MARITIME AND PORT AUTHORITY OF SINGAPORE
SHIPPING CIRCULAR TO SHIPOWNERS NO. 14 OF 2014

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20 August 2014

Applicable to: Ship owners, managers, operators, masters, crew members, surveyors, shipyards and the Shipping Community.

RESOLUTIONS ADOPTED BY THE 66TH SESSION OF THE MARITIME ENVIRONMENT PROTECTION COMMITTEE (MEPC 66) OF IMO

1. This circular informs the Shipping Community on the outcome, including the resolutions adopted/approved by the 66th session of the Marine Environment Protection Committee (MEPC 66) of IMO, and urges the Community to prepare for the implementation of these resolutions.

2. The details of the resolutions can be found in the MEPC 66 final report which is available from the MPA website.

3. The mandatory resolution includes the following:

a. Resolution MEPC.246(66) – Amendments to Annexes I, II, III, IV and V of MARPOL 73/78 (Amendments to MARPOL Annexes I, II, III, IV and V to make the use of the III Code mandatory);

The III Code was adopted at the twenty-eighth session of the IMO Assembly (A28) to enhance global maritime safety and protection of the marine environment and to assist States in the implementation of the instruments of IMO.

This resolution amends MARPOL Annexes I, II, III, IV and V in order to make the III Code mandatory and the amendments will enter into force on 1 January 2016.

The amendments to MARPOL Annexes I, II, IV and V will be given effect through amendments to the Prevention of Pollution of the Sea (Oil) Regulations, Prevention of Pollution of the Sea (Noxious Liquid

Substances in Bulk) Regulations, Prevention of Pollution of the Sea (Sewage) Regulations and Prevention of Pollution of the Sea (Garbage) Regulations respectively. The amendments to MARPOL Annex III will be implemented through the IMDG Code under the Merchant Shipping (Safety Convention) Regulations.

b. Resolution MEPC.247(66) – Amendments to Annex VI of MARPOL 73/78 (To make the use of the III Code mandatory);

This resolution amends MARPOL Annex VI in order to make the III Code mandatory.

The amendments to MARPOL Annex VI will enter into force on 1 January 2016, and will be given effect through amendments to the Prevention of Pollution of the Sea (Air) Regulations.

c. Resolution MEPC.248(66) – Amendments to Annex I of MARPOL 73/78 (Amendments to MARPOL Annex I on mandatory carriage requirements for a stability instrument);

The resolution amends MARPOL Annex I to require all oil tankers to be fitted with a stability instrument capable of verifying compliance with the relevant intact and damage stability requirements.

The amendments to MARPOL Annex I will enter into force on 1 January 2016, and will be given effect through amendments to the Prevention of Pollution of the Sea (Oil) Regulations.

d. Resolution MEPC.249(66) – Amendments to the BCH Code (Cargo containment and Form of Certificate of Fitness);

The amendments require all chemical tankers, subject to the BCH Code, to be fitted with a stability instrument capable of verifying compliance with the relevant intact and damage stability requirements.

Resolution MEPC.250(66) – Amendments to the IBC Code (General, Ship survival capability and location of cargo tanks, Cargo tank venting and gas-freeing arrangements, Environmental control, Fire protection and fire extinction, Special requirements, Summary of minimum requirements, and Form of Certificate of Fitness);

The amendments require all chemical tankers, subject to the IBC Code, to be fitted with a stability instrument capable of verifying compliance with the relevant intact and damage stability requirements. The amendments also provide clarifications on purging and gas-freeing requirements in relation to the SOLAS regulations concerning inert gas systems for applicable new tankers constructed on or after 1 January 2016.

The amendments to the BCH Code and the IBC Code will enter into force on 1 January 2016, and will be implemented under the Prevention of Pollution of the Sea (Noxious Liquid Substances in Bulk) Regulations.

e. Resolution MEPC.251(66) – Amendments to Annex VI of MARPOL 73/78 (Amendments to regulations 2, 13, 19, 20 and 21 and the Supplement to the IAPP Certificate under MARPOL Annex VI and certification of dual-fuel engines under the NOx Technical Code 2008).

