

## MARPOL Annex VI - Air Pollution Regulations

IMO ship pollution rules are contained in the “International Convention on the Prevention of Pollution from Ships”, known as MARPOL 73/78. On 27 September 1997, the MARPOL Convention has been amended by the “1997 Protocol”; which includes Annex VI titled “Regulations for the Prevention of Air Pollution from Ships”. Broadly MARPOL Annex VI has following regulations:

Regulation 12 : Ozone depleting substances

Regulation 13 : Nitrogen Oxides (NO<sub>x</sub>)

Regulation 14 : Sulphur Oxides (SO<sub>x</sub>)

Regulation 15 : Volatile Organic Compounds ( VOCs)

Regulation 16 : Shipboard incineration

Regulation 18 : Fuel Oil Availability and Quality

The requirement to ensure vessel’s compliance under each of the above regulations has been briefly summarized under heading for each regulation. This is for the guidance and ships have to cross check with the respective offices for special type, trading area and local requirements and follow specific MARPOL Annex VI Procedures Manual.

### Regulation 12 : Ozone depleting substances

Under this regulations, the vessels must maintain a list of equipment and system containing Ozone depleting substances and if it is a rechargeable system, an Ozone depleting substances Record Book shall be maintained on board.

Installations which contain Ozone Depleting substances, other than hydrochloro-fluorocarbons (HCFCs) are prohibited on all ships constructed on or after 19 May 2005.

Installations containing hydrochloro-fluorocarbons (HCFCs) are prohibited on all ships constructed on or after 01 Jan 2020.

### Regulation 13 : Nitrogen Oxides (NO<sub>x</sub>)

The IMO emission standards are commonly referred to as Tier I...III standards. The Tier I standards were defined in the 1997 version of Annex VI, while the Tier II/III standards were introduced by Annex VI amendments adopted in 2008, as follows. Accordingly, Annex VI entered into force on 19 May 2005. The application is as follows :

- Vessels constructed from January 1, 2000 to January 1, 2011 equipped with diesel engines greater than 130 kW power output.

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- For vessels which undergo a major conversion, such as (a) The engine is replaced by a new engine built on or after January 1, 2000. (b) Any substantial modification is made to the engine, as described on NOx Technical Code 1.3.2 ( e.g. changing camshaft, fuel injection system or any other NOx related setting or components) (c) The maximum continuous rating of the engine is increased by 10%.
- The diesel engine with a power output of more than 5000 KW and a per cylinder displacement at or above 90 litres which is installed on a ship constructed on or after 01 January 1990 but prior to 01 January 2000 also come under this regulation.
- The regulation also applies to fixed and floating rigs and to drilling platforms.

The regulation does not apply to :

- Emissions associated directly with exploration, exploitation and/or handling of sea-bed minerals resources.
- The emergency diesel engines, engines installed in life boats or for any equipment intended to be used solely in case of emergency.

In anticipation of the Annex VI ratification, most marine engine manufacturers have been building engines compliant with the above standards since 2000. Moreover, compliance is only required if an Approved Method for obtaining the necessary NOx reduction is available for the engine(s) in question. There is also a mechanism in the regulation to ensure that an Approved Method should meet a cost effectiveness criterion which will set a maximum cost for purchasing and installation of a method. Where applicable, necessary engine adjustments or fitting of NOx reducing kits shall take place no later than the first renewal survey that occurs 12 months or more after approval of a method applicable. However, if the supplier of an Approved Method is not able to deliver at this renewal survey, installation may take place at the following annual survey.

### **Certification and onboard verification**

The EIAPP (Engine International Air Pollution Prevention) certificate is required for all diesel engines as described above, and will be issued for marine diesel engines after demonstrating compliance with NOx emission limits. The certification process is to be carried out in accordance with the NOx Technical Code (2008) issued by IMO.

For the purpose of assessing compliance with Regulation 13 of Annex VI, it is not always necessary to measure the NOx level to know that an engine is likely to comply with the NOx emission limits. It will be sufficient to know that the present state of the engine corresponds to the specified components, calibration or parameter adjustment state at the time of initial certification. The engine's Technical File is identifying its components, settings and operating values that influences the exhaust emissions, and these must be checked to ensure compliance during surveys and inspections. Ship owners or people responsible for vessels equipped with diesel engines required to

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undergo an engine parameter check method shall ensure that the following documentation is at all times kept onboard and updated as applicable:

- Original Technical File including the onboard verification procedure.
- Record book of engine parameters for recording all of the changes made relative to an engine's components and settings. Also to include technical documentation in case of modification of any of the engine's designated components. This may be a print-out from the Planned Maintenance System on-board. We recommend to include all changes potentially affecting the NOx emission characteristics of the engine as Flag States and Port States may have different interpretations of what to be included.
- Original EIAPP certificate (or Certificate/Statement of Compliance) for each applicable engine.

