CHINA CLASSIFICATION SOCIETY

RULES FOR GREEN-ECO SHIPS

2022

Effective from 1 January 2023

Beijing

CONTENT

FOREWORD

The Rules aims to advocate the development and application of green technologies, promote the optimization and upgrading of industrial structure of shipbuilding, related manufacturing and shipping industries, promote the use by shipping companies of cost-effective technologies and management measures to new and existing ships so as to improve the energy saving and environmental protection levels of their fleets and, with safety as the precondition, achieve the goals of low energy consumption, low emissions, low pollution and comfortable working and living environment for their ships.

A green-eco ship uses advanced technologies to safely satisfy its intended functions and performance within its life cycle, meanwhile can improve energy efficiency, reduce greenhouse gas① (GHG) emission, minimize or eliminate the harmful effect on human health and the pollution and damage on ecological environment, enhance effective recycling of resources.

A green-eco ship covers two main elements of environmental protection and ecological protection.

(1) Ecological protection: mainly including the following aspects: emission control of GHG (with CO_2 as the emission control targets) which has impact on climate change, prevention of transfer of invasive organisms from ballast water and biofouling, and environmental friendliness (e.g. comfort onboard (vibration, compartment noise, indoor climate), underwater noise and ambient noise).

(2) Environmental protection: mainly including the following aspects: discharge control of various water pollutants (e.g. oil, noxious liquid substance (in bulk and package), sewage and grey water, garbage from ships, etc.) and emission control of air pollutants (e.g. nitrogen oxides (NOx), sulphur oxides (SOx), particulate matter (PM), ozone-depleting substances (ODS), volatile organic compounds (VOCs), etc.), and control of the use of harmful materials (e.g. harmful anti-fouling system(AFS), asbestos, etc.).

The goals of a green-eco ship include the following:

(1) The goal of ecological protection: prevention and reduction of adverse effects caused by ships on climate change, aquatic ecological environment and human health.

(2) The goal of environmental protection: prevention and reduction of pollution or damage caused by ships to water, land and air, and promotion of the recycling of resources.

The functional requirements for achieving the goals of green-eco ships consist of:

(1) Basic safety requirements:

① The strength, integrity and stability of ships in both intact and damaged conditions are to be adequate, and the construction and arrangement, machinery and electrical installations/systems, and safety equipment are to be suitable for the safe operation of ships.

② The application of any green ecological technology to ships is not to reduce the original safety level of ships.

(2) The functional requirements for achieving the goal of ecological protection:

① The GHG emission from ships and energy consumption of ships is to be reduced by combining with design measures and effective operational control under the same capacity and speed.

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① Greenhouse gas (GHG) includes six types of greenhouse gases specified in the Kyoto protocol: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbon (PFCs) and sulfur hexafluoride (SF6). For the purpose of the Rules, the control of CO_2 is the main objective of GHG.

② The clean, low-carbon or zero-carbon energies are to be used to the maximum for the energies necessary for ship propulsion, accommodation and the normal operation of auxiliary machinery, under the premise of ship safety.

③ Ships are to meet all applicable requirements of the International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 (if applicable) and in addition, further reduce risks caused by harmful aquatic organisms and pathogens in ballast water through the innovation and application of green ecological technologies in equipment, arrangement and operations of the ship.

④ Ships are to take appropriate technical and operational measures to control and manage biofouling to prevent transfer of invasive aquatic species, and at the same time, to improve the operational energy efficiency of the ship.

⑤ The structure, the arrangement of compartments and the installation of equipment of ships are to be such as to minimize risks of ship-generated vibrations and noises endangering human health and improve the comfort of working and living environment onboard.

⑥ The arrangement of the equipment and design of propeller are to be such as to minimize the adverse impact of underwater radiated noise from ships on marine life. The arrangement of equipment and design of exhaust systems of main and auxiliary engines and boilers, etc. are to be such as to minimize the adverse impact of ambient noise from ships on residents on shore.

(3) The functional requirements for achieving the goal of environmental protection:

① Ships are to meet all applicable requirements of IMO conventions related to environmental protection (MARPOL Convention, AFS Convention and Hongkong Ship recycling Convention) or the Regulations for the Statutory Surveys of Ships and Offshore Installations (Technical Regulations for the Statutory Surveys of Sea-Going Ships Engaged on Domestic Voyages) and in addition, further reduce risks of various water pollutants discharge and air pollutants emissions in terms of equipment, arrangement, operations and maintenance through innovation and application of green ecological technology.

② Usage of materials harmless to humans and marine ecosystems are to be encouraged and promoted in the design, construction and repairs of ships.

CHAPTER 1 GENERAL

1.1 General requirements

1.1.1 The Rules applies to sea-going ships for which China Classification Society (hereinafter referred to as CCS) green-eco ship class notations are requested. The Rules include two parts, of which, Part I applies to sea-going ships engaged on international voyages, and Part II applies to sea-going ships engaged on domestic voyages. For sea-going ships not flying the flag of China intended for navigating in restricted service and engaged on non-international voyages, the requirements for ships engaged on domestic voyages may be referred to based on the decisions made by flag State Administrations.

1.1.2 The Rules are part of CCS rules system. The purpose of the Rules is to encourage the design, construction and operation of the ships classed with CCS to a higher level of environmental and ecological protection, and to a more comfortable onboard working and living environment on the basis that international or national regulations on ship safety and environmental protection are complied with.

1.1.3 Ships, for which green-eco ship class notations are requested, are to comply with the applicable requirements of CCS Rules for Classification of Sea-going Steel Ships.

1.1.4 In addition, ships, for which green-eco ship class notations are requested, are to consider complying with the special requirements of the flag State Administration if any.

1.1.5 From 1 July 2020, the CLEAN class notations for sea-going ships applying for classification with CCS will not be assigned. Ships for which CLEAN class notations have already been assigned may proceed with the maintenance of CLEAN class notations according to the requirements of original applicable Chapter 8 of PART EIGHT of CCS Rules for Classification of Sea-going Steel Ships, or may request for green-eco ship class notations to replace the CLEAN class notations in accordance with the applicable requirements of the Rules.

1.1.6 From 1 July 2020, the Green Ship class notations and relevant class notations for sea-going ships applying for classification with CCS as specified in CCS Rules for Green Ships will not be assigned. Ships for which relevant class notations have already been assigned according to CCS Rules for Green Ships may proceed with the maintenance of relevant class notations according to the requirements of original applicable CCS Rules for Green Ships, or may request for green-eco ship class notations to replace the original class notations in accordance with the applicable requirements of the Rules.

1.2 Definitions and terms

1.2.1 Definitions

1.2.1.1 Unless provided otherwise, for the purpose of the Rules:

(1) *Oil residue* (*sludge*) means the residual waste oil products generated during the normal operation of a ship such as those resulting from the purification of fuel or lubricating oil for main or auxiliary machinery, separated waste oil from oil filtering equipment, waste oil collected in drip trays, and waste hydraulic and lubricating oils.

(2) *Oily bilge water* means water which may be contaminated by oil resulting from things such as leakage or maintenance work in machinery spaces. Any liquid entering the bilge system including bilge wells, bilge piping, tank top or bilge holding tanks is considered oily bilge water.

(3) *Oil residue* (*sludge*) *tank* means a tank which holds oil residue (sludge) from which sludge may be disposed directly through the standard discharge connection or any other approved means of disposal.

(4) *Oily bilge water holding tank* means a tank collecting oily bilge water prior to its discharge, transfer or disposal.

(5) *Sewage* (*black water*) means:

① drainage and other wastes from any form of toilets and urinals;

② drainage from medical premises (dispensary, sick bay, etc.) via wash basins, wash tubs and scuppers located in such premises;

③ drainage from spaces containing living animals; or

④ other waste waters when mixed with the drainage defined above.

(6) *Grey water* means drainage from dishwater, shower, laundry, bath and washbasin drains. It doe not include drainage from toilets, urinals, medical premises and animal spaces, as defined in 1.2.1.1 (5) of the Rules and drainage from cargo spaces.

(7) *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.

(8) *Cargo residues* means the remnants of any cargo which are not covered by Annexes I, II and III to MARPOL Convention and which remain on the deck or in holds following loading or unloading, including loading and unloading excess or spillage, whether in wet or dry condition or entrained in wash water but does not include cargo dust remaining on the deck after sweeping or dust on the external surfaces of the ship.

(9) *Cooking oil* means any type of edible oil or animal fat used or intended to be used for the preparation or cooking of food, but does not include the food itself that is prepared using these oils.

(10) *Anti-fouling system* means a coating, paint, surface treatment, surface, or device that is used on a ship to control or prevent attachment of unwanted organisms.

(11) *Ballast water* means water with its suspended matter taken on board a ship to control trim, list, draught, stability or stresses of the ship.

(12) *Ballast Water Management System* (*BWMS*) means any system which processes ballast water such that it meets or exceeds the ballast water performance standard in regulation D-2. The BWMS includes ballast water treatment equipment, all associated control equipment, piping arrangements as specified by the manufacturer, control and monitoring equipment and sampling facilities. BWMS does not include the ship's ballast water fittings, which may include piping, valves, pumps, etc., that would be required if the BWMS was not fitted.

(13) *Noxious liquid substance* (*NLS*) means any substance indicated in the Pollution Category column of chapter 17 or 18 of the International Bulk Chemical Code, or specified in the present MEPC.2/Circular or provisionally assessed under the provisions of regulation 6.3 of MARPOL Annex II as falling into category X, Y or Z.

(14) *Biofouling* means the accumulation of aquatic organisms such as micro-organisms, plants, and animals on surfaces and structures immersed in or exposed to the aquatic environment. Biofouling can include microfouling and macrofouling. Macrofouling means large, distinct multicellular organisms visible to the human eye such as barnacles, tubeworms, or fronds of algae. Microfouling means microscopic organisms including bacteria and diatoms and the slimy substances that they produce. Biofouling comprised of only microfouling is commonly referred to as a slime layer.

(15) *Domestic Regulations* means Regulations for the Statutory Surveys of Ships and Offshore Installations (Technical Regulations for the Statutory Surveys of Sea-going Ships Engaged on Non-International Voyages) and the amendments thereto, released by the Maritime Safety Administration under the Ministry of Transport, approved by the Ministry of Transport of the People's Republic of China.

(16) *Environmentally acceptable lubricants* mean lubricants that are biodegradable and minimally-toxic and are not bioaccumulative.

(17) *Greenhouse gas* (*GHG*) means any gas that absorbs and emits infrared radiation and exists in the atmosphere. For the purposes of the Rules, it refers to the carbon dioxide (CO_2) emitted from fossil fuels combustion of ships.

1.2.1.2 In addition to the above definitions, definitions given in relevant documents being referred to in the Rules, including IMO conventions, rules, guidelines and circulars, apply.

1.2.2 Terms and Abbreviations

1.2.2.1 The relevant terms of the Rules are abbreviated as follows:

(1) AFS: anti-fouling System;

(2) BC: black carbon;

(3) BWMP: ballast water management plan;

(4) BWMS: ballast water management system;

(5) CEEMC: Company Energy Efficiency Management Certificate;

(6) CO_2: carbon dioxide;

(7) DWT: dead weight tonnage;

(8) EEDI: energy efficiency design index;

(9) EGCS: exhaust gas cleaning system;

(10) FPSOs: floating Production, Storage and Offloading Units;

(11) FSUs: floating storage units;

(12) GHG: greenhouse gas;

(13) GT: gross tonnage;

(14) GWP: global warming potential;

(15) HFCs: hydrofluorocarbons;

(16) HVAC: heating ventilation and air conditioning system;

(17) IBC: International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk;

(18) IMO: International Maritime Organization;

(19) ITTC: International Towing Tank Conference;

(20) ISO: International Standardization Organization;

(21) LNG: liquefied natural gas;

(22) MARPOL: the International Convention for the Prevention of Pollution from Ships, 1973, developed by IMO, as modified by the Protocol of 1978 and the Protocol of 1997 relating thereto;

(23) MEPC: the Marine Environment Protection Committee of IMO;

(24) MSC: the Maritime Safety Committee of IMO;

(25) NLS: noxious liquid substance;

(26) NO_x: nitrogen oxides;

(27) ODP: ozone depletion potential;

(28) PM: particulate matter;

(29) SEEMC: Ship Energy Efficiency Management Certificate;

(30) SEEMP: Ship Energy Efficiency Management Plan;

(31) SOLAS: the International Convention for the Safety of Life at Sea, 1974, and the 1988 Protocol relating thereto;

(32) SO_x: sulfur oxides;

(33) STS: transfer of oil cargo between oil tankers;

(34) VOC: Volatile Organic Compounds.

1.3 Class notations for green-eco ships

1.3.1 Class notations for green-eco ships

1.3.1.1 Class notation for green-eco ships is a special identification of CCS classed ships complying with the relevant requirements of the two green elements of environmental protection and ecological protection. Class notations for green-eco ships for sea-going ships engaged on international voyages and domestic voyages are indicated as follows respectively:

Class Notations for green-eco ships **Table 1.3.1.1**

	Class notation for ecological protection	**Class notation for environmental protection**
Sea-going ships engaged on international voyages:	G-ECO	G-EP
	G-ECO (X)	G-EP (X)
Sea-going ships engaged on domestic voyages:	Gd-ECO	Gd-EP
	Gd-ECO (X)	Gd-EP (X)

1.3.1.2 The basic class notations of ecological protection (G-ECO) and environmental protection (G-EP) for green-eco ships are to indicate that a sea-going ship engaged on international voyages is in compliance with relevant applicable international conventions and rules only.

1.3.1.3 The basic class notation of ecological protection (Gd-ECO) and environmental protection (Gd-EP) for green-eco ships is to indicate that a sea-going ship engaged on domestic voyages is in compliance with relevant applicable domestic regulations only.

1.3.1.4 The class notations of ecological protection (G-ECO (X) and Gd-ECO (X)) and environmental protection (G-EP (X) and Gd-EP (X)) are to indicate further the levels of ecological protection and environmental protection by means of corresponding sub-elements listed in 1.3.2 and 1.3.3, where "X" represents a class notation of a sub-element for green-eco ships as described in Table 1.3.2.1 and 1.3.3.1.

1.3.1.5 The class notations of ecological protection (G-ECO (X) and Gd-ECO (X)) and environmental protection (G-EP (X) and Gd-EP (X)) are independent from each other and can be assigned separately.

1.3.2 Notations of sub-elements of ecological protection for green-eco ships

1.3.2.1 Notations of sub-elements of ecological protection for green-eco ships are to indicate that the ship is in compliance with relevant technical requirements for ecological protection in the following three aspects: GHG emission control, prevention of transfer of invasive organism and environmental friendliness. Notations of sub-elements of ecological protection for sea-going ships engaged on international voyages and domestic voyages are shown in Table 1.3.2.1 below.

Notation "X" of sub-elements of ecological protection for green-eco ships Table 1.3.2.1

Notations of sub-elements of ecological protection		**Sea-going ships engaged on international voyages**	**Sea-going ships engaged on domestic voyages**
GHG emission control	CO_2 emission design index	CDx CDEx	CDx
	CO_2 emission operation management	COM	COM
Prevention of transfer of invasive organism	Ballast water management	BWM (T) BWM (Ex) BWM (O)	Not applicable
	Bio-fouling management	BIO	
Environmental friendliness	Comfort onboard (vibration)	VIBx	VIBx
	Comfort onboard (compartment noise)	NOIx	NOIx
	Comfort onboard (indoor climate)	CLx	CLx
	Underwater noise	UW	UW
	Ambient noise	RN	RN

1.3.2.2 Sea-going ships engaged on international voyages and domestic voyages assigned with notations of sub-elements of ecological protection as listed in Table 1.3.2.1 are to comply with technical requirements for corresponding notations of sub-elements in Chapter 2 and Chapter 4 of the Rules respectively.

1.3.3 Notations of sub-elements of environmental protection for green-eco ships

1.3.3.1 Notations of sub-elements of environmental protection for green-eco ships are to indicate that the ship is in compliance with relevant technical requirements for environmental protection in the following three aspects: discharge control of water pollutants, emission control of air pollutants and control of use of harmful material. Notations of sub-elements of environmental protection for sea-going ships engaged on international voyages and domestic voyages are shown in Table 1.3.3.1 below.

1.3.3.2 Sea-going ships engaged on international voyages and domestic voyages assigned with notations of sub-elements of environmental protection listed in Table 1.3.3.1 are to comply with technical requirements for corresponding notations of sub-elements in Chapter 3 and Chapter 5 of the Rules respectively.

Notation "X" of Sub-elements of Environmental Protection for Green-eco Ships Table 1.3.3.1

Notation of sub-elements of environmental protection		Sea-going ships engaged on international voyages	Sea-going ships engaged on domestic voyages
Control of discharge of Water pollutants	Control of discharge of oil pollutant	OILx, EAL, IBTS	OILx, EAL, IBTS
	Control of discharge of noxious liquid substances	NLSx	NLSx
	Control of discharge of sewage water	SC	SC
	Control of discharge of grey water	GWC	GWC
	Control of discharge of garbage	RC	RC
Air pollutant emission control	NOx emission control	NECx	NECx
	SOx/PM emission control	SEC	SEC
	VOC emission control	VCS, VCS-T	VCS, VCS-T
	Ozone-depleting substance emission control	RSCx	RSCx
	Emission control of shipboard incineration.	INC	INC
	Black carbon emission control	BC20, BC70	Not applicable
	Emission control of diesel engine exhaust pollutant	Not applicable	GBEC
Control of use of harmful material	Control of harmful anti-fouling system	AFS, AFS+	AFS, AFS+
	Control of harmful substances	GPR/GPR+, GPR (EU)/ GPR(EU)+	GPR

1.4 Class notations for green-eco technologies

1.4.1 The Rules encourage ships to apply green-eco technologies, e.g. low carbon and zero carbon fuels such as LNG fuels, ammonia, methanol and biofuels, green energies such as shore power, solar energy and wind energy, control technologies such as resistance reduction and emission reduction, etc., in order to achieve the goals of environmental and ecological protection.

1.4.2 If a ship has applied relevant green-eco technologies and is in compliance with relevant technical requirements, the class notions of green-eco technologies may be assigned independent of the class notation of green-eco ships, as shown in Table 1.4.2.

Class Notations of Green-eco Technologies Table 1.4.2

Green-eco technology	Class notations	Application scope	Technical requirements
Dual fuel diesel engine used as power plant	DFD	Applicable to liquefied gas carriers	CCS Guidelines for Design and Installation of Gas Fuel Engine Systems of Liquefied Gas Carriers
Gas fuel only engines used as power plant	GF	Applicable to liquefied gas carriers	CCS Guidelines for Design and Installation of Gas Fuel Engine Systems of Liquefied Gas Carriers
Natural gas used as fuel	Natural Gas Fuel	Applicable to non -liquefied gas carriers	CCS Rules for Application of Natural Gas Fuel in Ships
Natural gas fuel ready system	DFDR	All ship types	CCS Guidelines for Natural Gas Fuel Ready Ships
SO_x emission control (Exhaust gas cleaning system)	SEC(EGCS)	All ship types	CCS Guidelines for Design and Installation of Exhaust Gas Cleaning Systems

Green-eco technology	Class notations	Application scope	Technical requirements
Exhaust gas cleaning systems (EGC) Ready	EGC Ready(X)	All ship types	CCS Guidelines for Exhaust Gas Cleaning Systems Ready
Low sulphur distillate fuels	LSDF	All ship types	CCS Guidelines for Use of Low Sulphur Distillate Fuels in Ships
NO_x emission control (Selective catalytic reduction system)	NEC(SCRS)	All ship types	CCS Guidelines for Application of Selective Catalytic Reduction (SCR) System Onboard Ships
Selective catalytic reduction system (SCR) Ready	SCR Ready(X)	All ship types	CCS Guidelines for Selective Catalytic Reduction System Ready
NOx emission control (exhaust gas recycling system)	NEC (EGRS)	All ship types	CCS Guidelines for Application of Exhaust Gas Recycling (EGR) System in Ships
Alternative Maritime Power Supply	AMPS	All ship types	Ch. 19, Pt. 8 of CCS Rules for Classification of Sea-going Steel Ships
Solar photovoltaic system	SPV	All ship types	CCS Guidelines for Survey of Solar Photovoltaic System and Lithium Iron Phosphate Battery System
Powered by battery only	Battery(Power)	All ship types	CCS Rules for Application of Battery Power in Ships
Partially powered by battery	Battery (Power-h)		
Hybrid power system	Hybrid	All ship types	CCS Guidelines for Survey of Ships Propelled by Hybrid Power
Full fuel cell power system	FC-FULL	All ship types	CCS Guidelines for Ships Using Fuel Cell Power Installations
Fuel cell power system	FC-POWER 1		
	FC-POWER 2		
Assisted propulsion system with rigid wing sail	WAP(RWS)	All ship types	CCS Guidelines for Evaluation and Survey of Marine Rigid Wing Sail
Air lubrication system for drag reduction	ALDR	All ship types	CCS Guidelines for Survey of Air Lubrication System for Drag Reduction
Ammonia fuel power system ready	AFD Ready 1	All ship types	CCS Guidelines for Ships Using Ammonia Fuel
	AFD Ready 2		
	AFD Ready 2 (X)		
Ammonia used as fuel	Ammonia fuel	All ship types	
Hydrogen fuel cell power unit ready	HFC Ready 1	All ship types	CCS Guidelines for Ships Using Fuel Cell Power Installations
	HFC Ready 2	All ship types	
	HFC Ready 2 (X)	All ship types	
Methanol/Ethanol fuel ready	M/E FR (X1,…, XN)	All ship types	CCS Guidelines for Ships Using Methanol/Ethanol Fuel
Methanol/Ethanol used as fuel	Methanol/Ethanol Fuel	All ship types	

1.5 Assignment of class notations for green-eco ships and green-eco technologies

1.5.1 Assignment of class notations of green-eco ships and sub-elements

1.5.1.1 When a sea-going ship engaged on international voyages only complies with the applicable requirements of regulation 2.2 of Chapter 2 and/ or regulation 3.2 of Chapter 3 of the Rules, the class notation of ecological protection (G-ECO) and/or the class notation of environmental protection (G-EP) of green-eco ships may be assigned.