The resolution amends MARPOL Annex VI to extend the application of the EEDI requirements to LNG carriers, ro-ro cargo ships (vehicle carriers), ro-ro cargo ships, ro-ro passenger ships and cruise passenger ships having non-conventional propulsion. Ships not propelled by mechanical means and cargo ships having ice-breaking capability are exempted.

The amendments also determined the effective implementation date of the Tier III NOx emission standard for existing NOx ECA to be 1 January 2016.

The amendments will enter into force on 1 September 2015, and will be given effect through amendments to the Prevention of Pollution of the Sea (Air) Regulations.

4. MEPC 66 also adopted the following resolutions:

a. Resolution MEPC.242(66) – 2014 Guidelines in respect of the information to be submitted by an Administration to the Organization covering the certification of an Approved Method as required under Regulation 13.7.1 of MARPOL Annex VI;

The guidelines provide information to assist Administrations in submitting notification of certification of an Approved Method for applicable marine diesel engines as required under Regulation 13.7.1 of MARPOL Annex VI to the IMO.

b. Resolution MEPC.243(66) – 2014 Guidelines on the Approved Method process;

The guidelines provide information for understanding the Approved Method process and responsibilities in relation to Regulation 13.7.1 of MARPOL Annex VI.

c. Resolution MEPC.244(66) – 2014 Standard Specification for shipboard incinerators (supersedes MEPC.76(40), as amended by MEPC.93(45));

The guidelines prescribe the design, manufacture, performance, operation and testing of incinerators installed onboard ships. Incinerators with capacity up to 4000 kW can be type-approved under this standard specification.

d. Resolution MEPC.245(66) – 2014 Guidelines on the method of calculation of the Attained Energy Efficiency Design Index (EEDI) for new ships (supersedes *MEPC.212(63), as amended by MEPC.224(64)*);

The guidelines provide the method of calculation for the Attained EEDI as required under Regulation 20 of MARPOL Annex VI and are updated to incorporate several amendments such as EEDI calculation for ships with dual-fuel engines, LNG carriers with diesel-electric propulsion; use of dwt for size threshold of ro-ro passenger ships; and correction factors for various ship types.

5. In addition to the adoption of resolutions, the following Unified Interpretations (UI) of MARPOL was also approved:

a. MEPC.1/Circ.795/Rev.1 –Unified Interpretations to MARPOL Annex VI;

The circular consolidates all existing UI to MARPOL Annex VI, including those set out in previous circulars MEPC.1/Circ.735, MEPC.1/Circ.795, MEPC.1/Circ.795/Corr.1, MEPC.1/Circ.812, MEPC.1/Circ.813, MEPC.1/Circ.814, and the amendments approved at MEPC 66 regarding the clarification that decrease of assigned shipboard and temporary increase of assigned shipboard should not be considered as major conversion applicable to the energy efficiency requirements.

6. The Unified Interpretations (UI) listed in paragraph 5 are acceptable to MPA and should be applied with immediate effect.

7. The IMO has also disseminated IMO Circular Letter No. 3445, which consolidates draft amendments to MARPOL Annexes I, III and VI. The draft amendments are expected to be adopted at MEPC 67 (Oct 2014). The Shipping Community is urged to consider the draft amendments and invited to provide comments and feedback as necessary.

8. The Shipping Community is urged to take early action to comply with the requirements on or before the date of entry into force of the amendments/resolutions.

