sec.3 D200

B. Definitions

B 100 Definition, main parameters

101 Emissions to air

All emissions to air which are caused by or needed for the operation of the ship, energy consumers, cargo, passengers, and crew on board a vessel, and any toxic emissions caused by operation, protection and conservation of vessel or cargo.

102 Discharges to sea

All discharges to sea which are caused by or needed for operation of the ship, energy consumers, cargo, passengers, and crew on board a vessel, and any toxic discharges caused by protection and conservation of vessel or cargo.

103 Deliveries to shore

Delivery of potential pollutants to shore for controlled disposal, recycling, etc.

104 Accidental emissions or discharges

All emissions to air or discharges to sea, caused by unforeseen or unplanned events, of substances needed for energy consumers, cargo, passengers, and crew on board a vessel, and any toxic emissions caused by protection and conservation of vessel or cargo.

105 Port

The ship is considered in port from ordering "stand by" prior to entering port to ordering "full ahead" when leaving the port. The time will be confirmed by entries in the ship's logbook.

B 200 Definitions and characteristics, systems and components

201 Ballast water system

Ballast water systems comprise:

- tanks for ballast water
- associated piping and pumping systems.

Environmental effects from ballast water covered by the rules in this chapter may include:

- transport and discharge of harmful aquatic organisms and pathogens.

Combined cargo/ballast tanks are not considered by the rules in this chapter.

202 Bilge water

Bilge water is oily water removed from the machinery space bilges. Bilge water removed from cargo holds of bulk carriers and general cargo vessels is not affected by the rules in this chapter.

203 *Cargo handling systems*

Cargo handling systems covered by the rules in this chapter comprise:

- Cargo tank vents for tankers with cargoes where evaporation may occur during loading, transport and discharge. (e.g.: **Tanker for Oil, Tanker for Chemicals, Tanker for Liquefied Gas**)
- Pumping and piping systems for tankers carrying cargoes that may cause global or local pollution.

204 *Cargo residues*

Cargo residues cover remains of cargo (oil or chemical contaminated water from cargo tank area, slop tanks and cargo pump room). Cargo residues may be present in discharged water used for cleaning cargo tanks, and discharged ballast water from tankers without 100 % segregated ballast tanks.

205 *Casualty*

Casualties covered by the rules in this chapter are defined as serious unplanned incident(s), e.g. grounding, collision or other incident damaging the hull's structural integrity, fire, sinking, etc. The consequence of a situation of total loss will be:

- cargo, or cargo containment system, is damaged, and cargo spilt into the sea
- the integrity of the ship is damaged causing oil spills, etc.

206 *Combustion machinery*

Combustion machinery comprises:

- internal combustion engines, both marine diesel engines and gas turbines
- boilers.

The rules in this chapter cover the emission to the atmosphere of oxides of nitrogen (NO_x) and -sulphur (SO_x) found in combustion machinery exhaust gases.

207 *Fire-fighting system*

The rules in this chapter cover the active fire-fighting media used in fixed fire-fighting systems.

208 *Garbage*

Garbage includes all kinds of victual, domestic and operational waste excluding fresh fish and parts thereof, generated during normal operation of the ship and liable to be disposed of continuously or periodically except those substances excluded specifically. Garbage generated by passengers on passenger vessels is included in the rules in this chapter.

Systems for garbage treatment include the following:

- garbage sorting systems, typically: glass, paper, metals, etc.
- compacting systems
- storage systems
- incinerators.

Sewage and waste oils are defined separately and not as garbage.

209 *Painting and antifouling systems*

Antifouling paint of the underwater area gives a continuous release of active ingredients to the sea. This effect is covered by the rules in this chapter.

In addition, painting and antifouling systems emit volatile organic compounds (VOC) during application. This effect is not considered by the rules in this chapter.

210 *Refrigeration systems*

The rules in this chapter cover refrigerant media used in refrigeration plants on conventional reefer ships, fishing vessels, liquefied gas carriers with re-liquefaction plants and other ships

with centralised cargo refrigeration systems. They are also applicable for centralised air conditioning and refrigeration systems onboard. Domestic type stand-alone air conditioning units and refrigerators are not covered.

Refrigerants may escape to the atmosphere through refrigeration system leakage, service work and dismantling at the end of the system's working life.

211 *Sewage*

Sewage is defined to include:

- drainage and other wastes from all toilets, urinals and WC scuppers. For passenger ships this applies both for crew and passenger areas
- drainage from medical premises (dispensary, sick bay, etc.) via wash basins, wash tubs and scuppers located in such rooms
- drainage from spaces containing living animals, or
- other waste waters when mixed with any of the drainage systems defined above.

Systems for sewage handling have varying complexity including:

- holding tanks
- sewage treatment plants
- discharge systems, ashore, or to sea.

212 *Waste oil*

Shipboard waste oils comprise the following:

- used lubrication and hydraulic oils
- oil leaked from lubrication and hydraulic oil systems
- leakage from fuel oil systems
- sludge from fuel and lubrication oil treatment systems (separators, filters, etc.).

Waste oils may be dealt with onboard, or pumped ashore. Cargo residues in slop tanks, etc., see 204, are considered separate from operational waste oils.