1.5.1.2 When a sea-going ship engaged on domestic voyages only complies with the applicable requirements of regulation 4.2 of Chapter 4 and/or regulation 5.2 of Chapter 5 of the Rules, the class notation of ecological protection (Gd-ECO) and/or environmental protection (Gd-EP) of green-eco ships may be assigned.

1.5.1.3 When a sea-going ship engaged on international voyages complies with, in addition to the requirements of regulation 2.2 of Chapter 2 of the Rules, the applicable requirements of regulations 2.3 to 2.5 of Chapter 2 of the Rules, the class notation of ecological protection (G-ECO(X)) may be assigned. Where "X" represents the class notation of a corresponding sub-element specified in regulations 2.3 to 2.5 of Chapter 2 of the Rules. If the ship satisfies the technical requirements of more than one sub-element, class notations of all of these sub-elements the technical requirements of which the ship fulfilled may be added in the suffix of the class notation of ecological protection. Examples are given in Table 1.5.1.3 below:

Examples of Assignment of Class Notation of Ecological Protection for a Sea-going Ship Engaged on International Voyages **Table 1.5.1.3**

	Class notation of ecological protection	**Notation of a corresponding sub-element "X"**
Sea-going ships engaged on international voyages	G-ECO (CD26)	CD26
	G-ECO (CD26, COM, BWM(T))	CD26, COM, BWM（T）
	G-ECO (CD26, COM, BWM(Ef), BIO, VIB2, CL1)	CD26, COM, BWM(Ef), BIO, VIB2, CL1

1.5.1.4 When a sea-going ship engaged on international voyages complies with, in addition to the requirements of regulation 3.2 of Chapter 3 of the Rules, the applicable requirements of regulations 3.3 to 3.5 of Chapter 3 of the Rules, the class notation of environmental protection (G-EP(X)) may be assigned. Where "X" represents the notation of a corresponding sub-element specified in regulations 3.3 to 3.5 of Chapter 3 of the Rules. If the ship satisfies the technical requirements of more than one sub-element, notations of all of these sub-elements the technical requirements of which the ship fulfilled may be added in the suffix of the class notation of environmental protection. Examples are given in Table 1.5.1.4 below:

Examples of Assignment of Class Notation of Environmental Protection for a Sea-going Ship Engaged on International Voyages **Table 1.5.1.4**

	Class notation of environmental protection	**Notation of a corresponding sub-element "X"**
Sea-going ships engaged on international voyages	G-EP (OIL2)	OIL2
	G-EP (OIL2, EAL, SC, SEC)	OIL2, EAL, SC, SEC
	G-EP (OIL2, EAL, N2, SC, GWC, NEC1, SEC, VCS, RSC2, GPR(EU))	OIL2, EAL, N2, SC, GWC, NEC1, SEC, VCS, RSC2, GPR(EU)

1.5.1.5 When a sea-going ship engaged on domestic voyages complies with, in addition to regulation 4.2 of Chapter 4 of the Rules, the applicable requirements of regulation 4.3 and/or regulation 4.4 of Chapter 4 of the Rules , the class notation of ecological protection (Gd-ECO(X)) may be assigned. Where "X" represents the notation of a corresponding sub-element specified in regulations 4.3 and 4.4 of Chapter 4 of the Rules. If the ship satisfies the technical requirements of more than one sub-element, notations of all of these sub-elements the technical requirements of which the ship fulfilled may be added in the suffix of the class notation of ecological protection. Examples are given in Table 1.5.1.5 below:

Examples of Assignment of Class Notation of Ecological Protection for a Sea-going Ship Engaged on Domestic Voyages **Table 1.5.1.5**

	Class notation of ecological protection	**Notation of a corresponding sub-element "X"**
Sea-going ships engaged on domestic voyages	Gd-ECO (CD20)	CD20
	Gd-ECO (CD20, VIB3, NOI2)	CD20, VIB3, NOI2
	Gd-ECO (CD20, COM, VIB3, NOI2, CL1, UW, RN)	CD20, COM, VIB3, NOI2, CL1, UW, RN

1.5.1.6 When a sea-going ship engaged on domestic voyages complies with, in addition to the requirements of regulation 5.2 of Chapter 5 of the Rules, the applicable requirements of regulations 5.3 to 5.5 of Chapter 5 of the Rules, the class notation of environmental protection (Gd-EP(X)) may be assigned. Where "X" represents the notation of a corresponding sub-element specified in regulations 5.3 to 5.5 of Chapter 5 of the Rules. If the ship satisfies the technical requirements of more than one sub-element, notations of all of these sub-elements the technical requirements of which the ship fulfilled may be added in the suffix of the class notation of environmental protection. Examples are given in Table 1.5.1.6 below:

Examples of Assignment of Class Notation of Environmental Protection for a Sea-going Ship Engaged on Domestic Voyages **Table 1.5.1.6**

	Class notation of environmental protection	Notation of a corresponding sub-element "X"
Sea-going ships engaged on domestic voyages	Gd-EP (OIL2)	OIL2
	Gd-EP (OIL2, EAL, SC, SEC)	OIL2, EAL, SC, SEC
	Gd-EP (OIL2, EAL, SC, GWC, GBEC, SEC, VCS, RSC2)	OIL2, EAL, SC, GWC, GBEC, SEC, VCS, RSC2

1.5.2 Assignment of class notations for green-eco technology

1.5.2.1 A green-eco technology class notation and a green-eco ship class notation are independent from each other. If a ship to which a certain green-eco technology has been applied satisfies the requirements of a green-eco technology class notation for this green-eco technology, and also satisfies the requirements of a certain green-eco ship class notation, then the green-eco technology class notation and the green-eco ship class notation may be assigned at the same time. Examples are given in Table 1.5.2.1 below:

Examples of Assignment of Ship Class Notations **Table 1.5.2.1**

	Class notation of environmental protection	Class notation of ecological protection	Class notation of green-eco technology	Assignment of ship class notations
Sea-going ships engaged on international voyages	G-EP (OIL2, EAL, SC, SEC)	G-ECO (CD26, COM, BWM(T))	AMPS, DFD	G-EP (OIL2, EAL, SC, SEC), G-ECO (CD26, COM, BWM(T)), AMPS, DFD
Sea-going ships engaged on domestic voyages	Gd-EP (OIL1, IBTS, SC, VCS)	Gd-ECO (CD20, VIB3, NOI2)	AMPS, LSDF	Gd-EP (OIL1, IBTS, SC, VCS), Gd-ECO (CD20, VIB3, NOI2), AMPS, LSDF

1.5.3 Sequence of green ecology class notations and characters of classification

1.5.3.1 The sequence of the assignment of green-eco ship class notations and green-eco technology class notations is to be arranged in accordance with Appendix 1 on the sequence of class notations of sea-going ships of Chapter 2 of PART ONE of CCS Rules for Sea-going Steel Ships.

1.5.4 Assignment, maintenance, suspension, cancellation and reinstatement of green-eco ship class notations

1.5.4.1 Assignment, maintenance, suspension, cancellation and reinstatement of green-eco ship class notations and green-eco technology class notations are to comply with the applicable requirements of Section 9, Chapter 2, PART ONE of CCS Rules for Classification of Sea-going Steel Ships.

1.6 Documentation requirements

1.6.1 In order to obtain the green-eco ship class notations, the relevant plans and documents as specified in the Rules are to be submitted for approval or for information. For easy retrieval, paragraphs of relevant documents with which the green-eco ship class notations of sea-going ships engaged on international voyages and domestic voyages as specified in the Rules are to comply are listed in Table 1.6.1(1) and Table 1.6.1(2) respectively.

Requirements for Plans and Documents Table 1.6.1(1)
(for sea-going ships engaged on international voyages)

Green elements	Applicable paragraphs	Green-eco ship class notations			
		G-EP	G-EP (X)	G-ECO	G-ECO (X)
Basic statutory requirements	2.2.2, 3.2.2	x	x	x	x
GHG emission control	2.3.5				x
Prevention of transfer of invasive organism	2.4.3				x
Environmental friendliness	2.5.6				x
Control of discharge of water pollutants	3.3.6		x		
Control of emission of air pollutants	3.4.7		x		
Control of use of harmful material	3.5.3		x		

Requirements for Plans and Documents Table 1.6.1 (2)
(for sea-going ships engaged on domestic voyages)

Green elements	Applicable paragraphs	Green-eco ship class notations			
		Gd-EP	Gd-EP (X)	Gd-ECO	Gd-ECO (X)
Basic statutory requirements	4.2.2, 5.2.2	x	x	x	x
GHG emission control	4.3.4				x
Environmental friendliness	4.4.6				x
Control of discharge of water pollutants	5.3.6		x		
Control of emission of air pollutants	5.4.6		x		
Control of use of harmful material	5.5.3		x		

1.6.2 If any change, revision or deletion is made to the approved procedures, plans and documents as specified in relevant chapters of the Rules, the relevant details are to be re-submitted for approval.

1.7 Alteration and repair

1.7.1 A ship already having a CCS green-eco ship class notation and/or a green-eco technology class notation, which has undergone any alteration or repair of its construction, equipment, arrangement, procedures or plans, etc., in association with green elements, is to be subject to a survey, as appropriate, for confirming compliance with the technical requirements for the existing notations or the applied altered notations. In the case of a major conversion, attention is to be given to the relevant requirements of the flag State Administration.

Part I REQUIREMENTS FOR SEA-GOING SHIPS ENGAGED ON INTERNATIONAL VOYAGES

CHAPTER 2 REQUIREMENTS FOR ECOLOGICAL PROTECTION

2.1 General Requirements

2.1.1 This Chapter specifies the relevant requirements of the ecological protection class notations G-ECO and G-ECO(X) for sea-going ships engaged on international voyages.

2.1.2 Ecological protection elements for green-eco ships include the following three aspects:

(1) GHG emission control: including the requirements for CO_2 emission design index and CO_2 emission operation management.

(2) Prevention of transfer of invasive organism: including the requirements for ballast water and sediment management and bio-fouling management.

(3) Environmental friendliness: including the requirements for comfort onboard (vibration, compartment noise, indoor climate), control of underwater noise and ambient noise.

2.1.3 Class notations related to ecological protection of green-eco ships are as follows:

(1) Class notations of ecological protection for green-eco ships include:

G-ECO: means that only the mandatory and statutory requirements of international Conventions and Codes, etc. are complied with.

G-ECO(X): means that the requirements of some sub-elements of ecological protection are higher than or equivalent to those of international Conventions represented by G-ECO class notation. Where X represents a notation of a corresponding sub-element of ecological protection.

(2) Notations of sub-elements of GHG emission control include:

CDx: means notation of sub-element of CO_2 emission design index for newbuildings, where "x" represents the percentage ratio of the ship's Attatined EEDI value lower than the EEDI reference line value for that ship.

CDEx: means notation of sub-element of CO_2 emission design index for ships in service, where "x" represents the percentage ratio of the ship's Attatined EEXI value lower than the EEDI reference line value for that ship.

COM: means notation of sub-element of CO_2 emission operation management, indicating the levels of ship energy efficiency management and company energy efficiency management.

(3) Notations of sub-elements of prevention of transfer of invasive organism include:

BWM (T, Ex, O): notations of sub-element of ballast water management, where:

BWM (T): means that ballast water is treated with a type approved BWMS to comply with D-2 standard;

BWM (Ex): means that ballast water exchange method is used, where "x" represents a specific exchange method, as below:

BWM(Es): means that sequential method is used;

BWM(Ef): means that flow-through method is used;

BWM (Ed): means that dilution method is used.

BWM(O): means that a ballast water management method other than the above is applied, e.g., discharge at the same location, non-carriage of ballast, other approved methods, etc.

When a ship satisfies two different ballast water exchange methods, the notations of these two different ballast water exchange methods may be assigned, e.g. BWM(Ef, Es). The notations BWM(T) and BWM (Ex) can be assigned simultaneously. However, notation BWM (O) cannot be assigned simultaneously with notations BWM (T) or BWM (Ex).

BIO: means notation of sub-element of biofouling management, indicating that the ship has adopted technical and operational measures to control and manage biofouling to prevent transfer of invasive organism.

(4) Notations of sub-elements of environmental friendliness include:

VIBx: means notation of sub-element of comfort onboard (vibration) , where "x" represents the grade of comfort onboard (vibration);

NOIx: means notation of sub-element of comfort onboard (compartment noise) , where "x" represents the grade of comfort onboard (compartment noise);

CLx: means notation of sub-element of comfort onboard (indoor climate), where "x" represents the grade of comfort onboard (indoor climate);

UW: means notation of sub-element of underwater noise, indicating the level of control of the adverse effects of underwater noise caused by the ship on aquatic life;

RN: means notation of sub-element of ambient noise, indicating the level of control of the adverse effects of noise caused by the ship on living and working environment of residents on shore.

2.2 Technical requirements for G-ECO class notation

2.2.1 General requirements

2.2.1.1 The "G-ECO" class notation may be assigned to ships complying with the latest applicable requirements in force of the following Conventions and Codes and are provided with corresponding statutory certificates or documents of compliance:

(1) Requirements of regulations on ship energy efficiency in MARPOL Annex VI;

(2) International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 (abbreviated as BWM convention) and its associated Guidelines;

(3) Compartment noise onboard is to comply with IMO Code on Noise Levels on board Ships (MSC.337(91));

(4) Ship ballast water management system (BWMS) is to comply with the requirements of IMO Guidelines for Approval of Ballast Water Management Systems (G8) (MEPC.174(58)) or the 2016 Guidelines for Approval of Ballast Water Management Systems (G8) (MEPC.279(70)) or the Code for Approval of Ballast Water Management Systems (MEPC.300(72)), and provided with valid type approval certificates.

2.2.2 Documentation requirements

2.2.2.1 The following documented applicable operational procedures are to be approved and kept onboard:

(1) Ship energy efficiency management plan (SEEMP);

(2) Ship ballast water management plan (BWMP).

2.2.2.2 The following applicable plans and documents are to be submitted for approval or for information:

(1) GHG emission control

① EEDI technical file (including the information for calculation process and results of the Attained EEDI of ships);

② Relevant supportive background documents needed for calculation and verification of EEDI technical file and additional information necessary for the verification (for information);

③ Information on major conversion and description of recalculation of the Attained EEDI and the recalculated EEDI technical file;

④ Relevant supportive background documents needed for calculation and verification of recalculated EEDI technical file and additional information necessary for the verification after major conversion (for information);

⑤ EEXI technical file (including the information for calculation process and results of the Attained EEXI of ships);

⑥ Relevant supportive background documents needed for calculation and verification of EEXI technical file and additional information necessary for the verification (for information);

⑦ Information on major conversion and description of recalculation of the Attained EEXI and the recalculated EEXI technical file;

⑧ Relevant supportive background documents needed for calculation and verification of recalculated EEXI technical file and additional information necessary for the verification after major conversion (for information).

(2) Ballast water management

① Arrangement of ballast water system, including details of ballast water processing;

② Arrangement of ballast water management system;

③ Arrangement of ventilation for the space where the BWMS is located;

④ Other relevant plans and documents required by 2.2 of CCS Guidelines on Survey and Certification for Ballast Water Management of Ships;

(3) Any information related to additional environmental protection requirements of ships raised by flag State Administration or the ship owner.

2.3 GHG emission control

2.3.1 Definitions and application

2.3.1.1 For the purpose of this regulation, the following definitions apply:

(1) *Bulk carrier* means a ship which is intended primarily to carry dry cargo in bulk, including ore carriers, as defined in SOLAS chapter XII, regulation 1, but excluding combination carriers. For ships dedicated to carrying cement, woodchips, fly ash and sugar, they are of the ship type of bulk carrier.

(2) *Gas carrier* means a cargo ship constructed or adapted and used for the carriage in bulk of any liquefied gas, but excluding LNG carriers.

(3) *Tanker* means an oil tanker as defined in MARPOL Annex I, regulation 1 or a chemical tanker or an NLS (noxious liquid substance) tanker as defined in MARPOL Annex II, regulation 1.

(4) *Container ship* means a ship designed exclusively for the carriage of containers in holds and on deck.

(5) *General cargo ship* means a ship with a multi-deck or single deck hull designed primarily for the carriage of general dry cargo. This definition excludes specialized dry cargo ships, which are not included in the calculation of reference lines for general cargo ships, namely livestock carriers, barge carriers, heavy load carriers①, yacht carriers and nuclear fuel carriers.

(6) *Refrigerated cargo carrier* means a ship designed exclusively for the carriage of refrigerated cargoes in cargo spaces.

(7) *Combination carrier* means a ship designed to load 100% deadweight with both liquid and dry cargo (including ores) in bulk.

(8) P*assenger ship* means a ship which carries more than 12 passengers.

(9) *Ro-ro passenger ship* means a passenger ship with roll-on-roll-off cargo spaces.

(10) *Ro-ro cargo ship* (*vehicle carrier*) means a multi-deck roll-on-roll-off cargo ship designed for the carriage of empty cars and trucks.

(11) *Ro-ro cargo ship* means a ship designed for the carriage of roll-on-roll-off cargo transportation units.

(12) *LNG carrier* means a cargo ship constructed or adapted and used for the carriage in bulk of liquefied natural gas (LNG).

(13) *Cruise passenger ship* means a passenger ship not having a cargo deck, designed exclusively for commercial transportation of passengers in overnight accommodations on a sea voyage.

(14) *Category A ship* means a ship designed for operation in polar waters in at least medium first-year ice, which may include old ice inclusions, as defined in the Polar Code.

(15) *Conventional propulsion* means a method of propulsion where a main reciprocating internal combustion engine(s) is the prime mover and coupled to a propulsion shaft either directly or through a gear box.

(16) *Non-conventional propulsion* means a method of propulsion, other than conventional propulsion, including diesel-electric propulsion, turbine propulsion, and hybrid propulsion systems.

2.3.1.2 Regulations 2.3.2 and 2.3.3 do not apply to ships which have non-conventional propulsion as defined in 2.3.1.1 (1) to 2.3.1.1 (11) above in principle.

2.3.1.3 For the purpose of cruise passenger ships as defined in 2.3.1.1 (13) above, regulations 2.3.2 and 2.3.3 only apply to cruise passenger ships having non-conventional propulsion systems.

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① Requirements of IACS Rec.170 may be referred to for the definition of heavy load carrier.

2.3.1.4 Regulations 2.3.2 and 2.3.3 do not apply to passenger ships and category A ships as defined in 2.3.1.1(8) and 2.3.1.1 (14) above.

2.3.1.5 Regulations 2.3.2 and 2.3.3 do not apply to ships other than those defined in 2.3.1.1(1) to 2.3.1.1(7), and 2.3.1.1 (9) to 2.3.1.1 (13) above.

2.3.1.6 Regulation does not apply to ships not propelled by mechanical means such as barges, and platforms (including FPSOs and FSUs) and drilling units.

2.3.2 Requirements for CO_2 emission design index for newbuildings

2.3.2.1 For the purpose of the notation of sub-element of CO_2 emission design index for newbuildings (CDx), the Attained EEDI and Required EEDI are defined as follows:

(1) Attained EEDI means the EEDI value actually achieved by an individual ship.

(2) Required EEDI means the maximum value of the Attained EEDI permissible for the specific ship type and size as specified in Regulation 24, Chapter 4 of MARPOL Annex VI.

2.3.2.2 The value of the Attained EEDI of a ship is to be less than or equal to the Required EEDI value corresponding to this ship:

$$\text{Attained EEDI} \leq \text{Required EEDI} = (1-X/100) \times RLV$$

Where: *RLV* – EEDI reference line value of the ship (referred to as *RLV*, see regulation 2.3.2.3);
X- reduction factor for determination of the Required EEDI for an individual ship (See Table 2.3.2.4).

