BLUE ANGEL

The Environmental Label

Eco-Friendly Ship Design

DE-UZ 141

Basic Award Criteria

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Version 3

The Environmental Label is supported by the following four institutions:

Federal Ministry
for the Environment, Nature Conservation
and Nuclear Safety

The Federal Ministry for the Environment, Nature Conservation and Nuclear Safety is the owner of the label. It regularly provides information on the decisions taken by the Environmental Label Jury.

Umwelt Bundesamt

The German Environmental Agency with its specialist department for "Ecodesign, Eco-Labelling and Environmentally friendly Procurement" acts as office of the Environmental Label Jury and develops the technical criteria of the Basic Criteria for Award of the Blue Angel.

Jury Umweltzeichen

The Environmental Label Jury is the independent, decision-making body for the Blue Angel and includes representatives from environmental and consumer associations, trade unions, industry, the trade, crafts, local authorities, academia, the media, churches, young people and the German federal states.

RAL gGmbH

The RAL gGmbH is the awarding body for the Environmental Label. It organises the process for developing the relevant award criteria in independent expert hearings – which involve all relevant interest groups.

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List of Abbreviations

BImSchV	First ordinance for implementing the Federal Immission Control Act (17th BImSchV - Ordinance on Waste Incineration and Co-Incineration).
BLG	IMO's *Sub-Committee on Bulk Liquids and Gases*
B/15	Distance definition in IMO regulations: Ship's breadth / 15
BW	Ballast water
CFC	Chlorofluorocarbons
CO_2	Carbon dioxide
COW	*Crude Oil Washing*
dB	Decibel
DNV	Det Norske Veritas
dwt	Deadweight tonnage (cargo carrying capacity of a ship in tonnes)
EDTA	Ethylenediaminetetraacetic acid
EEDI	*Energy Efficiency Design Index* (for new ships according to MARPOL Annex VI)
EIAPP	*Engine International Air Pollution Prevention Certificate*
ETC	Effective Tank Cleaning (class notation)
EU	European Union
FSS Code	*International Code for Fire Safety Systems*
GL	Germanischer Lloyd
GRT	*Gross Register Tonnage*
GT	Gross tonnage
GWP	*Global Warming Potential* (or also CO_2 equivalent)
HELCOM	Helsinki Commission to protect the marine environment of the Baltic Sea
HCFC	Hydrochlorofluorocarbons
HFC	Hydrofluorocarbons
HFO	*Heavy Fuel Oil*
HSMS	*Hull Stress Monitoring System*
Hz	Hertz
IACS	*International Association of Classification Societies*

IBC Code	*International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk*
IBTS	*Integrated Bilge Water Treatment System*
IHM	*Inventory of Hazardous Materials*
ILO	*International Labour Organization*
IMO	*International Maritime Organization*
IPCC	*Intergovernmental Panel on Climate Change*
ISM	*International Safety Management Code*
Km	Kilometres
kn	Knots (nautical miles per hour)
kPa	Kilopascals
LAN	*Local Area Network*
LNG	*Liquefied Natural Gas*
MARPOL	*International Convention for the Prevention of Pollution from Ships*
MCR	*Maximum Continuous Rating*
MDO	*Marine Diesel Oil*
MEPC	*IMO's Marine Environment Protection Committee*
MGO	*Marine Gas Oil*
MSC	IMO's *Maritime Safety Committee*
MSFD	Marine Strategy Framework Directive
NECA	*NOx Emission Control Area* (for nitrogen emissions according to MARPOL Annex VI)
nm	Nautical miles
NO_X	Nitrogen oxides
NTA	Nitrilotriacetic acid
ODP	*Ozone Depletion Potential*
PFOS	Perfluorooctane sulfonate
PM	*Particulate Matter*
POP	*Persistent Organic Pollutants*
PRF	Port Reception Facilities
RO	*Recognised Organisation*
RP	*Redundant Propulsion* (additional class notation issued by the GL)
SCR	*Selective Catalytic Reactor*

SECA	*Sulphur Emission Control Area* (according to MARPOL Annex VI)
SMS	*Safety Management System*
SOLAS	*International Convention for the Safety of Life at Sea*
SOx	Sulphur oxides
TBT	Tributyltin
UBA	Federal Environmental Agency
VOC	*Volatile Organic Compounds*
WHO	*World Health Organisation*

1 Preface

In cooperation with the Federal Minister for the Environment, Nature Conservation and Nuclear Safety (BMU), the Federal Environmental Agency (UBA) and considering the results of the expert hearings conducted by RAL gGmbH, the Environmental Label Jury has set up these Basic Criteria for the Award of the Environmental Label. RAL has been tasked with awarding the Environmental Label. Upon application to RAL and on the basis of a Contract on the Use of the Environmental Label to be concluded with RAL, the permission to use the Environmental Label may be granted to all ocean-going ships according to Paragraph 2, provided that they comply with the requirements as specified hereinafter.

The term "ship design", as used herein, comprises planning, structural elements as well as the construction of a ship. This terminology is based on the approach of the International Maritime Organization (IMO) to reduce greenhouse gas emissions. This approach differentiates between "design" focussing on structural aspects and "operation" focussing on operational aspects.

1.1 Methodology

A ship included in the application for the Blue Angel eco-label must fulfil all of the mandatory requirements (M) for the relevant type of ship and also achieve a certain number of points (see table below) by implementing optional requirements (O).

It is not possible to develop environmental criteria for all types of ship, sizes of ships, shipping areas etc. that at the same time represent ambitious environmental requirements and can also be applied to all ships. Therefore, an optional points system has been developed for the eco-label. Thus, applicants have the flexibility to select those measures from the catalogue of requirements that are appropriate for their new ship and area of operation. This combination of mandatory and optional requirements nevertheless delivers an eco-label that represents stringent environmental standards. For this purpose, special requirements have been included in the Basic Award Criteria for some types of ship - e.g. tankers, passenger ships.

Depending on their relevant effect on the environment, the optional requirements are issued with a point score of between one and ten.

The total number of points that can be achieved from the optional requirements differs according to the type of ship and thus the number of points required for obtaining the Blue Angel eco-label also differs. The minimum number of points given in the table for

each individual category of ship must be achieved. The minimum number of points corresponds to around 35% of the possible points available for the optional requirements.

Type of ship	Total possible number of points	Minimum required number of points
Cargo ships:	145	51
Passenger ships[1]	150	53
Tankers	163	57

The mandatory and/or optional requirements are based on the existing regulations (see Chapter 1.2) from the IMO yet go above and beyond the legal requirements.

If an optional measure is introduced as a mandatory international regulation then the possibility of achieving optional points for this measure is automatically removed. The minimum required number of points is then adjusted accordingly so that the applicant still requires 35% of the total possible number of points.

This combination of mandatory requirements and optional requirements (35% of the total possible number of points) delivers a high environmental standard overall for ship design.

1.2 Legal framework conditions

1.2.1 SOLAS

The origins of the "International Convention for the Safety of Life at Sea" (SOLAS)[2] can be traced back to the year 1914, when rules and regulations were set up for international shipping in response to the sinking of the Titanic. Because of the two world wars, the SOLAS Convention did not enter into force until 1958. It was substantially revised in 1974. The convention includes regulations for ship design and ship operation with the aim of ensuring the safety of maritime traffic.

[1] The Basic Award Criteria also includes "comparable ships" in the "passenger ships" category. Definition: The number of non-crew members in general operation is greater than the number of crew on board (e.g. on research ships).

[22] SOLAS: *Safety of life at sea*

1.2.2 MARPOL 73/78

The MARPOL[3] Convention covers the prevention of pollution of the marine environment by ships. This applies not only to operational pollution, such as the discharge of oil-polluted waste water but also to accident-related pollution that may occur as a result of oil leakages caused by ship accidents. The different sources of pollution are handled separately in MARPOL in various Annexes and have been supplemented and expanded since the convention was adopted. The following table shows the structure of the Annexes to the MARPOL Convention:

Annex I	Pollution by oil
Annex II	Pollution by noxious liquid substances in bulk (other than oil)
Annex III	Pollution by harmful substances in packaged form
Annex IV	Pollution by sewage from ships
Annex V	Pollution by garbage from ships
Annex VI	Air pollution from ships

1.2.3 ISM Code

The International Safety Management Code (ISM Code) was introduced in 1987 in response to the capsizing of the *"Herald of Free Enterprise"* in Zeebrugge harbour. The ISM Code prescribes a management system for safe and more environmentally sound operation of ships and off-shore facilities. Certification extends not only to the ship but also to the shipping company whose responsibility will be – beyond compliance with the legal provisions – to develop and improve safety rules of its own. The Safety Management System (SMS) for the ISM Code includes the following points:

- Management of the shipping company

- Onboard management

- Communication between ship and shore

The objective of the Code is to ensure compliance with all relevant national and international regulations, such as SOLAS, MARPOL and class rules, create a lasting safety

[3] *International Convention for the Prevention of Pollution from Ships*

awareness among onboard and onshore personnel and a permanent readiness to act in case of emergency, as well as to prevent accidents and environmental damage.

1.2.4 Other international Conventions

Individual environmental aspects are considered under internationally developed conventions. Some examples of such conventions are the Convention on Recycling of Ships and the Antifouling Convention.

2 Scope

These Basic Award Criteria apply to merchant ships defined according to the latest version of the SOLAS Convention, as well as to supply, research and administration vessels listed on a Register of Shipping. Fishing vessels, naval ships, high-speed crafts within the definition of the HSC Code and nuclear powered ships, as well as recreational crafts, shall be excluded from the award of the Blue Angel eco-label.

Due to the broad spectrum of requirements and the fact that the onboard situation usually differs – even on board sister ships – the award of the Blue Angel eco-label always refers to a specific ship of a shipping company identified by its IMO number.

3 Environmental Protection in Ship Design

3.1 Protection of Bunker Tanks (M+O)

Large container ships can carry up to 10,000 tonnes of bunker fuel oil as fuel (HFO / MDO[4]). In the event of an accident, this amount of fuel represents a substantial risk to the environment. In particular, grounding or collision can cause significant pollution of the marine environment due to the ship fuel. According to MARPOL[5], it has been compulsory for all new ships to be equipped with a double-hull in the bunker tank section since 2010. Sludge tanks and certain pipe systems may nevertheless continue to be installed in the double-hull.