B 300 *Abbreviations*

BCH Code:	Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (Bulk Chemical Code)
CFC:	Common name for refrigerants, e.g.: CFC-11 (Trichlorofluoromethane), CFC-12 (Di-chlorofluoromethane), etc.
CFR:	Code of Federal Regulations
GWP:	Global warming potential. (CO ₂ = 1, time horizon 100 years)
HCFC:	Hydrochlorofluorocarbons
HFC:	Hydrofluorocarbons
IACS:	International Association of Classification Societies.
IAPP Certificate:	International Air Pollution Prevention Certificate
IBC Code:	The International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk
IOPP Certificate:	International Oil Pollution Prevention Certificate
ISO:	International Organisation for Standardisation
IMO:	International Maritime Organisation
MARPOL or MARPOL 73/78:	The International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978 thereto
MSC:	Maritime Safety Committee (IMO)

MEPC:	Maritime Environmental Protection Committee (IMO)
NO _x :	Oxides of nitrogen
ODP:	Ozone depleting potential. (Compared to CFC 11)
SCR:	Selective Catalytic Reduction.
SO _x :	Oxides of sulphur
TBT:	Tributyltin (active ingredient in antifouling paint)
TEWI:	Total environmental warming impact.
TEWI analysis:	Analysis of environmental warming impact using CO ₂ equivalents.
USCG:	US Coast Guard
VOC:	Volatile organic compound.

B 400 International recommendations, standards and references

401 International recommendations, standards and references have been used as foundation for the rules, although the rule requirements may be more stringent. When setting the emission and discharge limits, and determining the measuring procedure, due consideration has been given to technical and practical limitations inherent in the design and construction of different types of ships.

402 International recommendations, standards and references with provisions used by the Society when developing the rules are reflected in the references specified in 403 to 410. Unless a particular edition is explicitly referred to, the latest edition of each standard applies.

403 General references

Generally the rules refer to applicable parts of Annexes I, II, IV, V and VI of MARPOL 73/78 Consolidated Edition, 2002. Regardless of the status of the ratification processes, the annexes are applicable for **CLEAN** and **CLEAN DESIGN**. Other references for specific areas are given in 404 to 410.

404 Antifouling paint

Requirements for restrictions to use of TBT in antifouling paint refer to International Convention on the Control of Harmful Anti Fouling Systems, adopted by IMO in October 2001.

405 Ballast water

Requirements for restrictions to transfer of harmful organisms in ballast water refer to the following IMO resolution:

- Resolution A.868(20), Guidelines for the Control and Management of Ships' Ballast Water to Minimise the Transfer of Harmful Organisms and Pathogens.

406 Cargo handling vapour emission control systems

When considering vapour emission control systems the following references are used:

- IMO Standards for Vapour Emission Control Systems, MSC/Circ.585 and MARPOL Annex VI, reg. 15
- USCG 46, CFR 39.

407 Marine diesel engines

The NO_x content in marine diesel engine exhaust gases is referred to IMO's "NO_x Code":

- NO_x Technical Code, (IMO MP Conf. 3/35 Res. 2)

408 Marine fuel oils and sulphur emission

Marine fuel oils shall be specified and tested according to Table B1.

409 Refrigerants and fire-fighting media

When considering refrigerants and fire-fighting media and

their effect on the ozone layer and global warming potential the "Montreal Protocol on Substances that Deplete the Ozone Layer" shall be used.

410 Shipboard incinerators

Incinerators, their design and use, shall comply with the following:

- IMO res. MEPC.76(40) on Standard specification for shipboard incinerators.

Table B1 Marine fuel oils and sulphur emissions – Specification and testing references

Specifications of marine fuels	ISO 8217, Petroleum Products – Fuels (Class F)
Sampling	Code of Practice for Bunkering by Bunker Barges/Tankers (Singapore Productivity and Standards Board) ISO 3170/ISO 3171 (or equivalent national standard.)
Test method, fuel sulphur content	ISO 8754
Test method, emission sulphur content	ISO 7934/ISO 7935/ISO 11632

C. Information and Documentation

C 100 General

101 Drawings, technical information, certificates and operational procedures as specified in Tables C1, C2 and C3 are required for approval and/or information.

Guidance note:

It should be noted that some of the required documentation is additional to, and different from, documentation normally considered "Class documentation" as delivered from the newbuilding yard. This is in particular the case for operational procedures specified in Table C2 that may require input from the owner.

---e-n-d---of---G-u-i-d-a-n-c-e---n-o-t-e---

102 Certificates and documentation of compliance

The certificates and other documentation of compliance given in Table C1 shall be available to the Society prior to assigning the class notations **CLEAN** or **CLEAN DESIGN**.

103 Discharge limiting and monitoring equipment shall be certified or type-approved.

104 Operational procedures

The operational procedures given in Table C2 shall be available and evaluated prior to assigning class notation **CLEAN** or **CLEAN DESIGN**.

105 Plans and particulars

The plans and particulars given in Table C3 shall be evaluated prior to assigning class notation **CLEAN** or **CLEAN DESIGN**.

C 200 In-service requirements

201 If approved arrangements, equipment or procedures are altered or modified documentation shall be resubmitted for approval.

202 The environmental performance of systems covered by the rules in this chapter shall be verified by inspection, measurements, and sampling, or by other equivalent means in accordance with the requirements of the rules in this chapter and in compliance with identified standards and guidelines. Data shall be gathered and kept onboard in appropriate logbooks for review during periodical surveys as defined in Pt.7 Ch.2 Sec.4.