2.3.2.3 The Reference line value (*RLV*) of a ship is to be determined by the following formula and the relevant parameters given in Table 2.3.2.3:

$$RLV = a \times b^{(-c)}$$

Parameters for Determination of Reference Line Value (*RLV*) Table 2.3.2.3

Ship type	***a***	**Capacity *b***	***c***
Bulk carrier	961.79	DWT（DWT≤279000）； 279000（DWT＞279000）	0.477
Gas carrier	1120.00	DWT	0.456
Tanker	1218.80	DWT	0.488
Container ship	174.22	DWT	0.201
General cargo ship	107.48	DWT	0.216
Refrigerated cargo carrier	227.01	DWT	0.244
Combination carrier	1219.00	DWT	0.488
Ro-ro passenger ship	902.59	DWT（DWT≤10000）； 10000（DWT＞10000）	0.381
Ro-ro cargo ship (vehicle carrier)	$(DWT/GT)^{-0.7}$·780.36, where (DWT/GT)<0.3; 1812.63, where (DWT/GT)≥0.3	DWT	0.471
Ro-ro cargo ship	1686.17	DWT （DWT≤17000）； 17000（DWT＞17000）	0.498
LNG carrier	2253.7	DWT	0.474
Cruise passenger ship having non-conventional propulsion system	170.84	GT	0.214

2.3.2.4 The reduction factor of the Required EEDI for an individual ship is to comply with the corresponding requirements in Chapter 4 of MARPOL ANNEX VI, as shown in Table 2.3.2.4.

Reduction Factors for Calculation of Required EEDI Table 2.3.2.4

Ship type	Size	Reduction factor X				
		Phase 1 2015.1.1-2019.12.31	**Phase 2 2020.1.1-2022.3.31**	**Phase 2 2020.1.1-2024.12.31**	**Phase 3 2022.4.1** and onwards	**Phase 3 2025.1.1** and onwards
Bulk carrier	≥20000DWT	10		20		30
	20000>DWT≥10000	0-10*		0-20*		0-30*
Gas carrier	≥15000DWT	10	20		30	
	15000>DWT≥10000	10		20		30
	10000>DWT≥2000	0-10*		0-20*		0-30*
Tanker	≥20000DWT	10		20		30
	20000>DWT≥4000	0-10*		0-20*		0-30*
Container ship	≥200000DWT	10	20		50	
	200000>DWT≥120000	10	20		45	
	120000>DWT≥80000	10	20		40	
	80000>DWT≥40000	10	20		35	
	40000>DWT≥15000	10	20		30	
	15000>DWT≥10000	0-10*	0-20*		15-30*	
General cargo ship	≥15000DWT	10	15		30	
	15000>DWT≥3000	0-10*	0-15*		0-30*	
Refrigerated cargo carrier	≥5000DWT	10		15		30
	5000>DWT≥3000	0-10*		0-15*		0-30*
Combination carrier	≥20000DWT	10		20		30
	20000>DWT≥4000	0-10*		0-20*		0-30*
Ro-ro passenger ship	≥1000DWT	5		20		30
	1000>DWT≥250	0-5*		0-20*		0-30*
Ro-ro cargo ship (vehicle carrier)	≥10000DWT	5		15		30
Ro-ro cargo ship	≥2000DWT	5		20		30
	2000>DWT≥1000	0-5*		0-20*		0-30*
LNG carrier	≥10000DWT	10	20		30	
Cruise passenger ship having non-conventional propulsion system	≥85000GT	5	20		30	
	85000>GT≥25000	0-5*	0-20*		0-30*	

* Reduction factor to be linearly interpolated between the two values dependent upon ship size.

2.3.2.5 The notation of sub-element of CO_2 emission design index (CDx) may be assigned to a ship having the Attained EEDI less than or equal to the Required EEDI, of which x is to be calculated using the following formula:

$$x\% = \frac{RLV - Attained\ EEDI}{RLV} \times 100\%$$

Where x takes only the integer by rounding off the decimal part.

When the finally verified value of *x* is greater than that for the application of the notation, the applied value of *x* may remain unchanged unless the shipowner proposes to change. When the finally verified value of *x* is less than that for the application of the notation, the value of x in CDx is to be reverified according to the result of final verification of Attained EEDI.

2.3.2.6 If the design of a ship falls into more than one of the above ship types, the Required EEDI of the ship is to be the lowest Required EEDI.

2.3.2.7 The Attained EEDI is to be calculated and verified in accordance with CCS *Guidelines on Calculation and Verification of the Energy Efficiency Design Index (EEDI) of Sea-Going Ships Engaged on International Voyages*.

2.3.2.8 The installed propulsion power of the ship is not to be less than the minimum propulsion power needed to maintain the manoeuvrability of the ship under adverse conditions. For bulk carriers, tankers and combination carriers, the installed propulsion power of the ship is to be determined in accordance with relevant requirements of CCS *Guidelines on Calculation and Verification of the Energy Efficiency Design Index (EEDI) of Sea-Going Ships Engaged on International Voyages*.

2.3.3 Requirements for CO_2 emission design index for ships in-service

2.3.3.1 For the purpose of the notation of sub-element of CO_2 emission design index for ships in-service (CDEx), the Attained EEXI and Required EEXI are defined as follows:

(1) Attained EEXI means the EEXI value actually achieved by an individual ship.

(2) Required EEXI means the maximum value of the Attained EEXI permissible for the specific ship type and size as specified in Regulation 25, Chapter 4 of MARPOL Annex VI.

2.3.3.2 The value of the Attained EEXI of a ship in service is to be less than or equal to the Required EEXI value corresponding to this ship:

$$\text{Attained EEXI} \leq \text{Required EEXI} = (1 - Y/100) \times RLV$$

Where: *RLV* – EEDI reference line value of the ship (referred to as RLV, see regulation 2.3.2.3);
Y – reduction factor for determination of the Required EEXI for an individual ship (See Table 2.3.3.3).

2.3.3.3 The reduction factor of the Required EEXI for an individual ship in service is to comply with the corresponding requirements in Chapter 4 of MARPOL ANNEX VI, as shown in Table 2.3.3.3.

Reduction Factors for Calculation of Required EEXI **Table 2.3.3.3**

Ship type	Size	Reduction factor *Y*
Bulk carrier	≥200000 DWT	15
	200000>DWT≥20000	20
	20000>DWT≥10000	0-20*
Gas carrier	≥15000 DWT	30
	15000>DWT≥10000	20
	10000>DWT≥2000	0-20*
Tanker	≥200000 DWT	15
	200000>DWT≥20000	20
	20000>DWT≥4000	0-20*

Ship type	Size	Reduction factor *Y*
Container ship	≥200000DWT	50
	200000>DWT≥120000	45
	120000>DWT≥80000	35
	80000>DWT≥40000	30
	40000>DWT≥15000	20
	15000>DWT≥10000	0-20*
General cargo ship	≥15000DWT	30
	15000>DWT≥3000	0-30*
Refrigerated cargo carrier	≥5000DWT	15
	5000>DWT≥3000	0-15*
Combination carrier	≥20000DWT	20
	20000>DWT≥4000	0-20*
Ro-ro passenger ship	≥1000DWT	5
	1000>DWT≥250	0-5*
Ro-ro cargo ship (vehicle carrier)	≥10000DWT	15
Ro-ro cargo ship	≥2000DWT	5
	2000>DWT≥1000	0-5*
LNG carrier	≥10000DWT	30
Cruise passenger ship having non-conventional propulsion system	≥85000GT	30
	85000>GT≥25000	0-30*

* Reduction factor to be linearly interpolated between the two values dependent upon ship size.

2.3.3.4 The notation of sub-element of CO_2 emission design index (CDEx) may be assigned to a ship having the Attained EEXI less than or equal to the Required EEXI, of which *x* is to be calculated using the following formula:

$$x\% = \frac{RLV - Attained\ EEXI}{RLV} \times 100\%$$

Where *x* takes only the integer by rounding off the decimal part.

2.3.3.5 If the design of a ship falls into more than one of the above ship types, the Required EEXI of the ship is to be the lowest Required EEXI.

2.3.3.6 The Attained EEXI is to be calculated and verified in accordance with CCS Guidelines on Calculation and Verification of the Attained Energy Efficiency Existing Ship Index (EEXI) .

2.3.3.7 For ships of which the CDEx notation is assigned by adopting conversion of power limitation or power reduction, the verification is to be carried out according to CCS Guidelines for Surveys of Reducing Ship Power.

2.3.4 Requirements for CO_2 emission operation management of ships

2.3.4.1 The COM sub-element notation of CO_2 emission operation management may be assigned to ships complying with the following requirements:

(1) The ship is to hold an SEEMP developed in accordance with IMO 2022 Guidelines for the Development of a Ship Energy Efficiency Management Plan (SEEMP) (MEPC.346(78)) and compliant with the requirements of Guidelines for the Verification and Company Audits by the Administration of Part III of the Ship Energy Efficiency Management Plan (SEEMP) (MEPC.347(78));

(2) The ship is to have management measures capable of increasing ship energy efficiency, e.g. route/speed optimization, trim optimization, and hull bio-fouling monitoring and management, etc., carry out real time or regular monitoring and evaluation, and make adjustment according to the implementation results.

2.3.5 Documentation Requirements

2.3.5.1 For ships to be assigned with notations for sub-element of GHG emission control, the following documents are to be submitted for approval or for information:

(1) EEDI technical file (including information on calculation process and results of the Attained EEDI of ships);

(2) Relevant supportive background documents needed for calculation and verification of EEDI technical file and additional information necessary for the verification (for information);

(3) Information on major conversion and description of recalculation of the Attained EEDI and the recalculated EEDI technical file;

(4) Relevant supportive background documents needed for calculation and verification of recalculated EEDI technical file and additional information necessary for the verification after major conversion (for information);

(5) EEXI technical file (including information on calculation process and results of the Attained EEXI of ships);

(6) Relevant supportive background documents needed for calculation and verification of EEXI technical file and additional information necessary for the verification (for information);

(7) Information on major conversion and description of recalculation of the Attained EEXI and the recalculated EEXI technical file;

(8) Relevant supportive background documents needed for calculation and verification of recalculated EEXI technical file and additional information necessary for the verification after major conversion (for information);

(9) Ship energy efficiency management plan (SEEMP).

2.4 Prevention of transfer of invasive organisms

2.4.1 Ship ballast water management

2.4.1.1 Ships in compliance with the following requirements may be assigned with notations of sub-element of ballast water management as follows:

(1) The BWM (T) sub-element notation maybe assigned to a ship which has been installed with a BWMS as described in 2.2.1.1(4) to comply with the D-2 standard specified in the BWM Convention;

(2) When a ballast water exchange method has been adopted onboard the ship to comply with the applicable requirements of the BWM Convention, the following notations of sub-element of ballast water exchange maybe assigned:

BWM(Es): when the sequential method is used;
BWM(Ef): when the flow-through method is used;
BWM (Ed): when the dilution method is used.

(3) The BWM(O) sub-element notation may be assigned to a ship where other ballast water management methods are adopted onboard the ship as the major ballast water management methods (e.g. discharge of ballast water at the same location, drinking water used as ballast water, non-carriage of ballast, etc.) to comply with the applicable requirements of the BWM Convention.

2.4.1.2 When any ballast water exchange method is adopted onboard a ship, safety assessment is to be carried out in accordance with CCS Guidelines for Development of Ship's Ballast Water Management Plan.

2.4.1.3 The ballast water management systems are to be installed onboard ships in compliance with the applicable requirements of Additional Requirements for Installation of Ballast Water Management Systems in Chapter 26 of PART EIGHT of CCS Rules for Classification of Sea-going Steel Ships.

2.4.2 Control of ships' biofouling

2.4.2.1 The BIO sub-element notation of biofouling management may be assigned to a ship complying with the requirements of 2.4.2.2 to 2.4.2.7 below:

2.4.2.2 A biofouling management plan is to be kept onboard. This plan is to be developed according to the 2011 Guidelines for the Control and Management of ships' Biofouling to Minimize the Transfer of Invasive Aquatic Species approved by Resolution MEPC.207(62), and is to be approved by CCS.

2.4.2.3 A Biofouling Record Book in accordance with Appendix 2 of Resolution MEPC.207(62) is also to be kept onboard the ship.

2.4.2.4 Suitable anti-fouling systems are to be applied to the ships' submerged surfaces including the hull and niche areas. An anti-fouling system can be a coating system applied to exposed surfaces, biofouling resistant materials used for piping and other unpainted components, marine growth prevention systems (MGPSs) for sea chests and internal seawater cooling systems, or other innovative measures to control biofouling.

2.4.2.5 Anti-fouling systems used onboard ships are to be in compliance with the requirements of AFS Convention.

2.4.2.6 At least the following factors are to be considered when choosing an anti-fouling system:

(1) planned periods between dry-docking: including any mandatory requirements for ships survey;

(2) ship speed: different anti-fouling systems are designed to optimize anti-fouling performance for specific ship speeds;

(3) operating profile: patterns of use, trade routes and activity levels, including periods of inactivity, influence the rate of biofouling accumulation;

(4) ship type and construction;

(5) differential needs of different areas of the ship for anti-fouling systems and facilitation of installation and repair.

2.4.2.7 The ship is to monitor the state of anti-fouling system and forming of biofouling on a regular basis according to the biofouling management plan and regular cleaning is to be performed.

2.4.3 Documentation requirements

2.4.3.1 For a ship to be assigned with the notations of prevention of transfer of invasive organisms, the following applicable documents are to be submitted for approval:

(1) Ship ballast water management plan (BWMP);

(2) Ship biofouling management plan;

(3) Plans and documents as listed in 2.2.2.2(2) of the Rules.

2.5 Environmental friendliness

2.5.1 Vibration

2.5.1.1 For the purpose of this regulation, the following definitions apply:

(1) *Passenger spaces* mean all areas intended for passenger use, and include passenger cabins, public spaces (e.g. restaurants, hospital, gymnasiums, shops, open deck recreation areas, etc.);

(2) *Crew spaces* means all areas intended for crew use only, and include crew cabins, public spaces (e.g. mess rooms, conference rooms, offices, etc.), and work areas (e.g. wheelhouse, engine control room and workshops, etc.);

(3) *Vibration level* means the overall frequency weighted r.m.s. value of vibration over the frequency range 1 to 80 Hz.

2.5.1.2 The VIBx sub-element notation may be assigned to ships complying with the relevant requirements of 2.5.1.3 upon measurement, where x represents the comfort grades 1, 2, 3, where "1" means an acceptable grade and "3" means the highest grade.

2.5.1.3 Technical requirements for assignment of the notation of sub-element of comfort onboard (vibration) are as follows:

(1) Vibration measurements are to be carried out in accordance with the requirements of Appendix 1 to the Rules.

(2) If, for all the compartments or spaces, vibration levels are lower than or equal to those corresponding to a given comfort grade, then the granted grade is that grade.

(3) Measured vibration levels slightly greater than those specified in the comfort criteria may be accepted. Not more than 20 percent of measuring points may exceed the relevant vibration criteria by 0.3 mm/s.

(4) The maximum allowable vibration levels for passenger spaces are given in Table 2.5.1.3(1).

Passenger Spaces – Maximum Allowable Vibration Levels in mm/s Table 2.5.1.3(1)

Location	Comfort grade (vibration)(x)		
	1	2	3
Passenger cabins, superior	2.2	2.0	1.7
Passenger cabins, standard	3.0	2.5	2.0
Passenger public spaces	4.0	3.5	3.0
Open deck recreation areas	4.0	3.5	3.0

(5) The maximum allowable vibration levels for crew spaces are given in Table 2.5.1.3(2).

Crew Spaces – Maximum Allowable Vibration Levels in mm/s Table 2.5.1.3(2)

Location	Comfort grade (vibration) (x)		
	1	2	3
Crew cabins	3.2	3.0	2.8
Wheel house, radio room	4.0	3.5	3.0
Crew public spaces, mess rooms	4.0	3.5	3.0
Hospital	3.2	3.0	2.8
Offices	4.0	3.5	3.0
Workshops	6.5	6.0	5.0
Engine control room	6.0	5.0	4.0

2.5.2 Compartment noise

2.5.2.1 For the purpose of this regulation, the following definition applies:

(1) *Noise level* means the A-weighted equivalent continuous sound pressure level measured in accordance with ISO 2923(1996).

2.5.2.2 The NOIx sub-element notation may be assigned to ships complying with the relevant requirements of 2.5.2.3 upon measurement, where x represents the comfort grades 1, 2, 3, where 1 means an acceptable grade and 3means the highest grade .

2.5.2.3 Technical requirements for assignment of the notation of sub-element of comfort onboard (noise) are as follows:

(1) Noise measurements are to be carried out in accordance with the requirements of CCS Guidelines for Control and Measurement of Noises for Ships and Marine Products.

(2) If, for all the compartments or spaces, noise levels are lower than or equal to those corresponding to a given comfort grade, then the granted grade is that grade.

(3) Measured noise levels slightly greater than those specified in the comfort criteria may be accepted. Not more than 20 percent of the passenger cabins, 30 percent of the public spaces and 20 percent of the crew cabins are to exceed the relevant noise criteria by 3 dB(A).

(4) For passenger ships, the maximum allowable noise levels of passenger spaces for different ship types, locations and comfort grades are given in Table 2.5.2.3(1).

Passenger Ships – Maximum Allowable Noise Levels in dB(A) of Passenger Spaces Table 2.5.2.3(1)

Location	Comfort grade (noise)(x)		
	1	2	3
Passenger cabins, superior	50	47	45
Passenger cabins, standard	55	52	49
Passenger public spaces	62	58	55
Hospital	55	52	49
Theatre	60	55	53
Open deck recreation areas①②③	73	69	65

Notes:① The levels may be exceeded by 5 dB(A) in sports areas.

② The levels may be exceeded by 5 dB(A) within 3 m of a ventilation inlet/outlet.

③ The levels for open deck recreation areas refer to ship generated noise only, and the noise generated from the effects of wind and waves are not considered.

(5) The bulkhead and deck air-borne sound insulation indices for passenger spaces, R_ω, calculated in accordance with ISO R717/1, are to be in compliance with Table 2.5.2.3(2).

Passenger ships – Minimum Airborne Sound Insulation Indices, R_ω Table 2.5.2.3(2)

Location	Comfort grade (noise) (x)		
	1	2	3
Passenger cabins, superior	40	42	45
Passenger cabins, standard	36	38	40
Superior passenger cabin to corridor	37	40	42
Standard passenger cabin to corridor	34	36	38
Superior passenger cabin to stairwell	45	47	50

Location	Comfort grade (noise) (x)		
	1	2	3
Standard passenger cabin to stairwell	43	45	47
Superior passenger cabin to passenger/crew public space	50	50	55
Standard passenger cabin to passenger/crew public space	48	48	52
Passenger cabins to discotheques	60	60	60
Passenger cabins to machinery spaces	50	53	55
Discotheques to stairwells and passenger/crew public spaces	52	52	52

Note: Not more than 20 percent of the interfaces tested of bulkheads and decks may have airborne sound insulation indices 3 dB(A) lower than the minimum specified values in Table 2.5.2.3(2).

(6) The maximum allowable noise levels and the comfort grades for crew cabins and public spaces are given in Table 2.5.2.3(3).

Crew Cabins and Public Spaces – Maximum Allowable Noise Levels in dB(A) Table 2.5.2.3(3)

Location	Comfort grade (noise) (x)		
	1	2	3
Sleeping cabins	55	52	49
Hospital	55	52	49
Conference rooms, offices, mess rooms	60	57	55
Crew public spaces	65	60	57
Galleys, changing rooms, laundries, bathrooms	75	73	70
Open deck recreation areas ①	75	73	70

Note: ① The levels may be exceeded by 5 dB(A) within 3 m of a ventilation inlet/outlet.

(7) The maximum allowable noise levels and the comfort grades for crew work areas are given in Table 2.5.2.3(4).

Crew Work Areas – Maximum Allowable Noise Levels in dB(A) Table 2.5.2.3(4)

Location	Comfort grade (noise) (x)		
	1	2	3
Engine control room	75	73	70
Wheelhouse	65	63	60
Radio room	60	57	55
Workshops	85	85	85
Machinery spaces	110	110	110

(8) The bulkhead and deck air-borne sound insulation indices for crew spaces, R_w, calculated in accordance with ISO R717/1, are to be in compliance with Table 2.5.2.3(5).

Crew Spaces – Minimum Airborne Sound Insulation Indices, R_w Table 2.5.2.3(5)

Location	Comfort grade (noise)(x)		
	1	2	3
Crew cabins	35	38	40
Crew cabin to corridor	30	32	35
Crew cabin to stairwell	30	32	35
Crew cabin to passenger/crew public spaces	45	45	45

Note: Not more than 20 percent of the interfaces tested of bulkheads and decks may have airborne sound insulation indices 3 dB(A) lower than the minimum specified values in Table 2.5.2.3(5).

