



# IMO Strengthens Air Pollution Regulations

*New regulations include significant emissions restrictions.*

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The Marine Environment Protection Committee (MEPC) of the International Maritime Organization (IMO) has adopted amendments to the MARPOL Annex VI regulations to reduce harmful emissions from ships. Annex VI of MARPOL 73/78, which addresses the prevention of air pollution from ships, was originally adopted in September 1997 and entered into force in May 2005. Over the past several years, the IMO has been working to make meaningful strides that will result in minimizing harmful ship emissions.

In a nutshell, the new amendments include significant and progressive limits for sulphur oxides (SO<sub>x</sub>) and nitrogen oxides (NO<sub>x</sub>) and for the first time address emissions of particulate matter. Regarding NO<sub>x</sub> emissions, the amendments introduce the concept of emission control areas for stringent NO<sub>x</sub> reductions, similar to those for SO<sub>x</sub> emission control areas. Part of this effort to revise MARPOL Annex VI includes significant revisions

for compliance. Other amendments include a requirement for a ship-specific volatile organic compound management plan to help minimize these emissions from tankers while in transit.

The revised Annex VI will allow for an emission control area to be designated for sulphur oxide and particulate matter emissions, nitrogen oxide emissions, or all three types of emissions from ships. In addition to amendments to Annex VI, IMO is asking the International Standardization Organization to consider the development of a fuel oil specification addressing air quality, ship safety, engine performance, and crew health, with recommendations for future consideration by IMO.

## SO<sub>x</sub> and Particulate Matter Emissions

The current regulation 14—sulphur oxides—is amended to achieve significant reductions of sulphur oxide and particulate matter emissions from ships. The new regulation 14—sulphur oxides and particulate matter—includes a scheme for a progressive reduction in SO<sub>x</sub> emissions from ships.

It is generally recognized that SO<sub>x</sub> emissions are a function of the sulphur content of fuel. Reducing the sulphur content of fuel will also result in lower particulate matter emissions. Currently, there is a global “sulphur cap” of 4.5 percent on the sulphur content in fuel. Under the revised Annex VI, this cap would be reduced

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sions to the NO<sub>x</sub> technical code, which includes the procedures for testing and certifying marine engines

**TABLE 1****Global Sulphur Cap**

<i>Effective date</i>	<i>Old sulphur limit</i>	<i>New sulphur limit</i>
January 1, 2012	4.5% S	3.5% S
January 1, 2020	3.5% S	0.5% S <sup>3</sup>

**ECA Sulphur Cap**

<i>Effective date</i>	<i>Old sulphur limit</i>	<i>New sulphur limit</i>
March 1, 2010	1.5% S	1% S
March 1, 2015	1% S	0.1% S

**The new SOx limit requirements.**

to 3.5 percent, effective January 1, 2012, and further reduced to 0.5 percent starting January 1, 2020 (subject to a feasibility review to be completed no later than 2018).

Regarding SOx emission control areas (now referred to by the generic name of emission control areas following the revisions to MARPOL Annex VI), the limits applicable in areas would be reduced starting on March 1, 2010, from the current level of 1.5 percent to one percent sulphur content of fuel consumed in those areas. The limit will be further reduced to 0.1 percent starting on January 1, 2015, subject to a review regarding the availability of fuel oil to comply with this fuel oil standard.<sup>1</sup>

**NOx Regulations for New Engines**

The Marine Environment Protection Committee also adopted amendments prescribing progressive reductions in nitrogen oxide emissions from marine engines. Allowing that the current levels for these emissions are known as Tier I and Tier II, limits were established for marine engines that represent roughly a 20 percent reduction in NOx that begins on January 1, 2011, followed by the most stringent controls on Tier III marine engines (those installed on ships constructed on or after January 1, 2016), operating in emission control areas where nitrogen oxide emissions are the focus. The Tier III limits represent roughly an 80 percent reduction from Tier II levels and would require the use of after-treatment systems.

The committee agreed on amendments confirming the proposed “three-tier” structure for new engines (which would set progressively tighter nitrogen oxide emission standards for new engines depending on the date of

their installation). Tier I applies to a diesel engine that is installed on a ship constructed on or after January 1, 2000, and prior to January 1, 2011, and represents the 17 g/kW standard, as stipulated in the existing Annex VI.

For Tier II, NOx emission levels for a diesel engine installed on a ship constructed on or after January 1, 2011, would be reduced to 14.4 g/kWh.

For Tier III, NOx emission levels for a diesel engine installed on a ship constructed on or after January 1, 2016, would be reduced to 3.4 g/kWh, when the ship is operating in a designated emission control area. Outside a designated emission control area, Tier II limits apply.