[4] HFO: *Heavy Fuel Oil* / MDO: *Marine Diesel Oil*
[5] Regulation 12A from MARPOL Annex I

3.1.1 International / regional Requirements

According to Regulation 12A of Annex I to the MARPOL Convention, ships delivered on or after August 1, 2010 must be equipped with a double-hull in the bunker tank section if the total bunker tank volume exceeds 600 m³. The tank size is limited to not more than 2,500 m³ in total[6].

3.1.2 Mandatory Requirements for Obtaining the Environmental Label

The same distances from the outer hull prescribed in the regulations for bunker tanks in MARPOL Regulation 12A must also be observed for sludge tanks.

3.1.3 Optional Requirements for Obtaining the Environmental Label

- The bilge water collection tanks shall also be located within the zone protected by the double-hull (4 points).
- In the case of ships with a total bunker tank volume < 600 m^3, a minimum distance B/15[7] from the outer hull is observed. Alternatively, the bunker tanks can also be protected by a complete double-hull (6 points).

3.1.4 Compliance Verification

Verification in the general or tank plans.

3.2 Onboard Use of Materials (M)

The materials used to build and equip a ship may be environmentally harmful, especially during ship repair or ship-breaking. These materials include, for example, tank coatings, insulating materials and chlorine-containing materials.

The IMO has compiled a list of the materials that need be taken into consideration. Documentation of the onboard use of materials facilitates not only ship repair and ship breaking but also the environmentally sound treatment and disposal of environmentally harmful materials.

3.2.1 International / regional Requirements

Since 2006, IMO's Marine Environment Protection Committee (MEPC) has been working together with representatives from the ILO and the Basel Convention on a Convention on Ship Recycling. The diplomatic conference for the adoption of the convention was held in May 2009 in the presence of 63 member countries. It is valid for new and

[6] In accordance with international practice, a comparable level of safety can also be verified using the probabilistic method.
[7] Ship's breadth / 15

existing ships with a size of 500 gross tonnes or greater. The convention will come into force two years after it has been ratified by at least 15 countries representing more than 40% of the world's gross merchant tonnage.

The focus of the convention is the creation of an Inventory of Hazardous Materials (IHM) carried on ships and the Authorization of Ship Recycling Facilities.

Guidelines have since been developed to support the implementation of the convention that covers the following themes:

- 2011: *Guidelines for the Development of the Inventory of Hazardous Materials*, MEPC.197(62);
- 2011: *Guidelines for the Development of the Ship Recycling Plan*, MEPC.196(62);
- 2012: *Guidelines for Safe and Environmentally Sound Ship Recycling*, MEPC.210(63);
- 2012: *Guidelines for the Authorization of Ship Recycling Facilities*, MEPC.211(63);
- 2012 *Guidelines for the Survey and Certification of Ships*, MEPC.222(64);
- 2012 *Guidelines for the Inspection*, MEPC.223(64).

The convention has not yet been signed by any of the member countries.

3.2.2 Mandatory Requirement for Obtaining the Environmental Label

Compliance with the regulations in the IMO Ship Recycling Convention and the European regulations for the use of materials on board ships in the currently valid version at the time of the application and independent of the ship's place of construction.

3.2.3 Compliance Verification

The applicant shall submit the IHM list and a Letter of Compliance or certificate to verify that the IMO Ship Recycling Convention and the European regulations for the use of materials on ships[8] have been observed.

3.2.4 Optional Requirement for Obtaining the Environmental Label

None.

[8] The list of materials to be tested for installation on ships is part of the IHM. The classification society, construction office or the shipyard is to confirm that the materials used for the construction of ships are not prohibited in the EU.

4 Structural Protection from accidental Environmental Pollution

4.1 Redundant Power Systems (O)

Loss of propulsion or steering is still one of the most common sources of hazard in maritime shipping. A significant number of all accidents at sea are attributed to the failure of engine components. Especially in coastal navigation and sea areas with high traffic density, this leads to situations that may cause pollution of marine and coastal areas. The use of redundant systems - which is currently only legally required for passenger ships - significantly enhances ship safety and thus environmental protection.

4.1.1 International / regional Requirements

Passenger ships with a length > 120 m that have three or more vertical fire zones and keel-laying on or after July 1, 2010 must be designed in accordance with SOLAS Regulation II-2/21. However, it does not prescribe automatically redundant power systems as described in Chapter 4.1.3.

Some classification associations issue additional class notations for redundant power systems (Redundant Propulsion, RP), that correspond to the relevant classification and construction regulations.

4.1.2 Mandatory Requirement for Obtaining the Environmental Label

None

4.1.3 Optional Requirement for Obtaining the Environmental Label

Installation of a redundant power system according to the additional class notation RP1 or higher under the rules for classification and construction issued by Germanischer Lloyd, I-Part 1, Chapter 14. Comparable additional class notations issued by an IACS-affiliated classification society will be recognized:

RP 1: 4 points

RP 2: 6 points

RP 3: 8 points

4.1.4 Compliance Verification

Include of an additional class notation into the class certificate to verify the redundant power system in accordance with RP1 or higher. Or include a comparable additional class notation from the relevant classification association or verification from a recognised organization.

4.2 Emergency Towing System (M+O)

In practice, problems are often encountered when establishing a towing connection between a disabled vessel and a tug that in many cases have caused failure and severe ecological damage. These problems could often have been avoided if the disabled vessel had been equipped with an emergency towing system.

On small ships (< 3,000 GRT) – because of the smaller load when being towed – evidence of a strong point on the bow of the ship (special or strengthened bitt or a corresponding eye for connecting the towing wire for the tug) shall also be considered as emergency towing equipment.

4.2.1 International / regional Requirements

The IMO currently only requires the use of an emergency towing system on tankers of 20,000 dwt or more.

4.2.2 Mandatory Requirement for Obtaining the Environmental Label

Installation of an emergency towing system approved under the provisions of Resolution MSC.35(63) or equivalent regulations on ships with a bunker fuel tank-capacity greater than 2,500 m³.

4.2.3 Compliance Verification

Ship safety construction certificate or certificate for the system and verification of the onboard installation of the system.

4.2.4 Optional Requirement for Obtaining the Environmental Label

Installation of an emergency towing system approved under the provisions of Resolution MSC.35(63) on ships with a bunker fuel tank volume smaller than 2,500 m³ (2 points).

4.2.5 Compliance Verification

Ship safety construction certificate or certificate for the system and verification of the onboard installation of the system.

4.3 Hull Stress Monitoring (O)

Monitoring the stress/strain in the structure of a ship using a Hull Stress Monitoring System (HSMS) enables critical conditions during loading, unloading and high seas to be quickly recognised and for countermeasures to be taken in good time, such as reducing speed or changing the course of the ship. The IMO especially recommends

the use of these systems for bulk container ships because of their high number of accidents. The systems are also being increasingly used onboard tankers and large container ships.

4.3.1 International / regional Requirements

None

4.3.2 Mandatory Requirement for Obtaining the Environmental Label

None

4.3.3 Optional Requirements for Obtaining the Environmental Label

Installation of a Hull Stress Monitoring System (3 points).

4.3.4 Compliance Verification

The certificate for the system and verification of the onboard installation of the system.

4.3.5 Explanatory Remarks

The above-mentioned system should not be confused with a ship loading calculator. A hull stress monitoring system continuously monitors the hull stresses and communicates data to the bridge. It is connected to an alarm device on the bridge.

5 Reduction of operation-related Emissions

The reduction of operation-related emissions is also to be primarily attributed to the operation of a ship. However, there are structural and design conditions that reduce emissions from a ship in operation right from the start. Also, ships design in the first place might open the possibility for a more environmentally sound operation.

5.1 Sulphur Dioxide Emissions (M+O)

Heavy fuel oil (HFO) is primarily used as fuel in the shipping sector. These residual oils from refineries contain significantly more sulphur and other pollutants e.g. heavy metals than other fuels used on land. The sulphur dioxide emissions (SOx) in the ship exhausts massively damage air quality particularly in port cities and coastal regions. The emissions cause a risk to health and contribute to the acidification and eutrophication of ecosystems (sea and land).

Accidents involving HFO have more severe environmental impacts than those accidents involving cleaner fuels that evaporate easier and can be biodegraded better by

microorganisms. Furthermore, handling HFO on board ships is significantly more complex because it needs to be cleaned and warmed due to its high viscosity before it can be pumped and supplied to the engine.

Even low-sulphur shipping fuels like Marine Diesel Oil (MDO) with 0.1% sulphur still contain 100 times more sulphur than road diesel in Europe.

5.1.1 International / regional Requirements

Annex VI to MARPOL requires all ships worldwide to burn fuel with a max. of 3.5 % sulphur and from 2020 a max. of 0.5% sulphur. In those special areas specified in Annex VI (SECA: Sulphur Emission Control Area), there is a lower limit value of a max. of 1.0 % sulphur, dropping to a limit value of 0.1 % from 2015[9].

The use of exhaust gas cleaning systems ("scrubbers") for the reduction of emissions is permitted as an alternative to comply with the above-named limit values according to MARPOL. In the case of systems where waste water is discharged into the sea, the limit values in the "Guidelines for Exhaust Gas Cleaning Systems 2009" according to MEPC 184(59) are valid.

5.1.2 Mandatory Requirement for Obtaining the Environmental Label

The limit values according to MARPOL Annex VI shall be observed without exhaust gas cleaning systems. This is valid for exhaust gas emissions from both main propulsion engines and auxiliary diesel engines, as well as from boilers.

5.1.3 Optional Requirement for Obtaining the Environmental Label

- Structural conditions permitting MDO/MGO operation only (distillate fuels) (7 points).
- Structural conditions permitting dual fuel operation using MDO/gas (8 points).
- Structural conditions permitting gas[10] operation only (10 points).

5.1.4 Compliance Verification

Verification that no exhaust gas cleaning system has been installed.

For 5.1.3: Verification of the relevant structural conditions or a certificate for the system (e.g. dual fuel engine) and its installation by the shipyard.

5.1.5 Explanatory Remarks

The exclusion of desulphurisation technology does not apply to inert gas processing systems on board tankers.

[9] The EU accepted these limit values in the amendments to Directive 1999/32/EC in 2012.
[10] The term "gas" within the framework of these Basic Award Criteria comprises LNG, CNG or LPG.

5.2 Nitrogen Oxide Emissions (M+O)

Nitrogen oxide (NOx) is formed during combustion in the engine. It contributes to the eutrophication of the ecosystem. In the sea, this increased contamination with nutrients is reflected in a depletion of oxygen and increased growth of algae blooms in small coastal waters or inland seas such as the Baltic Sea. The shipping routes are often close to densely populated coastlines, so these emissions also have a negative effect on human health. They lead, amongst other impacts, to respiratory illnesses, cardio-vascular diseases. They also contribute to the formation of ozone, which is also harmful to health.