Table C1 Required certificates and documentation of compliance		
<i>Description</i>	<i>Class notation</i>	
	CLEAN	CLEAN DESIGN
Confirmation of Emergency Response Service contract with the Society, or another IACS member society ¹⁾	X	X
International Air Pollution Prevention Certificate (IAPPC), or equivalent statement of compliance to NO _x control according to MARPOL 73/78/97, Annex VI, reg. 13, determined in accordance with the NO _x Technical Code (IMO MP/Conf.3/35 Resolution 2). Tests and procedures leading to the issue of the (IAPPC) or statement of compliance shall be carried out under the surveillance of the Society or another IACS member society. For engines not covered by the MARPOL 73/78/97, Annex VI, reg. 13, the NO _x emission levels shall be determined as decided by the Society	X	X
Incinerator type approval certificate in accordance with IMO resolution MEPC.(76)40	X	X
Vapour emission control certificate, or statement of compliance with IMO MSC/Circ.585 or USCG's regulations for vapour control systems CFR 46 Part 39. (Alternatively class notation VCS-2)	X	X
Certificate for the sewage system confirming compliance with the requirements of USCG 33 CFR 159, or MARPOL 73/78 Annex IV		X
Statement of Compliance to the International Convention on the Control of Harmful Anti-fouling Systems	X	X
Documentation of compliance with technical requirements for class notation E0 or ECO	X	X
Documentation of compliance with technical requirements for class notation NAUT-AW		X
Documentation of compliance with technical requirements for class notation OPP-F , subject to considerations in Sec.3 D200		X
1) This requirement is not applicable for Supply Vessels and dry cargo ships of less than 3000 gross tonnage.		

Table C2 Required operational procedures		
<i>Description</i>	<i>Class notation</i>	
	CLEAN	CLEAN DESIGN
NO _x emission control/measurement procedures, alternatively, procedure for maintaining diesel engine Technical File as described by NO _x Technical Code (IMO MP/Conf.3/35 Resolution 2)	X	X
Fuel oil management plan for control of SO _x emissions, including fuel bunkering management plan covering the requirements of MARPOL 73/78, Annex VI, reg. 18	X	X
Bunkering procedure	X	X
Refrigerant management procedures	X	X
Approved ballast water management plan, including ballast water exchange loading conditions and procedures, and procedures for preparing and maintaining a ballast water record book	X	X
Garbage and sewage management plans and handling procedures, including garbage record book as specified by MARPOL 73/78, Annex V, reg. 9(3)	X	X
Bridge operation control procedures		X
Engine room operation control procedures		X

Table C3 Required plans and particulars		
<i>Description</i>	<i>Class notation</i>	
	CLEAN	CLEAN DESIGN
General arrangement and tank plan	X	X
Fuel oil schematics including details of SO _x control methods, arrangement and system drawings, where applicable	X	X
Drawings of any exhaust gas cleaning systems that shall be approved in accordance with guidelines to be developed by IMO	X	X
Details and arrangement of refrigeration systems, including data sheet with information on intended refrigerant to be used	X	X
Single line diagrams for main power circuits		X
Specification of all fire fighting systems and fire extinguishers, including data sheet with information on intended extinguishing media to be used in the respective systems	X	X
Details and drawings of incinerator with system	X	X
Details of cargo and non-cargo manifold areas, including drip trays and oil spill prevention arrangements	X	X
Details of crude oil washing (COW) system, including shadow diagrams with documented coverage. (Tankers for oil with COW systems, only)		X
Details and schematics of fuel oil systems, bilge systems and ballast water systems	X	X
Details and schematics of garbage handling system	X	X
Details and schematics of sewage handling system	X	X

SECTION 2 CLASS NOTATION CLEAN

A. Introduction

A 100 General

101 The rules in this section cover emissions to air and give requirements for emissions to air from energy producers, cargo-handling systems and service systems on board the ship. References are made to national and international recommendations, standards and guidelines on emission criteria in relation to the protection of the environment concerning:

- ozone depletion
- global heating
- acidification
- resources.

102 The rules in this section cover discharges to sea giving requirements for discharges to sea from energy producers, lubrication and hydraulic systems, cargo/passenger handling systems, waste/sewage systems, underwater antifouling systems and ballast water systems on board ships. References are made to national and international recommendations, standards and references on discharge criteria in relation to protection of the environment.

103 Documentation required to be submitted for approval and verification of compliance with the rules is specified in Sec.1 C100.

B. Emissions to air

B 100 General

101 All fuel oils intended for use onboard shall meet the following requirements:

- a) The fuel shall not contain inorganic acid.
- b) The fuel shall not include any added substances or chemical waste which either jeopardises safety of the ship or the performance of the engine, is harmful to personnel, or contributes to additional air pollution. This shall not preclude incorporation of small amounts of additives intended to improve some aspects of performance.

102 Fuel oil management and control shall be carried out in accordance with a fuel oil management plan and fuel oil log. The fuel oil log shall document the qualities of the fuel ordered and the qualities of the received fuel as described by the bunker delivery note, see MARPOL 73/78/97, Annex VI, reg. 18.3 and 18.4.

103 The bunker delivery note shall be accompanied by a representative sample of the fuel delivered, sealed and signed by the supplier's representative and the master or officer in charge of the bunker operation. The sample shall be retained under the ship's control until the fuel is consumed but not for less than twelve months after the time of delivery.

104 The sampling equipment and test procedures shall comply with the DNVPS Guidelines: "Marine Fuel Management", based on the standards referred to in Table B1, Sec.1 B408.

B 200 Marine diesel engines

201 Requirements for emissions from diesel engines apply to all diesel engines with power output in excess of 130 kW, except emergency diesel engines, engines installed in lifeboats and any other device or equipment intended to be used solely in case of emergency.

202 The maximum allowed total emission levels for marine diesel engines installed onboard shall be as defined in 203 for NO_x and 208 and 209 for SO_x.