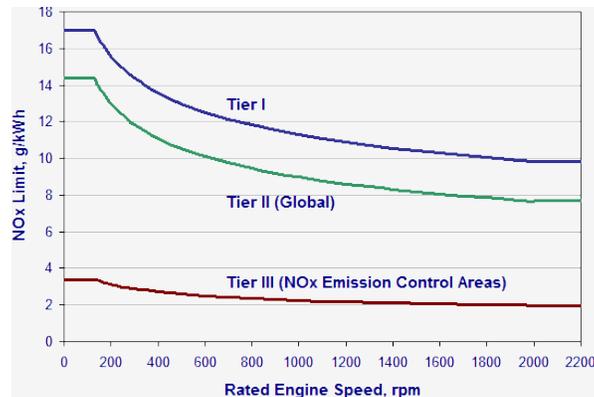
### NOx Emission Standards

NOx emission limits are set for diesel engines depending on the engine maximum operating speed (n, rpm), as shown in Table 1 and presented graphically in Figure 1. Tier I and Tier II limits are global, while the Tier III standards apply only in NOx Emission Control Areas.

<b>Table 1. MARPOL Annex VI NOx Emission Limits</b>				
<b>Tier</b>	<b>Date</b>	<b>NOx Limit, g/kWh</b>		
		<b>n &lt; 130</b>	<b>130 ≤ n &lt; 2000</b>	<b>n ≥ 2000</b>
Tier I	2000	17.0	$45 \cdot n^{-0.2}$	9.8
Tier II	2011	14.4	$44 \cdot n^{-0.23}$	7.7
Tier III	2016†	3.4	$9 \cdot n^{-0.2}$	1.96

† (Tier III have been reviewed by IMO and implementation postponed to 2021)

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**Figure 1. MARPOL Annex VI NOx Emission Limits**

**Tier II** standards are expected to be met by combustion process optimization. The parameters examined by engine manufacturers include fuel injection timing, pressure, and rate (rate shaping), fuel nozzle flow area, exhaust valve timing, and cylinder compression volume.

**Tier III** standards are expected to require dedicated NOx emission control technologies such as various forms of water induction into the combustion process (with fuel, scavenging air, or in-cylinder), exhaust gas recirculation, or selective catalytic reduction.

### **Important Note :**

**The IMO Tier III NOx limits adopted in 2008 were to be applicable to ships built from 2016 when sailing in areas designated by the IMO as NOx Emission Control Area (ECA). Currently the North American Coastline is such an area, and the Baltic Sea might be designated as another Nox ECA.**

**A committee of the IMO voted to postpone the entry into force of the MARPOL Annex VI, Regulation 13, Tier III Nox emissions limits from ship engines from 2016 to 2021. The IMO's decision will be voted again in the next MEPC expected to be held in March 2014.**

**The USA and Canada adopted national regulations enforcing IMO Tier III equivalent limits within the North American ECA effective 2016. The US EPA rule for Category III ships, however, references the international IMO standards. If the IMO emission standards are indeed delayed, the tier III standards will be applicable from 2016 only for US Flagged vessels.**

### **Pre-2000 Engines**

Under the 2008 Annex VI amendments, Tier I standards become applicable to existing engines installed on ships built between 1st January 1990 to 31st December 1999, with

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a displacement  $\geq 90$  liters per cylinder and rated output  $\geq 5000$  kW, subject to availability of approved engine upgrade kit.

### **Summary of Tier I, II and III and their applicability :**

#### **Tier I (current limits):**

For diesel engines installed on ships constructed from 1 January 2000 to 1 January 2011 allowable emissions of total weighted NO<sub>x</sub> depending on engine speed, n, are:

- 17,0 g/kWh when n is less than 130 rpm
- $45,0 \times n^{(-0,2)}$  g/kWh when n is 130 or more but less than 2000 rpm
- 9,8 g/kWh when n is 2000 rpm or more

#### **Tier II (current limits):**

For diesel engines installed on ships constructed on or after 1 January 2011 allowable emissions of total weighted NO<sub>x</sub> depending on engine speed, n, are:

- 14,4 g/kWh when n is less than 130 rpm
- $44,0 \times n^{(-0,23)}$  g/kWh when n is 130 or more but less than 2000 rpm
- 7,7 g/kWh when n is 2000 rpm or more

#### **Tier III ( Refer to “Important note on previous page):**

Ships constructed on or after 1 January 2016 will have additional limitations when operating in an Emission Control Area. For the purpose of NO<sub>x</sub> emissions no Emission Control Areas (ECAs) have yet been designated, but it is expected that both the Baltic Sea and the North Sea may be designated well ahead of 1 January 2016.