5.2.1 International / regional Requirements

In MARPOL Annex VI and the NOx Technical Code, the maximum permissible emissions are defined using a limiting curve based on the speed of the engine. The limit values will be tightened in compliance with a schedule divided into three tiers: Tier I (since 2005), Tier II (2011) and Tier III (from 2016 for new ships in NECAs: NOx Emission Control Areas).

5.2.2 Mandatory Requirement for Obtaining the Environmental Label

None

5.2.3 Optional Requirement for Obtaining the Environmental Label

- Compliance with MARPOL Tier II minus 20% (4 points).
- Immediate application of MARPOL Annex VI Tier III for engine operation in port (6 points).
- Immediate application of MARPOL Annex VI Tier III for all engines (9 points).

5.2.4 Compliance Verification

EIAPP Certificate[11] or equivalent documents (test certificate also).

5.2.5 Explanatory Remarks

The energetic average of main and auxiliary engines shall be determined for assessment purposes. This shall be done on the basis of the IMO test cycles for obtaining the EIAPP Certificate. The limit values include technical solutions such as the use of gas and exhaust gas recirculation.

[11] *Engine International Air Pollution Prevention Certificate*

5.3 Particulate Emissions (O)

Particulate emissions (particulate matter / PM) are classified as dangerous to human health or carcinogenic respectively. The smaller the particles, the easier they can enter the blood stream via the lungs. In addition, hazardous materials such as heavy metals or carcinogenic polycyclic aromatic hydrocarbons (PAH) can be deposited on the surface of particulate matter. Soot as part of the total particulate matter is classified as carcinogenic by the WHO.

Measures or systems for reducing soot and particulate matter have only been tested or deployed to a limited extent up to now in large ship engines. The following measures can reduce PM emissions in principle: Internal engine design, use of sulphur-free fuels, homogenisation of the fuel, use of an onshore power supply in ports and the use of a PM filter.

5.3.1 International / regional Requirements

There are no direct limit values for particulate matter in the exhaust gas from ocean-going ships. MARPOL Annex VI, Regulation 14, combines PM emissions and the sulphur content in fuels.

Soot emissions (“Black carbon”) are currently being discussed in new IMO working papers in the MEPC and BLG (Bulk Liquids and Gases) committees.

5.3.2 Mandatory Requirement for Obtaining the Environmental Label

None

5.3.3 Optional Requirement for Obtaining the Environmental Label

The following methods may be considered for a qualitative reduction of particulate matter. They will be recognized if a qualitative reduction of the PM emissions can be proven. The different levels of effectiveness offered by the technologies are reflected in the relevant points score available.

- Installation of fuel-water emulsion technology (3 points);
- Additional systems to improve the air supply e.g. pre-engine fans or additional fans (3 points);
- PM-filters, use of gas (also in dual fuel engines) or other methods with a comparably high level of effectiveness (7 points).

5.3.4 Compliance Verification

Certificate for the system including verification of a quantitative reduction of PM emissions.

Verification of the installation of the system.

5.3.5 Explanatory Remarks

The reduction of PM by using an exhaust gas cleaning system (scrubber) shall be excluded for compliance with this requirement.

5.4 Carbon Dioxide Emissions (M+O)

Carbon dioxide (CO_2) is the most important known greenhouse gas. It is true that the damaging effect per unit is comparatively small but the quantity of emissions globally is enormous. That is why efforts are under way worldwide to reduce greenhouse gas emissions by means of the Kyoto Protocol.

A reduction of CO_2 emissions in the shipping sector is possible using a variety of different technical measures. CO_2 emissions are closely correlated with fuel consumption, which means that fuel consumption and also (CO_2) emissions increase exponentially with increasing speed. Reductions can be achieved if fuel consumption is lowered by increasing the efficiency of the engines used in ships, optimising the operative measures, reducing the ship (hull) resistance or also by reducing the speed of the ship. Economically and with a view to the optimal design of a ship, a reduction of speed in the design of a ship can to be combined with a correspondingly smaller propulsion engine i.e. designing a ship with a lower design speed. It should be kept in mind that large propulsion engines widely used in maritime shipping are already often more efficient than propulsion engines used onshore. In addition, the waste heat generated by the engines is used for the required process technologies on board, which once again improve the fuel utilisation efficiency on board.

Apart from the technical possibilities for promoting energy efficiency and energy savings by improving the ship's operating processes, there are niches where alternative energies are also being increasingly used in the shipping sector, whereby these approaches are yet only reasonable in parts of international maritime shipping.

It should be noted that the mandatory NOx emission reducing measures for engines tend to increase fuel consumption, which could only be limited as a result of intensive development work.

5.4.1 International / regional Requirements

The shipping sector is currently still exempt from international climate protection agreement. At MEPC, the involvement of maritime shipping in climate protection has already been discussed intensively. The following resolutions for technical aspects of new ships have been agreed up to now:

- MEPC.203(62): *Inclusion of regulations on energy efficiency for ships in MARPOL Annex VI.* The *Energy Efficiency Design Index* (EEDI) has been adopted with defined reference lines and limit values for the relevant ship types in Annex VI of MARPOL. Timetables have been defined for the listed ships in which the permissible EEDI for new ships is to be gradually reduced. The details are defined in Regulations 19 to 21. The first level of the EEDI requirements entered into force on January 1, 2013.
- MEPC.212(63): *Guidelines on the method of calculation of the attained Energy Efficiency Design Index (EEDI) for new ships* (2012). The guidelines describe the conversion of the test cycle results to the compulsory operating conditions of the ship for the calculation of the EEDI.
- MEPC.214(63): *Guidelines on survey and certification of the Energy Efficiency Design Index (2012).* The guidelines govern the surveying and certification of the EEDI actually achieved by the ship.
- MEPC.215(63): *Guidelines for calculation of reference lines for use with the Energy Efficiency Design Index (EEDI).* The guidelines define the procedure to be used for calculating reference lines.

5.4.2 Mandatory Requirement for Obtaining the environmental Label (M)

It is mandatory for all ships to be registered with the CO_2 reporting system of the classification society classifying the ship upon entry into service or when the application for the Blue Angel environmental label is made for already delivered and operating ships.

5.4.2.1 Types of Ships listed in MARPOL Annex VI, Regulation 21 (M)

The fulfilment of the requirements in the next mandatory phase, meaning[12]:

- Phase 1 for ships built between January 1, 2013 and December 31, 2014.
- Phase 2 for ships built between January 1, 2015 and December 31, 2019.

[12] The implementation according to MARPOL begins with phase "0"

5.4.2.2 Types of Ships with Reference Limits agreed by the MEPC but not yet in force (M)

If special phases have been defined in the EEDI requirements for the relevant type of ship then the immediate fulfilment of phase 0 is mandatory. If this deadline has been passed by the time of the application then the requirements apply in accordance with 5.4.2.1 (see above).

5.4.2.3 Types of Ships without Reference Lines according to Regulation 21 (M)

If sufficient data is available for the calculation of the reference line (number of ships and quality of information), a reference line can be determined in agreement with the testing institution (see 7.1) in individual cases and the reduction factors defined for the phases.

If the data is not sufficient or if the ship is designed for a new type of transportation task such as ships for the erection, maintenance or repair of offshore wind energy plants then proof of the systematic energy analysis for the design, construction and operation of these ships is to be submitted together with information on the improvements achieved compared to the current general state of technology.

5.4.3 Optional Requirement for Obtaining the Environmental Label (O)

- The ship fulfils the requirements according to the next required phase in 5.4.2, meaning that instead of phase 1 the ship already fulfils the requirements for phase 2 by 2015; from 2015 phase 3 is fulfilled instead of phase 2 (7 points).
- The ship fulfils the requirements according to the next but one required phase in 5.4.2, meaning that instead of phase 1 the ship already fulfils the requirements for phase 3 (9 points).[13]
- Additional technical measures for the reduction of CO_2 have been installed on the ship. These are measures that are not already included for the calculation of the EEDI for the ship (e.g. pump control, programme for ballast and trim optimisation, energy-saving lighting). The following points can be issued based on the effectiveness of the reduction measure:

  2 – less than 5 %: 2 points

  5 – less than 10 %: 4 points

  > 10 %: 6 points

[13] It is only possible to fulfil the requirement for the next but one phase up to January 1, 2015.

5.4.4 Compliance Verification

Certificate from the flag state or the Recognised Organisation (RO) in accordance with Regulation MEPC.214(63).

In the case of already delivered and operating ships, it is also possible to use corresponding alternative methods such as proof of the speed-power relationship during a loaded journey at EEDI depth in agreement with the flag state or the RO.

About the additional technical measures in 5.4.3: A survey report from a competent authority (e.g. RO) is to be submitted to verify the CO_2 reduction with information on the effectiveness of the reduction measure in percent. Verification of its installation.

5.4.5 Explanatory Remark on 5.4.2.3

Only those types of ships included within the scope of MEPC.215(63) may be considered. Designs that deviate from the standard (e.g. engine systems and propulsion as the distinguishing characteristic) may not be considered using a special reference line but must be compared with the defined reference line for the relevant type of ship.

5.5 Reducing Emissions during Time in Port (M+O)

The emission of air pollutants represents a special risk to health particularly in densely populated areas and ports. As land-based emissions have increasingly fallen in recent decades in Europe and sea traffic has tended to increase, the share of overall emissions accounted for by sea traffic has increased proportionately. Therefore, the EU has reduced the limits for the sulphur content of marine fuels during time in ports to 0.1 % as a measure for the reduction of emissions (EU Directive 2012/33/EU).

One option for observing this limit value is to cover the required energy on board using onshore electricity. In various use cases, the use of onshore electricity supplies has already proven itself fit for use e.g. in the ports in Gothenburg, Stockholm and Lübeck.

However, some questions still remain unanswered e.g. clarifying any liability claims if damage is caused as a result of the onshore power supply.

Another alternative is the use of gas to generate electrical energy for operation in ports.

5.5.1 International / regional Requirements

There are currently no binding international regulations. Some port cities already have or plan to use memoranda of understanding between local authorities and the shipping companies relating to the acceptance of onshore power supplies.

The EU Directive 2012/33/EU is valid in European ports, which limits the sulphur content in the marine fuel to 0.1% during the ship's time in port. In order to observe this limit value, alternative processes are permitted e.g. the use of onshore electricity.