**NOx Standards for Existing Engines**

Amendments were also adopted that established a NOx emission limit of 17 grams/kilowatt for a diesel engine with a power output of more than 5,000 kW and a displacement per cylinder at or above 90 liters installed on a ship constructed on or after January 1, 1990, but prior to January 1, 2000.<sup>2</sup>

**TABLE 2**

<i>Tiers for NOx limits for new engine</i>	<i>Effective date</i>
Tier I	January 1, 2000
Tier II	January 1, 2011
Tier III	January 1, 2016 (for use in ECAs)

**New NOx limit requirements.****NOx Technical Code**

The NOx technical code was revised, and includes a new chapter based on the agreed approach for NOx regulation of existing (pre-2000) engines established in the amended MARPOL Annex VI. The revised NOx code also includes provisions for direct measurement and monitoring methods, a certification procedure for existing engines, and test cycles to be applied to Tier II and Tier III engines.

**Exhaust Gas Cleaning Systems**

Guidelines for exhaust gas cleaning systems to remove SOx emissions from engine exhaust were adopted and issued as an MEPC resolution. The guidelines include a rigorous set of interim washwater discharge criteria, which are being forwarded to the joint group of experts on scientific aspects of marine environmental protection



for review and comment. These interim washwater discharge criteria will be revised in the future as more data becomes available on the contents of the discharged washwater and its potential effects on the marine environment.

### Halons

A joint MSC-MEPC circular on decreasing availability of halons for marine uses was also adopted. The joint circular notes that the availability of halons is decreasing and recommends that ship owners, ship operators, shipping companies, and those other interested entities take appropriate action to reduce their reliance on halons. The joint circular also requests that IMO member governments collect data on halons from the maritime sector, in particular the number of ships equipped with halon systems (e.g., the total amount of halons installed for their merchant fleets), and to convey this information directly to the Ozone Secretariat of the United Nations Environment Program (Secretariat for the Vienna Convention and its Montreal Protocol).

### Volatile Organic Compounds

IMO also adopted guidelines for developing a volatile organic compound (VOC) management plan. This management plan would be ship-specific and is intended to

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ensure that the operation of a tanker, to which regulation 15 of MARPOL Annex VI applies, prevents or minimizes VOC emissions to the extent possible. Regulation 15 addresses VOCs and requires a party that regulates tanker VOC emissions to submit a notification to IMO

on the size of tankers to be controlled, on cargoes requiring vapor emission control systems, and the effective date of such control.

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### Endnotes:

- <sup>1</sup> If a decision is made that it is not possible for ships to comply, then the standard in that subparagraph shall become effective on and after January 1, 2025. Through this approach of tightening the sulphur content in fuel used in emission control areas, significant reductions in particulate matter will also be achieved where such reductions will contribute to significant improvements in air quality and respiratory health benefits in the adjacent land areas.
- <sup>2</sup> Such a retroactive requirement shall be applicable provided that an approved method for that engine has been certified by an administration of a party and notification of such certification has been submitted to IMO by the certifying administration. Certification of an approved method is to be in accordance with the NO<sub>x</sub> technical code. Further, it is to include verification by the designer of the base marine diesel engine to which the approved method applies that the calculated effect of the approved method will not decrease engine rating by more than one percent, increase fuel consumption by more than two percent, or adversely affect engine durability or reliability, and that the cost of the approved method is not excessive, as determined by a comparison of the amount of NO<sub>x</sub> reduced by the approved method and the cost of purchasing and installing such approved method.
- <sup>3</sup> The reduction of the global sulphur cap in 2020 would be subject to a review that would be completed no later than 2018 to determine the availability of fuel oil to comply with this fuel oil standard. The review would take into account the following elements: (i) the global market supply and demand for fuel oil to comply with the proposed standard that exists at the time that the review is conducted, (ii) an analysis of the trends in fuel oil markets, and (iii) any other relevant issue. This review would be conducted by a group of experts established by IMO, comprising of representatives with the appropriate expertise in the fuel oil market and appropriate maritime, environmental, scientific, and legal expertise. If a decision is made that it is not possible for ships to comply, then the standard in that subparagraph shall become effective on and after January 1, 2025.

In addition, a fuel availability provision is introduced under regulation 18, "Fuel Oil Availability and Quality," that describes what actions are appropriate should a ship be unable to obtain the fuel necessary to comply with a given requirement under the above-mentioned regulation 14.

IMO has also approved an MEPC.1 circular containing unified interpretations related to the verification of sulphur content in fuel oil. These should be applied until the 2008 amendments to MARPOL Annex VI enter into force. This circular also provides the fuel oil verification procedure for MARPOL Annex VI fuel samples.

### Bibliography:

International Maritime Organization documents from the 58th session, MEPC 58/23, MEPC resolutions MEPC.176(58) - AMENDMENTS TO THE ANNEX OF THE PROTOCOL OF 1997 TO AMEND THE INTERNATIONAL CONVENTION FOR THE PREVENTION OF POLLUTION FROM SHIPS, 1973, AS MODIFIED BY THE PROTOCOL OF 1978 RELATING THERETO (REVISED MARPOL ANNEX VI) and MEPC.177(58) - AMENDMENTS TO THE TECHNICAL CODE ON CONTROL OF EMISSION OF NITROGEN OXIDES FROM MARINE DIESEL ENGINES (NOX TECHNICAL CODE 2008).