For Tier III ships operating in the NO<sub>x</sub> ECAs the allowable emissions of total weighted NO<sub>x</sub> depending on engine speed, n, are:

- 3,4 g/kWh when n is less than 130 rpm
- $9,0 \times n^{(-0,2)}$  g/kWh when n is 130 or more but less than 2000 rpm
- 2,0 g/kWh when n is 2000 rpm or more

Tier III limits will not apply to engines installed on a ship with a length of less than 24 metres when it is designed and used solely for recreational purposes, or an engine installed on a ship with a combined nameplate diesel engine propulsion power of less than 750 kW if it is demonstrated that the ship cannot comply with the standards set

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forth in paragraph 5.1.1 of this regulation because of design or construction limitations of the ship.

### Regulation 14 : Sulphur Oxides (SOx)

#### Global Requirement :

19 May 2005 Annex VI to MARPOL entered into force. The revised Annex VI to MARPOL was adopted by IMO on 10 October 2008. The sulphur oxide (SOx) and Particulate Matter emissions from ships will in general be controlled by setting a limit on the sulphur content of marine fuel oils as follows. Globally, the sulphur content of any fuel oil used on board ships shall not exceed the following limits:

- 4.50% m/m prior to 1 January 2012
- 3.50% m/m on and after 1 January 2012
- 0.50% m/m on and after 1 January 2020

#### Requirements within Emission Control Areas:

More stringent requirements applicable to ships in Emission Control Areas (ECA). An Emission Control Area can be designated for SOx and PM, or NOx, or all three types of emissions from ships, subject to a proposal from a Party to Annex VI.

Existing Emission Control Areas include:

- Baltic Sea (SOx, adopted: 1997 / entered into force: 2005)
- North Sea (SOx, 2005/2006)
- North American ECA, which extends up to 200 nm from the coasts of the continental United States and Canada (NOx & SOx, 2010/2012).
- US Caribbean Sea ECA, including Puerto Rico and the US Virgin Islands (NOx & SOx, 2011/2014).

#### **The US Caribbean sea emission control area ( Ref to Coordinates and map on page 15 and 16) :**

The fourth, and latest IMO designated area, added to the global active ECA locations is known as the United States Caribbean Sea ECA.

More extensive than the first two ECA's, this follows the North American ECA and concerns emissions of Sulphur oxide (Sox), Nitrogen oxide (Nox) and Particulate Matter.

1. Applies to waters adjacent to the coasts of Puerto Rico and the United States Virgin Islands and was designated under MARPOL amendments adopted in July 2011.
2. While ships are operating in the United States Caribbean Sea ECA, the sulphur content of fuel oil used on board ships shall not exceed 0.1% m/m on and after 1 January 2014.

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3. In addition to the above, from 2016 new engines on vessels operating in the US Caribbean Sea ECA (and the North American ECA) must use emission controls that achieve an 80% reduction in Nox emissions to comply with the MARPOL annex VI Sox and Nox emission limits. These Tier I, II and III standards are set for diesel engines based on the engine's maximum operating speed (n, rpm).

<b>Geographical Area</b>	<b>At Sea Sulphur limit in Fuel oil w.e.f 01 Jan 2015 ( ME, A/E, BLR)</b>	<b>In port Sulphur limit of fuel w.e.f. 01 Jan 2015 (A/E, BLR)</b>
Global ( Except ECA, EU CARB Designated areas)	3.5 %	3.5%
North Sea ECA	0.1 %	0.1 %
Baltic region ECA	0.1 %	0.1%
North American region ECA	0.1%	0.1%
US Caribbean Sea region ECA	0.1%	0.1 %
	<b>REGIONAL SULPHUR REGULATIONS</b>	
EU ports as per EU Directives	0.1%	0.1%
California waters and within 24 miles of California base line ( AS PER CARB REGULATIONS)	0.1 % (only distillate Fuels to be used).  **The v/l's can comply with ECA regulation in CARB area under " Temporary Exemption or Research Exemption during sunset review period.	0.1 % (only distillate Fuels to be used).  **The v/l's can comply with ECA regulation in CARB area under " Temporary Exemption or Research Exemption during sunset review period.
TURKEY ports as per circular no. 647/2011 published by the Istanbul & Marmara, Aegean, Mediterranean and Black Sea Regions Chamber of Shipping.	0.1%  (NOT applicable for Ships passing the Turkish Straits WITHOUT calling any Turkish Ports)	0.1%  (NOT applicable for Ships passing the Turkish Straits WITHOUT calling any Turkish Ports)
HONG KONG ports as per Marine Department Notice no.56 of 2015. Effective 01 <sup>st</sup> July 2015 for vessels at anchorages and berth	0.5%	0.5%

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[PLEASE REFER TO MORE INFORMATION REGARDING EU, CARB, TURKEY and HONG KONG REGULATIONS ON PAGES 11-17.](#)

### Regulation 15 : Volatile Organic Compounds ( VOCs)

The revision of Annex VI to MARPOL which had entered into force in July 2010 has required crude oil tankers above 400 grt to implement and keep onboard a VOC management plan upon entry into force date of the revision. The plan has to be approved by the Administration (i.e. the Class Societies provided they have been Authorized to do so on behalf of the respective Administrations). The plan is to be ship specific, is to take into account Guidelines developed by IMO and shall as a minimum contain the following:

- Provide written procedures for minimizing VOC emissions during the loading and sea passage.
- Give consideration to the additional VOC generated during Crude Oil Washing;
- Identify a person responsible for implementing the plan.
- Be written in the working language of the master and officers and, if the working language is not English, French or Spanish, include a translation to one of these languages.