9. Any queries relating to this circular should be directed to Mr Princet Ang (Tel: 6375 6259).

TAN SUAN JOW
DIRECTOR OF MARINE
MARITIME AND PORT AUTHORITY OF SINGAPORE

ANNEX 7

RESOLUTION MEPC.246(66)
Adopted on 4 April 2014

AMENDMENTS TO THE ANNEX OF THE PROTOCOL OF 1978 RELATING TO THE INTERNATIONAL CONVENTION FOR THE PREVENTION OF POLLUTION FROM SHIPS, 1973

(Amendments to MARPOL Annexes I, II, III, IV and V to make the use of the III Code mandatory)

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee conferred upon it by international conventions for the prevention and control of marine pollution from ships,

NOTING article 16 of the International Convention for the Prevention of Pollution from Ships, 1973 (hereinafter referred to as the "1973 Convention") and article VI of the Protocol of 1978 relating to the International Convention for the Prevention of Pollution from Ships, 1973 (hereinafter referred to as the "1978 Protocol") which together specify the amendment procedure of the 1978 Protocol and confer upon the appropriate body of the Organization the function of considering and adopting amendments to the 1973 Convention, as modified by the 1978 Protocol (MARPOL),

RECALLING that the Assembly, at its twenty-eighth regular session, adopted, by resolution A.1070(28), the *IMO Instruments Implementation Code (III Code*),

HAVING CONSIDERED proposed amendments to MARPOL Annexes I, II, III, IV and V to make the use of the III Code mandatory,

1. ADOPTS, in accordance with article 16(2)(d) of the 1973 Convention, amendments to Annexes I, II, III, IV and V of MARPOL, the text of which is set out in the annex to the present resolution;

2. DETERMINES that, pursuant to regulation 44 of Annex I, regulation 19 of Annex II, regulation 10 of Annex III, regulation 15 of Annex IV and regulation 11 of Annex V, whenever the word "should" is used in the III Code (annex to resolution A.1070(28)), it is to be read as being "shall", except for paragraphs 29, 30, 31 and 32;

3. DETERMINES, in accordance with article 16(2)(f)(iii) of the 1973 Convention, that the amendments shall be deemed to have been accepted on 1 July 2015 unless, prior to that date, not less than one third of the Parties or Parties, the combined merchant fleets of which constitute not less than 50% of the gross tonnage of the world's merchant fleet, have communicated to the Organization their objection to the amendments;

4. INVITES the Parties to note that, in accordance with article 16(2)(g)(ii) of the 1973 Convention, the said amendments shall enter into force on 1 January 2016 upon their acceptance in accordance with paragraph 2 above;

5. REQUESTS the Secretary-General, in conformity with article 16(2)(e) of the 1973 Convention, to transmit to all Parties to MARPOL, certified copies of the present resolution and the text of the amendments contained in the annex;

6. REQUESTS FURTHER the Secretary-General to transmit to the Members of the Organization which are not Parties to MARPOL, copies of the present resolution and its annex.

ANNEX

AMENDMENTS TO MARPOL ANNEXES I, II, III, IV AND V

Amendments to MARPOL Annex I

1 The following is added at the end of regulation 1:

"44 *Audit* means a systematic, independent and documented process for obtaining audit evidence and evaluating it objectively to determine the extent to which audit criteria are fulfilled.

45 *Audit Scheme* means the IMO Member State Audit Scheme established by the Organization and taking into account the guidelines developed by the Organization*.

46 *Code for Implementation* means the IMO Instruments Implementation Code (III Code) adopted by the Organization by resolution A.1070(28).

47 *Audit Standard* means the Code for Implementation.

* Refer to the *Framework and Procedures for the IMO Member State Audit Scheme*, adopted by the Organization by resolution A.1067(28)."

2 A new chapter 10 is added to read as follows:

"**Chapter 10 – Verification of compliance with the provisions of this Convention**

Regulation 44
Application

Parties shall use the provisions of the Code for Implementation in the execution of their obligations and responsibilities contained in this Annex.

Regulation 45
Verification of compliance

1 Every Party shall be subject to periodic audits by the Organization in accordance with the audit standard to verify compliance with and implementation of this Annex.

2 The Secretary-General of the Organization shall have responsibility for administering the Audit Scheme, based on the guidelines developed by the Organization*.