2.5.3 Indoor climate

2.5.3.1 The requirements of this regulation apply to indoor environmental control of passenger ships.

2.5.3.2 For the purpose of this regulation, the following definitions apply:

(1) *Indoor climate* means air temperature, relative humidity, air velocity and temperature change used as descriptors for indoor climate.

(2) *Air velocity* means the measured mean velocity of a mass of air in motion.

(3) *Outside air temperature* means the actual air temperature measured out of direct sun exposure outside of the ship.

(4) *Fresh air supply quantity* means the quantity of fresh outside air per person supplied to a designated space.

(5) *Relative humidity* means the ratio between the actual amount of water vapour in the air and the saturation amount of water vapour in the air, expressed as percentage.

(6) *Temperature* means the average temperature of a specific number of temperature measurements in a particular space.

(7) *Density of population* means the number of people on per square meter area of a space.

2.5.3.3 The CLx sub-element notation may be assigned to ships complying with the relevant requirements of 2.5.3.4 to 2.5.3.8 upon measurement, where indoor temperature, relative humidity, air velocity and fresh air supply are all at least to satisfy the corresponding requirements for a certain grade of x. x represents the comfort grades 1, 2, 3, where 1 means an acceptable grade and 3 means the highest grade.

2.5.3.4 Indoor temperature

Corresponding to different grades of comfort sub-element notations, requirements for indoor temperature at different locations are shown in Table 2.5.3.4. Meanwhile the following requirements are to be complied with:

(1) Corresponding to different grades of comfort sub-element notation of indoor climate (CLx), each designated cabin/space is to be able to reduce by 3℃ from the highest heating temperature limit in winter or increase by 3℃ from the lowest cooling temperature limit in summer in not more than 2 hours, 1.5 hours and 1 hours respectively.

(2) For comfort sub-element notations CL_1 and CL_2, individual temperature control of the designated space/cabin is to be provided.

(3) For comfort sub-element notation CL_3, individual and automatic temperature control (with thermostat) of the designated space/cabin is to be provided.

Indoor Temperature Required at Different Locations Table 2.5.3.4

Location	Outdoor temperature	Indoor temperature(℃) /grade (x)		
		1	2	3
Areas for long-term stay (e.g. living areas such as passenger cabins, etc.), hospital	15℃ and below	20	22	24
	40℃and below	26	25	24
Areas for short-term stay (public spaces such as conference rooms, libraries, card rooms, seating areas, dining areas, casinos, shopping areas, bars, dance lounges, discos, gymnasiums)	15℃and below	19	21	23
	40℃and below	27	26	25

Notes: ① For outside temperatures between 15°C and 40°C, the required indoor temperature value is to be obtained thorough linear interpolation.

② For areas with special requirements, the temperature control criteria may be considered separately.

2.5.3.5 Relative humidity

Corresponding to different grades of the comfort sub-element notation of indoor climate (CLx), requirements for relative humidity at different locations are shown in Table 2.5.3.5.

Relative Humidity Required at Different Locations Table 2.5.3.5

Location	Relative humidity(%)/grade(x)		
	1	2	3
Passenger cabins, hospital, public spaces intended for low physical activity (such as conference rooms, libraries, card rooms, seating areas), public spaces intended for high physical activity (such as show lounges, dining areas, casinos, shopping areas, bars, dance lounges, discos, gymnasiums)	<65	20~60	30~60

2.5.3.6 Air Velocity

Corresponding to different grades of the comfort sub-element notation of indoor climate (CLx), requirements for air velocity at different locations are shown in Table 2.5.3.6.

Maximum Air Velocity Required at Different Locations Table 2.5.3.6

Location	Maximum air velocity(m/s) /grade(x)		
	1	2	3
Passenger cabins	0.35	0.30	0.25
Hospital	0.25	0.2	0.15
Public spaces intended for low physical activity (such as conference rooms, libraries, card rooms, seating areas)	0.3	0.25	0.2
Public spaces intended for high physical activity (such as show lounges, dining areas, casinos, shopping areas, bars, dance lounges, discos, gymnasiums)	0.35	0.3	0.25

Notes: ① The maximum air velocity specified in the above table corresponds to outdoor temperatures of 40℃ and above. Where outdoor temperatures are of 15℃ and below, the maximum air velocity is to deduct 0.05m/s respectively from the values specified in Table 2.5.3.6.

② For outside temperatures between 15°C and 40°C, the required maximum air velocity value is to be obtained thorough linear interpolation.

2.5.3.7 Fresh air supply quantity

(1) Corresponding to different grades of the comfort sub-element notation of indoor climate (CLx), requirements for minimum fresh air supply quantity per person at different locations are shown in Table 2.5.3.7 (1).

Minimum Fresh Air Supply Quantity Per Person Required at Different Locations Table 2.5.3.7 (1)

Location	Minimum fresh air supply quantity(m^3/(h·person)) /grade(x)		
	1	2	3
Passenger cabins	30	30	35

Note: ① Unless otherwise specified by owner and yard the number of persons in each designated cabin/space will be counted according to ISO7547.

(2) The hospital onboard is to be provided with fresh air system, the design minimum fresh air supply quantity of which is to be determined by air changes, as shown in Table 2.5.3.7(2).

Minimum Air Changes Required in Hospital Table 2.5.3.7(2)

Location	Minimum air changes(h^{-1})/grade (x)		
	1	2	3
Hospital	2	2.5	3

(3) The design minimum fresh air supply quantity for spaces with high density of population is to be determined according to the minimum fresh air supply quantity per person required under different densities of population, as shown in Table 2.5.3.7 (3).

Minimum Fresh Air Supply Quantity per Person Required under Different Densities of Population **Table 2.5.3.7 (3)**

Location	Minimum fresh air supply quantity(m^3/(h·person)) / grade(x)								
	1			2			3		
	PF≤0.4	0.4<PF≤1.0	PF>1.0	PF≤0.4	0.4<PF≤1.0	PF>1.0	PF≤0.4	0.4<PF≤1.0	PF>1.0
Public spaces intended for low physical activity (such as conference rooms, libraries, card rooms, seating areas)	13	10	9	17	11	10	26	18	16
Public spaces intended for high physical activity (such as show lounges, dining areas, casinos, shopping areas, bars, dance lounges, discos, gymnasiums)	17	15	14	25	18	15	40	37	36

Note: *PF* means density of population.

2.5.3.8 Indoor climate is to be measured according to the requirements described in Chapter 4 of Appendix 1 of CCS Rules for Cruise Ships.

2.5.4 Underwater noise

2.5.4.1 For the purpose of this regulation, the following definitions apply:

(1) *Sound source level* L_{p1m} means the sound pressure level at a distance of 1 m from the equivalent sound center obtained by conversion, in dB.

(2) *Ship acoustic center* means the position of the sound source for the postulated point. The acoustic center is taken longitudinally as the midpoint of the distance between the propeller and the main engine, and vertically at 2/3 of the draft below the waterline.

(3) *Closest point of approach* (*CPA*) means in the measurement of underwater radiated noise, the vertical foot obtained from the trajectory of hydrophone to ship acoustic center.

(4) *Distance at the closest point of approach* (d_{cpa}) means the horizontal distance from the closest point of approach to the hydrophone, in m.

(5) *Background noise* means the ambient noise in water received by the hydrophone, which is not affected by the ship noise under test.

(6) *Typical navigational condition* means navigational condition for common operation.

2.5.4.2 The UW sub-element notation may be assigned to ships complying with the requirements of 2.5.4.3 upon measurement.

2.5.4.3 Underwater radiated noise limits

(1) Underwater radiated noise is to be measured according to the requirements of CCS Guidelines for Underwater Radiated Noise of Ships.

(2) The one-third octave band frequency sound pressure level of underwater radiated noise of ships is to be measured and the sound source level at 1 m from the equivalent acoustic center is to be obtained by conversion.

(3) The side thruster condition is not considered as the assessment condition of underwater radiated noise.

(4) Measurement is to be conducted in typical navigational conditions and the result of measurement is to comply with the requirements of Table 2.5.4.3.

Underwater radiated noise limits(dB) Table 2.5.4.3

Frequency range	Limit criteria dB (reference sound pressure 1μPa)
10 Hz~315Hz	168
315Hz~1 kHz	208-16 lg f (Hz)
1 kHz~100 kHz	160-12 lg f (kHz)
Note： f —— one-third octave band center frequency.	

2.5.5 Ambient noise

2.5.5.1 For the purpose of this paragraph, the following definitions apply:

(1) *Maximum AS-weighted sound pressure level* means maximum sound pressure level achieved from measurement during the passage of the vessel or yacht under specified operating conditions measured with frequency weighting A and with time weighting S according to IEC 61672-1, expressed in decibels(dB).

(2) *Background noise* means noise from all sources other than the craft under test, e.g., noise from waves splashing on the measuring craft or the shore, other craft or equipment, and wind effects.

(3) *Day time equivalent sound level* means the maximum AS-weighted sound pressure level measured during the day time period, in dB.

(4) *Night time equivalent sound level* means the maximum AS-weighted sound pressure level measured during the night time period, in dB.

(5) *Day time* means the time period from 6:00 to 22:00.

(6) *Night time* means the time period from 22:00 to 6:00 of the next day.

(7) *Typical navigational condition* means the navigational condition for common operation.

2.5.5.2 The RN sub-element notation may be assigned to ships complying with the requirements of 2.5.5.3 upon measurement.

2.5.5.3 Limits of ambient noise

(1) Ambient noise is to be measured according to the requirements described in Appendix 2 of the Rules.

(2) Measurements are to be performed for ships in typical navigational condition and operating in harbors respectively, the results of which are to comply with the requirements in (3) below.

(3) The maximum AS-weighted sound pressure levels for ships navigating in course and operating in harbors are to comply with the requirements in Table 2.5.5.3.

Limits of noise from ships navigating in course or operating in harbors (dB(AS)) Table 2.5.5.3

Ship type		Noise limit(dB)
Navigating in course		65
Operating in harbors	Day time	65
	Night time	60

2.5.6 Documentation requirements

2.5.6.1 For ships to be assigned with notations for sub-element of environmental friendliness, the following applicable documents are to be submitted for approval or for information.

2.5.6.2 Documents for notations of vibration sub-element are to include:

(1) Measurement procedures, including arrangement of measuring points, loading conditions, machine operating conditions, weather conditions, measuring instruments, etc.;

(2) Measurement reports, including vibration measurement results, etc.;

(3) A general arrangement plan in which measuring points are indicated (for information).

2.5.6.3 Documents for notations of noise sub-element are to include:

(1) Measurement procedures, including arrangement of measuring points, loading conditions, machine operating conditions, weather conditions, measuring instruments, etc.;

(2) Measurement reports, including noise measurement results, etc.;

(3) A general arrangement plan in which measuring points are indicated (for information).

2.5.6.4 Documents for notations of sub-element of indoor climate are to include:

(1) Measurement procedure, at least including ship information, HVAC system parameter and HVAC system arrangement, etc.;

(2) Measurement report, to include measurement information, position of measuring points, measuring instruments, measurement results.

2.5.6.5 Documents for notations of sub-element of underwater noise are to include:

(1) Measurement program, including measuring instruments, measurement conditions, the operation status of the ship under test, measurement procedure, etc.;

(2) Measurement report, including differences with the measurement program, background noise spectrum, background noise correction method, result and criterion of one-third octave band frequency sound pressure level, etc.

2.5.6.6 Documents for notations of sub-element of ambient noise are to include:

(1) Measurement program, including measuring instrument, measurement conditions, measurement procedure, etc.;

(2) Measurement report, including background noise, background noise correction, result of ambient noise measurement, etc.

2.6 Survey requirements

2.6.1 Product inspection

2.6.1.1 The products meeting ecological protection requirements covered in this Chapter are only for the purpose of obtaining and maintaining the ecological protection class notations in this Chapter.

2.6.1.2 Where no technical requirements are specified for any products covered by the Rules, they may be designed, manufactured and tested according to applicable standards at the discretion of the manufacturer.

The confirmation of technical requirements for such products are in general to include:

(1) Drawings and information of products;

(2) Condition for onboard use;

(3) Requirements for material and welding;

(4) Test items relating to safety and performance.

2.6.2 Survey of class notation of ecological protection of ship

2.6.2.1 Initial classification

(1) Plans and documents;

① For ships intending to apply for G-ECO class notation, plans and documents are to be submitted according to the provisions of 2.2.2, Chapter 2 of the Rules;

② For ships intending to apply for G-ECO(X) class notation, plans and documents required by sub-element corresponding to X are to be submitted according to the provisions of 2.3.5, 2.4.3 and 2.5.6, Chapter 2 of the Rules.

(2) Initial classification survey is to include:

① In order to assign G-ECO class notation, initial survey involved in following applicable conventions and regulations is to be completed and requirements of 2.2.1, Chapter 2 of the Rules are to be met.

a. regulations on energy efficiency of ships in MARPOL Annex VI；

b. BWM convention；

c. other International Regulations or Guidelines involved in 2.2.1, Chapter 2 of the Rules.

② In order to assign G-ECO(X) class notation, the required survey aiming at following detailed X sub-elements is to be completed to verify compliance of corresponding technical requirements:

a. CDx: CCS Guidelines mentioned in 2.3.2.8, Chapter 2 of the Rules;

b. CDEx: CCS Guidelines mentioned in 2.3.3.6, Chapter 2 of the Rules;

c. COM: IMO Guidance and CCS rules mentioned in 2.3.4.1, Chapter 2 of the Rules;

d. BWM (T/Ex/O): initial survey specified by BWM Convention is to be completed according to CCS Guidelines on Survey and Certification for Ballast Water Management of Ships, and compliance with relevant requirements of 2.4.1 of the Rules is to be confirmed;

e. BIO: IMO Guidance mentioned in 2.4.2, Chapter 2 of the Rules;

f. VIBx: 2.5.1.2, Chapter 2 of the Rules;

g. NOIx: 2.5.2.2, Chapter 2 of the Rules;

h. CLx: 2.5.3.3, Chapter 2 of the Rules;

i. UW: 2.5.4.2, Chapter 2 of the Rules;

j. RN: 2.5.5.2, Chapter 2 of the Rules.

2.6.2.2 Annual survey

(1) For class notations G-ECO and G-ECO (BWM(T/Ex/O)), annual surveys applicable to the ship and specified by BWM Convention are to be completed according to CCS Guidelines on Survey and Certification for Ballast Water Management of Ships, and requirements of 2.2.1 or 2.4.1, Chapter 2 of the Rules are to be met.

(2) It is to confirm that the ship holds valid certificates or documents of compliance, logbook and approved procedure documents required by Chapter 2 of the Rules.

2.6.2.3 Intermediate survey

(1) For class notations G-ECO and G-ECO (BWM(T/Ex/O)), intermediate surveys applicable to the ship and specified by BWM Convention are to be completed according to CCS Guidelines on Survey and Certification for Ballast Water Management of Ships.

(2) It is to confirm that the ship holds valid certificates or documents of compliance, logbook and approved procedure documents required by Chapter 2 of the Rules.

2.6.2.4 Special survey

(1) For class notations G-ECO and G-ECO (BWM(T/Ex/O)), renewal surveys applicable to the ship and specified by BWM Convention are to be completed according to CCS Guidelines on Survey and Certification for Ballast Water Management of Ships.

(2) It is to confirm that the ship holds valid certificates or documents of compliance, logbook and approved procedure documents required by Chapter 2 of the Rules.

2.6.2.5 Where CCS is not authorized to carry out statutory service, it is to confirm that the ship holds all relevant valid statutory certificates or documents, and an overall assessment is performed to the items relating to statutory certificates, at the same time, the condition that the ship complies with the notation requirements of this Chapter is to be checked to confirm compliance with all relevant requirements of this Chapter.

CHAPTER 3 REQUIREMENTS FOR ENVIRONMENTAL PROTECTION

3.1 General requirements

3.1.1 This Chapter specifies the relevant requirements of environmental protection class notations G-EP and G-EP(X) for sea-going ships engaged on international voyages.

3.1.2 Environmental protection elements for green-eco ships include the following three aspects:

(1) *control of discharge of water pollutants*, including control of discharge into the sea of oil, noxious liquid substances, harmful substances carried by sea in packaged form, sewage and grey water and garbage;

(2) *control of emission of air pollutants*, including nitrogen oxides (NO_x) from marine engines, sulphur oxides (SO_x) and particulate matter (PM) and black carbon (BC) from fuel combustion, volatile organic compounds (VOCs) from cargoes, ozone-depleting substances (ODS) from ship's fire-extinguishing systems and refrigeration systems, exhaust gas from onboard incineration;

(3) *control of use of hazardous materials*, including prohibiting the use of hazardous materials such as harmful anti-fouling systems (AFS) and asbestos, control of use of other hazardous materials[①], prevention of pollution from recycling of ships.

3.1.3 Class notations related to environmental protection of green-eco ships are as follows:

(1) Class notations of environmental protection for green-eco ships include:

G-EP: means that only the mandatory and statutory requirements of international Conventions and Codes, etc. are complied with.

G-EP (X): means that the requirements of some sub-elements of environmental protection are higher than those of international Conventions. Where X represents the notation of a corresponding sub-element of environmental protection.

(2) Notations of sub-element of control of discharge of water pollutants include the following:

OILx: means notation of sub-element of control of oil pollutants, where x represents the level of control of oil pollutants;

EAL: means that environmental acceptable lubricants are used or other equivalent measures are adopted on the ship;

IBTS: means that the ship satisfies the requirements for integrated bilge water treatment system;

NLSx: means notation of sub-element of control of noxious liquid substances, where x represents the level of control of noxious liquid substances;

SC: means notation of sub-element of control of discharge of sewage;

GWC: means notation of sub-element of control of discharge of grey water;

RC: means notation of sub-element of control of discharge of garbage.

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① Including 9 hazardous materials listed in Appendix 2 of the Hong Kong Convention.

(3) Notations of sub-element of control of emission of air pollutants include the following:

NECx: means notation of sub-element of control of NOx emission from diesel engines, where x represents the level of emission control;

SEC: means notation of sub-element of emission control of SOx and particulate matter (PM) from ships;

VCS: means notation of sub-element of VOC emission control of cargoes of tankers;

VCS-T: means notation of sub-element of VOC emission control of cargoes of auxiliary ships;

RSCx: means notation of sub-element of management and emission control of refrigerant of refrigeration system of ships, where x represents the level of emission control;

INC: means notation of sub-element of emission control of incineration operation on board;

BC20: means notation of sub-element of emission control of black carbon of marine diesel engines, where 20 represents reduction of black carbon emission by 20% and over;

BC70: means notation of sub-element of emission control of black carbon of marine diesel engines, where 70 represents reduction of black carbon emission by 70% and over;

(4) Notation of sub-element of control of use of hazardous materials:

AFS: means notation of sub-element of anti-fouling systems that do not use organotin compounds as biocides;

AFS+: means notation of sub-element of anti-fouling systems that do not contain any biocides;

GPR/ GPR+: means notation of sub-element of control of hazardous materials of ships, indicating that the ship has inventory of hazardous materials complying with the requirements of the convention;

GPR (EU) /GPR (EU) +: means notation of sub-element of control of hazardous materials of ships, indicating that the ship has inventory of hazardous materials complying with the requirements of EU ship recycling regulation.

3.2 Technical requirements for G-EP class notation

3.2.1 General requirements

3.2.1.1 The G-EP class notation may be assigned to ships complying with the latest requirements in force of the following conventions and codes, as applicable, and holding the corresponding statutory certificates or document of compliance:

(1) MARPOL Annexes I to VI, except for regulations on energy efficiency of ships in Annex VI;

(2) International Convention on the Control of Harmful Anti-Fouling Systems on Ships, 2001 (referred to as the AFS Convention);

(3) marine diesel engines are to comply with IMO Technical Code on Control of Emission of Nitrogen Oxides from Marine Diesel Engines (MEPC.177(58)) and amendments related thereto;

(4) shipboard incinerators are to comply with IMO 2014 Standard Specification for Shipboard Incinerators (MEPC.244(66)) and amendments related thereto;

(5) exhaust gas cleaning systems of sulphur oxides are to comply with IMO 2015 Guidelines for Exhaust Gas Cleaning Systems (MEPC.259(68)) and amendments related thereto or 2021 Guidelines for Exhaust Gas Cleaning Systems (MEPC.340(77)) ;

(6) oil filtering equipment of bilges is to comply with IMO Revised Guidelines and Specifications for Pollution Prevention Equipment for Machinery Space Bilges of Ships (MEPC.107(49)) and amendments related thereto;

(7) sewage treatment plants are to comply with IMO 2012 Guidelines on implementation of effluent standards and performance tests for sewage treatment plants (MEPC.227(64)) and amendments related thereto.

3.2.1.2 In addition, ships to be assigned the G-EP notation are to comply with the following requirements, as applicable:

(1) For ships with an aggregate oil fuel capacity of 600 m^3 and above, the design of all oil fuel tanks with individual capacity greater than 30 m^3 is to comply with the requirements for oil fuel tank protection of regulation 12A of MARPOL Annex I.