### Regulation 16 : Shipboard incineration

All incinerators installed on a ship constructed on or after 1 January 2000 or incinerator that is installed on board a ship on or after 1 January 2000 shall be type approved in accordance with Resolution MEPC 76(40) giving the IMO standard specification for shipboard incinerators. For such incinerators a manufacturer's operating manual is required.

Monitoring of combustion flue gas outlet temperature shall be required at all times and waste shall not be fed into a continuous-feed shipboard incinerator when the temperature is below the minimum allowed temperature of 850°C. For batch-loaded shipboard incinerators, the unit shall be designed so that the temperature in the combustion chamber shall reach 600°C within 5 minutes after start-up and will thereafter stabilize at a temperature not less than 850 °C. It must be ensured that the incinerators' flue gas outlet temperature monitoring system is operational.

Incineration of Annex I, II and III cargo residues, of PCB's (Polychlorinated biphenyls), of garbage containing more than traces of heavy metals and of refined petroleum products containing halogen compounds is always prohibited.

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For all the ships to which Regulation 16 will be applicable, also incineration of exhaust gas cleaning systems residues will be always prohibited. Onboard incineration outside an incinerator is prohibited except that sewage sludge and sludge oil from oil separators may be incinerated in the main or auxiliary power plants and boilers when the ship is not in ports, harbours and estuaries. Incineration of PVC's (polyvinyl chlorides) is prohibited except in shipboard incinerators type approved according to resolutions MEPC 59(33) or MEPC 76(40).

### Regulation 18 : Fuel Oil Availability and Quality

Previously fuel oil quality was primarily a matter between owners/managers (and charterers) and suppliers. With the entry into force of Annex VI of MARPOL 73/78, 19 May 2005, Fuel Oil Quality became a statutory matter. The revised MARPOL Annex VI adopted on 10 October 2008 also contains an additional provision on Fuel Oil Availability. In addition to requirements controlling the Sulphur Oxide (SOx) and Particulate Matter emissions from ships by limiting the sulphur content of oil fuel, Annex VI contains requirements preventing the incorporation of potentially harmful substances, and in particular waste streams (e.g. chemical waste), into fuel oils. Regulation 18 specifically requires that fuel oil supplied to ships is to be free from inorganic acids or chemical wastes that could jeopardise the safety of the ship, be harmful to ships' personnel, or which would contribute overall to additional air pollution. The addition of small amounts of additives intended to improve the performance is however permitted.

The requirements to fuel oil quality in Regulation 18 are similar to the general requirements of ISO 8217, although no references have been given by IMO to the same. Accordingly one question raised has been whether a fuel found off-spec compared to ISO 8217 table 2 test parameters, other than those limits specifically given by MARPOL Annex VI is in violation of Regulation 18. Consultations with certain port states indicate that this will likely not be the regular case. However it has been indicated that the general requirements of Regulation 18 may be enforced in case a ship is involved in accidents or near accidents where fuel quality is a suspected contributor.

### **Bunker delivery notes**

It is a requirement of Regulation 18 that any fuel oil for combustion purposes delivered to and used onboard shall be recorded by means of a Bunker Delivery Note (BDN). This implies that a bunker delivery note shall be presented for every barge delivery and every grade. Bunker Delivery Notes are required to contain all specific information as follows:

- Name and IMO number of receiving ship
- Port
- Date of commencement of delivery
- Name, address, and telephone number of marine fuel oil supplier
- Product name (s)

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- Quantity in metric tons
- Density at 15 oC, kg/m<sup>3</sup>
- Sulphur content (% m/m)

A declaration signed and certified by the fuel oil supplier's representative that the fuel oil supplied is in conformity with the applicable subparagraph of regulation 14.1 or 14.4 and regulation 18.3 of this Annex. (i.e. that the fuel supplied has a sulphur level below:

4.50% m/m prior to 1 January 2012

3.50% m/m on and after 1 January 2012

0.50% m/m on and after 1 January 2020

And that the fuel is free from inorganic acid, does not include any added substance or chemical waste which either jeopardises the safety of ships, adversely affects the performance of the machinery, is harmful to personnel, or contributes overall to additional air pollution).

Further, the revised MEPC Resolution recommends that the seal number of the associated MARPOL 73/78 Annex VI fuel sample is included in the BDN's for cross-reference purposes. The BDN's are to be kept on board and readily available for inspection at all times. It shall be retained for a period of three years after the fuel oil has been delivered on board.