3 Every Party shall have responsibility for facilitating the conduct of the audit and implementation of a programme of actions to address the findings, based on the guidelines developed by the Organization*.

4 Audit of all Parties shall be:

.1 based on an overall schedule developed by the Secretary-General of the Organization, taking into account the guidelines developed by the Organization*; and

.2 conducted at periodic intervals, taking into account the guidelines developed by the Organization*.

* Refer to the *Framework and Procedures for the IMO Member State Audit Scheme*, adopted by the Organization by resolution A.1067(28)."

Amendments to MARPOL Annex II

3 The following is added at the end of regulation 1:

"18 *Audit* means a systematic, independent and documented process for obtaining audit evidence and evaluating it objectively to determine the extent to which audit criteria are fulfilled.

19 *Audit Scheme* means the IMO Member State Audit Scheme established by the Organization and taking into account the guidelines developed by the Organization*.

20 *Code for Implementation* means the IMO Instruments Implementation Code (III Code) adopted by the Organization by resolution A.1070(28).

21 *Audit Standard* means the Code for Implementation.

* Refer to the *Framework and Procedures for the IMO Member State Audit Scheme*, adopted by the Organization by resolution A.1067(28)."

4 A new chapter 9 is added to read as follows:

"**Chapter 9 – Verification of compliance with the provisions of this Convention**

Regulation 19
Application

Parties shall use the provisions of the Code for Implementation in the execution of their obligations and responsibilities contained in this Annex.

Regulation 20
Verification of compliance

1 Every Party shall be subject to periodic audits by the Organization in accordance with the audit standard to verify compliance with and implementation of this Annex.

2 The Secretary-General of the Organization shall have responsibility for administering the Audit Scheme, based on the guidelines developed by the Organization*.

3 Every Party shall have responsibility for facilitating the conduct of the audit and implementation of a programme of actions to address the findings, based on the guidelines adopted by the Organization*.

4 Audit of all Parties shall be:

.1 based on an overall schedule developed by the Secretary-General of the Organization, taking into account the guidelines developed by the Organization*; and

.2 conducted at periodic intervals, taking into account the guidelines developed by the Organization*.

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* Refer to the *Framework and Procedures for the IMO Member State Audit Scheme*, adopted by the Organization by resolution A.1067(28)."

Amendments to MARPOL Annex III

5 A new heading is added before regulation 1 to read as follows:

"*Chapter 1 – General*"

6 A new regulation 1 is added to read as follows:

"**Regulation 1**
Definitions

For the purposes of this annex:

1 *Harmful substances* are those substances which are identified as marine pollutants in the International Maritime Dangerous Goods Code (IMDG Code) or which meet the criteria in the appendix of this annex.

2 *Packaged form* is defined as the forms of containment specified for harmful substances in the IMDG Code.

3 *Audit* means a systematic, independent and documented process for obtaining audit evidence and evaluating it objectively to determine the extent to which audit criteria are fulfilled.

4 *Audit Scheme* means the IMO Member State Audit Scheme established by the Organization and taking into account the guidelines developed by the Organization*.

5 *Code for Implementation means* the IMO Instruments Implementation Code (III Code) adopted by the Organization by resolution A.1070(28).

6 *Audit Standard* means the Code for Implementation.

* Refer to the *Framework and Procedures for the IMO Member State Audit Scheme*, adopted by the Organization by resolution A.1067(28)."

7 The subsequent regulations are renumbered accordingly.

8 In regulation 2, Application, subparagraphs 1.1 and 1.2 are deleted.

9 A new chapter 2 is added to read as follows:

"**Chapter 2 – Verification of compliance with the provisions of this annex**

Regulation 10
Application

Parties shall use the provisions of the Code for Implementation in the execution of their obligations and responsibilities contained in this Annex.

Regulation 11
Verification of compliance

1 Every Party shall be subject to periodic audits by the Organization in accordance with the audit standard to verify compliance with and implementation of this Annex.