(2) The use of ozone-depleting substances is prohibited in shipboard refrigerating systems (excluding permanently sealed equipment without refrigerant charging connection or permanently sealed equipment without removable parts containing ozone-depleting substances) and fire-extinguishing systems (including fixed fire-extinguishing systems and portable fire extinguishers).

3.2.2 Documentation requirements

3.2.2.1 The following operational procedural documents, where applicable, are to be approved and kept on board the ship:

(1) Shipboard oil pollution emergency plan;

(2) STS operations plan (only for oil tankers conducting STS operations);

(3) Fuel oil change-over procedure;

(4) VOC management plan (for crude oil tankers);

(5) Shipboard marine pollution emergency plan or shipboard marine pollution emergency plan for noxious liquid substances (for chemical tankers or NLS tankers);

(6) NOx emission control/measurement procedures.

3.2.2.2 The following plans and information are to be submitted for approval:

(1) Arrangement of cargo tanks and ballast tanks, including drawings showing cargo and ballast pipe systems, and overflow protection arrangement (for oil tankers, chemical tankers and NLS tankers);

(2) Arrangement of fuel oil storage, settling and daily service tanks, including overflow protection arrangement;

(3) Arrangement of fuel oil tanks and piping;

(4) Capacity of bilge water holding tanks (if fitted), sludge tanks and slop tanks together with piping arrangement;

(5) Arrangement of cargo oil and non-cargo-oil loading and unloading facilities, including connections, drip trays and drainage systems;

(6) Arrangement plan of ballast water system, including details of ballast water treatment;

(7) Arrangement and details of sewage system, including treatment equipment, including capacity of storage tank and treatment capacity etc.;

(8) Sketch and details of incinerators and associated piping and monitoring equipment;

(9) Arrangement and details of exhaust gas cleaning system;

(10) Sketch and details of garbage storage or treatment system;

(11) Details of fire-extinguishing media used in fixed fire-extinguishing systems and portable fire extinguishers, including names, quantities, etc.;

(12) arrangement plan and details of boil-off gas recovery system;

(13) Any information related to additional environmental protection requirements of the flag State Administration or the Owner of the ship.

3.3 Control of discharge of water pollutants

3.3.1 Control of discharge of oil pollutants

3.3.1.1 The OIL1 sub-element notation may be assigned to ships complying with the following applicable requirements:

(1) The 15 ppm oil filtering equipment used for machinery space bilge water is to be provided with an alarm and an automatic stopping device so that alarm will be activated and the discharge overboard automatically stopped when the oil content of any effluent from oily bilge water in machinery spaces exceeds 15 ppm.

(2) The sludge tank discharge piping and bilge-water piping are not to be connected except that they may be connected to a common piping leading to the standard discharge connection.

(3) Deck connections of fueling stations of fuel oil, lubricating oil and other oils (e.g. hydraulic oil) are to be provided with drip trays having a closed drainage system leading to a deck oily water holding tank or drain tank.

(4) Vent piping outlet of fuel oil tanks, lubricating oil tanks, hydraulic oil tanks and other tanks are to be provided with drip trays capable of collecting spilled oil. Means are to be provided to clean the spilled oil in order to prevent overboard discharge.

(5) The storage tank of fuel oil, lubricating oil, hydraulic oil and other oils is to be provided with high level alarm to prevent overflow. Where the internal tank is so designed that in case of overflow, it will not lead to environmental pollution, the high level alarm may not be fitted.

(6) Cargo oil tanks are to be provided with high level alarm or overflow protection measures.

(7) Both sides of the main deck within the cargo area of oil tanker are to be fitted with continuous coaming from the fore end to the aft end of cargo area, in order to prevent the discharge into the sea of spilled oil during cargo operations on deck. The height of coaming is to be determined in accordance with the size, type, arch, trim and stability of the ship. The main deck within cargo areas is also to be provided with a drainage system of spilled oil capable of draining such oil into a deck collecting tank or slop tank.

(8) Connections of the cargo oil manifold on an oil tanker are to be provided with drip trays having a closed drainage system leading to a deck collecting tank or slop tank.

(9) For oil tankers of 600 tonnes deadweight and above but less than 5,000 tonnes deadweight, cargo oil tanks are to be protected by wing and double bottom tanks having a minimum protection distance as required below:

① For wing tanks, the minimum width $w = 0.4 + \frac{2.4DWT}{20000}(m)$, the minimum value of w = 0.76 m;

where: *DWT*—tonnes deadweight of ship.

② For double bottom tanks, the minimum height $h = B/15$ (m), the minimum value of h = 0.76 m.
where: *B*—moulded breadth of ship.

(10) Carriage of ballast water in the fuel oil tanks or carriage of fuel oil in the ballast water tanks is prohibited.

3.3.1.2 The OIL2 sub-element notation may be assigned to ships complying with the following applicable requirements in addition to the applicable requirements of 3.3.1.1 above:

(1) The oil content of any oily bilge effluent from the engine room is not to exceed 5 ppm. The alarm device of bilge water is to be set at 5 ppm, which is to be calibrated at least once every 5 years. The calibration certificate or the complete calibration record is to be kept on board the ship and readily available for inspection.

(2) As an alternative to (1) above, the ship is to be provided with oily bilge water holding tanks of sufficient capacity to retain all oily bilge water on board so as to facilitate the subsequent discharge to reception facilities. Piping to and from oily bilge water holding tanks is to have no direct connection overboard, other than the standard discharge connection referred to in MARPOL Annex I.

(3) For drip trays mentioned in 3.3.1.1(3) of this Chapter, the minimum capacity is to comply with the following requirements:

① for ships greater than 1600 GT: 0.16 m^3;

② for ships between 300 GT and 1600 GT: 0.08 m^3.

(4) For drip trays mentioned in 3.3.1.1(4) of this Chapter, the minimum capacity is to comply with the following requirements:

① for ships greater than 1600 GT: 0.08 m^3;

② for ships between 300 GT and 1600 GT: 0.04 m^3.

(5) For continuous coaming fitted on the deck within cargo area mentioned in 3.3.1.1(7) of this Chapter, the following height requirements are at least to be complied with:

① for oil tankers of 100000 DWT and above: the transverse coaming at the fore end is 0.25 m in height with transition gradually made towards the aft end of cargo area and connected to the transverse coaming at the aft end, which is 0.30 m in height;

② for oil tankers of less than 100000 DWT: the transverse coaming at the fore end is 0.10 m in height with transition gradually made towards the aft end of cargo area and connected to the transverse coaming at the aft end, which is 0.30 m in height.

(6) For drip trays mentioned in 3.3.1.1(8) of this Chapter, the arrangement and minimum size are to comply with the following requirements:

① length: the fore and the aft ends of manifolds to be included;

② width: at least 1.8 m, and approximately 1.2 m beyond the end of flange of manifolds;

③ depth: at least 0.3 m.

(7) All oil fuel tanks (except for overflow tanks) with an individual capacity greater than 30 m^3 are to be arranged to be protected by wing tanks and double bottom tanks. However the aggregate capacity of oil fuel tanks with an individual capacity not greater than 30 m^3 is not to be greater than 600 m^3. The requirements for protective positions of wing tanks and double bottom tanks are as follows:

① Oil fuel tanks are to be located above the moulded line of the bottom shell plating nowhere less than the distance h as specified below:

$h = B/20$ m or
$h = 2.0$ m, whichever is the lesser.

The minimum value of $h = 0.76$ m.

In the turn of the bilge area and at locations without a clearly defined turn of the bilge, the oil fuel tank boundary line is to run parallel to the line of the midship flat bottom as shown in Figure 3.3.1.2(7)①.

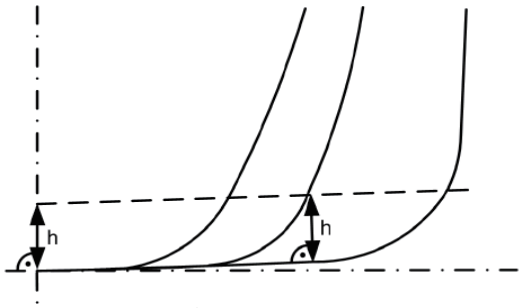

Figure 3.3.1.2(7)① Oil fuel tank boundary line

② For ships having an aggregate oil fuel capacity of less than 5,000 m^3, oil fuel tanks are to be located inboard of the moulded line of the side shell plating, nowhere less than the distance W which, as shown in Figure 3.3.1.2(7)②, is measured at any cross-section at right angles to the side shell, as specified below:

$$W = 0.4 + 2.4C/20000 \quad \text{m}$$

where: C – Tank capacity, in m^3.

The minimum value of $W = 1.0$ m; however, for individual tanks with an oil fuel capacity of less than 500 m^3 the minimum value is 0.76 m.

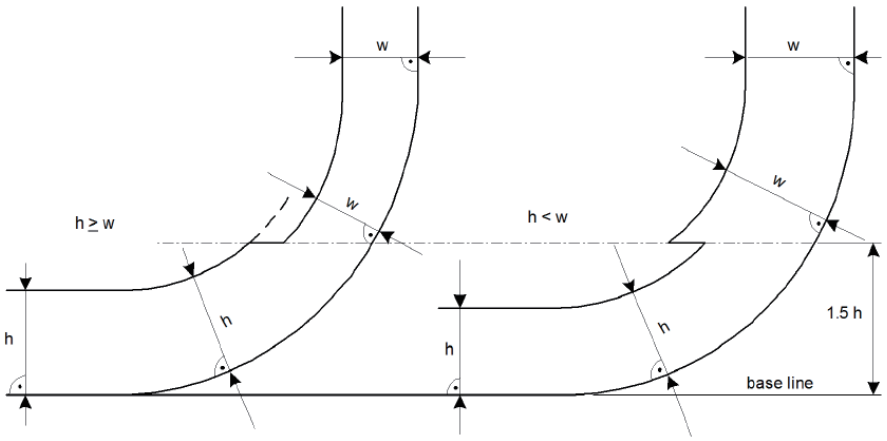

Figure 3.3.1.2(7)② Oil fuel tank boundary line

③ For ships having an aggregate oil fuel capacity of 5,000 m^3 and over, oil fuel tanks are to be located inboard of the moulded line of the side shell plating, nowhere less than the distance W which, as shown in Figure 3.3.1.2(7)②, is measured at any cross-section at right angles to the side shell, as specified below:

$W = 0.5 + C/20000$ m or

$W = 2.0$ m, whichever is the lesser.

The minimum value of $W = 1.0$ m.

where: C – Tank capacity, in m^3.

④ Lines of oil fuel piping located at a distance from the ship's bottom of less than h, as defined in ① above, or from the ship's side less than W, as defined in ② and ③, are to be fitted with valves or similar closing devices within or immediately adjacent to the oil fuel tank. These valves are to be capable of being brought into operation from a readily accessible enclosed space the location of which is accessible from the navigation bridge or propulsion machinery control position without traversing exposed freeboard or superstructure decks. The valves are to close in case of remote control system failure and are to be kept closed at sea at any time when the tank contains oil fuel except that they may be opened during oil fuel transfer operations.

⑤ Suction wells in oil fuel tanks may protrude into the double bottom below the boundary line defined by the distance h provided that such wells are as small as practicable and the distance between the well bottom and the bottom shell plating is not less than $0.5h$.

(8) Cargo oil tanks of any oil tanker are to be arranged to be protected by double bottoms and double side skins. For oil tankers of less than 600 tonnes deadweight, cargo oil tanks are to be protected by wing tanks and double bottom tanks having a minimum protection distance required by 3.3.1.1(9) above.

3.3.1.3 Where environmentally acceptable lubricants are used for oil-to-sea interfaces or equivalent measures are adopted, the EAL sub-element notation may be assigned provided that the following requirements are satisfied:

(1) Equipment having oil-to-sea interfaces includes but not limited to controllable pitch propeller, thruster hydraulic fluid and other equipment that might have lubrication discharges from oil seals and surfaces, such as paddle wheel propulsion, stern tubes, thruster bearings, stabilizers, rudder bearings, azimuth thrusters, podded propulsors, and wire rope and mechanical equipment subject to immersion.

(2) As an alternative to (1) above, where there is sufficient evidence showing the non-existence of oil-to-sea interfaces onboard ships, e.g. the seawater-lubricated rudder bearings, water-lubricated bearings, and air seal system, descriptions are to be given in the EAL Report.

(3) The ship is to keep on board a Statement of Compliance for EAL issued by CCS.

3.3.1.4 The IBTS sub-element notation may be assigned to ships where the management and discharge arrangement of engine room bilge water comply with the following requirements:

(1) The management and discharge arrangement of engine room bilge water is to comply with IMO MEPC.1/Circ.642 on integrated bilge water treatment system and amendments related thereto.

(2) A Statement of Fact on Installation of an Integrated Bilge Water Treatment System (IBTS) issued by CCS is to be kept on board.

3.3.2 Control of discharge of noxious liquid substances

3.3.2.1 The NLS1 sub-element notation may be assigned to chemical tankers complying with the following applicable requirements:

(1) Both sides of the main deck within the cargo area of chemical tanker are to be fitted with continuous coaming from the fore end to the aft end of cargo area, in order to prevent the discharge into the sea of leakage during cargo operations on deck. The height of coaming is to be determined in accordance with the

size, type, arch, trim and stability of the ship. The main deck within cargo areas is also to be provided with a drainage system capable of collecting leakages during cargo operations and draining cargo leakages into a deck collecting tank or slop tank.

(2) Connections of the cargo manifold of chemical tankers are to be provided with drip trays having a closed drainage system leading to a deck collecting tank or slop tank.

(3) Cargo tanks of chemical tankers are to be provided with restricted gauging system, unless a closed gauging system is required due to the cargo categories.

3.3.2.2 The NLS2 sub-element notation may be assigned to chemical tankers complying with the following applicable requirements in addition to applicable requirements of 3.3.2.1 above:

(1) The structural arrangement of chemical tankers is at least to comply with the requirements for double side skins and double bottoms of type 2 chemical tankers in Chapter 2 of CCS Rules for Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk, unless type 1 chemical tankers are required due to the cargo categories.

(2) The maximum allowable quantity of cargo residue remaining in each cargo tank and its associated piping of chemical tankers is not to exceed 50*L*.

(3) Cargo tanks of chemical tankers are to be provided with a closed gauging system and overflow alarm device independent from the closed gauging system.

(4) For continuous coaming fitted on the deck within cargo area mentioned in 3.3.2.1(1) of this Chapter, the following height requirements are at least to be complied with:

① for chemical tankers of 100000DWT and above: the transverse coaming at the fore end is 0.25 m in height with transition gradually made towards the aft end of cargo area and connected to the transverse coaming at the aft end, which is 0.30 m in height;

② for chemical tankers of less than 100000DWT: the transverse coaming at the fore end is 0.10 m in height with transition gradually made towards the aft end of cargo area and connected to the transverse coaming at the aft end, which is 0.30 m in height.

(5) For drip trays mentioned in 3.3.2.1(2) of this Chapter, the arrangement and minimum size are to comply with the following requirements:

① length: to include the fore and the aft ends of manifolds;

② width: at least 1.8 m, and approximately 1.2 m beyond the end of flange of manifolds;

③ depth: at least 0.3 m.

3.3.3 Control of discharge of sewage

3.3.3.1 The SC sub-element notation may be assigned to ships complying with the following applicable requirements:

(1) The ship is to be provided with a sewage treatment plant. The sewage is discharged after treatment. The treated sewage effluent is to meet effluent standards given in 4.2 of the annex to resolution MEPC.227(64).

(2) As an alternative to (1) above, the sewage from the ship is not discharged into the sea but to the reception facilities. The ship is to be provided with sewage holding tank of sufficient capacity and pipelines discharging the sewage to the reception facilities. The holding tank is to have capacity for the retention of all sewage,

having regard to the operation of the ship, the number of persons on board and other relevant factors①. The holding tank is to have a means to indicate visually the amount of its contents, which may be a liquid level meter, observation port, manual or automatic liquid level measuring device.

(3) The vent piping of sewage treatment plant and sewage holding tank is to be independent from other vent piping. The vent piping may share the ventilation main pipe with the vent piping of grey water treatment system and grey water holding tank (if any).

(4) The ship is to keep on board a sewage management plan, which is to be approved by CCS. Such plan is to provide guidance to the crew on management of sewage treatment and discharge of sewage. The sewage management plan is at least to include the following:

① ship name and identification number;

② sketch of sewage treatment plant, holding tanks of sewage and all relevant piping arrangement;

③ management and operational procedures of sewage;

④ means and method of recording all sewage discharges to shore reception facilities or to the sea. The recorded data is to include the date, place and quantity of such discharges. For discharges from the sewage treatment plant, the time of activating and stopping the system is to be recorded in lieu of the quantity discharged. The discharge of untreated sewage in emergency is also to be recorded

3.3.4 Control of discharge of grey water

3.3.4.1 The GWC sub-element notation may be assigned to ships carrying control of grey water in accordance with the requirements for equipment and discharge as specified in MARPOL Annex IV and complying with the following applicable requirements:

(1) The ship is to be provided with a treatment system for grey water. The discharge after treatment is to comply with the standard specified in resolution MEPC.227(64). Where the sewage treatment plant fitted onboard treats both sewage and grey water, the treatment capacity of the sewage treatment plant is to meet the treatment demand of both sewage and grey water subject to type approval.

(2) As alternative to 3.3.4.1 (1) above, where the grey water is held onboard for discharge to shore reception facilities or discharge to the sea only at a distance of more than 12 n miles from the nearest land, grey water holding tanks are to be provided, the capacity of which can be calculated for the number of persons onboard and voyage duration with 125 L/person/day. Where sewage and grey water share the same holding tank, the capacity of the tank is to be equal to the sum of the capacities of both the sewage holding tank and grey water holding tank.

(3) The grey water holding tank is to be fitted with high level alarm.

(4) The vent pipes of grey water treatment system and holding tanks is to be independent of other vent piping systems. The vent piping may share the ventilation main pipe with the vent piping of sewage treatment plant and sewage holding tank.

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① When other clear documents are not provided, the capacity of the holding tank is to be calculated by the following methods: 1) when the voyage time of the ship from the departing port to the discharge area required by the port Administration exceeds 24 h, 70 L per person for one day and night is to be taken; 2) when the voyage time is between 8 h to 24 h, 35 L per person for one day and night is to be taken; 3) when the voyage time is between 4 h to 8 h, 18 L per person for one day and night is to be taken; 4) when the voyage time is between 1 h to 4 h, 9 L per person for one day and night is to be taken; 5) when the voyage time is less than 1 h, 6 L per person for one day and night is to be taken. 6) If the ship is fitted with the toilets of the vacuum type, the above values of the different voyage time may be reduced by half.

(5) In addition to the requirements of 3.3.4.1 (1) to 3.3.4.1 (4) above, for grey water generated in the galley, prior to its discharge, discharge to the holding tank or treatment by the sewage treatment plant, the grey water is to flow through the oil water separator for oil water separation.

(6) The ship is to keep on board a grey water management plan, which is to be approved by CCS. Such plan is to provide guidance to the crew on grey water treatment and discharge management. The grey water management plan may be combined with the sewage management plan and is to include the following as a minimum:

① name and identification number of the ship;

② diagrams of the grey water treatment system, holding tank and all relevant piping arrangement;

③ management and operational procedures of grey water;

④ means and method of recording all grey water discharge to shore reception facilities or to the sea, and amount of water reuse (where applicable). The recorded data is to include the date, place and quantity of such discharges; the speed of the ship and its nearest distance to shore are also to be recorded for discharges to the sea.

3.3.5 Control of discharge of garbage

3.3.5.1 The RC sub-element notation may be assigned to ships complying with the following requirements:

(1) The disposal of food wastes is not permitted except when they have been passed through a comminuter or grinder. Such comminuted or ground food wastes are to be capable of passing through a screen with openings no greater than 25 mm.

(2) The ship is to keep on board a garbage management plan complying with IMO requirements, which is to be approved by CCS and contain management measures in compliance with 3.3.5.1 (1) above.

3.3.6 Documentation requirements

3.3.6.1 For ships assigned corresponding sub-element notations for discharge control of water pollutants, the following applicable information is to be submitted for approval in addition to applicable plans and documents required by 3.2.2 of this Chapter:

3.3.6.2 For ships applying for EAL sub-element notation, the following is to be submitted:

① EAL report: the use of EAL of all oil-to-sea interfaces is to be described in the report;

② Air sealing system (if any): alarm table and conversion plan (where applicable) of air sealing system.

3.3.6.3 For ships applying for NLSx sub-element notation, the following is to be submitted:

(1) overflow protection arrangement;

(2) plan of cargo tank measuring system.

3.3.6.4 The following applicable procedural documents:

(1) Sewage Management Plan;

(2) Grey water Management Plan;

(3) Garbage Management Plan.