5.5.2 Mandatory Requirement for Obtaining the Environmental Label (M)

Onboard preparation of measures that enable retrofitting for an:

- external electricity supply[14] or an
- alternative method to achieve a comparable reduction in air pollutants.

5.5.3 Compliance Verification

Verification provided in the technical documentation from the shipyard (possibly online diagram).

5.5.4 Optional Requirement for Obtaining the Environmental Label (O)

- Installation of a fully functional system for supplying the ship with external electricity for operation in ports (4 points).
- Installation of a fully functional system for supplying the ship with gas for operation in ports (7 points).
- Alternative option: Power generation in compliance with the limits specified in the 17th Federal Immission Control Ordinance (BImSchV) for the substances SOx, NOx, CO and particulate matter (8 points).

5.5.5 Explanatory Remark

The mandatory requirement is waived for tankers because any future developments relating to safety issues concerning the possible realisation of onshore electricity provision cannot be predicted.

5.6 Refrigerants (M+O)

The air-conditioning systems installed on the ship and the refrigeration systems installed for cooling the provisions rooms, fridges, ice machines etc. generally contain climate changing and ozone layer depleting substances. The use of refrigerants without Ozone Depletion Potential (ODP) and with a low Global Warming Potential (GWP) are finding increasing acceptance in the shipping sector and make a concrete contribution toward climate protection.

[14] "External electricity supply" also includes, for example, the use of electricity from an LNG Power Barge.

5.6.1 International / regional Requirements

In accordance with MARPOL Annex VI, Regulation 12, the installation of systems containing ozone depleting substances in the category CFC[15] is prohibited.

The installation of systems containing substances in the category HCFC[16] like chlorodifluormethane (R22) is still permitted until January 1, 2020 according to MARPOL. In the European Union and other countries, the installation of systems containing substances with ODP (e.g. CFC, HCFC) is already prohibited.

Hydrofluorocarbons (HFC) often used as a substitute for ozone depleting substances generally have a high global warming potential. The GWP value for the HFC tetrafluoroethane (R134a) is 1430, for the HFC mix R 407A it is 2107 and for R 404A it is 3922[17].

In accordance with Directive (EC) no. 842/2006 Article 4 (3) and (4), the refrigerant in mobile equipment is to be recovered during servicing, maintenance and final disposal.

5.6.2 Mandatory Requirement for Obtaining the Environmental Label (M)

- All refrigeration and air-conditioning systems must not contain any refrigerant with an ozone depleting effect (ODP = 0). Refrigeration systems must not contain any halogenated refrigerants, insofar as the use of natural refrigerants such as ammonia or CO_2 represents the latest state of technology for the intended application.
- All air-conditioning systems must not contain refrigerants with a GWP higher than 1800.
- An automatic signalling system with sufficient sensitivity for the refrigerant(s) used is to be installed to detect excessive refrigerant concentrations in systems with a filling quantity higher than 300 kg (leak detector / gas warning system).
- The ability to recover refrigerant from the system must be provided (Recovery Unit e.g. suction equipment for the recovery, refrigerant container or suitable space for setting up mobile equipment).
- Refrigeration and air-conditioning systems including all refrigerant-carrying parts must be accessible for leak tests, maintenance and repairs.

5.6.3 Optional Requirement for Obtaining the Environmental Label (O)

- Avoidance of the use of HFCs in all refrigeration and air-conditioning systems when it is technically possible (3 points).

[15] Chlorofluorocarbons
[16] Hydrochlorofluorocarbons
[17] These values are bases on the *IPCC 4th Assessment Report, Climate Change 2007*: Source: http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html#table-2-14 (observe errata); The values are also to be found in Annex I of the Basic Award Criteria

- Installation of permanent systems or those required for the ship's operation that exclusively use refrigerants based on natural substances (e.g. water, nitrogen, ammonia, CO_2) (4 points).
- Alternatively: Installation of permanent systems or those required for the ship's operation that exclusively use refrigerants based on natural substances (e.g. water, nitrogen, ammonia, CO_2) and whose operation can also additionally demonstrate better energy efficiency than the above-named process (6 points).

5.6.4 Compliance Verification

Data sheet, specification sheet for the refrigerant and verification that the systems have been filled with the refrigerant (e.g. service report). Description of the gas warning system.

Drawing of the system with information on the suction equipment, container location and access points to the system.

About 5.6.3 / bullet point 3: Description of the innovative concept and submission of a survey report showing that the systems display better energy efficiency.

5.6.5 Explanatory Remark

Only those systems belonging to the ship including the ship's air-conditioning systems, fridges, ice machines etc. can be considered but not conventional refrigeration containers designed for the temporary transport of cargo or for special purposes on board (e.g. for research ships) because the shipyard or the ship owners cannot have any influence over this equipment.

The GWP values are based on CO_2 as a reference substance over a time horizon of 100 years. The GWP values from the IPCC Fourth Assessment Report (AR4, 2007) are to be used (see Annex I).

5.7 Extinguishing Agents (M+O)

The use of extinguishing agents on board is necessary for the safety of the crew and the ship. Different extinguishing systems with environmentally friendly extinguishing agents are available.

Extinguishing agents can display Ozone Depletion Potential (ODP) and a high Global Warming Potential (GWP). In the case of both groups, there are now alternatives that are also finding acceptance in maritime shipping.

5.7.1 International / regional Requirements

In accordance with MARPOL Annex VI, Regulation 12, the installation of systems containing substances with Ozone Depletion Potential (ODP e.g. CFCs and halons) is prohibited. This has been valid in Germany since 1995 and in the EU since 2000.

HCFCs will also be prohibited according to MARPOL from 2020.

In accordance with Directive (EC) 842/2006, it is also prohibited to sell fully fluorinated hydrocarbons as extinguishing agents. HFCs with low global warming potential and halogen-free extinguishing agents and extinguishing systems are available as alternatives.

Since June 2011, fire extinguishing foam containing more than 0.001 percent by mass of perfluorooctanesulfonic acid and its derivatives (PFOS) are prohibited in the EU (Directive (EC) no. 757/2010 / Directive amending the Directive (EC) no. 850/2004 - POP directive).

5.7.2 Mandatory Requirement for Obtaining the Environmental Label (M)

- Observance of the limit values for ODP = 0 and GWP < 3500 for permanent systems or those required for the ship's operation including the hand portable fire extinguishers on board.
- Immediate observance of the EU Directive 757/2010 for all fire extinguishing foams in hand portable fire extinguishers and permanent systems.

5.7.3 Optional Requirement for Obtaining the Environmental Label (O)

Operation of permanent systems or those extinguishing agents required for the ship's operation based on environmentally friendly substances e.g. water, nitrogen, argon (4 points).

5.7.4 Compliance Verification

Certificate for the system and verification of the installation of the system.

5.8 Waste Avoidance (O)

The best solution to the waste problem is to avoid generating waste. This can be primarily achieved by a corresponding purchasing policy on the part of the shipping company and a conscious handling of the problem on board the ship. However, suitable supporting measures can also already be taken during the construction of the ship. In particular, the use of reusable and large containers, as well as the installation of dosing systems for cleaning agents and other operating materials, would have a

direct influence on the amount of waste generated on board ships. In addition, onboard equipment for the use of reusable large packaging could be provided.

5.8.1 International / regional Requirements

The IMO has not yet imposed any requirements. MARPOL Annex V includes requirements for waste disposal only.

5.8.2 Mandatory Requirement for Obtaining the Environmental Label (M)

None

5.8.3 Optional Requirement for Obtaining the Environmental Label (O)

Structural design facilitating the use of reusable and large packaging (3 points).

5.8.4 Compliance Verification

Verification of the structural design and its effectiveness.

5.9 Waste Disposal and Waste Incineration (M+O)

An increased level of pollution has been identified on beaches and coasts worldwide, as well as in sea water and the seabed alongside major shipping lanes, which is primarily caused by solid waste thrown overboard from ships at sea. The problem of waste from ships is mainly concentrated along the coasts of industrialised countries but waste from ships can also be found in remote sea areas.

From an environmental point of view, the most appropriate form of waste treatment is to take all waste ashore and dispose of it properly. In most industrialised countries and in many other countries, this is an effective way to protect the marine environment. This requires adequate storage capacities, shredders or compactors on board the ship

However, in remote areas without an effective waste disposal system where passenger ships are sailing this may lead to environmental problems. Due to the lack of storage capacities and because of possible hygienic problems on board the ship, waste incineration of defined substances is therefore useful and permitted on board passenger ships.

5.9.1 International / regional Requirements

5.9.1.1 MARPOL

MARPOL Annex V requires every ship over 400 GRT or carrying more than 15 persons to have a waste management plan. In particular, this includes the requirement to keep

a Garbage Record Book to record all disposal and waste treatment operations. The Garbage Record Book is also required under the ISM Code.

The permissible practice of waste disposal at sea depends on the sea area and on the type of waste. The regulations are based on the distance of the ship from the nearest coastline: the closer the ship gets to the shore, the more stringent the regulations. In addition, special areas can be stipulated according to MARPOL Annex V in which stricter regulations apply.

5.9.1.2 EU Directive on Port Reception Facilities for ship-generated Waste and Cargo Residues

The EU directive 2000/59/EC of the European Parliament and of the Council on port reception facilities for ship-generated waste and cargo residues entered into force on November 27, 2000. In accordance with the provisions of MARPOL Annex V, Regulation 7, it regulates the general waste disposal obligations of all ocean-going vessels, the availability of port reception facilities and the development of port waste management plans, as well as the associated fee system for the waste disposal.

The objectives of this directive include the reduction of marine pollution, transboundary marine environmental protection, EU-wide implementation of MARPOL, improvement of the use, availability and control of port reception facilities, as well as avoiding the distortion of competition resulting from different disposal modalities.

The directive on port reception facilities applies to all ships including fishing vessels and sport boats calling at a port of a member state or operated within this member state, irrespective of their flag.

5.9.2 Mandatory Requirement for Obtaining the Environmental Label (M)

Cargo ships:

- No shipboard waste incineration. Discharge of all garbage to onshore facilities. For this purpose, the ship shall provide adequate structural onboard storage facilities, possibly in combination with facilities for waste volume reduction, such as presses, shredders etc.

Passenger ships and comparable ships:

- Waste incineration on board is permitted. Waste aboard passenger ships or comparable ships may be incinerated in accordance with MARPOL Annex V. Ship-generated waste shall be incinerated in compliance with the limits specified in the 17th Federal Immission Control Ordinance (BImSchV) for the substances NOx, CO, SOx and particulate matter. As a matter of principle, the ash shall be disposed of on land.