203 NO_x emissions shall comply with the level defined by the IMO NO_x-curve, defined by MARPOL 73/78, Annex VI, reg. 13: Nitrogen Oxides (NO_x). The IMO NO_x-curve defines the maximum limits for NO_x per kWh dependent on engine type as identified by engine r.p.m. as given in Table B1.

Table B1 Maximum limits for NO_x per kWh as function of engine r.p.m.

n < 130 r.p.m.	17.0 g/kWh
130 ≤ n < 2000 r.p.m.	45.0 n ^(-0.2) g/kWh
2000 ≤ n	9.8 g/kWh

204 The reduction of oxides of nitrogen can be achieved by the introduction of equipment and arrangements such as, but not limited to, those listed below:

- engine adjustments or modifications
- water addition to the combustion process by water injection, emulsification or humidification
- exhaust gas cleaning.

205 All arrangements, fuel oil additives etc. introduced to reduce the NO_x emission levels are subject to the Society's approval and shall:

- be operated according to manufacturer's instructions
- allow normal engine performance and safe operation in case of failure
- have features so that its operations and performance can be documented by a log book record
- have sufficient mechanical fastening to ensure safe and steady support and avoid damaging vibrations
- where applicable, have adequate hatches for inspection and maintenance of installations or systems.

206 The following arrangements will be subject to special considerations:

- arrangements where NO_x reduction is carried out on more than one engine
- arrangements using SCR cleaning where the reactor unit is positioned between the engine and the turbo blower.

207 For ships where NO_x emissions are controlled by devices installed in or added to the fuel or exhaust systems, such devices shall be operated and controlled in accordance with procedures incorporating the manufacturer instructions and with the Society's approval.

Guidance note:

Engine modification and adjustments

NO_x reductions by modification of engine parameters, water injection, fuel/water emulsification, etc. and/or by adjusting engine settings in order to influence the combustion characteristics, should be specified by the engine manufacturer and carried out under his supervision. The chosen combination of modifications and adjustments should aim to avoid an increase in the engine's fuel consumption.

Selective Catalytic Reduction (SCR)

Any requirements related to engine performance where SCR-systems are fitted should be identified and addressed in a compliance note to the required documentation as specified in Sec.1 C100. The compliance note is also to identify operational temperature limits.

- The reducing agent should be specified by the manufacturer. If other agent than urea-solution is used, this will be subjected to special considerations.

In the case where the NO_x emission level is used to verify or control the reduction agent injection rate, the level should be detected by an analyser based upon one of the following methods:

- electrochemical cell
- infrared chemiluminescence.

NO_x level measurements

NO_x level measurements on diesel engines, with or without NO_x reduction arrangements, should comply with the methods specified in IMO NO_x Technical Code referred to from MARPOL 73/78 Annex VI, or other equivalent methods accepted by the Society. Measurements and tests are to be documented, as required by the Society. Where documentation is to be applied for class notation only, independent third party witnessing and verification of tests may be waived.

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208 SO_x emission limits are generally achieved by use of low sulphur content fuel oil. Alternatively, an exhaust gas cleaning system can be adopted in order to obtain the required reductions of SO. The maximum sulphur content in fuel oil carried onboard is 3.0 % S. Alternatively, SO_x cleaning can be used to achieve a general SO_x-content in the exhaust gas of maximum 12.0 g SO_x/kWh.

209 When in ports or in SO_x-controlled areas, the allowable maximum sulphur content in fuel oil used is 1.5 % S. Changes of fuel type when entering and leaving port, or other SO_x-controlled areas, shall be documented by entries in the ship's log-book. Alternatively, SO_x cleaning can be used to achieve a general SO_x-content in the exhaust gas of maximum 6.0 g SO_x/kWh.

210 For engines controlling the emission of SO_x through an exhaust gas cleaning system, the SO_x content of the exhaust gas shall be verified in accordance with standards specified in Sec.1 B408, under the surveillance of the Society.

B 300 Oil fired boilers and inert gas generators

301 The emission criteria specified for oil fired boilers also apply for inert gas generators.

302 SO_x emission limits are generally achieved by use of low sulphur content fuel oil with a maximum sulphur content as specified in 208 through 210 for open sea and port/special areas, respectively.

303 Alternatively, an exhaust gas cleaning system can be adopted in order to obtain the required reductions of SO_x. If a SO_x cleaning device is proposed used, this will be subject to special considerations.

B 400 Refrigerants

401 The emission criteria for refrigerants apply to refrigeration plants on conventional reefer ships, fishing vessels, gas carriers with re-liquefaction plants and other ships with centralised cargo refrigeration systems. They are also applicable to centralised air conditioning and refrigeration systems onboard. Domestic type stand-alone air conditioning units and refrigerators are not covered by these requirements.

402 The emission criteria for refrigerants are limited to requirements related to the properties of the refrigerant used with respect to its ozone depleting potential and to its global warming potential (ODP/GWP) as defined by the 1987 Montreal Protocol on Substances that Deplete the Ozone Layer.

403 The use of ozone depleting substances is not permitted within the scope of this chapter. The refrigerant may be any of the following:

- HFC
- Natural refrigerants such as NH₃ or CO₂.

The used refrigerant shall comply with: GWP < 3500.

Guidance note:

As an alternative to GWP < 3500 documented equivalent TEWI may be accepted.

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404 Refrigerant systems shall have suitable means of isolation to allow maintenance without releasing any bulk quantity of the refrigerant to the atmosphere. Unavoidable minimum releases associated with recapture or recycling are acceptable provided recovery units are installed for the evacuation of the system.