3.4 Control of emission of air pollutants

3.4.1 Control of NO_x emission from diesel engines

3.4.1.1 The NEC1 sub-element notation may be assigned to ships constructed prior to 1 January 2011, where NO_x emission from each marine diesel engine with a power output of more than 130 kW installed on the ship is within the following limits:

(1) 14.4g/kW·h, when n<130r/min;

(2) $44.0\times n^{(-0.23)}$g/kW·h, when 130r/min≤n<2000r/min;

(3) 7.7g/kW·h, when n≥2000r/min.

where n is rated engine speed (crankshaft revolutions per minute).

3.4.1.2 The NEC2 sub-element notation may be assigned to all ships, where NO_x emission from each marine diesel engine with a power output of more than 130 kW installed on the ship is within the following limits:

(1) 3.4g/kW·h, when n<130r/min;

(2) $9.0\times n^{(-0.2)}$g/kW·h, when 130r/min≤n<2000r/min;

(3) 2.0g/kW·h, when n≥2000r/min.

where n is rated engine speed (crankshaft revolutions per minute).

3.4.1.3 The test procedures and measurement methods for NO_x emission from diesel engines are to comply with the requirements of CCS Guidelines for Testing and Survey of Emission of Nitrogen Oxides from Marine Diesel Engines.

3.4.1.4 The NEC1 or NEC2 sub-element notation may be assigned to ships on which NO_x reducing devices are fitted to reduce NO_x emissions below the limits specified in 3.4.1.1 or 3.4.1.2. Such devices are to be approved by CCS.

3.4.1.5 The requirements of this regulation do not apply to emergency engines, or engines fitted on lifeboats, or engines of devices or equipment used only in emergencies.

3.4.2 Control of SO_x emission

3.4.2.1 The SEC sub-element notation may be assigned to ships when the sulphur content of any fuel oil used or carried for use on board the ship does not exceed 0.10% m/m.

3.4.2.2 As an alternative to the requirements of 0.10% m/m low sulphur fuel oil in 3.4.2.1 above, an approved exhaust gas cleaning system (EGCS) or other approved measures may be used to control SO_x emissions within the corresponding limit. The SO_x emission limit corresponding to the fuel oil sulphur content of 0.10%m/m above is to comply with the provisions specified in resolution MEPC.259(68), as amended.

3.4.3 Control of black carbon emission

3.4.3.1 The BC20 sub-element notation may be assigned to ships when the black carbon emission reduction technology is used by the ship to reduce the emission of black carbon from diesel engines with a power output of more than 130 kW on board by 20% and over as compared to that before the application of the black carbon emission reduction technology.

3.4.3.2 The BC70 sub-element notation may be assigned to ships when the black carbon emission reduction technology is used by the ship to reduce the emission of black carbon from diesel engines with a power output of more than 130 kW on board by 70% and over as compared to that before the application of the black carbon emission reduction technology.

3.4.3.3 Black carbon may be tested by any of the methods recommended by IMO, i.e. Filter Smoke Number (FSN), Photo -Acoustic Spectroscopy (PAS) or Laser Induced Incandescence (LII). Recognized national and international standards may be used as the test specification. The test cycles are to comply with relevant requirements of CCS Guidelines for Testing and Survey of Emission of Nitrogen Oxides from Marine Diesel Engines.

3.4.3.4 The requirements of this regulation do not apply to emergency engines, or engines fitted on lifeboats, or engines of devices or equipment used only in emergencies.

3.4.4 Control of VOCs emission from tankers

3.4.4.1 The VCS sub-element notation may be assigned to tankers, where vapour emission control systems for cargoes of cargo tanks complying with applicable requirements of Chapter 15, PART THREE of the Rules for Classification of Sea-going Steel Ships are provided on board.

3.4.4.2 The VCS-T sub-element notation may be assigned to service ships receiving cargo vapour, where vapour emission control systems for cargoes of cargo tanks complying with applicable requirements of Chapter 15, PART THREE of the Rules for Classification of Sea-going Steel Ships are provided on board.

3.4.5 Control of emission from shipboard incineration

3.4.5.1 The INC sub-element notation may be assigned to ships complying with the following requirements:

(1) Unless the ship is fully capable of transferring the garbage to the shore, at least one incinerator is to be installed on board, which is to be type approved by CCS in accordance with IMO resolution MEPC.244(66) and have a valid IMO type approval certificate.

(2) All operations of the incinerator are to be recorded in the Garbage Record Book or Oil Record Book, as appropriate.

3.4.6 Control of emission of ozone-depleting substances

3.4.6.1 The requirements for RSC1 and RSC2 emission control sub-element notations for ozone-depleting substances (refrigerants) of this paragraph apply to refrigerated cargo installations, central air conditioning systems and centralized refrigeration systems of all ships, but do not apply to permanently sealed equipment without refrigerant charging connection or permanently sealed equipment without removable parts containing ozone-depleting substances.

3.4.6.2 The RSC1 sub-element notation may be assigned to ships complying with the following applicable requirements:

(1) Refrigerating systems are to be provided with suitable maintenance isolation means to prevent significant leaks of refrigerants during maintenance or repairs. However, unavoidable minimal release of refrigerants associated with refrigerant recovery is acceptable.

(2) In order to recover refrigerants, compressors are to be capable of evacuating refrigerants within the system into a liquid receiver. Additionally, recovery units are to be capable of evacuating a system either into the existing liquid receiver or into suitable reservoirs dedicated for this purpose. The capacity of the liquid receiver or reservoirs is to be sufficient to contain all refrigerants of the largest refrigerating unit that can be isolated.

(3) The annual refrigerant leakage rate of each system is to be less than 10% of its total charge. A leakage detection system is to be provided to monitor continuously the spaces into which the refrigerant could leak. An alarm is to be activated to give warning in a permanently manned location when the concentration of refrigerant in the space exceeds a predetermined limit (e.g. 25 ppm for ammonia). Remedial measures are to be implemented when any leak is detected.

(4) Where different refrigerants are in use, means are to be provided to prevent them from being mixed.

(5) The ship is to keep on board a refrigerant management plan which is at least to include the following:

① ship name and identification number;

② list of all refrigerating systems as well as sketch and component description (including leakage detection system);

③ means adopted to manage and control consumption, leakage, evacuation and disposal of refrigerants together with the remedial measures in the event of any leakage as stated in (3) above;

④ means and method of recording replacement, leakage, recovery, charging and disposal of refrigerants, including at least date, system type, refrigerant type, initial system charge and refrigerant level, charging amount, recovery amount, leakage type and remedial measures.

(6) The ship is to establish and maintain a list of refrigerants on board and a record book required by 3.4.6.2(5)④ above, which are to be kept throughout the life time of the system. The record of each item is to be kept on board for at least 3 years and available for check by the surveyor.

3.4.6.3 The RSC2 sub-element notation may be assigned to ship complying the following applicable requirements in addition to the applicable requirements of 3.4.6.2 :

(1) For refrigerated cargo installations, central air conditioning systems and centralized refrigeration systems of ships, the ozone depletion potential (ODP) is to be 0 and the global warming potential (GWP) less than 2000. Both ODP and GWP are to be determined according to the definitions given in the Montreal Protocol on Substances that Deplete the Ozone Layer, 1987.

3.4.6.4 The use of halons or halocarbons as fire-fighting media is to be prohibited for fixed fire-extinguishing systems and portable fire extinguishers. Natural substances are to be used as fire-fighting media for fire-extinguishing systems insofar as practicable, e.g., argon, nitrogen, water mist, carbon dioxide. Any other alternative product used is to have a GWP of less than 2000.

3.4.7 Documentation requirements

3.4.7.1 For ships to be assigned with sub-element notations for emission control of air pollutants, the following applicable information is to be submitted for approval in addition to applicable plans and documents required by 3.2.2 of this Chapter.

3.4.7.2 NO_x emission control

(1) engine technical file or emission test report approved by CCS;

(2) arrangement of NO_x emission control.

3.4.7.3 SO_x emission control

(1) arrangement of SO_x emission control;

(2) when applied as equivalent, review of plans and arrangement of exhaust gas cleaning system or other technical methods.

3.4.7.4 Black carbon emission control

(1) emission test report approved by CCS;

(2) arrangement of black carbon emission control.

3.4.7.5 VOC emission control

(1) For ships to be assigned with VCS or VCS-T sub-element notation, the following plans and documents are to be submitted for approval :

① Diagrammatic plan of the vapour piping system, indicating material specifications, scantlings, ratings, joining details and fittings;

② Diagrammatic plan of the gauging system and overfill protection, indicating manufacturer and type of the equipment or instruments, hazardous area locations, location of electrical equipment in gas–dangerous spaces and safe certificates of the electrical instruments intended to be used in hazardous locations, electrical schemes concerning the alarm system supply, electrical schemes concerning the intrinsically safe circuits;

③ Diagrammatic plan of the venting system, indicating necessary data for verifying the venting capacity of the pressure/vacuum valves;

④ Pressure drop calculation comparing cargo transfer rates versus pressure drops from the farthest tanks to the vapour connection, including any possible hoses;

⑤ Calculations showing the time available between alarm setting and overfill at maximum loading rate for each tank;

⑥ Instruction manual.

(2) For ships to be assigned with VCS-T sub-element notation, documentation of the explosion-proof devices, including equipment manufacturer, type and inspection documents, is also to be submitted for information.

3.4.7.6 Shipboard incineration emission control

(1) type approval certificate and instructions of incinerators;

(2) arrangement of shipboard incinerators.

3.4.7.7 Ozone-depleting substance emission control

(1) diagrammatic plan of refrigerating equipment and arrangement;

(2) refrigerant management plan.

3.5 Control of use of hazardous materials

3.5.1 Control of harmful anti-fouling systems

3.5.1.1 The AFS+ sub-element notation may be assigned to ships where the anti-fouling system applied to the ship’s hull is not to contain any biocides.

3.5.1.2 Biocide-free anti-fouling system includes but not limited to the following:

(1) Organic silicon;

(2) Organic fluorine fouling-release paint;

(3) Environmental protection paint such as bionic antifouling.

3.5.1.3 The AFS sub-element notation may be assigned to ships where the anti-fouling system applied to the ship's hull is not to contain organotin compounds and cybutryne as biocides.

3.5.2 Control of hazardous materials

3.5.2.1 The GPR sub-element notation may be assigned to ships complying with the following requirements:

(1) The ship is to carry the Inventory of Hazardous Materials in compliance with Regulation 5 of the Annex to Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009 of IMO.

(2) The Inventory of Hazardous Materials is to be developed in accordance with Guidelines for the Development of the Inventory of Hazardous Materials, 2015 adopted by IMO by resolution MEPC.269(68) and to be verified by CCS in accordance with the Guidelines for Development and Survey of the Inventory of Hazardous Materials of Ships.

3.5.2.2 The GPR+ sub-element notation may be assigned to ships when sampling testing and verification are further carried out in accordance with 3.6.8 or 4.4.10 of CCS Guidelines for Development and Survey of the Inventory of Hazardous Materials of Ships, in addition to complying with the requirements of 3.5.2.1.

3.5.2.3 The GPR(EU) sub-element notation may be assigned to ships complying with the following requirements:

(1) The ship is to carry the Inventory of Hazardous Materials in compliance with Article 5 of Regulation (EU) No. 1257/2013.

(2) The Inventory of Hazardous Materials is to be developed in accordance with Guidelines for the Development of the Inventory of Hazardous Materials, 2015 adopted by IMO by resolution MEPC.269(68). In addition, the use of perfluorooctane sulfonic acid and brominated flame retardant is to comply with relevant requirements of Regulation (EU) No 1257/2013.

3.5.2.4 The GPR(EU)+ sub-element notation may be assigned to ships when sampling testing and verification are further carried out in accordance with 3.6.8 or 4.4.10 of CCS Guidelines for Development and Survey of the Inventory of Hazardous Materials of Ships, in addition to complying with the requirements of 3.5.2.3.

3.5.3 Documentation requirements

3.5.3.1 For ships to be assigned with sub-element notations for control of use hazardous materials, information is to be provided in accordance with the following requirements:

(1) For control of harmful anti-fouling systems, information is to be submitted in accordance with relevant requirements of CCS Guidelines for Survey of Anti-fouling Systems on Ships.

(2) For control of hazardous materials, information is to be submitted in accordance with relevant requirements of CCS Guidelines for Development and Survey of the Inventory of Hazardous Materials of Ships.

3.6 Survey requirements

3.6.1 Product inspection

3.6.1.1 The products meeting environment protection requirements covered in this Chapter are only for the purpose of obtaining and maintaining the environment protection class notations in this Chapter.

3.6.1.2 Where no technical requirements are specified for any products covered by the Rules, they may be designed, manufactured and tested according to applicable standards at the discretion of the manufacturer. The confirmation of technical requirements for such products are in general to include:

(1) Drawings and information of products;

(2) Condition for use on board;

(3) Requirements for material and welding;

(4) Test items relating to safety and performance.

3.6.1.3 For the oil filtering equipment (including bilge water alarm unit) complying with OIL2 sub-element notation for discharge control of oil pollutant mentioned in 3.3.1.2 of the Rules, the product performance is to meet the requirements of 3.3.1.2 of the Rules, and the performance parameters are to be indicated in type approval certificate and product certificate.

3.6.1.4 For the sewage treatment plant complying with SC sub-element notation for control of sewage mentioned in 3.3.3.1 of the Rules, compliance with the requirements of MEPC.227(64) is to be indicated in product type approval certificate, and relevant requirements of GB3552-2018 may also be indicated.

3.6.2 Survey of class notation of environment protection of ship

3.6.2.1 Initial classification

(1) Plans and documents

① For ships intending to apply for G-EP class notation, plans and documents are to be submitted according to the provisions of 3.2.2, Chapter 3 of the Rules;

② For ships intending to apply for G-EP(X) class notation, plans and documents required by sub-element corresponding to X are to be submitted according to the provisions of 3.3.6, 3.4.7 and 3.5.3, Chapter 3 of the Rules.

(2) Initial classification survey is to include:

① In order to assign G-EP class notation, initial survey involved in following conventions and regulations is to be completed and the requirements of 3.2.1, Chapter 3 of the Rules are to be met:

a. MARPOL Convention;

b. AFS Convention;

c. Other international regulations or guidelines involved in 3.2.1, Chapter 3 of the Rules.

② In order to assign G-EP (X) class notation, in addition to survey mentioned in 3.6.2.1(2)① of this Chapter, the required survey aiming at following detailed X sub-element is to be completed to verify compliance of corresponding technical requirements:

a. OlLx: requirements of 3.3.1.1 or 3.3.1.2, Chapter 3 of the Rules;

b. EAL: requirements of 3.3.1.3, Chapter 3 of the Rules;

c. IBTS: requirements of 3.3.1.4, Chapter 3 of the Rules;

d. NLSx: requirements of 3.3.2.1 or 3.3.2.2, Chapter 3 of the Rules;

e. SC: requirements of 3.3.3.1, Chapter 3 of the Rules;

f. GWC: requirements of 3.3.4.1, Chapter 3 of the Rules;

g. RC: requirements of 3.3.5.1, Chapter 3 of the Rules;

h. NECx: requirements of 3.4.1.1 or 3.4.1.2, Chapter 3 of the Rules;

i. SEC: requirements of 3.4.2, Chapter 3 of the Rules;

j. INC: requirements of 3.4.5, Chapter 3 of the Rules;

k. RSCx: requirements of 3.4.6.2 or 3.4.6.3, Chapter 3 of the Rules;

l. AFS/AFS+: requirements of 3.5.1.1 or 3.5.1.3, Chapter 3 of the Rules;

m. GPR/GPR+: requirements of 3.5.2.1 or 3.5.2.2, Chapter 3 of the Rules;

n. GPR(EU)/GPR(EU)+: requirements of 3.5.2.3 or 3.5.2.4, Chapter 3 of the Rules.

③ In order to assign G-EP (BC20/BC70) class notation, in addition to completion of survey mentioned in 3.6.2.1(2)① of this Chapter, it is to confirm that engines within the scope of application have adopted or installed black carbon emission reduction technology/equipment, emission comparison test has been performed according to the requirements of 3.4.3, Chapter 3 with CCS approval (engine components affecting engine black carbon emission, set value or operation value, fuel oil specifications and limits are to be indicated in test report), and onboard check inspection has been carried out according to the requirements of 6.2, Chapter 6 of CCS Guidelines for Nitrogen Oxide Emission Test and Inspection of Marine Diesel Engine.

④ In order to assign G-EP (VCS/VCS-T) class notation, in addition to survey mentioned in 3.6.2.1(2)① of this Chapter, survey mentioned in 6.3.1.2, Chapter 6, PART ONE of CCS Rules for Classification of Seagoing Steel Ships is to be completed.

3.6.2.2 Annual survey

(1) For G-EP notation, annual survey involved in following conventions and regulations applicable to ships is to be completed, and the requirements of 3.2.1, Chapter 3 of the Rules are to be met:

① MARPOL Convention;

② Other international regulations or guidelines involved in 3.2.1, Chapter 3 of the Rules.

(2) For G-EP (X) class notation, in addition to the survey mentioned in 3.6.2.2(1) of this Chapter, the survey aiming at X sub-element mentioned in 3.6.2.1(2)② of this Chapter is to be completed to verify compliance of corresponding technical requirements.

(3) For G-EP (BC20/BC70) class notation, it is to confirm that engines within scope of application have not undertaken major modification during interval. Engine parameter logbook and fuel oil supply sheet are to be checked to confirm that engines have not been subject to modification or setting beyond the limit specified in CCS approval test report or non-compliant fuel oil has been used since last survey.

(4) For G-EP (VCS/VCS-T) class notation, survey mentioned in 6.3.1.3, Chapter 6, PART ONE of CCS Rules for Classification of Seagoing Steel Ships is to be completed.

(5) It is to confirm that the ship holds valid certificates or documents of compliance, logbook and approved procedure documents required by Chapter 3 of the Rules.

3.6.2.3 Intermediate survey

(1) For G-EP class notation, intermediate survey required by conventions and regulations involved in above 3.6.1.2 and applicable to ships is to be completed.

(2) For G-EP (X) class notation, in addition to the survey mentioned in 3.6.2.3(1) of this Chapter, the required survey aiming at X sub-element mentioned in 3.6.2.1(2)② of this Chapter is to be completed to verify compliance of corresponding technical requirements.

(3) For G-EP (BC20/BC70) class notation, it is to be carried out according to the provisions of 3.6.2.2(3) of this Chapter.

(4) For G-EP (VCS/VCS-T) class notation, survey mentioned in 6.3.1.3, Chapter 6, PART ONE of CCS Rules for Classification of Seagoing Steel Ships is to be completed.

(5) It is to confirm that the ship holds valid certificates or documents of compliance, logbook and approved procedure documents required by Chapter 3 of the Rules.

3.6.2.4 Special survey

(1) For G-EP class notation, renewal survey involved in conventions and regulations in above 3.6.2.3 and applicable to ships is to be completed.

(2) For G-EP (X) class notation, in addition to the survey mentioned in 3.6.1.4(1) of this Chapter, the required survey aiming at X sub-element mentioned in 3.6.2.1(2)② of this Chapter is to be completed to verify compliance of corresponding technical requirements.

(3) For G-EP (BC20/BC70) class notation, it is to be performed according to the provisions of 3.6.2.2(3) of this Chapter.

(4) For G-EP (VCS/VCS-T) class notation, survey mentioned in 6.3.1.4, Chapter 6, PART ONE of CCS Rules for Classification of Seagoing Steel Ships is to be completed.

(5) It is to confirm that the ship holds valid certificates or documents of compliance, logbook and approved procedure documents required by Chapter 3 of the Rules.

3.6.2.5 Where CCS is not authorized to carry out statutory service, it is to confirm that the ship holds all relevant valid statutory certificates or documents, and an overall assessment is performed to the items relating to statutory certificates, at the same time, the condition that the ship complies with the notation requirements of this Chapter is to be checked to confirm compliance with all relevant requirements of this Chapter.

PART II REQUIREMENTS FOR SEA-GOING SHIPS ENGAGED ON DOMESTIC VOYAGES

CHAPTER 4 REQUIREMENTS FOR ECOLOGICAL PROTECTION

4.1 General requirements

4.1.1 This Chapter specifies the relevant requirements of ecological protection class notations Gd-ECO and Gd-ECO(X) for sea-going ships engaged on domestic voyages.

4.1.2 Ecological protection elements for green-eco ships include the following two aspects:

(1) GHG emission control: including requirements for CO_2 emission design index and CO_2 emission operational management.

(2) Environmental friendliness: including the requirements for comfort onboard (vibration, compartment noise, indoor climate), control of underwater noise and environmental noise.

4.1.3 Class notations related to ecological protection of green-eco ships are as follows:

(1) Class notations of ecological protection for green-eco ships include:

Gd-ECO: means that only the mandatory and statutory requirements of Domestic Regulations are complied with.

Gd-ECO (X): means that the requirements of some sub-elements of ecological protection are higher than the mandatory and statutory requirements of Domestic Regulations represented by Gd-ECO class notation. Where X represents a notation of a corresponding sub-element of ecological protection.