5.9.3 Compliance Verification

Verification of the installation of storage space and / or facilities for volume reduction.

Passenger ships: If the ship is equipped with an incinerator: Verification of compliance with the above-mentioned limits (certificate for the system).

5.9.4 Optional Requirement for Obtaining the Environmental Label (O)

Passenger ships:

- In order to also avoid emissions of heavy metals and chlorine in the incineration of waste, process instructions for the incineration system that forbid the incineration of printed, colour, high-gloss paper and materials containing PVC (2 points).
- Ship-generated waste shall be incinerated in compliance with all of the limits specified in the 17th Federal Immission Control Ordinance (BImSchV). As a matter of principle, the ash shall be disposed of on land (4 points).
- No shipboard waste incineration. Structural designs are to be provided that guarantee the complete disposal of waste on land (6 points).

5.9.5 Compliance Verification

Verification in the general plan that no waste incineration plant has been installed.

If the ship is equipped with an incinerator: Verification that the system complies with all values in the 17th Federal Immission Control Ordinance (BImSchV) (certificate for the system).

Verification that the above-stated process instructions for the onboard operation have been created and are posted in a visible location next to the incineration system.

5.10 Black Water (Sewage) Treatment (M+O)

Effective onboard sewage treatment reduces nutrients and oxygen-demanding substances in waste water and thus eases the strain on the environment if it is discharged into the sea – especially in heavily travelled waters. A critical view is taken of chlorine disinfection of waste water which is still common practice because this process may lead to the formation of hazardous organic chlorine compounds which increase the impact on the environment. Alternatives include, for example, a system with a membrane filter or UV radiation following the biological waste water treatment.

5.10.1 International / regional Requirements

In general, MARPOL Annex IV regulates the discharge of black water (sewage) into the sea from ships larger than 400 GRT or those carrying more than 15 persons on board. The following exceptions are however permissible based on the distance to the nearest land:

- Outside 3 nm: Discharge from a certified sewage treatment plant (mechanically treated and disinfected),
- Outside 12 nm: without treatment at a minimum speed of 4 knots.

The permitted volume of residual chlorine for disinfecting waste water has been limited to 0.5 ppm since 2010[18].

From 2013, the Baltic Sea will become the first special area for the discharge of waste water from passenger ships. However, the regulation will only come into force when the adjacent states have provided sufficient port reception facilities[19].

5.10.2 Mandatory Requirement for Obtaining the Environmental Label (M)

No use of chlorine or halogen compounds for the treatment of waste water that is discharged into the sea. In addition, the following is valid for:

Passenger ships and comparable ships

- Use of a membrane system or comparable efficient technology.
- Collection of preliminary clarification products in storage tanks for incineration or disposal on land and
- the collection of biosludge in storage tanks for incineration or disposal on land.

5.10.3 Compliance Verification

Certificate for the system and verification of the installation of the system.

Verification of sufficient collection tanks for the preliminary clarification products or biosludge on board.

5.10.4 Optional Requirement for Obtaining the Environmental Label (O)

- Collection of all of the waste water in storage tanks and onshore disposal (6 points).

Cargo ships:

- Collection of preliminary clarification products in storage tanks and onshore disposal (2 points).

[18] MEPC.159(55)
[19] MEPC.200(62)

- Collection of biosludge in storage tanks and onshore disposal (3 points).

Passenger ships and comparable ships:

- Installation of a system that ensures the immediate observance of the limit values proposed by HELCOM[20] for the special areas according to MARPOL Annex IV Regulation 9.2.1 (5 points).

5.10.5 Compliance Verification

Certificate for the system and verification of the installation of the system.
Verification of sufficient collection tanks for the preliminary clarification products and/or biosludge on board.

5.10.6 Explanatory Remarks

All values for the waste water shall be determined in the discharge water during the type approval test.

5.11 Grey Water Treatment (M+O)

In the living areas for the ship's crew and in the passenger areas, grey water is generated in the showers and wash basins. Other sources of grey water are the onboard laundry and other water that has been used for cleaning as long as it is not mixed with black water (if so, it shall be considered as black water). The grey water from the kitchen due to its high fat content and the water from the laundry with its high detergent content can cause problems at a biological purification stage. Particularly due to the high levels of nutrients in the water, it should be correspondingly treated in accordance with the requirements for black water.

5.11.1 International / regional Requirements

MARPOL does not include any requirements for grey water treatment.

5.11.2 Mandatory Requirement for Obtaining the Environmental Label (M)

Passenger ships and comparable ships:

- No use of chlorine or halogen compounds for the treatment of waste water that is discharged into the sea. Use of a membrane system or comparable efficient technology.

[20] See. HELCOM MARITIME 9/2010 Doc. 4/1 or. MEPC 60/6/2 Annex 3

- Collection of preliminary clarification products in storage tanks for incineration or disposal on land and
- the collection of biosludge in storage tanks for incineration or onshore disposal.

5.11.3 Optional Requirement for Obtaining the Environmental Label (O)

Cargo ships:

- No use of chlorine or halogen compounds for the treatment of waste water that is discharged into the sea. (3 points).
- Collection of the total grey water and onshore disposal (5 points).
- Collection of the preliminary clarification products and onshore disposal (2 points).
- Collection of the biosludge and onshore disposal (3 points).

Passenger ships or comparable ships:

- Collection of the total grey water and onshore disposal (7 points).
- Installation of a system for the immediate observance of the limit values proposed by HELCOM for the special areas according to MARPOL Annex IV Regulation 9.2.1 (6 points).

5.11.4 Compliance Verification

Certificate for the system and verification of the installation of the system.

Verification of sufficient storage tanks for black water, biosludge and/or preliminary clarification products that correspond to the application purpose/area for the ship.

5.11.5 Explanatory Remarks

All values shall be determined in the discharge water during the type approval test.

5.12 Bilge Water Treatment (M+O)

The term bilge water refers to drain water and condensation water in the engine room. Bilge water may contain - besides fuel and lubricants - hydraulic oils, anti-corrosive materials and synthetic oils, for example from leakages. Cold cleaners, cooling water additives, evaporator additives and other chemicals, as well as dirt (e.g rust, sand, paint residues, metal abrasives), can also get into the bilge water as a result of special activities such as the operation of separators and cooling equipment.

5.12.1 International / regional Requirements

According to MARPOL Annex I, the residual oil content of the bilge water shall not exceed 15 ppm if it is discharged into the sea.

5.12.2 Mandatory Requirement for Obtaining the Environmental Label (M)

In the event of discharge into the sea in accordance with MARPOL Annex I, the residual oil content of the bilge water after oil separation shall be less than 5 ppm.

5.12.3 Compliance Verification

Type approval test of the onboard bilge water oil separator and verification that the value of 5 ppm can be achieved using the system.

5.12.4 Explanatory Remarks

The values shall be indicated in accordance with international test standards.

5.12.5 Optional Requirement for Obtaining the Environmental Label (O)

- Creation of the possibility for exclusive onshore disposal through the installation of tank capacities designed to cope with the expected volumes and the anticipated length of travel (6 points).
- Conceptional implementation of the "*Integrated Bilge Water Treatment Systems*" (IBTS) for treating bilge water in engine rooms based on MEPC Circular 760[21] (4 points).
- Conceptional implementation of bilge water free ships (8 points).

5.12.6 Compliance Verification

Verification in the ship's general plan.

5.13 Ballast Water Treatment (M+O)

The introduction of invasive alien species by ballast water (BW) poses a threat to ecosystems and in some regions has already caused lasting changes to the aquatic biocoenoses and economic damage. An as-complete-as-possible exchange of ballast water at sea is an effective primary means of reducing the introduction of invasive alien species into coastal areas, estuaries and inland waters. Often, however, such exchanges cannot be performed for various reasons (ship stability, excess of allowable

[21] Guidelines for systems for handling oily wastes in machinery spaces of ships incorporating guidance note for an integrated bilge water treatment system (IBTS), MEPC.1/Circ.511 and amendment MEPC.1/Circ.760, dated 25.08.2011

stress limits for the design of the ship, lack of time, non-compliance with IMO criteria for ballast water exchange zones). Therefore, the exchange of BW is to be regarded as a transitionary measure that according to the current and previous IMO regulations is to be entirely replaced by ballast water treatment from 2016. The development of international legal provisions regarding ballast water treatment has almost been completed.

A series of different systems for onboard ballast water treatment are already available on the market, while further concepts are currently under development. The systems use mechanical, physical, chemical and biological processes either singular or in combination.

5.13.1 International / regional Requirements

The IMO Ballast Water Convention was adopted in February 2004 but has not yet entered into force. A prerequisite is the ratification by 30 member states with a minimum total shipping tonnage in GRT of 35% of the merchant fleet and a subsequent 12 months transitional period.

5.13.2 Mandatory Requirement for Obtaining the Environmental Label (M)

Installation of a ballast water treatment system for those ships that come under the regulations of the BW convention. The exemptions defined in the convention will be adopted for the Blue Angel environmental label.

5.13.3 Compliance Verification

Certified ballast water management plan.

Type approval for the installed ballast water treatment system.

5.13.4 Optional Requirement for Obtaining the Environmental Label (O)

- Installation of a ballast water treatment system without using active substances, (6 points);
- Installation of a closed-loop ballast water treatment system (8 points);
- Construction of a ship not designed or constructed to carry ballast water (“ballast-free ship”) (8 points).

5.13.5 Compliance Verification

Type approval and verification of the installation of the system. The effectiveness and environmental compatibility of the system must be verified.

For 5.13.4 Point 3: Confirmation of the construction of a “ballast-free ship”.

5.13.6 Explanatory Remarks

If the optional requirement for a "ballast-free ship" is realised, the mandatory requirement for the installation of a ballast water system is waived.

"Active substances" refers here to substances that are classified as having a chemical reaction in the ballast water (e.g. chlorination, electro chlorination, ozonisation or the addition of substances such as peraclean).

5.14 Use of Lubricating and Hydraulic Oils (O)

Every mechanical system needs to be lubricated. Lubrication reduces friction and abrasion or it ensures the power transmission. These are processes where the emission of lubricants cannot be avoided. Lubricants in closed-loop systems are released into the environment by exudation, leakages and regularly occurring minor and major accidents.

Conventional lubricating and hydraulic oils are usually based on mineral oils. Because they are toxic and not easily degradable they have a strong negative impact on the environment. It is assumed that on land 45% of the lubricants are emitted during use, 32% are collected and disposed of and 23% percent cannot be assigned.