405 For refrigerant recovery, compressors shall be capable of evacuating a system charge into a liquid receiver. Additionally, recovery units shall be provided to evacuate a system either into existing liquid receivers or into suitable reservoirs.

406 Annual refrigerant leakage shall be as small as possible but not more than 10% of the total refrigerant charge for each system. The leakage shall be documented through recorded consumption figures. The figures shall include topping up due to leakage, as well as renewal of refrigerant during repairs or overhauls.

407 Where different types of refrigerants are used, measures shall be taken in order to avoid mixing of these substances.

408 Refrigerants in refrigeration systems shall be controlled in a manner suitable for detection of all types of leakage, including those normally not detected by an automatic leak detection system. Acceptable solutions may include one, or a combination, of the following:

- leak detection system appropriate to the applicable refrigerant with automatic alarm if presence of refrigerant is measured outside the refrigeration system
- level measurement in refrigeration system with alarm for low level
- manual level measurement with systematic level reading at predefined time intervals, as a minimum once per week, and log keeping.

The intent of this paragraph is to ensure that leaks to the atmosphere are avoided, or kept to a minimum. The efficiency and practical layout need to be evaluated when deciding what approach to use for leak detection.

Guidance note:

The chosen solution may be in addition to, or in combination with, safety requirements for "potentially hazardous, non-essential installations" specified in the Rules for Classification of Ships Pt.4 Ch.1 Sec.3. The requirements in Pt.6 Ch.12 Sec.2 shall not replace requirements in the Rules for Classification of Ships Pt.4 Ch.1 Sec.3.

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409 Whichever solution is chosen to control leakages, the relevant procedures must be implemented. Such procedures shall as a minimum include the following:

- how to monitor the refrigerant system with respect to possible leaks
- how often any such monitoring shall take place
- limits for when corrective actions shall be initiated.

B 500 Cargo evaporation

501 The criteria for emissions from cargo evaporation apply for tankers carrying crude oil, petroleum products or chemicals with flash point less than 60°C. These emissions are defined as volatile organic compounds, VOC.

502 VOC emission and control criteria shall be equivalent to those specified for the class notation **VCS-2**, see Ch.10 Sec.1 A200.

B 600 Fire fighting substances

601 Natural substances used in fixed fire fighting systems and extinguishers, are not considered damaging to the atmosphere. If other substances are used in fixed fire fighting systems that may have a global warming potential, the used substance shall comply with:

GWP < 4000

ODP = 0.

Guidance note:

Natural substances: Natural substances: e.g. argon, nitrogen, water spray, high expansion foam, CO₂. Note that CO₂ in this context is considered a natural substance without ODP or GWP since it will utilise CO₂ already present in the atmosphere.

Other substances: E.g. industrial substances including Hydrofluorocarbons (HFC) and Sulphur fluorides.

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B 700 Shipboard incinerators

701 When installed onboard, incinerators shall be Type Approved in accordance with IMO res. MEPC.76(40).

702 All use of incinerators shall be in accordance with MARPOL 73/78, Annex VI, reg. 16, and be recorded in the garbage record book referred in MARPOL 73/78, Annex V, reg. 9(3).

C. Discharges to Sea**C 100 General**

101 Compliance with the rules in C shall be verified by means and measures as identified in Sec.1 C. Actual discharges shall be recorded as specified in 200 to 900.

102 Ships with class notations **Tanker for Oil** or **Tanker for Chemicals** shall as a minimum have a double skin arrangement in the cargo area equivalent to that described by MARPOL 73/78, Annex I, reg. 13F. Tank- and piping arrangement and hull subdivision shall be such that ballast tanks or piping systems are not contaminated by cargo.

C 200 Residues of cargo oil and chemicals

201 Discharge criteria for cargo residues apply to tankers carrying crude oil, petroleum products or chemicals.

202 Discharge of contaminated water or cargo residues into the sea shall be limited as far as practicable. Discharges and deliveries to shore shall be documented in the Oil record book, or Cargo record book, for tankers for oil and tankers for chemicals, respectively.

203 On tankers for chemicals the maximum allowable remaining cargo quantity shall be 0.1 m³ for pollution category B, and 0.3 m³ for pollution category C. The pollution categories are defined in MARPOL Annex II, Appendix 1.

204 For vessels with the Class Notation **TANKER FOR OIL**, the COW efficiency to be as required by that Notation.

C 300 Cargo handling

301 Tankers for oil or chemicals shall have fitted and implemented means and arrangements to reduce the likelihood of cargo spill on deck reaching the sea.

Gutter plates on both sides of the cargo deck shall be increased in height from a point 0.2 L forward of midship to a termination at the aft end of the cargo deck with the minimum heights

given in Table C1.

Table C1 Cargo deck gutter plates, minimum heights

Ships greater than 100 000 tonnes DW:	forward of 0.2 L:	0.25 m
	aft end:	0.40 m
Ships smaller than 100 000 tonnes DW:	forward of 0.2 L:	0.10 m
	aft end:	0.25 m

To avoid cargo flowing around the accommodation/poop deck, a transverse fishplate shall be arranged at the aft end of the cargo area. At the outer end the transverse fishplate shall have the same height as and be connected to the aft end of the gutter plate.

302 For the collection of possible oil spills during cargo operations the main deck in cargo area shall be fitted with a drainage system with discharge to a deck collecting tank or a slop tank. The drainage system may be arranged either with a manually operated valve, or with an automatic deck scupper drainage system.