### **Supplier's responsibility**

While most IMO conventions place full responsibility on the ships and shipowners, Regulation 18 also places responsibilities on the fuel suppliers (fuel oil quality declaration, BDN and the Annex VI fuel oil sample by continuous drip and at the receiving ships manifold). Annex VI of MARPOL 73/78 also contains instruments to encourage port states to ensure that suppliers fulfil their obligations. Port states are therefore required to:

- Maintain a register of local suppliers of fuel oil.
- Require local suppliers to provide the BDN and sample, certified by the fuel oil supplier that the fuel oil meets the requirements of regulations 14 and 18.
- Require local suppliers to retain a copy of the bunker delivery note for at least three years for inspection and verification by the Port State as necessary.
- Take action as appropriate against fuel oil suppliers that have been found to deliver fuel oil that does not comply with that stated on the Bunker Delivery Note.
- Inform the Flag Administration of any ship receiving fuel oil found to be non-compliant with the requirements of regulations 14 or 18 of this Annex.

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- Inform IMO for transmission to Parties to the Protocol of 1997 of all cases where fuel oil suppliers have failed to meet the requirements specified in regulations 14 or 18.

However, despite the suppliers' responsibilities and the instruments available, previous experience from Port State Controls indicates that it is advisable for owners/managers themselves to ensure compliance. In order to assist ships in ensuring that the operational requirements are met, it should be considered to include clauses related to MARPOL 73/78 Annex VI compliance in bunker contracts and agreements with suppliers, as well as charter parties. For vessels taking part in a fuel testing scheme it could be advantageous to include a clause referring to the 4th sample taken at the receiving vessel manifold as the retained sample in case the supplier is not in a position to comply with the procedural requirements stated in Annex VI of MARPOL 73/78

### European Union (EU) Regulations :

Maximum sulphur content of marine fuels used by inland waterway vessels and ships at berth in Community ports :

1. With effect from 1 January 2010, Member States shall take all necessary measures to ensure that the following vessels do not use marine fuels with a sulphur content exceeding 0,1 % by mass:

- Inland waterway vessels; and
- Ships at berth in Community ports, allowing sufficient time for the crew to complete any necessary fuel-changeover operation as soon as possible after arrival at berth and as late as possible before departure. Member States shall require the time of any fuel change over operation to be recorded in ships' logbooks.

2. Paragraph 1 shall not apply (EU Exemptions (0.1% S at berth) :

- Whenever, according to published timetables, ships are due to be at berth for less than two hours;
- To inland waterway vessels that carry a certificate proving conformity with the International Convention for the Safety of Life at Sea, 1974, as amended, while those vessels are at sea
- To ships which switch off all engines and use shoreside electricity while at berth in ports.

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- until 1 January 2012 for the vessels listed in the annex and operating exclusively within the territory of the Hellenic Republic;

3. With effect from 1 January 2010, Member States shall ensure that marine gas oils are not placed on the market in their territory if the sulphur content of those marine gas oils exceeds 0,1 % by mass.

### Californian regulations :

With effect from 1 January 2014, the California Air Resources Board (CARB) Ocean Going Vessels (OGV) Fuel Rule Phase II fuel requirements will enter into force. The maximum permitted sulphur content of Marine Gas Oil - MGO (DMA) and Marine Diesel Oil - MDO (DMB) used by ocean going vessels within Californian waters will reduce from 1.0% and 0.5% sulphur respectively to a maximum of 0.1% sulphur for both fuel types. Further details can be found in CARB Marine Notice 2013-1 issued by Californian Air Resource Board. If vessel is planned to call CARB zone on or after 01 Jan 2014, it is to be ensured that suitable bunkers are ordered in a timely manner and supplied on board prior entry into Californian waters.

Attention to be paid to change over procedures and precautions to be taken while using 0.1% Sulphur Fuel which effectively will be same as LSMGO 0.1% S ( by weight) fuel.

Please further note that Vessels complying with the CARB OGV Fuel Rule must also adhere to the maximum fuel oil sulphur requirements of the MARPOL Annex VI North American Emission Control Area as both sets of regulations will apply.

#### Changes to the fuel requirements:

The fuel requirements will be implemented in two phases and the current changes affect both phases. The following amendments have been made to the fuel requirements:

<b>Phase</b>	<b>Effective Date</b>	<b>Per cent sulphur content limit required</b>	<b>Changes from existing requirement</b>
Phase 1	1 July 2009	Marine gas oil (MGO) at or below 1.5% sulphur; or Marine diesel oil (MDO) at or below 0.5% sulphur	No changes.
	1 August 2012	Marine gas oil (MGO) at or below 1.0% sulphur; or Marine diesel oil (MDO) at or below 0.5% sulphur	MGO sulphur limit reduced from 1.5% to 1.0%. No change in MDO limit.
Phase 2	1 January 2014	Marine gas oil (MGO) or Marine diesel oil (MDO) at or below 0.1% sulphur	Implementation date delayed from 2012 to 2014.