2 The Secretary-General of the Organization shall have responsibility for administering the Audit Scheme, based on the guidelines developed by the Organization*.

3 Every Party shall have responsibility for facilitating the conduct of the audit and implementation of a programme of actions to address the findings, based on the guidelines developed by the Organization*.

4 Audit of all Parties shall be:

.1 based on an overall schedule developed by the Secretary General of the Organization, taking into account the guidelines developed by the Organization*; and

.2 conducted at periodic intervals, taking into account the guidelines developed by the Organization*.

* Refer to the *Framework and Procedures for the IMO Member State Audit Scheme*, adopted by the Organization by resolution A.1067(28)."

Amendments to MARPOL Annex IV

10 The following is added at the end of regulation 1:

"12 *Audit* means a systematic, independent and documented process for obtaining audit evidence and evaluating it objectively to determine the extent to which audit criteria are fulfilled.

13 *Audit Scheme* means the IMO Member State Audit Scheme established by the Organization and taking into account the guidelines developed by the Organization*.

14 *Code for Implementation* means the IMO Instruments Implementation Code (III Code) adopted by the Organization by resolution A.1070(28).

15 *Audit Standard* means the Code for Implementation.

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* Refer to the *Framework and Procedures for the IMO Member State Audit Scheme*, adopted by the Organization by resolution A.1067(28)."

11 A new chapter 6 is added to read as follows:

"**Chapter 6 – Verification of compliance with the provisions of this annex**

Regulation 15
Application

Parties shall use the provisions of the Code for Implementation in the execution of their obligations and responsibilities contained in this Annex.

Regulation 16
Verification of compliance

1 Every Party shall be subject to periodic audits by the Organization in accordance with the audit standard to verify compliance with and implementation of this annex.

2 The Secretary-General of the Organization shall have responsibility for administering the Audit Scheme, based on the guidelines developed by the Organization*.

3 Every Party shall have responsibility for facilitating the conduct of the audit and implementation of a programme of actions to address the findings, based on the guidelines developed by the Organization*.

4 Audit of all Parties shall be:

.1 based on an overall schedule developed by the Secretary-General of the Organization, taking into account the guidelines developed by the Organization*; and

.2 conducted at periodic intervals, taking into account the guidelines developed by the Organization*.

* Refer to the *Framework and Procedures for the IMO Member State Audit Scheme*, adopted by the Organization by resolution A.1067(28)."

Amendments to MARPOL Annex V

12 A new heading is added before regulation 1 to read as follows:

"*Chapter 1 – General*"

13 The following is added at the end of regulation 1:

"15 *Audit* means a systematic, independent and documented process for obtaining audit evidence and evaluating it objectively to determine the extent to which audit criteria are fulfilled.

16 *Audit Scheme* means the IMO Member State Audit Scheme established by the Organization and taking into account the guidelines developed by the Organization*.

17 *Code for Implementation means* the IMO Instruments Implementation Code (III Code) adopted by the Organization by resolution A.1070(28).

18 *Audit Standard* means the Code for Implementation.

* Refer to the *Framework and Procedures for the IMO Member State Audit Scheme*, adopted by the Organization by resolution A.1067.(28)."

14 A new chapter 2 is added, to read as follows:

"**Chapter 2 – Verification of compliance with the provisions of this annex**

Regulation 11
Application

Parties shall use the provisions of the Code for Implementation in the execution of their obligations and responsibilities contained in this Annex.

Regulation 12
Verification of compliance

1 Every Party shall be subject to periodic audits by the Organization in accordance with the audit standard to verify compliance with and implementation of this Annex.

2 The Secretary-General of the Organization shall have responsibility for administering the Audit Scheme, based on the guidelines developed by the Organization*.

3 Every Party shall have responsibility for facilitating the conduct of the audit and implementation of a programme of actions to address the findings, based on the guidelines developed by the Organization*.

4 Audit of all Parties shall be:

.1 based on an overall schedule developed by the Secretary-General of the Organization, taking into account the guidelines developed by the Organization*; and

.2 conducted at periodic intervals, taking into account the guidelines developed by the Organization*.

