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Glossary

International Maritime Organisation (IMO): is the United Nations specialized agency with responsibility for the safety and security of shipping and the prevention of marine pollution by ships. In 1948 an international conference in Geneva adopted a convention formally establishing IMO (the original name was the Inter-Governmental Maritime Consultative Organisation, or IMCO, but the name was changed in 1982 to IMO). IMO currently has 170 Member States and three Associate Members. Non-governmental international organisations that have the capability to make a substantial contribution to the work of IMO may be granted consultative status by the Council with the approval of the Assembly. At present 89 NGOs have Consultative status. IMO may enter into agreements of cooperation with other intergovernmental organisations on matters of common interest with a view to ensuring maximum co-ordination in respect of such matters. To date there are 61 intergovernmental organisations which have signed agreements of co-operation with IMO.

Marine Environment Protection Committee (MEPC): is one of the five main Committees of IMO and consists of all Member States; it is empowered to consider any matter within the scope of the Organisation concerned with prevention and control of pollution from ships. In particular it is concerned with the adoption and amendment of conventions and other regulations and measures to ensure their enforcement (e.g. MARPOL). The MEPC was first established as a subsidiary body of the IMO’s Assembly and raised to full constitutional status in 1985.

MARPOL (MARine POLlution): means the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto and by the Protocol of 1997. It currently includes six technical Annexes. To become a party to MARPOL, a state must accept Annex I and II, as of today 152 states have ratified the first two annexes. Amendments of MARPOL are discussed and agreed upon by the MEPC.

MARPOL Annex VI: annex added to MARPOL in 1997 to regulate air pollution from ships.

Emission Control Area (ECA): MARPOL Annex VI, which entered into force in 2005, foresees a specially designated sea area where the adoption of special mandatory measures for emissions from ships is required to prevent, reduce and control air pollution from NOx, SOx and/or particulate matter and their attendant adverse impacts on human health and the environment. In this regard we speak about a SOx Emission Control Area, SECA or a NOx Emission Control Area, NECA.

NOx (nitrogen oxides): NOx is a generic term for mono-nitrogen oxides No (nitric oxide) and NO2 (nitrogen dioxide). They are produced from the reaction of nitrogen and oxygen gases in the air during

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1. [http://www.imo.org/About/Membership/Pages/NGOsInConsultativeStatus.aspx](http://www.imo.org/About/Membership/Pages/NGOsInConsultativeStatus.aspx)
2. [http://www.imo.org/About/Membership/Pages/IGOsWithObserverStatus.aspx](http://www.imo.org/About/Membership/Pages/IGOsWithObserverStatus.aspx)
combustion, especially at high temperatures.

\[ \text{SO}_x \] (Sulphur oxides): Sulphur oxide refers to many types of sulphur and oxygen containing compounds that can be found in ship exhaust gas. The most frequent sulphur content in ships emissions is sulphur dioxide (\( \text{SO}_2 \)).

The following definitions have been updated according to Directive 2012/33/EU as regards the sulphur content in marine fuel:

**Heavy fuel oil (HFO):** any petroleum-derived liquid fuel, excluding marine fuel, falling within CN code 2710 19 51 to 2710 19 68, 2710 20 31, 2710 20 35, 2710 20 39, or any petroleum-derived liquid fuel, other than gas oil as defined in points 2 and 3, which, by reason of its distillation limits, falls within the category of heavy oils intended for use as fuel and of which less than 65\% by volume (including losses) distils at 250°C by the ASTM D86 method. If the distillation cannot be determined by the ASTM D86 method\(^3\), the petroleum product is likewise categorised as a heavy fuel oil.

**Gas oil:** any petroleum-derived liquid fuel, excluding marine fuel, falling within CN code 2710 19 25, 2710 19 29, 2710 19 47, 2710 19 48, 2710 20 17 or 2710 20 19, or any petroleum-derived liquid fuel, excluding marine fuel, of which less than 65\% by volume (including losses) distils at 250°C and of which at least 85\% by volume (including losses) distils at 350°C by the ASTM D86 method.