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## **Californian regulations – CARB Exemptions**

- Ocean-going vessel voyages that are comprised of continuous and expeditious navigation through any Regulated California Waters for the purpose of traversing such bodies of water without entering California internal or estuarine waters or calling at a port, roadstead, or terminal facility.
- Emergency generators.
- Ocean-going vessels owned or operated by any branch of local, state, or federal government, or by a foreign government, when such vessels are operated within Regulated California Waters on government non-commercial service.
- Engines and boilers operating on alternative fuel (Alternative fuel means natural gas, propane, ethanol, methanol, hydrogen, electricity, or fuel cells. Alternative fuel also means any mixture that only contains these fuels).

## **Safety Exemptions**

- Exemptions from the regulation in situations where compliance would endanger the safety of the;
  - Vessel
  - Crew
  - Its Cargo
  - or Its passengers
- Due to;
  - Severe weather conditions
  - Equipment failure
  - Fuel contamination
  - or other extraordinary reasons beyond the master's reasonable control

## **Safety Exemptions – applying for this exemption**

- The master should limit the use of the non-compliant fuel to the relevant equipment and duration needed to maintain vessel safety
- Within 24 hours after the episode during which the safety exemption is claimed, the master must notify the Air Resources Board staff
- The master must submit to the ARB, within 4 working days after the notification above, all documentation (in English) necessary to establish conditions necessitating the safety exemption and the date(s), local time, and position of the vessel (longitude and latitude) in Regulated California Waters at the beginning and end of the time period during which a safety exemption is claimed under this subsection.
- The master must also submit steps that will be taken to avoid or minimize repeated claims of the exemption.

## **Recordkeeping**

- The date, local time and position (longitude and latitude) of the vessel;

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- for each entry, and each departure of the Regulated California Waters
- at the initiation and completion of any fuel switching procedures used to comply prior to entry
- at the initiation and completion of any fuel switching procedures within Regulated California Waters
- The type of fuel used in each auxiliary engine, main engine, and auxiliary boiler operated in Regulated California Waters

### **Documentation of Fuel Switch Over Procedures :**

- A fuel system diagram that shows all storage, service, and mixing tanks, fuel handling, pumping, and processing equipment, valves, and associated piping. The diagram or other documentation shall list the fuel tank capacities and locations, and the nominal fuel consumption rate of the machinery at rated power
- Description of the fuel switch over procedure with detailed instructions and clear identification of responsibilities
- The make, model, rated power and serial numbers of all main engines and auxiliary engines
- The make, model, rated output and serial numbers of all auxiliary boilers
- The types, amounts, and the actual percent by weight sulphur content of all fuels purchased for use on the vessel, as reported by the fuel supplier or a fuel testing firm.

### **The fuel use requirements in the regulations will cease to apply when:**

Sunset Review : Under sunset review process, CARB staff will evaluate the emissions reductions achieved by the ECA Regulation and compare them to the emissions achieved by the California OGV Fuel Regulation. The evaluation will take into consideration the exemptions, exceptions, and alternative technologies allowed under the ECA Regulation that are different from the specific fuel standards in the California Regulation. Staff will also evaluate the extent to which the enforcement program implemented by USCG and EPA will be as effective as the program being implemented to enforce the California OGV Fuel Regulation. Staff anticipates that this evaluation will be completed by April 2015. CARB Staff will allow vessels complying with the ECA Regulations under the provisions of the Sunset Review to comply with the CARB Regulation by using the Temporary Experimental or Research Exemption ( Subsection © (6) in both title, CCR, #2299,2 and the title 17, CCR, #93118.2).

In case of non-availability of CARB compliant fuel :

If a ship owner is not able to obtain compliant fuel due to non-availability, a FONAR Report must be submitted. FONAR is not a waiver, it is a statement of non-compliance. The lowest possible sulphur content fuel should be used in case of non-availability of compliant fuel.

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### HONG KONG Regulations :

The Hong Kong Marine Department (HKMD) has issued the Marine Department Notice no.56 of 2015, which concerns switch to clean fuel while at berth for Ocean-Going Vessels (OGVs). This regulation applies from 01<sup>st</sup> July 2015 and is applicable for vessels at anchorages and berth while in Hong Kong waters.

The Regulation requires OGVs to use compliant fuel i.e. low sulphur fuel with sulphur content not exceeding 0.5% by weight, liquefied natural gas and any other fuels approved by the Director of Environmental Protection while at berth in Hong Kong, except **during the first hour after arrival and the last hour before departure**, so as to reduce sulphur dioxide (SO<sub>2</sub>) emissions. Vessels are required to record the date and time of fuel switching and keep the relevant records for three years.

If an OGV uses technology that can achieve the same or less emission of SO<sub>2</sub> as compared with using low sulphur marine fuel, the OGV may be exempted from switching to compliant fuel.