The drainage shall be used during cargo operations where spillage may occur, and shall not affect normal deck drainage when at sea. When at sea drainage from the deck area shall be ensured to avoid free surface effects with negative impact on the ship's stability.

303 On tankers for oil or tankers for chemicals, all cargo manifolds shall be fitted with drip/spill trays with arrangements for draining. The drip/spill trays shall have the following minimum dimensions:

- length: beyond forward and aft ends of the manifold
- width: at least 1.8 m, though such that the spill tray extends at least 1.2 m outboard of the end of the manifold flange
- depth: minimum depth 0.3 m.

304 Tankers for oil or tankers for chemicals shall have fitted means to adequately support hoses in way of ship's side abreast of manifolds. The support shall preferably be arranged as a horizontal curved plate or pipe section.

305 Tankers for oil or tankers for chemicals shall have fitted a closed sounding system with high and high-high level alarms. Alternatively, a high level alarm can be accepted in combination with a closed sounding system, provided the alarm is independent from the sounding system.

306 Other ships carrying oil-containing liquids in bulk shall be equipped with arrangements as specified under Oil bunkering arrangements in C400.

Guidance note:

This applies to e.g. supply vessels and other ships carrying fuel oils, oil-based muds, etc.

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This requirement does not apply to tanks carrying oily liquids during emergency operations only, e.g. tanks for oil recovered from oil spills at sea.

C 400 Oil bunkering arrangement

401 Fuel oil, lubricating oil and other oil bunker tanks on all ships shall be equipped with high level alarm to prevent overfilling.

402 Fuel oil, lubricating oil and other oil bunkering stations, vent and overflow pipes and other areas where spillage may occur shall be fitted with spill/drip trays to prevent oil escaping to sea. Capacity; 80 litres for ships between 300 and 1600 tons gross tonnage, 160 litres for ships larger than 1600 tons gross tonnage.

403 Tanks with no risk of causing environmental contamination due to overfilling need not comply with 401 and 402. Typ-

ically this applies to internal tanks, e.g. engine room dirty oil, slop tanks etc.

C 500 Ballast water

501 The intent of the discharge criteria for ballast water is to minimise or prevent transport of harmful aquatic organisms and pathogens from one geographical area to another.

Guidance note:

For the purpose of ballast water treatment IMO Resolution A.868(20), Guidelines for the Control and Management of Ships' Ballast Water to Minimise the Transfer of Harmful Organisms and Pathogens are referred to.

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502 All ships carrying ballast water shall be provided with an approved ballast water management plan to assist in the minimization of transfer of harmful aquatic organisms and pathogens, as described by section 7.1 of res. A.868(20).

503 All ships carrying ballast water shall comply with the recording and reporting procedures described in section 8.1 of res. A.868(20).

504 All ships carrying ballast water shall be prepared for and employ precautionary practices to reduce the uptake and discharge of potentially harmful aquatic organisms, pathogens or sediments containing such organisms when loading ballast, as described by section 9.1 of res. A.868(20).

505 All ships carrying ballast water shall be prepared to carry out any of the following ballast water management options described in res. A.868(20) section 9.2, such as:

- ballast water exchange
- non-release, or minimum ballast water release
- discharge to reception facilities.

506 If suitable new and emerging treatments and technologies prove viable, and are acceptable to the Society, these may substitute for, or be used in conjunction with, the current options mentioned above. Such treatments may include e.g. thermal methods, filtration or disinfecting including ultraviolet light.

507 On all ships where ballast water operations are carried out, whether at sea, or in port, the ship's safety limitations shall be adhered to and have first priority at all times. Effects from ballast water operations on the ship's operability and safety shall be documented in the ballast water management plan approved by the Society. These shall as a minimum include all applicable loading conditions including effects on:

- draught and stability
- strength, including both local and global effects

- over- and under-pressurisation of ballast water tanks
- weather limitations, if any
- etc.

C 600 Bilge water

601 Discharge criteria for bilge water apply to all ships as defined by MARPOL 73/78, Annex I, reg. 9, 10, 11 and 16.

602 The ship shall hold a valid IOPP Certificate, or alternatively a certificate of compliance with MARPOL 73/78, Annex I. In addition the following shall be provided:

- oil filtering equipment and 15 ppm alarm combined with an automatic stopping device
- holding tank with facilities for delivery to shore.

C 700 Garbage

701 Discharge criteria for garbage apply to all ships as regulated by MARPOL, Annex V, reg. 3, 4, 5, 6 and 9.

702 A procedure for garbage sorting and volume reduction shall be available in addition to the garbage management plan required by MARPOL, Annex V, reg. 9.

C 800 Sewage

801 Discharge criteria for sewage apply to all ships. All discharge of sewage into the sea is regulated by MARPOL 73/78, Annex IV, reg. 8 and 9.

802 It is required that sewage is treated by comminuting or grinding prior to storage in holding tank and subsequent disposal. The comminuting/grinding system is to be approved (see MARPOL 73/78, Annex IV, reg. 3(1)(a)(ii)).

803 Sewage treatment and discharge shall be carried out according to approved sewage treatment procedures.

804 All sewage discharges, whether to sea or to shore based reception facilities shall be recorded with description of date, location and quantity of sewage discharged. In cases where untreated sewage is discharged to sea, the records shall include information on the ship's speed and distance to nearest shore at the time of sewage discharge.

C 900 Antifouling

901 Discharges from underwater antifouling systems shall be considered for all ships.

902 The ship is to carry a Statement of Compliance with International Convention on the Control of Harmful Anti Foul-ing Systems.