(2) Notations of sub-element of GHG emission control include:

CDx: means notation of sub-element of CO_2 emission design index, where x represents the percentage ratio of the ship's Attained EEDI value lower than the Required EEDI value for that ship;

COM: means notation of sub-element of CO_2 emission operational management, indicating the levels of ship energy efficiency management and the company energy efficiency management.

(3) Notations of sub-elements of environmental friendliness include:

VIBx: means notation of sub-element of comfort onboard (vibration), where "x" represents the grade of comfort onboard (vibration);

NOIx: means notation of sub-element of comfort onboard (compartment noise), where "x" represents the grade of comfort onboard (compartment noise);

CLx: means notation of sub-element of comfort onboard (indoor climate), where "x" stands for the grade of comfort onboard (indoor climate);

UW: means notation of sub-element of underwater noise, indicating the level of control of the adverse effects of underwater noise caused by the ship on aquatic life;

RN: means notation of sub-element of environmental noise, indicating the level of control of the adverse effects of noise caused by the ship on living and working environment of residents on shore.

4.2 Technical requirements for Gd-ECO class notation

4.2.1 General requirements

4.2.1.1 The Gd-ECO class notation may be assigned to ships complying with the latest applicable requirements in force of PART FIVE of Domestic Regulations and are provided with corresponding statutory certificates or documents of compliance:

(1) Requirements of Section 3, Chapter 7, PART FIVE of Domestic Regulations①.

4.2.2 Documentation requirements

4.2.2.1 The following applicable plans and documents are to be submitted for approval or for information:

(1) EEDI technical file (including the information on calculation process and results of the Attained EEDI of ships);

(2) Relevant supportive background documents needed for calculation and verification of EEDI technical file and additional information necessary for the verification (for information);

(3) Information on major conversion and description of recalculation of the Attained EEDI and the recalculated EEDI technical file;

(4) Relevant supportive background documents needed for calculation and verification of recalculated EEDI technical file and additional information necessary for the verification after major conversion (for information) (if applicable).

4.3 GHG emission control

4.3.1 Definitions and application

4.3.1.1 For the purpose of this regulation, the following definitions apply:

(1) *Bulk carrier* means a ship which is constructed generally with single deck, top-side tanks and hopper side tanks in cargo spaces, and is intended primarily to carry dry cargo in bulk, including such types as ore carriers and combination carriers.

(2) *Tanker* means an oil tanker as defined in Chapter 2, or a chemical tanker or an NLS tanker as defined in Chapter 3 of PART FIVE of Technical Regulations for Statutory Surveys of Sea-going Ships Engaged on Domestic Voyages.

(3) *Container ship* means a ship designed exclusively for the carriage of containers in holds and on deck.

(4) *Dry cargo ship* means a ship designed primarily for the carriage of dry cargo (including liquid cargo in barrels) in holds or on the deck, excluding bulk carriers, container ships, ro-ro cargo ships, refrigerated cargo ships, cement carriers, livestock carriers, woodchip carriers and deck cargo ships.

(5) *Conventional propulsion* means a method of propulsion where a main reciprocating internal combustion engine(s) is the prime mover and coupled to a propulsion shaft directly or through a gear box.

(6) *Non-conventional propulsion* means a method of propulsion, other than conventional propulsion, including diesel-electric propulsion, turbine propulsion and hybrid propulsion systems.

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① To implement after amendments to 2022 Domestic Regulations take effect.

4.3.1.2 Regulation 4.3.2 of this Chapter applies to sea-going ships engaged on domestic voyages which fall within the ship types as defined in 4.3.1.1 (1) to (4) above.

4.3.1.3 Regulation 4.3.2 of this Chapter does not apply to ships having non-conventional propulsion systems which fall within the ship types as defined in 4.3.1.1(1) to (4) above.

4.3.1.4 Regulation 4.3.2 of this Chapter does not apply to ships not propelled by mechanical means, such as barges, and platforms (including FPSOs and FSUs) and drilling units.

4.3.2 Requirements for CO_2 emission design index for newbuildings

4.3.2.1 The CDx notation of sub-element of of CO_2 emission design index may be assigned to a ship having the Attained EEDI less than or equals to the Required EEDI, of which x is to be calculated from the following formula:

$$x\% = \frac{Required\ EEDI - Attained\ EEDI}{Required\ EEDI} \times 100\%$$

where x takes only the integer by rounding off the decimal part. When the finally verified value of x is greater than that for the application of the notation, the applied value of x may remain unchanged unless the shipowner proposes to change. When the finally verified value of x is less than that for the application of the notation, the value of x in CDx is to be reverified according to the result of final verification of Attained EEDI.

4.3.2.2 The Required EEDI value of a ship is to be determined by the following formula and the relevant parameters given in Table 4.3.2.2.

$$\text{Required EEDI} = a \times b^{(-c)}$$

where: b is the Capacity.

Parameters for Determination of Required EEDI **Table 4.3.2.2**

Ship type	***a***	**Capacity** ***b***	***c***
Bulk carrier	142.8	DWT	0.294
Tanker	161.8	DWT	0.286
Container ship	452.2	DWT	0.370
Dry cargo ship	142.8	DWT	0.294

4.3.2.3 If the design of a ship falls into more than one of the ship types specified in Table 4.3.2.2, the Required EEDI of the ship is to be the lowest Required EEDI.

4.3.2.4 The Attained EEDI for ships is to be calculated and verified in accordance with CCS Guidelines on Calculation and Verification of the Energy Efficiency Design Index (EEDI) of Sea-going Ships Engaged on Domestic Voyages.

4.3.2.5 The ship is to designed so as to have sufficient installed power to maintain the manoeuvrability in navigable conditions while meeting the corresponding Required EEDI.

4.3.3 Requirements for CO_2 emission operational management of ships

4.3.3.1 The COM sub-element notation for CO_2 emission operational management may be assigned to ships complying with the requirements of 2.3.4 of the Rules.

4.3.4 Documentation requirements

4.3.4.1 For ships to be assigned with sub-element notations for GHG emission control , the documents are to be submitted in compliance with following requirements:

(1) Documents mentioned in 4.2.2 of the Rules;

(2) Ship energy efficiency management plan (SEEMP) (only applicable to COM sub-element notation).

4.4 Environmental friendliness

4.4.1 Vibration

4.4.1.1 The corresponding VIBx sub-element notation of vibration comfort may be assigned to sea-going ships engaged on domestic voyages complying with the applicable requirements of 2.5.1 of the Rules.

4.4.2 Compartment noise

4.4.2.1 The corresponding NOIx sub-element notation of noise comfort may be assigned to sea-going ships engaged on domestic voyages complying with the applicable requirements of 2.5.2 of the Rules.

4.4.3 Indoor climate

4.4.3.1 The corresponding CLx sub-element notation of indoor climate may be assigned to sea-going ships engaged on domestic voyages complying with the applicable requirements of 2.5.3 of the Rules.

4.4.4 Underwater noise

4.4.4.1 The corresponding UW sub-element notation of underwater radiated noise may be assigned to sea-going ships engaged on domestic voyages complying with the relevant requirements of 2.5.4 of the Rules.

4.4.5 Environmental noise

4.4.5.1 The corresponding RN sub-element notation of environmental noise may be assigned to sea-going ships engaged on domestic voyages complying with the applicable requirements of 2.5.5 of the Rules.

4.4.6 Documentation requirements

4.4.6.1 For ships to be assigned with sub-element notations for environmental friendliness, the documents are to be submitted in accordance with 2.5.6 of the Rules.

4.5 Survey requirements

4.5.1 Product inspection

4.5.1.1 The products meeting ecological protection requirements covered in this Chapter are only for the purpose of obtaining and maintaining the ecological protection class notations in this Chapter.

4.5.1.2 Where no technical requirements are specified for any products covered by the Rules, they may be designed, manufactured and tested according to applicable standards at the discretion of the manufacturer. The confirmation of technical requirements for such products are in general to include:

(1) Drawings and information of products;

(2) Condition for use on board;

(3) Requirements for material and welding;

(4) Test items relating to safety and performance.

4.5.2 Survey of class notation of ship ecological protection

4.5.2.1 Initial classification

(1) Plans and documents

① For ships intending to apply for Gd-ECO class notation, plans and documents are to be submitted according to the provisions of 4.2.2, Chapter 4 of the Rules;

② For ships intending to apply for Gd-ECO(X) class notation, plans and documents required by sub-element corresponding to X are to be submitted according to the provisions of 4.3.4 and 4.4.6, Chapter 4 of the Rules.

(2) Initial classification survey is to include:

① In order to assign Gd-ECO class notation, initial survey involved in Chapter 24, PART ONE of Domestic Regulations to which the ships apply is to be completed and the corresponding requirements of Section 3, Chapter 7, PART FIVE of Domestic Regulations are to be met;

② In order to assign Gd-ECO(X) class notation, the required survey aiming at following detailed X sub-element is to be completed to verify compliance of corresponding technical requirements:

a. CDx: requirements of 4.3.2, Chapter 4 of the Rules;

b. COM: requirements of 4.3.3, Chapter 4 of the Rules;

c. VIBx: requirements of 4.4.1, Chapter 4 of the Rules;

d. NOIx: requirements of 4.4.2, Chapter 4 of the Rules;

e. CLx: requirements of 4.4.3, Chapter 4 of the Rules;

f. UW: requirements of 4.4.4, Chapter 4 of the Rules;

g. RN: requirements of 4.4.5, Chapter 4 of the Rules.

4.5.2.2 Annual survey

(1) It is to confirm that the ship holds valid certificates or documents of compliance, logbook and approved procedure documents required by Chapter 4 of the Rules.

4.5.2.3 Special survey

(1) It is to confirm that the ship holds valid certificates or documents of compliance, logbook and approved procedure documents required by Chapter 4 of the Rules.

4.5.2.4 Where CCS is not authorized to carry out statutory service, it is to confirm that the ship holds all relevant valid statutory certificates or documents, and an overall assessment is performed to the items relating to statutory certificates, at the same time, the condition that the ship complies with the notation requirements of this Chapter is to be checked to confirm compliance with all relevant requirements of this Chapter.

CHAPTER 5 REQUIREMENTS FOR ENVIRONMENTAL PROTECTION

5.1 General requirements

5.1.1 This Chapter specifies the relevant requirements of environmental protection elements for Gd-EP and Gd-EP(X) class notations for sea-going ships engaged on domestic voyages.

5.1.2 Environmental protection elements include the following:

(1) control of discharge of water pollutants, including control of discharge into the sea of oil, noxious liquid substances, harmful substances carried by sea in packaged form, sewage and grey water and garbage;

(2) control of emission of air pollutants, including nitrogen oxides (NO_x) from marine engines, sulphur oxides (SO_x) and particulate matter (PM), carbon oxide (CO) and hydrocarbon (HC) from fuel combustion, volatile organic compounds (VOCs) from cargoes, ozone-depleting substances (ODS) from ship's fire-extinguishing systems and refrigeration systems, exhaust gas from onboard incineration;

(3) control of use of hazardous materials, including prohibiting the use of hazardous materials such as harmful anti-fouling systems (AFS) and asbestos, control of use of other hazardous materials①, prevention of pollution caused by dismantling of ships.

5.1.3 Class notations related to environmental protection of green-eco ships are as follows:

(1) Class notations of environmental protection for green-eco ships include:

Gd-EP: means that only the mandatory and statutory requirements of Domestic Regulations etc. are complied with.

Gd-EP (X): means that the requirements of some sub-elements of environmental protection are higher than the mandatory and statutory requirements of Domestic Regulations represented by Gd-EP notation, where X represents a notation for a sub-element of environmental protection.

(2) Notations of sub-elements of water pollutants discharge control include:

OILx: means notation of sub-element of oil pollutants control, where x represents the level of control of oil pollutants;

EAL: means environmental acceptable lubricants are used or other equivalent measures are adopted on the ship;

IBTS: means the ship satisfies the requirements for integrated bilge water treatment system;

NLSx: means notation of sub-element of noxious liquid substances control, where x represents the level of control of noxious liquid substances;

SC: means notation of sub-element of sewage discharge control;

GWC: means notation of sub-element of grey water discharge control;

RC: means class notation of sub-element of garbage discharge control.

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① Including 9 hazardous materials listed in Appendix 2 of the Hong Kong Convention.

(3) Notations of sub-elements of air pollutants emission control include:

NECx: means notation of sub-element of control of NO_x emission from diesel engines, where x represents the level of emission control;

SEC: means notation of sub-element of emission control of SO_x and particulate matter (PM) from ships;

VCS: means notation of sub-element of VOC emission control of cargoes of tankers;

VCS-T: means notation of sub-element of VOC emission control of cargoes of auxiliary ships;

RSCx: means notation of sub-element of management and emission control of refrigerant of refrigeration system of ships, where x represents the level of emission control;

INC: means notation of sub-element of emission control of incineration operation on board;

GBEC: means notation of sub-element of emission control of exhaust gas pollutants from diesel engines, indicating that the ship complies with phase II limit in GB 15097-2016 - Emission Limits and Measurement Methods of Exhaust Gas Pollutants from Ship Engines (China Phase I and II).

(4) Notations of sub-elements of control of use of hazardous materials include:

AFS: means notation of sub-element of anti-fouling systems that do no use organotin compounds as biocides;

AFS+: means notation of sub-element of anti-fouling systems that do not contain any biocides;

GPR: means notation of sub-element of control of hazardous materials of ship, indicating that the ship has inventory of hazardous materials complying with the requirements of the convention.

5.2 Technical requirements for Gd-EP class notation

5.2.1 General requirements

5.2.1.1 The Gd-EP class notation may be assigned to ships complying with the latest requirements in force of PART FIVE of Domestic Regulations, and holding the corresponding statutory certificates or document of compliance.

5.2.1.2 In addition, ships to be assigned the Gd-EP class notation are to comply with the following requirements, as applicable:

(1) For ships with an aggregate oil fuel capacity of 600 m^3 and above, the design of all oil fuel tanks with individual capacity greater than 30 m^3 is to comply with the requirements for oil fuel tank protection of 2.4, Chapter 2, PART FIVE of Domestic Regulations.

(2) The use of ozone-depleting substances is prohibited in shipboard refrigerating systems (excluding permanently sealed equipment without refrigerant charging connection or permanently sealed equipment without removable parts containing ozone-depleting substances) and fire-extinguishing systems (including fixed fire-extinguishing systems and portable fire extinguishers).

(3) Diesel engines with an individual output power greater than 130 kW, other than emergency diesel engines, those installed on lifeboats or used solely for emergency purposes, are to comply with the nitrogen oxide (NOx) emission limits as specified below:

① 14.4 g/kWh, when n<130r/min;

② 44.0× $n^{(-0.23)}$ g/kWh, when 130r/min≤n<2000r/min;

③ 7.7 g/kWh, when n≥2000r/min.

where n is rated engine speed (crankshaft revolutions per minute).

The test procedures and measurement methods are to comply with the requirements of CCS Guidelines for Testing and Survey of Emission of Nitrogen Oxides from Marine Diesel Engines.

5.2.2 Documentation requirements

5.2.2.1 The following operational procedural documents, where applicable, are to be approved or for information and kept on board the ship:

(1) Shipboard oil pollution emergency plan (for information);

(2) STS operations plan (only for oil tankers conducting STS operations);

(3) Fuel oil change-over procedure;

(4) VOC management plan (for crude oil tankers);

(5) Shipboard marine pollution emergency plan or shipboard marine pollution emergency plan for noxious liquid substances (for chemical tankers or NLS tankers) (for information);

(6) NO_x emission control/measurement procedures.

5.2.2.2 The following plans and information are to be submitted for approval:

(1) Arrangement of cargo tanks and ballast tanks, including drawings showing cargo and ballast pipe systems, and overflow protection arrangement (for oil tankers, chemical tankers and NLS tankers);

(2) Arrangement of fuel oil storage, settling and daily service tanks, including overflow protection arrangement;

(3) Arrangement of fuel oil tanks and piping;

(4) Capacity of bilge water holding tanks (if fitted), sludge tanks and slop tanks together with piping arrangement;

(5) Arrangement of cargo oil and non-cargo-oil loading and unloading facilities, including connections, drip trays and drainage systems;

(6) Arrangement and details of sewage system, including treatment equipment, including capacity of storage tank and treatment capacity etc.;

(7) Sketch and details of incinerators and associated piping and monitoring equipment;

(8) Arrangement and details of exhaust gas cleaning system;

(9) Sketch and details of garbage storage or treatment system;

(10) Details of fire-extinguishing media used in fixed fire-extinguishing systems and portable fire extinguishers, including names, quantities, etc.;

(11) arrangement plan and details of boil-off gas recovery system;

(12) Any information related to additional environmental protection requirements of the flag State Administration or the Owner of the ship.

5.3 Control of discharge of water pollutants

5.3.1 Control of discharge of oil pollutants

5.3.1.1 The OIL1 sub-element notation may be assigned to ships complying with the applicable requirements of 3.3.1.1 of the Rules.

5.3.1.2 The OIL2 sub-element notation may be assigned to ships complying with the applicable requirements of 3.3.1.2 of the Rules.

5.3.1.3 The EAL sub-element notation may be assigned to ships complying with relevant requirements of 3.3.1.3 of the Rules.

5.3.1.4 The IBTS sub-element notation may be assigned to ships complying with relevant requirements of 3.3.1.4 of the Rules.

5.3.2 Control of discharge of noxious liquid substances

5.3.2.1 The NLS1 sub-element notation may be assigned to ships complying with the applicable requirements of 3.3.2.1 of the Rules.

5.3.2.2 The NLS2 sub-element notation may be assigned to ships complying with the applicable requirements of 3.3.2.2 of the Rules.

5.3.3 Control of discharge of sewage

5.3.3.1 The SC sub-element notation may be assigned to ships complying with applicable requirements of 3.3.3.1 of the Rules as well as the following requirements:

(1) When sewage is discharged after being treated by the sewage treatment plant when the ship is within 3 nautical miles from the nearest land, the ship is to be on the voyage.

(2) The requirement of (1) above is to be described in the sewage management plan.

5.3.4 Control of discharge of grey water

5.3.4.1 The GWC sub-element notation may be assigned to ships complying with the applicable requirements of 3.3.4 of the Rules.

5.3.5 Control of discharge of garbage

5.3.5.1 The RC sub-element notation may be assigned to ships complying with the applicable requirements of 3.3.5 of the Rules.

5.3.6 Documentation requirements

5.3.6.1 For ships to be assigned with sub-element notations for discharge control of water pollutants, the information is to be submitted in accordance with 3.3.6 of the Rules.

5.4 Control of emission of air pollutants

5.4.1 Control of emission of exhaust gas pollutants from diesel engines

5.4.1.1 The NEC1 sub-element notation may be assigned to sea-going ships engaged on domestic voyages constructed before 1 March 2015, where NO_x emission from each marine diesel engine with a single cylinder displacement of 30 L and above installed on the ship is within the following limits:

(1) 14.4g/kW·h, when n<130r/min;

(2) $44.0\times n^{(-0.23)}$g/kW·h, when 130r/min≤n<2000r/min;

(3) 7.7g/kW·h, when n≥2000r/min.

where n is rated engine speed (crankshaft revolutions per minute).

5.4.1.2 The NEC2 sub-element notation may be assigned to all sea-going ships engaged on domestic voyages, where NO_x emission from each marine diesel engine with a single cylinder displacement of 30 L and above installed on board is within the following limits:

(1) 3.4g/kW·h, when n<130r/min;

(2) $9.0\times n^{(-0.2)}$g/kW·h, when 130r/min≤n<2000r/min;

(3) 2.0g/kW·h, when n≥2000r/min.

where n is rated engine speed (crankshaft revolutions per minute).

5.4.1.3 The NEC1 or NEC2 sub-element notation may be assigned to ships on which NO_x reducing devices are fitted to reduce NO_x emissions below the limits specified in 5.4.1.1 or 5.4.1.2. Such devices are to be approved by CCS.

5.4.1.4 For assignment of the NEC1 or NEC2 sub-element notation, the test procedures and measurement methods for NO_x emission from diesel engines are to comply with the requirements of CCS Guidelines for Testing and Survey of Emission of Nitrogen Oxides from Marine Diesel Engines.

5.4.1.5 The GBEC sub-element notation may be assigned to sea-going ships engaged on domestic voyages, where emission of exhaust gas pollutants (CO, HC+NO_x, PM) from each marine diesel engine with a single cylinder displacement below 30 L installed on board is within the following limits of emission standards:

(1) phase II limit in GB 15097-2016 - Limits and measurement methods for exhaust pollutants from marine engines (CHINA I、II) for rated power of 37 kW and above. The test procedures and measurement methods are to comply with the requirements of GB 15097-2016.

(2) phase IV limit in GB 20891-2014 - Limits and measurement methods for exhaust pollutants from diesel engines of non-road mobile machinery (CHINA III、IV) for rated power below 37 kW. The test procedures and measurement methods are to comply with the requirements of GB 20891-2014.