5.14.1 International / regional Requirements

None

5.14.2 Mandatory Requirement for Obtaining the Environmental Label (M)

None

5.14.3 Optional Requirement for Obtaining the Environmental Label (O)

- Installation of deck machinery which is approved by the manufacturer for use of biodegradable lubricants (3 points);
- Installation of auxiliary units in the engine room which is approved by the manufacturer for use if biodegradable lubricants (2 points);
- Installation of a main propulsion unit which is approved by the manufacturer for the use of biodegradable lubricants (4 points);
- Installation of technologies that has been proven to reduce the use of lubricating oil by 10%. The consumption values from a comparable engine model from 2007 shall be used as a base value (3 points).
- Elimination of the use of lubricating oils in the stern tube through the use of water lubrication. (4 points).

5.14.4 Compliance Verification

Documentation of the approval of the use of biodegradable lubricants by the manufacturer.

Confirmation of the reduction in consumption of lubricating oil in the form of a survey report.

Verification of the installation of the relevant system.

5.14.5 Explanatory Remarks

Biodegradability refers to the ability of an organic substance to be decomposed by microorganisms[22]. A substance is considered biodegradable if more than 60% of it biodegrades within 28 days in the course of a test procedure.

5.15 Application of Anti-fouling Products on the Hull (O)

The use of TBT-containing anti-fouling was prohibited by the IMO from 2003 by means of a convention that did not enter into force until September 2008. A negative impact on marine ecosystems can be further avoided by the use of biocide-free anti-fouling systems on the ship's hull. In particular, the load on estuaries and heavily travelled harbour areas can be directly reduced.

5.15.1 International / regional Requirements

The International Convention on the Control of Harmful Anti-fouling Systems on Ships is valid, which was adopted by the IMO and came into force after it was ratified in September 2008.

5.15.2 Mandatory Requirement for Obtaining the Environmental Label (M)

None

5.15.3 Optional Requirement for Obtaining the Environmental label (O)

Use of biocide-free anti-fouling systems (5 points).

5.15.4 Compliance Verification

Specification data from the manufacturer and verification of the application of the product.

[22] http://www.umweltdatenbank.de/lexikon/biologische_abbaubarkeit.htm

5.16 Application of Anti-fouling Products on Seawater Cooling Systems (M)

Seawater chests and seawater pipes can also contain invasive alien species and thus contribute to the introduction of these organisms into other ecosystems. Furthermore, the obstruction of system/pipes through overgrowing can represent a technical problem. This is prevented by the use of biocides or other measures e.g. the use of chlorine.

Environmentally friendlier methods include, for example, the heating of chests and pipes or the use of less harmful substances.

5.16.1 International / regional Requirements

The IMO Convention on the Control of Harmful Anti-fouling Systems on Ships and the Guidelines for the control and management of ship's biofouling to minimize the transfer of invasive alien species (Biofouling Management Plan, MEPC.207(62)) adopted in 2011 are valid for the use of anti-fouling products on board ships.

5.16.2 Mandatory Requirement for Obtaining the Environmental Label (M)

Neither chlorine compounds nor bromine compounds nor TBT shall be used.

5.16.3 Compliance Verification

Specification data from the manufacturer and verification of the application of the product.

5.16.4 Optional Requirement for Obtaining the Environmental Label (O)

None

5.17 Corrosion Prevention Measures (M)

Corrosion of the outer hull of a ship is generally reduced by applying zinc anodes on the ship's hull. These anodes gradually degrade over time and emit pollutants into the water that are toxic to living organisms. The release of zinc can amount to several tonnes per year depending on the size of the ship. These emissions can be avoided through the use of other systems e.g. an impressed current cathodic protection system.

5.17.1 International / regional Requirements

There are currently no international requirements for the prevention of zinc emissions into the water.

5.17.2 Mandatory Requirement for Obtaining the Environmental Label (M)

Use of technologies or materials that do not emit harmful substances (e.g. an impressed current cathodic protection system).

5.17.3 Compliance Verification

Entry into the equipment certificate.

5.17.4 Optional Requirement for Obtaining the Environmental Label (O)

None

5.18 Use of Dosage Systems for Cleaning Agents (M+O)

Cleaning agents are used in all sections of the ship. A continuous change of staff and, usually, a continuous change of cleaning agents may lead to wrong dosing and often to overdosing. The overdosed washing water can disturb the delicate biological balance in the waste water treatment plant and, at worst, kill the microorganisms so that the plant fails and waste water is released into the environment untreated and highly contaminated.

The same could also occur with cleaning agents on deck. This washing water usually ends up untreated in the sea. In this case, it is also necessary to reduce the volume of cleaning agents using dosage systems. The use of phosphate, NTA and EDTA[23] should also be avoided.

There are systems available on the market for ships that automatically prepare the correct dose of the cleaning agents from detergent concentrates. It is usually sufficient to have just a few different concentrated substances being dosed differently for various applications. The required system is permanently installed on board the ship and the concentrates are available worldwide. Ideally, they are environmentally friendly, e.g. biodegradable.

In practice, it has become evident, in addition to environmental protection through guaranteed correct dosage and waste prevention by the use of a few reusable large packagings, that this concept will also help to cut costs.

5.18.1 International / regional Requirements

None

[23] NTA: nitrilotriacetic acid; EDTA: ethylenediaminetetraacetic acid

5.18.2 Mandatory Requirement for Obtaining the Environmental Label (M)

Installation of a dosage system for the use of cleaning agents utilised outside the engine room and the posting of the process description (dosage instructions) for the product.

5.18.3 Optional Requirement for Obtaining the Environmental Label (O)

Installation of a dosage system for the use of cleaning agents utilised in the engine room and the posting of the process description (dosage instructions) for the product (1 point).

5.18.3.1 Compliance Verifications

Verification of the installation of the system.

Verification that the process description is posted in a suitable location on the ship.

5.19 Underwater Noise (M+O)

Underwater noise emitted by ship traffic disrupts the use of sound waves by marine creatures for communication, predator avoidance and orientation. It can also cause damage to their hearing.

Low-frequency noise in deep water (e.g. in oceans) can be transmitted over distances greater than 1,000 km. There is a high sound level at all frequencies over short distances. Below 300 Hz, the sound level in the oceans is determined by shipping traffic. In the frequency range 10 to 300 Hz, the natural noise level is increased by 20 to 30 decibels by maritime traffic.

The main sources of noise on ships are cavitating propellers and 4-stroke diesel engines that are used to deliver propulsion or to generate electricity on board.

5.19.1 International / regional Requirements

There are currently no internationally binding regulations. The IMO is currently preparing optional regulations and criteria for the possible reduction of underwater noise emitted from ships. The responsible Correspondence Group will present their relevant recommendations by 2013.

The Marine Strategy Framework Directive (MSFD) issued by the EU looked at the emission of energy into the sea with a particular focus on underwater noise as one of the descriptors for the definition of "good environmental status".

However, some classification associations have already developed optional requirements.

Measurement processes for underwater noise emitted by ships are currently being developed as part of the standardisation process.

5.19.2 Mandatory Requirement for Obtaining the Environmental Label (M)

4-stroke diesel propulsion engines and diesel generators greater than 5 tonnes in weight (including the generator) are to be elastically mounted with a static deflection of at least 3 mm. The foundations must be designed with sufficient stiffness.

5.19.2.1 Compliance Verifications

Verification in the form of the machine installation plan.

5.19.3 Optional Requirement for Obtaining the Environmental Label (O)

Examination of the pressure fluctuations caused above the propeller by the propeller in a model test.

- Measurement of the underwater noise and provision of the data for the definition of limit values (2 points);
- Achieving a pressure of less than 3 kPa for the propeller blade frequency (speed per propeller blade) (2 points);
- Alternatively: Verification that the source power level does not exceed 175 dB re 1 µPa for 90% MCR in any third octave band above 31 Hz (4 points).

5.19.4 Compliance Verification

Report from a model basin institute.

In the event of measurements at sea, the water depth should be at least 40 m and the measurement distance <100 m[24]. The measurement hydrophone is to be placed at a maximum of 2 m above ground and averaged over 30 seconds. Alternatively, a process found in a standardisation process can be used. Verification is to be provided in the form of the measurement report.

About 5.19.3: The criteria required under the second and third bullet points can be proven in the model test.

5.19.5 Explanatory Remarks

Underwater noise from merchant ships has been poorly investigated in comparison to marine ships. There are currently no international regulations on this subject. There is also no recognised standard for the measurement process. The limit values named above for the propeller noise are indicators that anticipate a lower total noise level.

About Chapter 5.19.2 (mandatory requirement): 2-stroke propulsion engines may continue to be rigidly mounted because they are correspondingly quieter.

6 Criteria for Tank Ship Construction (additional)

The additional mandatory and optional requirements for tanker construction contained in this chapter cover all types of ships with the exception of gas tankers, which are classified as normal cargo ships within the framework of these Basic Award Criteria.

6.1 Protection of Cargo Tanks (O)

Considerations regarding the protection of cargo tanks from damage caused by collision or grounding were the impetus for the regulation requiring a double-hull for tankers according to the MARPOL Convention. It is true that according to this principle an increased double-hull width would lead to a standard ensuring greater safety than the international requirements. But on the other hand this would lead to reduced cargo capacity for an identical ship size and it would oppose the efforts for improved energy efficiency and, hence, the aim of emission reduction per unit of transport performance. Moreover, the increase in the width of the double-hull would have to be comparatively very large in order to achieve a significant improvement in safety.

Alternatively, MARPOL provides for a probabilistic methodology. This methodology assesses the probability of cargo leakages in the event of a defined accident. The probabilistic approach makes it possible to assess and compare innovative measures and technologies as an alternative to the double-hull concept. The following technical solutions are possible, for example:

- Provision of a predetermined breaking point between the outer hull and the hull of the cargo tank. The collision energy will be absorbed by the outer hull, the hull of the cargo tank breaks away and can deform without cracking.
- Y-shaped design of the outer hull.

6.1.1 International / regional Requirements

MARPOL, Annex I, Regulation 19, requires a double-hull for the cargo section of oil tankers delivered after July 6, 1996. As an alternative to the double-hull design, equivalent methods can be used for cargo tank protection. The criteria for the approval of

alternative methods are set forth in Resolution MEPC.110(49) Revised Interim Guidelines for the Approval of Alternative Methods of Design and Construction of Oil Tankers. In the basis of a risk analysis described in the guideline it should be demonstrated that the alternative method, have equal or less cargo oil outflow than it would occur with a double-hull construction. The calculation should taking in to account the probability of cargo oil outflow, the average outflow rate and the maximum outflow which could be expected in the event of a collision. The guideline specifies reference oil outflow parameters for corresponding double-hull designs.