903 Anti fouling paint systems containing TBT as the active ingredient are not permitted.

SECTION 3 CLASS NOTATION CLEAN DESIGN

A. Introduction

A 100 General

101 The rules cover areas for emissions to air and discharges to sea similar to those described in Sec.2 A100.

102 Compared to the requirements for the class notation **CLEAN**, the class notation **CLEAN DESIGN** introduces stricter requirements for emissions to air and discharges to sea.

103 In addition, the design of the ship is covered by the class notation **CLEAN DESIGN**. The requirements are intended to prevent occurrence of accidents leading to pollution, and to limit the consequences of pollution if an accident should occur.

104 Documentation required to be submitted for approval and verification of compliance with the rules is specified in Sec.1 C100.

B. Emissions to Air

B 100 General

101 Compliance with the rules shall be verified by means and measures as identified in Sec.1 C.

102 All fuel oils intended for use onboard shall meet the requirements given in Sec.2 B100.

B 200 Marine diesel engines

201 Requirements for emissions from diesel engines apply to all diesel engines with power output in excess of 130 kW, except emergency diesel engines, engines installed in lifeboats and any other device or equipment intended to be used solely in case of emergency.

202 NO_x emissions shall comply with 60 % of the level defined by the IMO NO_x-curve, defined by MARPOL 73/78, Annex VI, reg. 13: Nitrogen Oxides (NO_x). The maximum limits for NO_x per kWh, dependent on engine type as identified by engine r.p.m., is specified in Table B1.

Table B1 Maximum limits for NO _x per kWh as function of engine r.p.m.	
n < 130 r.p.m.	10.2 g/kWh
130 ≤ n < 2000 r.p.m.	27.0 n ^(-0.2) g/kWh
2000 ≤ n	5.9 g/kWh

203 Equipment and arrangements for NO_x reduction shall be according to Sec.2 B204 to B207.

204 The sulphur content of fuel oil carried onboard shall not exceed the limits given in Sec.2 B208.

205 When in ports or in SO_x-controlled areas only, the allowable maximum sulphur content in the fuel oil used is 0.5 % S. Changes of fuel type when entering and leaving port, or SO_x-controlled areas shall be documented by entries in the ship's logbook. Alternatively, SO_x cleaning can be used to achieve a general SO_x-content in the exhaust gas of maximum 2.0 g SO_x/kWh.

206 For engines controlling the emission of SO_x through an exhaust gas cleaning system, the SO_x content of the exhaust gas shall be verified in accordance with standards specified in Sec.1 B408, under the surveillance of the Society.

B 300 Oil fired boilers and inert gas generators

301 The emission criteria specified for oil fired boilers also

apply for inert gas generators.

302 SO_x emission limits are achieved by use of fuel oil with low sulphur content as specified in 204 and 205 for general use and use in ports and in SO_x controlled areas, respectively.

303 Alternatively, an exhaust gas cleaning system can be adopted in order to obtain the required reductions of SO_x. If a SO_x cleaning device is proposed used this shall be subject to special considerations.

B 400 Refrigerants

401 Emission criteria for refrigerants onboard shall comply with requirements given in Sec.2 B400.

402 The emission criteria for refrigerants are limited to requirements related to the properties of the refrigerant used with respect to its ozone depleting potential and to its global warming potential (ODP/GWP) as defined by the "1987 Montreal Protocol on Substances that Deplete the Ozone Layer".

403 The refrigerant shall be either a natural refrigerant (e.g. NH₃ or CO₂), or alternatively an HFC complying with: GWP < 1890 and ODP = 0.

Guidance note:

As an alternative to GWP < 1890 documented equivalent TEWI may be accepted.

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404 Design and operational requirements in Sec.2 B404 through 408 shall be complied with.

B 500 Cargo evaporation

501 Criteria for emissions from cargo evaporation apply to tankers carrying crude oil, petroleum products or chemicals with flash point less than 60°C, similar to those required in Sec.2 B500.

B 600 Fire fighting substances

601 Natural substances used in fixed fire fighting systems are not considered damaging to the atmosphere. If other substances are used in fixed fire fighting systems that may have a global warming potential, the used substance shall comply with:

GWP < 1650
ODP = 0.

Guidance note:

Natural substances: Natural substances: e.g. argon, nitrogen, water spray, high expansion foam, CO₂. Note that CO₂ in this context is considered a natural substance without ODP or GWP since it will utilise CO₂ already present in the atmosphere.

Other substances: E.g. industrial substances including Hydrofluorocarbons (HFC) and Sulphur fluorides.

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B 700 Shipboard incinerators

701 When installed, incinerators shall be designed, constructed and operated according to design and operational criteria for incinerators specified in Sec.2 B700.

C. Discharges to Sea

C 100 General

101 Compliance with the rules in C shall be verified by

means and measures as identified in Sec.1 C. Actual discharges shall be recorded as specified in Sec.1 C.

102 Requirements to hull arrangement in cargo area for vessels with class notations **Tanker for Oil** or **Tanker for Chemicals**, are defined in Sec.2 C102.

103 Other ships carrying oil-containing liquids in bulk are to comply with requirements in D200, this also applies to cargo tanks.

Guidance note:

This applies to e.g. supply vessels and other ships carrying fuel oils, oil-based muds, etc.

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C 200 Residues of cargo oil and chemicals

201 General requirements to discharge of cargo residues are as given in Sec.2 C200.

202 On tankers for chemicals the maximum allowable remaining cargo quantity shall be 0.05 m³ for pollution categories B and C. The pollution categories are defined in MARPOL Annex II, Appendix 1.