**Marine fuel:** any petroleum-derived liquid fuel intended for use or in use on board a vessel, including those fuels defined in ISO 8217 (1996), in particular:

**Marine diesel oil:** marine diesel oil means any marine fuel as defined for DMB grade in Table I of ISO 8217 with the exception of the reference to the sulphur content;

**Marine gas oil (MGO):** marine gas oil means any marine fuel as defined for DMX, DMA and DMZ grades in Table I of ISO 8217 with the exception of the reference to the sulphur content;

\(^3\) ASTM method means the methods laid down by the American Society for Testing and Materials in the 1976 edition of standard definitions and specifications for petroleum and lubricating products.
Historical background to MARPOL and IMO regulations

The International Convention for the Prevention of Pollution from Ships (MARPOL) is the main international convention covering prevention of pollution of the marine environment by ships from either operational or accidental causes. It is a combination of two treaties adopted in 1973 and 1978 respectively and also includes the Protocol of 1997 (Annex VI). It has been updated by amendments through the years.

The MARPOL Convention was adopted on 2 November 1973 at IMO and covered pollution by oil, chemicals, harmful substances in packaged form, sewage and garbage. The Protocol of 1978 relating to the 1973 International Convention for the Prevention of Pollution from Ships (1978 MARPOL Protocol) was adopted at the Conference on Tanker Safety and Pollution Prevention in February 1978 held in response to a spate of tanker accidents in 1976-1977. As the 1973 MARPOL Convention had not yet entered into force, the 1978 MARPOL Protocol absorbed the parent Convention. The combined instrument is referred to as the International Convention for the Prevention of Marine Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78), and it entered into force on 2 October 1983 (Annexes I and II). In 1997 a new Protocol was adopted to add Annex VI.

The Convention includes regulations aimed at preventing and minimizing pollution from ships - both accidental pollution and that from routine operations - and currently includes six technical Annexes. Special areas with strict controls on operational discharges are included in most Annexes. To become a party to MARPOL a state must accept Annex I and II. Annexes III-VI are voluntary annexes.

Annex I Regulations for the Prevention of Pollution by Oil (entered into force 2nd October 1983, ratified by 152 States/Parties)

It covers prevention of pollution by oil from operational measures as well as from accidental discharges. The 1992 amendments to Annex I made it mandatory for new oil tankers to have double hulls and introduced a phase-in schedule for existing tankers to fit double hulls, which was subsequently revised in 2001 and 2003.

Annex II Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk (entered into force 2nd October 1983, ratified by 152 States/Parties)

Annex II details the discharge criteria and measures for the control of pollution by noxious liquid substances carried in bulk.

Some 250 substances were evaluated and included in the list appended to the Convention. The discharge of their residues is allowed only to reception facilities when certain concentrations and conditions (which vary with the category of substances) are complied with.
In any case, no discharge of residues containing noxious substances is permitted within 12 miles of the nearest land. More stringent restrictions apply to the Baltic and Black Sea areas.

Annex III Prevention of Pollution by Harmful Substances Carried by Sea in Packaged Form (entered into force 1st July 1992, ratified by 138 States/Parties)
Annex III contains general requirements for the issuing of detailed standards on packing, marking, labelling, documentation, stowage, quantity limitations, exceptions and notifications for preventing pollution by harmful substances. The International Maritime Dangerous Goods (IMDG) Code has, since 1991, included marine pollutants.

Annex IV Prevention of Pollution by Sewage from Ships (entered into force 27 September 2003, ratified by 131 States/Parties)
Annex IV contains requirements to control pollution of the sea by sewage.

Annex V Prevention of Pollution by Garbage from Ships (entered into force 31st December 1988, ratified by 144 States/Parties)
This deals with different types of garbage and specifies the distances from land and the manner in which they may be disposed of. The requirements are much stricter in a number of “special areas” but perhaps the most important feature of the Annex is the complete ban imposed on the dumping into the sea of all forms of plastic.

Annex VI Prevention of Air Pollution from Ships (entered into force 19th May 2005, ratified by 75 States/Parties)
The regulations in this annex set limits on SO\textsubscript{x} and NO\textsubscript{x} emissions from ship exhausts, as well as particulate matter, and prohibit deliberate emissions of ozone depleting substances. Emission control areas set more stringent standards. It was prepared by the MEPC in 1990s and added to the MARPOL Protocol in 1997. It established:
- A global cap of 4.5% of sulphur in marine fuels;
- A lower limit of 1.5% of sulphur in SOx Emission Control Areas (hereafter SECAs), in Europe the Baltic Sea was regarded as such (fully implemented in May 2006);
- To sets limits on emissions of nitrogen oxides (NOx) from diesel engines. A mandatory NOx Technical Code, which defines how this shall be done, was adopted.
- Deliberate emissions of ozone depleting substances, which include halons and chlorofluorocarbons (CFCs), are prohibited. New installations containing ozone-depleting substances are prohibited on all ships. New installations containing hydro-chlorofluorocarbons (HCFCs) are permitted until 1 January 2020.
- The incineration onboard ships of certain products, such as contaminated packaging materials and polychlorinated biphenyls (PCBs), is prohibited;