6.1.2 Mandatory Requirement for Obtaining the Environmental Label (M)

None

6.1.3 Optional Requirement for Obtaining the Environmental Label (O)

Application of a structural concept for cargo tank protection that is 10% percent better than the double-hull construction required under MARPOL, Annex I, Regulation 19 (5 points).

6.1.4 Compliance Verification

The quality of the construction is to be determined and proven for the ship in accordance with the method stipulated in MEPC.110(49).

6.2 Use of an Online Loading Computer (M)

An online loading computer can be linked directly to other systems, e.g. engine room automation systems and also sensors such as tank radar or draft indicators. Therefore, the data no longer needs to be entered by hand, which reduces the workload for the nautical staff and eliminates sources of errors.

The online loading computer can be integrated into the onboard computer network (LAN) allowing various workstations (e.g. on the bridge and in the engine control room) access to the cargo data. Data can also be transmitted via satellite to the shipping company, allowing additional control and support by the onshore organisation. It must, however, be taken into account that certain sensors such as the draft indicator will not be as accurate as a direct reading and that even in an online system some data still needs to be entered by hand, for example, the salinity of the water to calculate the ship's draft. Accordingly, the users need to receive proper training about the special features and limits of such a system[25.]

[25] See. MARS Report No. 161, March 2006

6.2.1 International / regional Requirements

The use of online loading computers is not mandatory, although the various classification societies have developed their own regulations. According to GL rules, the device and the software must be tested. If only one device is used on board the ship, the onboard installation also needs to be inspected and approved. This is not necessary in the event of redundancy.

6.2.2 Mandatory Requirement for Obtaining the Environmental Label (M)

Installation of an online loading computer system.

6.2.3 Optional Requirement for Obtaining the Environmental Label (O)

None

6.2.4 Compliance Verification

Certificate for the system and verification of the installation of the system.

6.3 Installation of a Gas Detection System (M)

The installation of a gas detection system on board the ship allows the early detection of explosive gas mixtures and the initiation of counteractive measures. It is recommended that detection sensors are placed in the lower and upper sections of the space to be controlled by the system. This ensures that gases with a higher or lower density than that of the ambient air are detected. For the optimum protection of crew and ship, gas detection sensors should be installed at the very least in the following areas:

- Ballast water tanks
- Void spaces
- Pump rooms[26].

The installation of sensors in void spaces and ballast water tanks also makes it possible to detect the formation of hairline cracks at an early stage, because gas evaporation from cargo is detected.

Audible alarm units should be mounted on the bridge, in the engine room and in the cargo control room if the latter is the control room for the system.

6.3.1 International / regional Requirements

According to SOLAS Chapter II-2, Regulation 4 Paragraph 5.7, tankers must be equipped with portable gas detection systems. Where the atmosphere in double-hull

[26] See: Lindenau 2006, Page 172

spaces cannot be reliably measured using portable gas detection systems, such spaces shall be fitted with a permanent gas detection system according to SOLAS Chapter II-2, Regulation 4 Paragraph 5.7.2.2.

According to SOLAS Chapter II-2, Regulation 4 Paragraph 5.10.1.3, pump rooms must be equipped with a permanent system for continuous monitoring of the concentration of hydrocarbons together with the corresponding alarm units.

6.3.2 Mandatory Requirement for Obtaining the Environmental Label (M)

Installation of a permanent gas detection system for explosives in ballast tanks and void spaces adjacent to the cargo section.

6.3.3 Optional Requirement for Obtaining the Environmental Label (O)

None

6.3.4 Compliance Verification

Installation certificate from the shipyard or system manufacturer.

6.4 Inert Gas Systems on Tankers < 20,000 dwt (M+O)

According to SOLAS, inert gas systems are only required on tankers with 20,000 dwt or larger because there is a relationship between the risk of explosion and the size of the tank. In recent years, however, there have been repeated cases of severe accidents and total losses of ships of less than 20,000 dwt caused by explosions in their cargo tanks. This is why the IMO's Subcommittee on Fire Protection is currently discussing widening the scope of the SOLAS regulations to also include smaller tankers.

6.4.1 International / regional Requirements

The set-up and operation of inert gas systems is regulated in SOLAS, Chapter II-2, Regulation 4, Paragraph 5.5 and specified in detail in the IMO's Fire Safety Systems Code (FSS Code), Chapter 15. The key requirements are listed below:

SOLAS Chapter II-2, Regulation 4, Paragraph 5.5

Tankers > 20,000 dwt are to be fitted with a permanent inert gas system. Equivalent systems shall be eligible for approval. All tankers with Crude Oil Washing (COW) systems must be equipped with an inert gas system. All Tankers fitted with an inert gas system must be equipped with a self-contained tank content measuring system. It must be possible to supply the double-hull with inert gas.

6.4.2 Mandatory Requirement for Obtaining the Environmental Label (M)

Creation of the possibility to supply inert gas to cargo tanks and double-hull spaces on all tankers approved for the transport of cargo with a flash point of less than 60°C. Irrespective of the size of the ship, this shall be achieved by the installation of a permanent or mobile inert gas system. The design of the system must comply with SOLAS Chapter II-2, Regulation 4, Paragraph 5.5.

6.4.3 Optional Requirement for Obtaining the Environmental Label (O)

- Installation of an inert gas generating system using nitrogen as the inert gas (5 points).
- Alternatively: This can also be achieved by meeting the prerequisites for storage of sufficient shore-generated nitrogen (5 points).

6.4.4 Compliance Verification

Installation certificate from the shipyard or system manufacturer.

6.5 Inerting of Ballast Water Tanks and Void Spaces (V)

Hairline cracks, which often remain undetected during inspections or only form due to the overstressing of materials e.g. due to mistakes during loading or unloading or heavy seas, may cause cargo to enter void spaces or empty ballast tanks. If this happens, the result could be the formation of explosive gas mixtures or even explosions. In order to prevent this danger, it should be possible to inert the ship's ballast tanks and void spaces.

6.5.1 International / regional Requirements

According to SOLAS Chapter II-2, Regulation 4, Paragraph 5.5.1.3, tankers required to be fitted with inert gas systems shall be fitted with inert gas connections inside the double-hull.

6.5.2 Mandatory Requirement for Obtaining the Environmental Label (M)

Creation of the possibility to inert ballast water tanks and void spaces. This can be achieved, for example, by the use of a portable solution with corresponding connection options between the inert gas system and the ballast water tanks and void spaces to be rendered inert or through a permanent connection with the inert gas pipe system.

6.5.3 Optional Requirement for Obtaining the Environmental Label (O)

None.

6.5.4 Compliance Verification

Verification through the submission of the corresponding pipe diagrams for the inert gas system showing the connection points.

6.6 Emissions from Cargo during Loading and Unloading (M)

It is only in recent decades that the harmfulness of emissions from cargo, particularly emissions of Volatile Organic Compounds (VOC), has been recognized. The dominant and most important group of VOCs is the group of hydrocarbon-containing compounds. Considerable amounts of VOCs can be released into the environment during loading and unloading operations.

In order to avoid these emissions, vapour recovery systems are installed between the tank on land and the tanker. They reduce the gas pressure in the tanks and thus contribute to a reduction in VOC emissions.

6.6.1 International / regional Requirements

MARPOL Annex VI, Regulation 15, requires the return of VOC if the port state as a contracting state to MARPOL stipulates this measure. Therefore, this is actually a national regulation. In this case, however, only IMO-approved systems may be used according to MARPOL.

6.6.2 Mandatory Requirement for Obtaining the Environmental Label (M)

Installation of a vapour recovery system or alternative system.

6.6.3 Optional Requirement for Obtaining the Environmental Label (O)

None.

6.6.4 Compliance Verification

Verification of the installation of relevant systems in the general plan.

6.7 Tank Design (O)

After unloading, a certain residual amount of the transported material remains in all tanks and can find its way into the sea e.g. via the tank wash water.

A reduction of these tank residues can be achieved on board in a number of different ways. There is the possibility of already creating the relevant conditions at the design stage of the ship to ensure that the smallest number of surfaces or pockets for the residual amounts of the load are formed.

6.7.1 International / regional Requirements

MARPOL Annex II, Regulation 12 requires all ships with a keel laid after January 1, 2007 to limit their tank residues to 75 litres independent of the product category.

There is no corresponding regulation applying to oil cargoes according to Annex I.

6.7.2 Mandatory Requirement for Obtaining the Environmental Label (M)

None

6.7.3 Optional Requirement for Obtaining the Environmental Label (O)

Application of an accepted standard for tank design when building a new ship, e.g. additional class notation "ETC[27]" from the DNV[28] (6 points).

6.7.4 Compliance Verification

Additional class notation and information about the type and properties of the built-in tanks.

6.8 Cargo Traces in Wash Water (Slop) (M)

Especially in the event of a change of cargo, large amounts of so-called "slop" (cargo-contaminated wash water) are produced due to the washing of the tanks that usually needs to be disposed of on land.

The cargo residues may, however, also be discharged into the environment in compliance with relevant requirements set forth in MARPOL Annex II. However, these amounts shall be kept as small as possible in order to protect the environment.

6.8.1 International / regional Requirements

MARPOL Annexes I and II regulate the handling of tank wash water residues.

6.8.2 Mandatory Requirement for Obtaining the Environmental Label (M)

No release/discharge of slop into the marine environment, meaning the installation of adequate storage tank capacity for later discharge on land.

6.8.3 Optional Requirement for Obtaining the Environmental Label (O)

None

[27] ETC: *Efficient Tank Cleaning*
[28] DNV: Det Norske Veritas

6.8.4 Compliance Verification

Verification of the storage tank capacity in the general plan.

6.9 Cargo Tank Residues (M)

There are different ways of reducing cargo residues on board a tanker. As described above, one possible way is to already create the corresponding shipbuilding conditions in terms of the "tank design" when designing the ship.

Another possibility is to install a stripping and super-stripping system. These measures help to reduce cargo residues in the tank. At the same time, they also increase the volume of cargo unloaded.

6.9.1 International / regional Requirements

MARPOL Annex II limits the cargo residues after unloading to 75 litres.

6.9.2 Mandatory Requirement for Obtaining the Environmental Label (M)

Installation of a super-stripping system.

6.9.3 Optional Requirement for Obtaining the Environmental Label (O)

None.