After the Regulation enters into force, masters and owners of any OGVs using non-compliant fuel while at berth in Hong Kong will be liable to a maximum fine of \$200,000 and imprisonment for six months. Masters and owners who fail to record or keep the required particulars will also be liable to a maximum fine of \$50,000 and imprisonment for three months.

Please refer to the Marine Department Notice no.56 of 2015 as well as the document "*Ocean Going Vessels Fuel Switch At Berth*" issued by the Air Policy Group of Environmental Protection Department, Hong Kong.

### TURKEY Regulations :

Ships arriving at Turkish ports and ships anchored at anchorages shall be subject to the rule of using bunkers with a maximum sulfur content of 0.1% by mass during loading, discharging or accommodation activities or during periods of time they are safely berthed or anchored without any cargo operations. In this context, the obligation of berthed ships to use bunkers with a maximum sulfur content of 0.1% by mass shall not apply if the ship in question is or should be berthed for less than two hours.

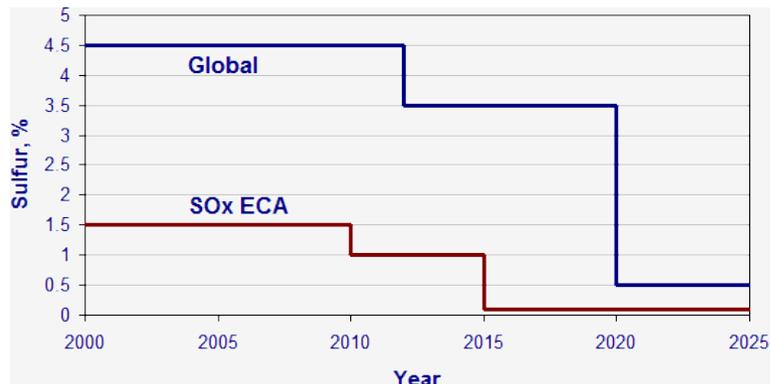
Ships passing the Turkish Straits without calling to Turkish Ports are NOT be subject to the rule of using marine fuels with sulfur content not exceeding 0.1% by mass, as long as they proceed without calling to any Turkish Port.

Please refer to Circular No. 647/2011 published by the Istanbul & Marmara, Aegean, Mediterranean and Black Sea Regions Chamber of Shipping for more details.

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Date	Sulphur Limit in Fuel (% m/m)	
	ECA	Global
2000	1.5 %	4.5 %
2010	1.0 %	4.5 %
2012		3.5 %
2015	0.1 %	
2020 <sup>a</sup>		0.5 %

a - alternative date is 2025, to be decided by a review in 2018



**Figure 2. MARPOL Annex VI Fuel Sulfur Limits**

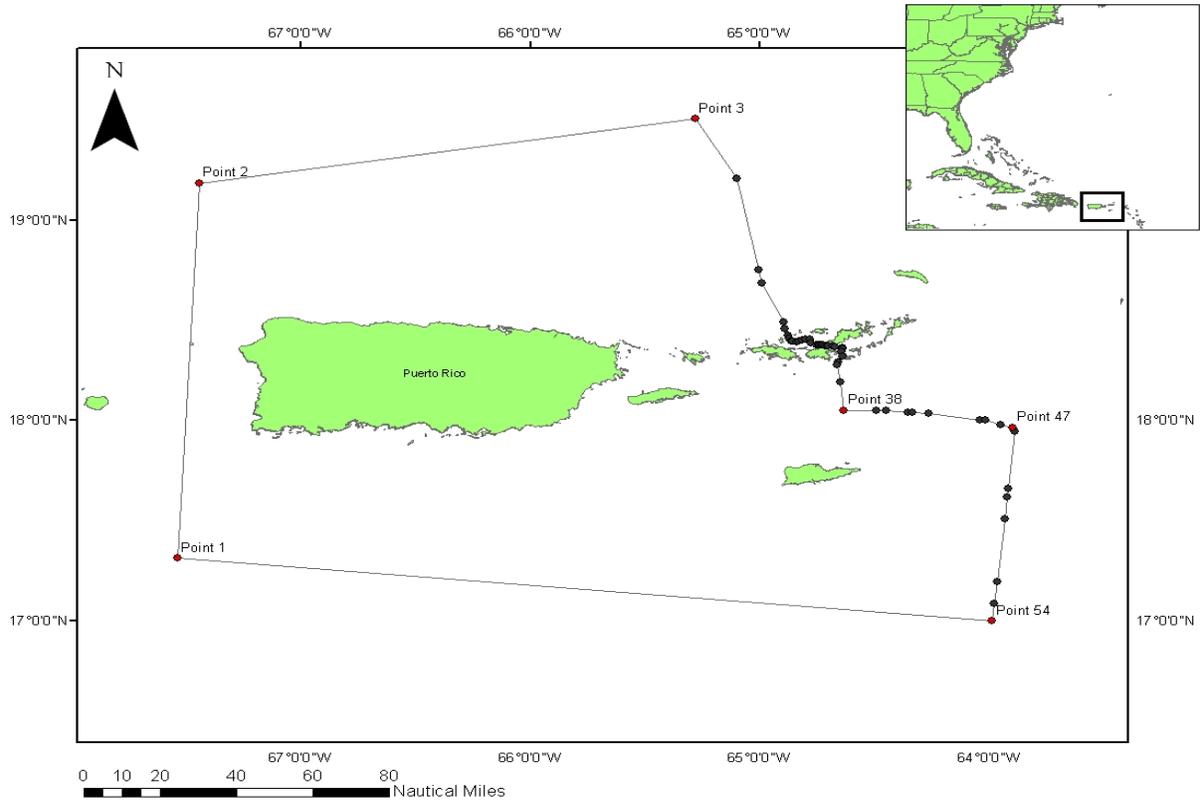
## MARPOL Annex VI - Air Pollution Regulations