The MEPC initiated the discussion of strengthening Annex VI with additional amendments in July 2005.
The North Sea was adopted as SECA at that time, the date of entry into force of this amendment was 22 November 2006, with full implementation 12 months later.

The MEPC agreed on the need to undertake a review of Annex VI and the NO\textsubscript{x} Technical Code with a view to revising the regulations to take account of current technology and the need to further reduce emissions from ships. Between 2005 and 2007 a sub-committee carried out the review, focusing in particular on available and developing techniques for the reduction of emissions of air pollutants and the potential for a reduction of NO\textsubscript{x} and PM emissions. The revised version of Annex VI was adopted in October 2008. To date 75 States/Parties have subscribed to the revised MARPOL Annex VI.
Current situation from IMO standpoint

The limits for SO\textsubscript{x} in fuel oil are subject to a series of step changes over the years:

<table>
<thead>
<tr>
<th>Outside SECAs</th>
<th>Inside SECAs</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.5% prior to 1\textsuperscript{st} January 2012</td>
<td>1.5% prior to 1\textsuperscript{st} January 2010</td>
</tr>
<tr>
<td>3.5% on and after 1\textsuperscript{st} January 2012</td>
<td>1.0% on and after 1\textsuperscript{st} January 2010</td>
</tr>
<tr>
<td>0.5% on and after 1\textsuperscript{st} January 2020*</td>
<td>0.1% on and after 1\textsuperscript{st} January 2015</td>
</tr>
</tbody>
</table>

*depending on the outcome of a review by MEPC, to be concluded in 2018, as to the availability of the required fuel oil, this date could be deferred to 2025.

As of March 2014 the SECAs established to limit SO\textsubscript{x} and particulate matter emissions are:
1. Baltic Sea area – as defined in Annex I of MARPOL
2. North Sea area (including the English Channel) – as defined in Annex V of MARPOL
3. North American area (entered into force on 1\textsuperscript{st} August 2012); and
4. United States Caribbean Sea (entered into force on 1\textsuperscript{st} January 2014)
Most ships which operate both outside and inside these SECAs will therefore have to operate on different fuel oils in order to comply with the respective limits. In such cases, prior to entry into the SECA, it is required to have fully changed-over to using the SECA compliant fuel oil and to have onboard implemented written procedures as to how this is to be undertaken. Similarly, the change-over from using the SECA compliant fuel oil is not to commence until after exiting the SECA. At each change-over it is required that the quantities of the SECA compliant fuel oils onboard are recorded, together with the date, time and position of the ship when either completing the change-over prior to entry or commencing change-over after exit from such areas. These records are to be made in a logbook as prescribed by the ship’s flag state. In the absence of any specific requirement in this regard the record could be made, for example, in the ship’s Annex I Oil Record Book.

Annex VI also mentions a fuel availability clause (Regulation 18). It requires that each subscribing state shall take all reasonable steps to promote the availability of fuel oils which comply with the limitations set in the Annex and inform the IMO of the availability of compliant fuel oils in its ports and terminals. It also grants a certain level of protection to the shipowners in the event of non-availability of compliant fuel oil.

There are other means by which equivalent levels of SO\textsubscript{2} and particulate matter emission controls could be achieved, both outside and inside SECAs. These may be divided into methods termed primary (in which the formation of the pollutant is avoided) or secondary (in which the pollutant is formed but subsequently removed to some degree prior to discharge of the exhaust gas stream to the atmosphere). The regulation in Annex VI allows for the application of such methods subject to approval by the subscribing state. In approving such equivalents an administration should take into account any relevant guidelines. As of October 2010 there are no guidelines in respect of any primary methods (which could encompass, for example, onboard blending of liquid fuel oils or dual fuel (gas / liquid) use). In terms of secondary control methods, guidelines (MEPC.184 (59)) have been adopted for exhaust gas cleaning systems which operate by water-washing the exhaust gas stream prior to discharge to the atmosphere. In using such arrangements there would be no constraint on the sulphur content of the fuel oils as bunkered other than that given by the system’s certification.
Historical background of EU Directives

At European Union level there have been subsequent steps to regulate sulphur content in liquid fuels to reduce its emissions in the atmosphere during the past twenty years.