203 Segregated ballast tanks as required in Sec.2 C102 are a prerequisite for tankers for oil or chemicals. Cargo tanks shall be designed with smooth surfaces and be equipped with cargo wells, or equivalent, for efficient stripping.

Guidance note:

Under-deck longitudinals of slab type are acceptable. Horizontal areas on stiffeners and brackets should be avoided, if possible. Horizontally corrugated bulkhead plating is acceptable with maximum angle of corrugations being 65°. Vertical girders in horizontally corrugated bulkheads will be accepted.

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204 Where applicable on tankers for oil, the COW efficiency shall be such that coverage of minimum 96% is obtained, as documented by shadow diagrams.

C 300 Cargo handling

301 Tankers for oil or chemicals shall have fitted and implemented means and arrangements to reduce the likelihood of cargo spill on deck reaching the sea, as given in Sec.2 C301.

302 For the collection of possible oil spills during cargo operations the tank deck area shall be fitted with a closed drainage system with discharge to a deck collecting tank or a slop tank. The drainage system may be arranged either with a manually operated valve, or with an automatic deck scupper drainage system.

The drainage shall be used during cargo operations where spillage may occur, and shall not affect normal deck drainage when at sea. When at sea, drainage from the deck area shall be ensured to avoid free surface effects with negative impact on the ship's stability.

303 On tankers for oil, all cargo manifolds shall be fitted with drip/spill trays with the minimum dimensions as given in Sec.2 C300.

Manifold connections and spill trays shall be fitted with adequate means for closed drainage to a deck collecting tank or slop tank.

304 Tankers for oil shall have fitted means to adequately support hoses in way of ship's side abreast of manifolds, as given in Sec.2 C300.

305 Tankers for oil or chemicals shall have fitted a closed sounding system with high and high-high alarms.

306 Other ships carrying oil-containing liquids in bulk shall be equipped with arrangements as specified in Sec.2 C306.

C 400 Oil bunkering arrangement

401 Fuel oil, lubricating oil and other oil bunkering arrangements shall be as given in Sec.2 C400.

402 Spill/drip trays are to be fitted with closed drainage to a deck collecting tank or slop tank.

C 500 Ballast water

501 Requirements for ballast water handling as given in Sec.2 C500 shall be complied with.

C 600 Bilge water

601 Discharge criteria for bilge water as given in Sec.2 C600 shall be complied with.

602 In addition, a bilge water holding tank shall be arranged as required for the class notation **OPP-F**. All drains from machinery space bilges shall be arranged such that they are drained into the bilge holding tank. Drainage of sea- or freshwater not contaminated by oil may be arranged to a wastewater holding tank that may be discharged overboard.

603 No drainage from machinery space bilges shall be pumped overboard, but be kept in the bilge holding tank for discharge ashore. Extraordinary circumstances may necessitate that bilge water is pumped overboard. Such circumstances will require a separate report of the reason for the discharge to sea.

C 700 Garbage

701 Discharge criteria for garbage as given in Sec.2 C700 shall be complied with.

702 The ship shall be equipped and arranged for sorting, minimising and storing garbage prior to incineration or delivery to shore. Ships with class notations **Passenger Ship** or **Car Ferry A** (or **B**) shall have sufficient capacity to allow 100% delivery to shore, or incineration where permitted. However, food waste having passed through a grinder or comminutor may be disposed to sea where permitted by international legislation.

C 800 Sewage

801 Requirements to sewage discharge and handling as given in Sec.2 C800 shall be complied with, except where superseded by requirements 802 to 804.

802 Ships with class notations **Passenger Ship** or **Car Ferry A** (or **B**) shall have sewage holding tank(s) with sufficient capacity to allow storage of both sewage ("black water") and "grey water" when in port. The tank(s) shall be fitted with a high level alarm.

803 Ships shall be equipped with an approved sewage treatment system.

804 Sewage treatment plants on ships with class notations **Passenger Ship** or **Car Ferry A** (or **B**) shall have included means to treat "grey water" in addition to "black water".

C 900 Antifouling

901 Requirements given in Sec.2 C900 shall be complied with.

D. Construction and Design

D 100 Fuel oil tank arrangement

101 Accidental discharges of fuel oil may take place following events compromising hull integrity, such as collision or grounding, or fire or explosion. It is intended that the rules in this subsection shall limit the consequences of such accidents.

102 The fuel oil tanks on tankers for oil or chemicals shall be located in a protective location as required for the class nota-

tion **OPP-F**, see Ch.1 Sec.6.

103 For other ships, tanks for fuel oil including overflow tanks and tanks with capacity exceeding 20 m³ for waste oils, sludge etc., are to be arranged with an inner bottom at least B/25 or 1.5 m, whichever is less, above the vessels base line. In no case shall the height of the inner bottom be less than 0.76 m above base line. Small suction wells may be arranged in the inner bottom.

104 Tanks for residual fuel shall be protected by a double side also when located in the machinery space aft.

For ships below 20 000 tons gross tonnage the distance between the oil fuel tank and the shell side plating shall nowhere be less than 0.76 m.

For ships of 20 000 tons gross tonnage and above the distance

between the oil fuel tank and the side shell plating shall nowhere be less than 2.0 m.

D 200 Ship operation requirements

201 Alternate means of propulsion shall be available, allowing the ship to maintain manoeuvrability, in case of failure in the main propulsion system. This may be satisfied e.g. by a double drive train (engine shafting and propeller) and rudder system arrangement, or through a thruster arrangement.

Guidance note:

Ships fulfilling the requirements specified for the class notation **RP**, see Ch.2, satisfy this requirements.

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