5.4.1.6 The requirements of this regulation do not apply to emergency engines, or engines fitted on lifeboats, or engines of devices or equipment used only in emergencies.

5.4.2 Control of SOx emission

5.4.2.1 The SEC sub-element notation may be assigned to sea-going ships engaged on domestic voyages complying with the relevant requirements of 3.4.2 of the Rules.

5.4.3 Control of VOCs emission from tankers

5.4.3.1 The VCS sub-element notation may be assigned to sea-going ships engaged on domestic voyages complying with the relevant requirements of 3.4.4.1 of the Rules.

5.4.3.2 The VCS-T sub-element notation may be assigned to sea-going ships engaged on domestic voyages complying with the relevant requirements of 3.4.4.2 of the Rules.

5.4.4 Control of emission from shipboard incineration

5.4.4.1 The INC sub-element notation may be assigned to sea-going ships engaged on domestic voyages complying with the relevant requirements of 3.4.5 of the Rules.

5.4.5 Control of emission of ozone-depleting substances

5.4.5.1 The RSC1 sub-element notation may be assigned to sea-going ships engaged on domestic voyages complying with the relevant requirements of 3.4.6.2 of the Rules.

5.4.5.2 The RSC2 sub-element notation may be assigned to sea-going ships engaged on domestic voyages complying with the relevant requirements of 3.4.6.3 of the Rules.

5.4.6 Documentation requirements

5.4.6.1 For ships to be assigned with sub-element notations for emission control of air pollutants, the following applicable information is to be submitted for approval in addition to applicable plans and documents required by 5.2.2 of this Chapter.

5.4.6.2 Control of emission of exhaust gas pollutants from diesel engines

(1) engine technical file or emission test report approved by CCS;

(2) arrangement of control of emission of exhaust gas pollutants from diesel engines.

5.4.6.3 SOx emission control

(1) arrangement of SOx emission control;

(2) when applied as equivalent, review of plans and arrangement of exhaust gas cleaning system or other technical methods.

5.4.6.4 VOC emission control

(1) The following plans and documents are to be submitted for approval by ships for which VCS or VCS-T sub-element notation is requested:

① Diagrammatic plan of the vapour piping system, indicating material specifications, scantlings, ratings, joining details and fittings;

② Diagrammatic plan of the gauging system and overfill protection, indicating manufacturer and type of the equipment or instruments, hazardous area locations, location of electrical equipment in gas–dangerous spaces and safe certificates of the electrical instruments intended to be used in hazardous locations, electrical schemes concerning the alarm system supply, electrical schemes concerning the intrinsically safe circuits;

③ Diagrammatic plan of the venting system, indicating necessary data for verifying the venting capacity of the pressure/vacuum valves;

④ Pressure drop calculation comparing cargo transfer rates versus pressure drops from the farthest tanks to the vapour connection, including any possible hoses;

⑤ Calculations showing the time available between alarm setting and overfill at maximum loading rate for each tank;

⑥ Instruction manual.

(2) For ships for which VCS-T sub-element notation is requested, documentation of the explosion-proof devices, including equipment manufacturer, type and inspection documents, is also to be submitted for information.

5.4.6.5 Shipboard incineration emission control

(1) type approval certificate and instructions of incinerators;

(2) arrangement of shipboard incinerators.

5.4.6.6 Ozone-depleting substance emission control

(1) diagrammatic plan of refrigerating equipment and arrangement;

(2) refrigerant management plan.

5.5 Control of use of hazardous materials

5.5.1 Control of harmful anti-fouling systems

5.5.1.1 The AFS+ sub-element notation may be assigned to ships complying with the relevant requirements of 3.5.1.1 of the Rules.

5.5.1.2 The AFS sub-element notation may be assigned to ships complying with the relevant requirements of 3.5.1.3 of the Rules.

5.5.2 Control of hazardous materials

5.5.2.1 The GPR sub-element notation may be assigned to ships complying with the relevant requirements of 3.5.2.1 of the Rules.

5.5.3 Documentation requirements

5.5.3.1 For ships to be assigned with sub-element notations for control of use hazardous materials, information is to be submitted in accordance with the applicable requirements of 3.5.3 of the Rules.

5.6 Survey requirements

5.6.1 Product inspection

5.6.1.1 The products meeting environment protection requirements covered in this Chapter are only for the purpose of obtaining and maintaining the environment protection class notations in this Chapter.

5.6.1.2 Where no technical requirements are specified for any products covered by the Rules, they may be designed, manufactured and tested according to applicable standards at the discretion of the manufacturer. The confirmation of technical requirements for such products are in general to include:

(1) Drawings and information of products;

(2) Condition for use on board;

(3) Requirements for material and welding;

(4) Test items relating to safety and performance.

5.6.1.3 For the oil filtering equipment (including bilge water alarm unit) complying with OIL2 sub-element notation for discharge control of oil pollutant mentioned in 3.3.1.2 of the Rules, the product performance is to meet the requirements of 3.3.1.2 of the Rules, and the performance parameters are to be indicated in type approval certificate and product certificate.

5.6.1.4 For the sewage treatment plant complying with SC sub-element notation for control of sewage mentioned in 3.3.3.1 of the Rules, the product performance is to meet the requirements of 5.3.3.1 of the Rules, and compliance with the requirements of MEPC.227(64) is to be indicated in product type approval certificate, and relevant requirements of GB3552-2018 may also be indicated at the same time.

5.6.1.5 For the diesel engine complying with GBEC sub-element notation for control of emission of exhaust gas pollutants from diesel engines mentioned in 5.4.1.5 of the Rules, emission test is to be carried out according to the requirements of 5.4.1.5 of the Rules and corresponding emission certificates are to be obtained.

5.6.2 Survey of class notation of ship environment protection

5.6.2.1 Initial classification

(1) Plans and documents

① For ships intending to apply for Gd-EP class notation, plans and documents are to be submitted according to the provisions of 5.2.2, Chapter 5 of the Rules;

② For ships intending to apply for Gd-EP(X) class notation, plans and documents required by sub-element corresponding to X are to be submitted according to the provisions of 5.3.6, 5.4.6 and 5.5.3, Chapter 5 of the Rules.

(2) Initial classification survey is to include:

① In order to assign Gd-EP class notation, initial survey involved in PART ONE of Domestic Regulations is to be completed and the requirements of corresponding chapters of PART FIVE of Domestic Regulations are to be met;

② In order to assign Gd-EP (X) class notation, in addition to survey mentioned in 5.6.2.1(2)① of this Chapter, the required survey aiming at following detailed X sub-element is to be completed to verify compliance of corresponding technical requirements:

a. OlLx: requirements of 5.3.1.1 or 5.3.1.2, Chapter 5 of the Rules;

b. EAL: requirements of 5.3.1.3, Chapter 5 of the Rules;

c. IBTS: requirements of 5.3.1.4, Chapter 5 of the Rules;

d. NLSx: requirements of 5.3.2.1 or 5.3.2.2, Chapter 5 of the Rules;

e. SC: requirements of 5.3.3.1, Chapter 5 of the Rules;

f. GWC: requirements of 5.3.4.1, Chapter 5 of the Rules;

g. RC: requirements of 5.3.5.1, Chapter 5 of the Rules;

h. NECx: requirements of 5.4.1.1 or 5.4.1.2, Chapter 5 of the Rules;

i. GBEC: requirements of 5.4.1.5, Chapter 5 of the Rules;

j. SEC: requirements of 5.4.2, Chapter 5 of the Rules;

k. INC: requirements of 5.4.4, Chapter 5 of the Rules;

l. RSCx: requirements of 5.4.5.1 or 5.4.5.2, Chapter 5 of the Rules;

m. AFS/AFS+: requirements of 5.5.1.1 or 5.5.1.2, Chapter 5 of the Rules;

n. GPR: requirements of 5.5.2.1, Chapter 5 of the Rules.

③ In order to assign Gd-EP (VCS/VCS-T) class notation, in addition to survey mentioned in 5.6.2.1(2)① of this Chapter, survey mentioned in 6.3.1.2, Chapter 6, PART ONE of CCS Rules for Classification of Seagoing Steel Ships is to be completed.

5.6.2.2 Annual survey

(1) For Gd-EP class notation, annual survey involved in PART ONE of Domestic Regulations is to be completed and the requirements of corresponding chapters of PART FIVE of Domestic Regulations are to be met.

(2) For Gd-EP (X) class notation, in addition to survey mentioned in 5.6.2.2(1) of this Chapter, the survey aiming at X sub-element mentioned in 5.6.2.1(2)② of this Chapter is to be completed to verify compliance of corresponding technical requirements.

(3) For Gd-EP (VCS/VCS-T) class notation, survey mentioned in 6.3.1.3, Chapter 6, PART ONE of CCS Rules for Classification of Seagoing Steel Ships is to be completed.

(4) It is to confirm that the ship holds valid certificates or documents of compliance, logbook and approved procedure documents required by Chapter 5 of the Rules.

5.6.2.3 Intermediate survey

(1) For Gd-EP class notation, intermediate survey involved in PART ONE of Domestic Regulations mentioned in above 5.6.2.2(1) and applicable to ships is to be completed and meet the requirements of corresponding chapters of PART FIVE of Domestic Regulations.

(2) For Gd-EP (X) class notation, in addition to the survey mentioned in 5.6.2.3(1) of this Chapter, the survey aiming at X sub-element mentioned in 5.6.2.1(2)② of this Chapter is to be completed to verify compliance of corresponding technical requirements.

(3) For Gd-EP (VCS/VCS-T) class notation, survey mentioned in 6.3.1.3, Chapter 6, PART ONE of CCS Rules for Classification of Seagoing Steel Ships is to be completed.

(4) It is to confirm that the ship holds valid certificates or documents of compliance, logbook and approved procedure documents required by Chapter 5 of the Rules.

5.6.2.4 Special survey

(1) For Gd-EP class notation, renewal survey involved in PART ONE of Domestic Regulations mentioned in above 5.6.2.2(1) and applicable to ships is to be completed and meet the requirements of corresponding chapters of PART FIVE of Domestic Regulations.

(2) For Gd-EP (X) class notation, in addition to the survey mentioned in 5.6.2.4(1) of this Chapter, the survey aiming at X sub-element mentioned in 5.6.2.1(2)② of this Chapter is to be completed to verify compliance of corresponding technical requirements.

(3) For Gd-EP (VCS/VCS-T) class notation, survey mentioned in 6.3.1.4, Chapter 6, PART ONE of CCS Rules for Classification of Seagoing Steel Ships is to be completed.

(4) It is to confirm that the ship holds valid certificates or documents of compliance, logbook and approved procedure documents required by Chapter 5 of the Rules.

5.6.2.5 Where CCS is not authorized to carry out statutory service, it is to confirm that the ship holds all relevant valid statutory certificates or documents, and an overall assessment is performed to the items relating to statutory certificates, at the same time, the condition that the ship complies with the notation requirements of this Chapter is to be checked to confirm compliance with all relevant requirements of this Chapter.

Appendix 1 Measurement of Ship Vibration

1 General provisions

(1) This Appendix is intended to provide measurement requirements for ship vibration as specified in 2.5.1 and 4.4.1 of the Rules.

(2) The measurements of vibration may be undertaken by CCS or an organization accepted by CCS. The measurements are to be witnessed by a CCS Surveyor.

2 Instrumentation

(1) The vibration measurement and calibration equipment is to comply with ISO 6954:2000 and ISO 8041, and the instrumentation is to include at least a transducer with an appropriate amplifier, and a FFT analyzer.

(2) The instrumentation used is to be within a calibration validity period specified by the calibration authority, and copies of relevant documents are to be provided prior to measurements and together with the measurement report.

3 Conditions for measurements

(1) Conditions for vibration measurement are to be in accordance with ISO 6954:2000 and ISO 20283-2.

(2) Prior to measurements, a measurement procedure is to be submitted to CCS site surveyor for approval. This procedure is at least to contain details of the arrangement of measuring points, loading condition, weather condition, machinery operating condition and measuring equipment.

(3) Possible deviation from the required conditions may be accepted by CCS and this is to be clearly mentioned in the report.

(4) Tests are to be conducted when the ship is fully outfitted and all systems contributing to noise and vibration levels are operational.

(5) Generally the main engine is to operate with the power output corresponding to the designed normal seagoing condition, or at least 80% of the maximum continuous power available. All machinery and equipment that may operate simultaneously under normal operation conditions are to be run simultaneously.

(6) In general, the tests are to be conducted in deep water, with a water depth not less than 5 times the mean draft and a distance from shore not less than 25 times the ship breadth. For ships usually operating in shallow waters, the tests are to be performed with conditions corresponding to normal service conditions.

(7) The tests are to be conducted in sea conditions not greater than sea state 3 on the WMO sea state code, with the wind force being not greater than 4 on the Beaufort scale.

(8) Tests may generally be conducted in sea trial conditions. For cargo ships which may be operated over a large range of drafts, if the designed normal seagoing condition is different from the test conditions, additional measurements may be required.

(9) Ship course is to be kept constant as far as possible, with rudder angle variations being within the range of ±2 degrees portside or starboard, for the duration of the measurement.

(10) For offshore service ships to be operated at DP, measurements are to be carried out with the side thrusters in an operating condition corresponding to contractual conditions or with at least 40% power on the thrusters.

4 Arrangement of measurement points

Measurement locations are to be chosen so that the assessment represents the overall vibration environment on board the ship. In cabins, vibration readings are to be taken in the centre of the floor area. In large spaces, such as restaurants, sufficient measurements are required to define the vibration profile. CCS may require additional measurements at the measuring points or locations.

5 Measurement report

The vibration measurement report is to comply with ISO 6954:2000 and ISO 20283-2, and is to include a schematic diagram of the position and direction of measurement point, a list of vibration levels, machine operating conditions, measurement conditions and a copy of the metrological certificate of measurement instruments.

Appendix 2 Measurement of Ambient Noise from Ships

1 General provisions

(1) This Appendix is intended to provide measurement procedures and technical requirements for ambient noise from ships as specified in 2.5.5 and 4.4.5 of the Rules.

(2) This Appendix is for measurement of ship ambient noise, to reduce the effect of ambient noise on the banks of waterways and harbor areas.

(3) If a ship has undergone a major conversion which may affect ambient noise, re-measurement is to be carried out and confirmed.

2 Measuring instruments

(1) Measuring instruments include precision sound level meters, microphones, sound calibrators and windscreen, etc.

(2) Measuring instruments are to comply with the following requirements:

① free field microphones are to comply with the requirements of IEC 61094;

② sound level meters are to comply with the level 1 requirements in IEC 61672-1: 2002;

③ sound calibrators are to comply with the level 1 requirements in IEC 60942:2003;

④ filters are to comply with the level 1 requirements of IEC 61260:1995.

(3) All measuring instruments and calibrators are to be verified by nationally recognized metrological verification institutions and are within the period of validity.

3 Measurement conditions

3.1 Measurement site

(1) The surroundings of the microphone up to 30 m are to be free of large, sound-reflecting objects like barriers, hills, rocks, bridges or buildings, etc. The area between the vessel being measured and the measurement microphone is to be open water or the ground without sound absorbing coverings (e.g. grass, snow), free from any person or obstacle.

(2) Impacts of other noise sources are to be avoided during measurement, e.g. noise due to wind, the amplifier of the measuring instruments, electromagnetic interference or other external sound sources.

(3) At the test course, the depth of water is to be sufficient for normal operation of the vessel.

3.2 Meteorological conditions

(1) During measurement, wind velocity is not to exceed 7 m/s; measurement is to be avoided in conditions of rain or snow.

(2) Where there is prominent air flow, a windscreen is to be used to effectively avoid the impact on the measurement results.

3.3 Conditions of ships navigating in course or operating in harbors

(1) Ships are to be measured in typical navigational or harbor operational conditions.

(2) The main engines, generators and engine room ventilators, etc. are to run at a design output power for normal navigational or harbor operational conditions. All machinery installations that may be probably used at the same time during normal navigation or during operation in harbors are to be started simultaneously.

3.4 Background noise

(1) Background noise generated by external sound sources is not to affect the noise level at measurement positions.

(2) Background noise is at least to be 6 dB(A) lower than the measured radiated noise from ships.

(3) The effect of background noise on ambient noise is to be corrected according to Table 3.4.1.

Effect of background noise on ambient noise **Table 3.4.1**

Difference between the measured ambient noise and background noise, in dB	Correction to be applied to the measured ambient noise, in dB
≥10	0
6 to 9	-1

4 Measurement procedures

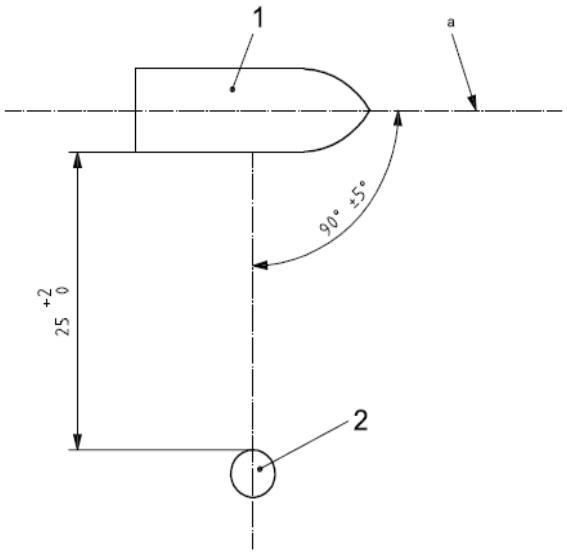
4.1 Measurement preparation

(1) The microphone is to be positioned 3.5 ± 0.5 m above the water surface and, if mounted on a solid surface, is to be positioned at least 1.2 m above that surface. The microphone is to be positioned within ± 0.5m of the edge of the surface above which it is mounted.

(2) The microphone may be placed on the shore, on a boat, on a remote buoy or other suitable platform. The microphone is to be oriented to the path of the ship in accordance with the manufacturer's recommendation.

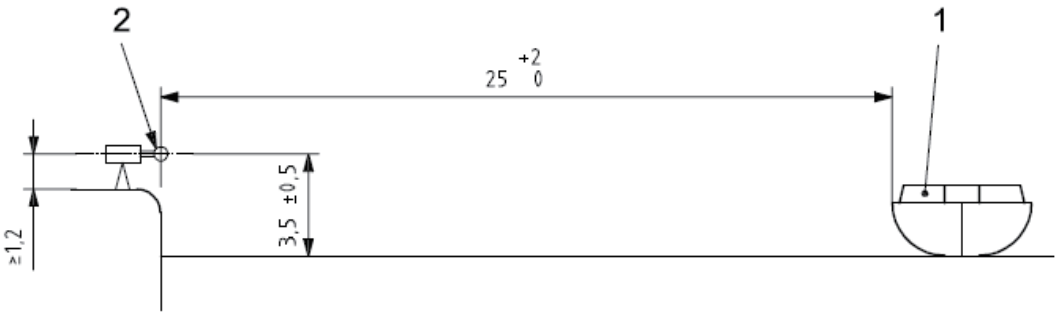
(3) When the vessel passes the point right in front of the microphone, the reference distance between the microphone and the ship is to be 25 ± 2m. Correction is to be made if there's deviation from this distance.

(4) For a ship operating in a harbor, the microphones are to be placed 25 ± 2 m from the ship and at several points around the ship.



1—ship being measured 2—microphone a—ship course line

Figure 4.1.1 Position of the microphone and test course



1—ship being measured 2—microphone

Figure 4.1.2 Microphone position and heights

4.2 Measurement procedures for ships navigating in course or operating in harbors

(1) The heading of the ship is to be a straight line as far as possible during measurement, and the test course is to be followed by the ship being measured as required and its heading is to be recorded.

(2) The vertical foot is obtained from the trajectory of the microphone to ship course. The ship being measured is to be in a condition as specified when at a distance from the microphone. Recording of data is to be started when the distance between the bow and the vertical foot is two times the ship length and recording is to be stopped when the distance between the stern and the vertical foot is two times the ship length.

(3) Analysis is to be carried out on the data of maximum AS-weighted sound pressure level recorded by the microphone which are to be used as a sample as a whole .

(4) At least two measurements are to be made for each side of the ship and the average value is to be taken. The difference between the measurement results is not to be greater than 3dB.

(5) If for the ship being measured, the reference distance of 25 m cannot be ensured, the measured maximum AS-weighted sound pressure level is to be corrected according to the following formula:

$$L_{pAS\ \max,25} = L_{pAS\ \max,d} + 20\lg(d / 25)$$

Where: $L_{pAS\,\max,25}$— The converted maximum AS-weighted sound pressure level when the distance between the microphone and the ship is 25m, in dB;

$L_{pAS\,\max,d}$ — The measured maximum AS-weighted sound pressure level measured at a distance d, in dB;

d — During measurement, the actual distance between the microphone and the side of the vessel being measured, in m.