The Directive 93/12/EEC of 23rd March 1993 established lower limits for the sulphur content in gas oil (definition on page 4 is from Directive 05/33/EC and does not include marine gas oil as was the case in previous directives) and new limits for aviation kerosene.

In the following years it has been deemed important to lay down limits for the sulphur content of other liquid fuels, in particular heavy fuel oils, marine fuels, marine gas oils and gas oils, on the basis of cost effectiveness studies and also in view of the regulation in Annex VI on sulphur content of marine fuel in the IMO’s MARPOL Protocol of 1997. The result was Directive 99/32/EC of 26 April 1999 which amended Directive 93/12/EEC and established limits for sulphur content in heavy fuel oil (1.0% after 1 January 2003) and gas oil, including marine gas oil (0.2% after 1 January 2000 and 0.1% after 1 January 2008). In the latter case derogations for Greece throughout its territory, for Spain with regard to the Canary Islands, for France with regard to the French Overseas Departments, and for Portugal with regard to the archipelagos of Madeira and Azores were also included since the limits would present technical and economic problems for these regions. In the Directive was also included a recommendation to continue the initiative to have the North Sea/English Channel declared a SECA.

Following the entry into force of MARPOL Annex VI in May 2005 a new Directive, 05/33/EC, was promulgated in July 2005, amending Directive 99/32/EC. The measures in this Directive meant to complement Member States’ national measures to comply with emission ceilings for atmospheric pollutants set out in Directive 01/81/EC. No impact assessment has been done by the European Commission since the Member States had already approved the new regulations as subscribers of the MARPOL ANNEX VI.

Directive 2005/33/EC on the sulphur content of marine fuels established the following:

1. The exclusion of marine gas oil from the sulphur content limit established for gas oil, and it eliminated the derogation for Greece for gas oil from 1st January 2010.
2. A 1.5% limit for marine fuels used in SECAs and by passenger ships operating on regular services to or from EU ports in Member States’ territorial seas, exclusive economic zones and pollution control zones. The application dates were: 11th August 2006 for the Baltic Sea, 11th August 2007 for the North Sea (including English Channel), and 12 months after entry into force for any other SECA, including ports, designated by the IMO.
3. A 0.1% limit for marine fuels used by inland waterway vessels and by ships at berth in EU ports as from 1st January 2010.
This limit does not apply:

a) whenever, according to published timetables, ships are due to be at berth for less than two hours;
b) 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;
c) until 1st January 2012 for the vessels listed in the Directive’s Annex and operating exclusively within the territory of the Hellenic Republic;
d) to ships which switch off all engines and use shore-side electricity while at berth in ports.

4. As an alternative to using low sulphur marine fuels meeting the requirements listed above, Member States may allow ships to use an approved emission abatement technology, provided that these ships:
   • continuously achieve emission reductions which are at least equivalent to those which would be achieved through the limits on sulphur in fuel specified in the Directive;
   • are fitted with continuous emission monitoring equipment;
   • document thoroughly that any waste streams discharged into enclosed ports, harbours and estuaries have no impact on ecosystems, based on criteria communicated by the authorities of port states to the IMO.

5. The limit of sulphur content for heavy fuel oil remains 1.0% since 1st January 2003.
Current situation from EU standpoint

The EU rendered mandatory IMO rules on marine fuels through the Directive 2012/33/EU, effective as of 17th December 2012, further amending Directive 1999/32/EC as regards the sulphur content of marine fuels. The key elements of this new Directive are:

In line with Annex VI of the MARPOL Convention, the limits for the sulphur content of marine fuels used in designated SECAs will be 1% until 31st December 2014 and 0.1% as from 1st January 2015. The IMO standard of 0.5% for sulphur limits outside SECAs will be mandatory in EU waters by 2020. This will also be valid for passenger ships operating outside SECAs to which the current regime of 1.5% applies until that date. A general cap does not allow the use of marine fuels with a sulphur content of more than 3.5% by mass within Member States territory, with the exception of fuels used by vessels with alternative exhaust gas cleaning systems, the so-called ‘scrubbers’, operating in closed mode. In line with the MARPOL Convention, the Directive provides that Member States shall endeavour to ensure the availability of the required marine fuels