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* Refer to the *Framework and Procedures for the IMO Member State Audit Scheme*, adopted by the Organization by resolution A.1067(28)."

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ANNEX 8

RESOLUTION MEPC.247(66)
Adopted on 4 April 2014

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

(To make the use of the III Code mandatory)

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee (the Committee) conferred upon it by international conventions for the prevention and control of marine pollution from ships,

NOTING article 16 of the International Convention for the Prevention of Pollution from Ships, 1973 (hereinafter referred to as the "1973 Convention"), article VI of the Protocol of 1978 relating to the International Convention for the Prevention of Pollution from Ships, 1973 (hereinafter referred to as the "1978 Protocol") and article 4 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 (hereinafter referred to as the "1997 Protocol"), which together specify the amendment procedure of the 1997 Protocol and confer upon the appropriate body of the Organization the function of considering and adopting amendments to the 1973 Convention, as modified by the 1978 and 1997 Protocols,

NOTING ALSO that, by the 1997 Protocol, Annex VI entitled Regulations for the Prevention of Air Pollution from Ships was added to the 1973 Convention (hereinafter referred to as "Annex VI"),

RECALLING that the Assembly, at its twenty-eighth regular session, adopted, by resolution A.1070(28), the *IMO Instruments Implementation Code (III Code)*,

HAVING CONSIDERED proposed amendments to MARPOL Annexes VI to make the use of the III Code mandatory,

1. ADOPTS, in accordance with article 16(2)(d) of the 1973 Convention, amendments to Annex VI, the text of which is set out in the annex to the present resolution;

2. DETERMINES that, pursuant to new regulation 24 of Annex VI, whenever the word "should" is used in the III Code (annex to resolution A.1070(28)), it is to be read as being "shall", except for paragraphs 29, 30, 31 and 32;

3. DETERMINES, in accordance with article 16(2)(f)(iii) of the 1973 Convention, that the amendments shall be deemed to have been accepted on 1 July 2015, unless prior to that date, not less than one third of the Parties or Parties, the combined merchant fleets of which constitute not less than 50% of the gross tonnage of the world's merchant fleet, have communicated to the Organization their objection to the amendments;

4. INVITES the Parties to note that, in accordance with article 16(2)(g)(ii) of the 1973 Convention, the said amendments shall enter into force on 1 January 2016 upon their acceptance in accordance with paragraph 2 above;

5. REQUESTS the Secretary-General, in conformity with article 16(2)(e) of the 1973 Convention, to transmit to all Parties to the 1973 Convention, as modified by the 1978 and 1997 Protocols, certified copies of the present resolution and the text of the amendments contained in the annex;

6. REQUESTS FURTHER the Secretary-General to transmit to the Members of the Organization which are not Parties to the 1973 Convention, as modified by the 1978 and 1997 Protocols, copies of the present resolution and its annex.

ANNEX

AMENDMENTS TO MARPOL ANNEX VI

1 The following is added at the end of regulation 2:

"For the purposes of this annex:

44 *Audit* means a systematic, independent and documented process for obtaining audit evidence and evaluating it objectively to determine the extent to which audit criteria are fulfilled.

45 *Audit Scheme* means the IMO Member State Audit Scheme established by the Organization and taking into account the guidelines developed by the Organization*.

46 *Code for Implementation* means the IMO Instruments Implementation Code (III Code) adopted by the Organization by resolution A.1070(28).

47 *Audit Standard* means the Code for Implementation.

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* Refer to the *Framework and Procedures for the IMO Member State Audit Scheme*, adopted by the Organization by resolution A.1067(28)."

2 A new chapter 5 is added to read as follows:

"**Chapter 5 – Verification of compliance with the provisions of this annex**

Regulation 24
Application

Parties shall use the provisions of the Code for Implementation in the execution of their obligations and responsibilities contained in this Annex.