6.9.4 Compliance Verification

Certificate for the system and verification of the system in the general plan.

7 Application / Approval

7.1 Testing / Testing Institutions

The requirements under Paragraphs 3.1 to 6.9 shall be considered met if compliance is confirmed in a comprehensive survey report. These survey reports can be created by:

- an IACS-recognized classification society or
- a ship management company[29] in a country with an IACS-recognized classification society.
-

[29] in Germany, e.g. the “BG Verkehr”

7.2 Applicants and Parties involved

7.2.1 Shipping companies or ship operating companies of ships according to Paragraph 2 shall be eligible for application.

7.2.2 Parties involved in the award process are:

- RAL to award the Blue Angel eco-label,
- the federal state being home to the shipping company;
- Umweltbundesamt, (Federal Environment Agency) which after the signing of the contract will receive all data and documents submitted in application for the Blue Angel in order to be able to proceed with the development of the Basic Award Criteria.

8 Use of the Environmental Label

8.1 The terms governing the use of the Environmental Label by the applicant are stipulated by a Contract on the Use of the Environmental Label to be concluded with RAL.

8.2 Within the scope of such contract, the applicant undertakes to comply with the requirements under Paragraphs 3.1 to 6.9 as long as the Environmental Label is used.

8.3 Contracts on the Use of the Environmental Label are concluded to fix the terms for the certification of ships according to Paragraph 2. Such contracts shall run until **December 31, 2021**. They shall be extended by periods of one year each, unless termi-nated in writing by **March 31, 2021** or March 31 of the respective year of extension. The Environmental Label may only be used to label the ship during the period of the con-tract. The continued use of the Environmental Label beyond the period of validity of the Basic Award Criteria is possible if the label and the advertising under the logo contains the issue date of the Basic Award Criteria as follows: (Label according to RAL-UZ 141 Edition 2013-04).

In the event of an application for the Environmental Label, the "contract agreement with the shipyard" or the "date the keel was laid" are taken as the date of the application according to the relevant Basic Award Criteria valid at this time if the shipping company informs RAL by this date about the planned application.

If the ship is sold or a major conversion is carried out on the ship, the Environmental Label expires. In this case RAL is to be informed without request. It is possible for the new owner to reapply for the Environmental Label in accordance with the original Basic Award Criteria. However, this requires the submission of a new survey report (see Chapter 7.1).

8.4 The Contract on the Use of the Environmental Label shall specify:

- Applicant (shipping company, ship operating company)
- Name of the ship (including IMO Number)
- Type of ship
- Optionally flag, classification society and class notations.

Appendix I: Global Warming Potential GWP100 for Refrigerants in Refrigeration and Air-conditioning Systems on Ships

Name	Ingredients in Refrigerant Mixtures	GWP_{100}
R507	R125 R143a	3 985
R404A	R 125 R 134a R143a	3 922*
R407A	R 32 R 125 R 134a	2 107*
R410A	R 32 R 125	2 088*
R407C	R 32 R 125 R 134a	1 774*
R134a	-	1 430*
hydrocarbons (like propane R290, propene R1270, butane R600, isobutane R600a)	-	3**
	-	0**

In the case of other refrigerants, the GWP is to be based on the information in report IPCC 2007.

Sources for GWP:

*) IPCC 2007: IPCC 4th Assessment Report, Climate Change 2007 at http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html (if relevant, observe errata)

**) IPCC 1990: IPCC 1st Assessment Report, Climate Change 1990 (IPCC 2007)

Apendix II Overview of the Points awarded for the optional Criteria

	Requirements (points for optional criteria)	**M/O**	**Points** (total / theoretical)	**Cargo Ships**	**Pax**	**Tanker**	**Note / Explanation**
3	**Environmental Protection in Ship Design**						
3.1	**Protection of Bunker Tanks**	**M+O**					
	Collection tanks for bilge water		**4**	4	4	4	
	Tank < 600 m^3: Distance B/15 from outer hull		**6**	6	6	6	
3.2	**Onboard use of Materials**	**M**					
4	**Structural protection from accidental environmental pollution**						
4.1	**Redundant Power Systems**	**O**					
	RP 1		**4**				*only one RP code is possible*
	RP 2		**6**				
	RP 3		**8**	8	8	8	
4.2	**Emergency Towing System**	**M+O**					
	Emergency towing system for ships <2,500m^3 T volumes		**2**	2	2	2	
4.3	**Hull Stress Monitoring**	**O**					
	Installation of the system		**3**	3	x	3	*no additionnal environ. benefit on pax*
5	**Reduction of Operation-related Emissions**						
5.1	**Sulphur Emissions**	**M+O**					
	MDO/MGO operation possible		**7**				
	MDO/gas operation possible		**8**				
	Only gas operation		**10**	10	10	10	
5.2	**Nitrogen Oxide Emissions**	**M+O**					
	MARPOL Annex VI Tier II – 20 %		**4**				
	MARPOL Annex VI Tier III immediate application for engines in port		**6**				
	MARPOL Annex VI Tier III immediate application for all engines		**9**	9	9	9	
5.3	**Particulate Emissions**	**O**					
	Reduction technology (with a lower reduction than a particle filter)		**3**				
	Particle filter or gas operation		**7**	7	7	7	*also includes dual fuel engines*

	Requirements (points for optional criteria)	M/O	Points (total / theoretical)	Cargo Ships	Pax	Tanker	Note / Explanation
5.4	**Carbon Dioxide Emissions**	**M+O**					
	next EEDI phase (e.g. 2 instead of 1)		**7**				
	next but one EEDI phase (e.g. 3 instead of 1)		**9**	9	9	9	*only possible until Jan.1, 2015*
	Individual measures for efficiency that are not included in the EEDI calculation		**6**	6	6	6	*2, 4 or up to 6 points possible depending on the reduction*
5.5	**Reducing Emissions in Port**	**M+O**					
	Implementation of an external electricity supply		**4**				
	Implementation of a gas supply		**7**				
	Comply with the BImSchV values for SOx, NOx, CO, PM		**8**	8	8	8	
5.6	**Refrigerants**	**M+O**					
	Use of natural refrigerants		**4**				
	Natural refrigerant + energy-efficient concept		**6**	6	6	6	*e.g. adsorption cooling system*
	Elimination of HFCs, if technically possible		**3**	3	3	3	
5.7	**Extinguishing agents**	**M+O**					
	Environmentally friendly substances (H_2O, nitrogen, argon)		**4**	4	4	4	
5.8	**Waste Avoidance**	**O**					
	Reusable and large containers		**3**	3	3	3	
5.9	**Waste Disposal and Waste Incineration**	**M+O**					
	Pax: Collection + complete disposal on land		**6**	x	6	x	*Requirement already mandatory for cargo ships*
	Pax: comply with all limit values in BImSchV		**4**	x		x	*Incineration not permitted on cargo ships*
5.10	**Black Water Treatment**	**M+O**					
	Complete collection + disposal on land		**6**	6	6	6	
	Cargo ships: Collection of preliminary clarification products		**2**		x		

	Requirements (points for optional criteria)	M/O	Points (total / theoretical)	Cargo Ships	Pax	Tanker	Note / Explanation
	Cargo ships: Collection of biosludge		**3**		x		
	Pax: Comply with limit values from MARPOL Reg. 9.2.1		**5**	x		x	
5.11	**Grey Water Treatment**	**M+O**					
	Cargo ships: no use of chlorine and halogen compounds		**3**		x		
	Cargo ships: complete collection + disposal on land		**5**	5	x	5	
	Cargo ships: Collection of preliminary clarifycation products		**2**		x		
	Cargo ships: Collection of biosludge		**3**		x		
	Pax: Disposal on land		**7**	x	7	x	
	Pax: Immediate comply with MARPOL IV, Reg. 9.2.1		**6**	x		x	
5.12	**Bilge Water Treatment**	**M+O**					
	Disposal on land		**6**				
	Implementation of IBTS		**4**				
	Bilge water free ship		**8**	8	8	8	
5.13	**Ballast Water Treatment**	**M+O**					
	Implementation without "active substances"		**6**				
	Implementation of a closed-loop system		**8**	8	8	8	
	Ballast water free ship		**8**				
5.14	**Use of Lubricating and Hydraulic Oils**	**O**					
	Biodegradable use on deck		**3**	3	3	3	
	Biodegradable use in engine room		**2**	2	2	2	
	Biodegradable use in main propulsion unit		**4**	4	4	4	
	Technologies that achieve the -10% reduction in oil		**3**	3	3	3	
	Water lubrication for stern tube		**4**	4	4	4	
5.15	**Antifouling on the Ship's Hull**	**O**					
	Biocide-free antifouling system		**5**	5	5	5	
5.16	**Antifouling on the Sea Water Cooling System**	**M**					
5.17	**Corrosion Protection Measures**	**M**					
5.18	**Dosage Systems for Cleaning Agents**	**M+O**					
	Use in the engine room		**1**	1	1	1	

	Requirements (points for optional criteria)	M/O	Points (total / theoretical)	Cargo Ships	Pax	Tanker	Note / Explanation
5.19	**Noise Emissions**	**M+O**					
	Measurement of the underwater noise		**2**	2	2	2	
	Achieving a pressure less than 3 kPa		**2**	2	2	2	
	Sound power level at any third octave bands lower than 175 dB re 1 µPa		**4**	4	4	4	
6	**Specific Requirements for Tank Ship Construction**						
6.1	***Protection of Cargo Tanks***	**O**					
	Tank design min. 10% > than MARPOL		**7**	x	x	7	
6.2	***Use of an Online Loading Computer***	**M**					
6.3	***Installation of a Gas Detection System***	**M**					
6.4	***Inert gas on tankers < 20,000 dwt***	**M+O**					
	Nitrogen inert gas generation plant		**5**	x	x	5	
	Storage of nitrogen on land		**5**	x	x		
6.5	***Inerting of Ballast Water Tanks and Void Spaces***	**M**					
6.6	***Emissions from Cargo during Loading and Unloading***	**M**					
6.7	***Tank Design***	**O**					
	Implementation of e.g. ETC		**6**	x	x	6	
6.8	***Cargo Traces in Wash Water (Slop)***	**M**					
6.9	***Cargo Tank Residues***	**M**					
	Maximum possible Number of Points		*293*	**145**	**150**	**163**	
	Minimum mandatory Points Score *(corresponds to 35 %)*			**51**	**53**	**57**	

The points in the columns, subdivided according to the type of ship, only provide the simultaneously possible technical measures. Therefore, only the maximum possible points score under real conditions is added together.