4-1

POINT	LATITUDE	LONGITUDE	POINT	LATITUDE	LONGITUDE
1	17° 18' 37" N.	67° 32' 14" W.	29	18° 21' 57" N.	64° 40' 60" W.
2	19° 11' 14" N.	67° 26' 45" W.	30	18° 21' 51" N.	64° 40' 15" W.
3	19° 30' 28" N.	65° 16' 48" W.	31	18° 21' 22" N.	64° 38' 16" W.
4	19° 12' 25" N.	65° 6' 8" W.	32	18° 20' 39" N.	64° 38' 33" W.
5	18° 45' 13" N.	65° 0' 22" W.	33	18° 19' 15" N.	64° 38' 14" W.
6	18° 41' 14" N.	64° 59' 33" W.	34	18° 19' 7" N.	64° 38' 16" W.
7	18° 29' 22" N.	64° 53' 51" W.	35	18° 17' 23" N.	64° 39' 38" W.
8	18° 27' 35" N.	64° 53' 22" W.	36	18° 16' 43" N.	64° 39' 41" W.
9	18° 25' 21" N.	64° 52' 39" W.	37	18° 11' 33" N.	64° 38' 58" W.
10	18° 24' 30" N.	64° 52' 19" W.	38	18° 3' 2" N.	64° 38' 3" W.
11	18° 23' 51" N.	64° 51' 50" W.	39	18° 2' 56" N.	64° 29' 35" W.
12	18° 23' 42" N.	64° 51' 23" W.	40	18° 2' 51" N.	64° 27' 2" W.
13	18° 23' 36" N.	64° 50' 17" W.	41	18° 2' 30" N.	64° 21' 8" W.
14	18° 23' 48" N.	64° 49' 41" W.	42	18° 2' 31" N.	64° 20' 8" W.
15	18° 24' 11" N.	64° 49' 0" W.	43	18° 2' 3" N.	64° 15' 57" W.
16	18° 24' 28" N.	64° 47' 57" W.	44	18° 0' 12" N.	64° 2' 29" W.
17	18° 24' 18" N.	64° 47' 1" W.	45	17° 59' 58" N.	64° 1' 4" W.
18	18° 23' 13" N.	64° 46' 37" W.	46	17° 58' 47" N.	63° 57' 1" W.
19	18° 22' 37" N.	64° 45' 20" W.	47	17° 57' 51" N.	63° 53' 54" W.
20	18° 22' 39" N.	64° 44' 42" W.	48	17° 56' 38" N.	63° 53' 21" W.
21	18° 22' 42" N.	64° 44' 36" W.	49	17° 39' 40" N.	63° 54' 53" W.
22	18° 22' 37" N.	64° 44' 24" W.	50	17° 37' 8" N.	63° 55' 10" W.
23	18° 22' 39" N.	64° 43' 42" W.	51	17° 30' 21" N.	63° 55' 56" W.
24	18° 22' 30" N.	64° 43' 36" W.	52	17° 11' 36" N.	63° 57' 57" W.
25	18° 22' 25" N.	64° 42' 58" W.	53	17° 4' 60" N.	63° 58' 41" W.
26	18° 22' 26" N.	64° 42' 28" W.	54	16° 59' 49" N.	63° 59' 18" W.
27	18° 22' 15" N.	64° 42' 3" W.	55	17° 18' 37" N.	67° 32' 14" W.
28	18° 22' 22" N.	64° 38' 23" W.			

# MARPOL Annex VI - Air Pollution Regulations

## LATEST ADDITION IN EMISSION CONTROL AREA



## MSDS

The SOLAS VI/5-1 regulation requires MSDS to be issued for both Annex I cargoes and fuel oil (bunkers)

- Effective 1 January 2011
- Parties to SOLAS can be expected to verify that ships have received the required MSDS
- MS Resolution 286(86) contains recommendations on the format and content for the MSDS

A copy of the corresponding MSDS should be given to the freight forwarding agent, or attached to the outside of the fuel sample carton box.