Aid for investment costs

Since the costs of new requirements to reduce sulphur emissions could have negative effects on the competitiveness of the industry and are expected to produce a modal shift from sea to land, Member States may provide support to operators in accordance with the applicable state aid rules if such aid measures are deemed to be compatible with the treaty. Furthermore, the European Commission should make full use of financial instruments that are already in place and promote the development and testing of alternative technologies to reduce emissions from ships.

As part of the effective, proportionate and dissuasive penalties to be set by Member States in implementing the Directive, possible fines should at least be equivalent to the benefits deriving from the infringements to the provisions of the Directive.

In relation to reporting and review, the Commission should, based on the implementation of the Directive, draw up a report by December 2013 and consider in this context further strengthening the provisions of the Directive. In the review of the Commission’s air quality policy scheduled for 2013, the Commission should consider all possibilities how to reduce air pollution, including in the territorial seas of Member States.
Future developments

By 18th June 2014 at the latest, Member States will have to amend their existing legislation on the quality of marine fuels to align it with the new Directive. The Directive is supposed to provide legal certainty for the required investments by ship owners, port operators and refineries.

From 2015 onwards, Member States are asked to ensure that ships use fuels with a sulphur content of not more than 0.1% in the Baltic Sea and the North Sea including the English Channel. Equivalent compliance methods, such as exhaust cleaning systems, are accepted.

From 2020 onwards, ships operating in all other European Sea areas will have to use fuels with sulphur content of 0.5% or less.

On 20th December 2012, the French Delegation brought the topic of sulphur back to the EU Council of Transport Ministers’ table. In its official note 17790/12, France was explicitly concerned about the Ro-Ro ships operating exclusively in SECA’s. France estimated that these ships will not be able to remain competitive (i.e. shift to road) due to the increasing costs of switching from Heavy Fuel Oil to Marine Diesel Oil. The alternatives (natural gas, exhaust gas cleaning systems) raise numerous technical and safety issues which were addressed within a Council Working Group under the co-ordination of the Irish Presidency of the EU and in co-operation with the European Commission.

The IMO will perform a review (to be completed by 2018) to determine the availability of fuel oil to comply with the fuel oil standard set forth in MARPOL Annex VI. It shall take into account the following elements:

1. the global market supply and demand for fuel oil to comply with the sulphur limit that exists at the time that the review is conducted;
2. an analysis of the trends in fuel oil markets;
3. any other relevant issue.
### Important deadlines and timeline

#### Sulphur content summary table

<table>
<thead>
<tr>
<th></th>
<th>2011</th>
<th>2012 →</th>
<th>2015 →</th>
<th>2020 →</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ships at berth</td>
<td>0.1%</td>
<td>0.1%</td>
<td>0.1%</td>
<td>0.1%</td>
</tr>
<tr>
<td>Inland waterways</td>
<td>0.1%</td>
<td>0.1%</td>
<td>0.1%</td>
<td>0.1%</td>
</tr>
<tr>
<td>Outside SECAs</td>
<td>4.5%</td>
<td>3.5%</td>
<td>3.5%</td>
<td>0.5%</td>
</tr>
<tr>
<td>Inside SECAs</td>
<td>1%</td>
<td>1%</td>
<td>0.1%</td>
<td>0.1%</td>
</tr>
<tr>
<td>Ro-Pax (outside SECAs) *</td>
<td>1.5%</td>
<td>1.5%</td>
<td>1.5%</td>
<td>0.5%</td>
</tr>
</tbody>
</table>

* only in Member States’ territorial seas as established by Directive 2005/33/EC
Entry into force of MARPOL Annex VI

IMO assessment of fuel availability

Deferred implementation date as possible result of IMO assessment

Creation of ECA in the Baltic Sea
Useful links

IMO: http://www.imo.org

ECSA: http://www.ecsa.be/

MARPOL Annex VI revised 2008:


Information Note 17790/12 of the French Delegation – Transport Council 14th December 2012:

Directive 2012/33/EU:

Directive 2005/33/EC1:

Directive 1999/32/EC:

Directive 1993/12/EEC: