

## MARPOL Annex VI (revised, 2008)

MARPOL 73/78, Annex VI – Regulations for the Prevention of Air Pollution from Ships outlines international requirements to reduce harmful air emissions from ships. The International Maritime Organization (IMO) originally adopted Annex VI in September 1997, and it entered into force in May 2005. Annex VI entered into force for the United States on January 8, 2009.

In October 2008, the Marine Environment Protection Committee (MEPC) of the IMO adopted amendments to Annex VI. Annex VI (revised) will enter into force on July 1 2010.

The new amendments include significant and progressive limits for Sulfur Oxide (SO<sub>x</sub>) and Nitrogen Oxide (NO<sub>x</sub>) emissions from marine engines and for the first time address emissions of Particulate Matter (PM). Regarding these emissions, the amendments introduce the concept of Emission Control Areas (ECA) for both SO<sub>x</sub> and PM or NO<sub>x</sub> or all three types of emissions.

*Nitrogen Oxide (NO<sub>x</sub>) emissions:* Progressive reductions in NO<sub>x</sub> emissions from ships include new stringent controls on marine diesel engines. Regulation 13 of Annex VI (revised) implements a “three-tier” structure for new engines, which progressively sets tighter NO<sub>x</sub> emission standards for new engines depending on the date of their installation<sup>1</sup>. The revised Annex VI also places controls on existing marine diesel engines if an Approved Method for that engine has been certified by an Administration<sup>2</sup>. Table 1 summarizes the engine Tiers, effective date, and NO<sub>x</sub> emissions standards.

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<sup>1</sup> Regulation 13 of Annex VI (revised) implements a “three-tier” structure for new engines. 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/kWh standard, as stipulated in the existing Annex VI. For Tier II, NO<sub>x</sub> 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, NO<sub>x</sub> 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 ECA. Outside a designated ECA, Tier II limits apply.

<sup>2</sup> The revised Annex VI also places controls on existing marine diesel engines if an Approved Method for that engine has been certified by an Administration of a Party and notification of such certification has been submitted to the Organization by the certifying Administration. Marine diesel engines with a power output of more than 5,000 kW and a per cylinder displacement at or above 90 liters installed on a ship constructed on or after 1 January 1990 but prior to 1 January 2000 shall comply with the emission limits into force under the Tier I.

Table 1: New NOx Limit Requirements:

<u>Tiers for NOx limits for new engine</u>	<u>Effective date</u>	<u>g/kWh (NOx Emission)</u>
Tier I	January 1, 2000	17
Tier II	January 1, 2011	14.4
Tier III	January 1, 2016 (for use in ECAs, otherwise Tier II applies)	3.4
<u>Existing Engines</u>		
NOx limits for existing engines of more than 5, 000 kW installed between JAN90 – JAN00		
Tier I	12 months after Administration notifies IMO	17

*Sulfur Oxide (SOx) emissions:* Progressive reduction in Sulfur (SOx) emissions from ships include a reduction in the global Sulfur content in fuel oil cap as well as a reduction in the cap while a vessel operates in a ECA. Table 2 summarizes the Global and ECA SOx limits.

Table 2: New SOx Limit Requirements:

<u>Global Sulfur Cap</u>		
<u>Effective date</u>	<u>Old Sulfur limit</u>	<u>New Sulfur limit</u>
January 1, 2012	4.5% S	3.5% S
January 1, 2020**	3.5% S	0.5% S
<u>ECA Sulfur Cap</u>		
<u>Effective date</u>	<u>Old Sulfur limit</u>	<u>New Sulfur limit</u>
March 1, 2010	1.5% S	S 1% S
March 1, 2015	1% S	0.1% S

\*\* based on a study regarding the availability of such fuel; if not available, then the limit would be postponed till 2025.

*Emission Control Areas (ECA):* Annex VI (revised) introduces the concept of Emission Control Areas (ECA) for more stringent NOx reductions, similar to those previously established for SOx Emission Control Areas (SECA) found in the previous version of Annex VI. An ECA may be designated for SOx and Particulate Matter (PM), or NOx, or all three types of emissions from ships. That is, an ECA can be defined as one that regulates SOx and PM – commonly referred to as a SOx-ECA, or one that regulates NOx – commonly referred to as a NOx-ECA, or one that regulates both SOx/PM and NOx emissions – commonly referred to as an ECA.

As defined in Annex VI (revised), an Emission Control Area means an area where the adoption of special mandatory measures for emissions from ships is required to prevent, reduce and control air pollution from NOx or SOx and particulate matter or all three types of emissions and their attendant adverse impacts on human health and the environment. Emission Control Areas shall include those listed in, or designated under, regulations 13 and 14 of this Annex.