Regulation 25
Verification of compliance

(1) Every Party shall be subject to periodic audits by the Organization in accordance with the audit standard to verify compliance with and implementation of this Annex.

(2) The Secretary-General of the Organization shall have responsibility for administering the Audit Scheme, based on the guidelines developed by the Organization*.

(3) Every Party shall have responsibility for facilitating the conduct of the audit and implementation of a programme of actions to address the findings, based on the guidelines developed by the Organization*.

(4) Audit of all Parties shall be:

.1 based on an overall schedule developed by the Secretary-General of the Organization, taking into account the guidelines developed by the Organization*; and

.2 conducted at periodic intervals, taking into account the guidelines developed by the Organization*.

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* Refer to the *Framework and Procedures for the IMO Member State Audit Scheme*, adopted by the Organization by resolution A.1067(28).''

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ANNEX 9

RESOLUTION MEPC.248(66)
Adopted on 4 April 2014

AMENDMENTS TO THE ANNEX OF THE PROTOCOL OF 1978 RELATING TO THE INTERNATIONAL CONVENTION FOR THE PREVENTION OF POLLUTION FROM SHIPS, 1973

Amendments to MARPOL Annex I
(Mandatory carriage requirements for a stability instrument)

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee conferred upon it by international conventions for the prevention and control of marine pollution from ships,

NOTING article 16 of the International Convention for the Prevention of Pollution from Ships, 1973 (hereinafter referred to as the "1973 Convention") and article VI of the Protocol of 1978 relating to the International Convention for the Prevention of Pollution from Ships, 1973 (hereinafter referred to as the "1978 Protocol") which together specify the amendment procedure of the 1978 Protocol and confer upon the appropriate body of the Organization the function of considering and adopting amendments to the 1973 Convention, as modified by the 1978 Protocol (MARPOL),

HAVING CONSIDERED proposed amendments to Annex I of MARPOL, developed by the Sub-Committee on Stability and Load Lines and on Fishing Vessels Safety, at its fifty-fifth session,

1. ADOPTS, in accordance with article 16(2)(d) of the 1973 Convention, amendments to Annex I of MARPOL, the text of which is set out in the annex to the present resolution;

2. DETERMINES, in accordance with article 16(2)(f)(iii) of the 1973 Convention, that the amendments shall be deemed to have been accepted on 1 July 2015 unless, prior to that date, not less than one third of the Parties or Parties, the combined merchant fleets of which constitute not less than 50% of the gross tonnage of the world's merchant fleet, have communicated to the Organization their objection to the amendments;

3. INVITES the Parties to note that, in accordance with article 16(2)(g)(ii) of the 1973 Convention, the said amendments shall enter into force on 1 January 2016 upon their acceptance in accordance with paragraph 2 above;

4. REQUESTS the Secretary-General, in conformity with article 16(2)(e) of the 1973 Convention, to transmit to all Parties to MARPOL, certified copies of the present resolution and the text of the amendments contained in the annex;

5. REQUESTS FURTHER the Secretary-General to transmit to the Members of the Organization which are not Parties to MARPOL, copies of the present resolution and its annex.

ANNEX

AMENDMENTS TO MARPOL ANNEX I

Chapter 1 – General

Regulation 3 – Exemptions and waivers

1 A new paragraph 6 is inserted, as follows:

"6 The Administration may waive the requirements of regulation 28(6) for the following oil tankers if loaded in accordance with the conditions approved by the Administration taking into account the guidelines developed by the Organization*:

.1 oil tankers which are on a dedicated service, with a limited number of permutations of loading such that all anticipated conditions have been approved in the stability information provided to the master in accordance with regulation 28(5);

.2 oil tankers where stability verification is made remotely by a means approved by the Administration;

.3 oil tankers which are loaded within an approved range of loading conditions; or

.4 oil tankers constructed before 1 January 2016 provided with approved limiting KG/GM curves covering all applicable intact and damage stability requirements.

* Refer to operational guidance provided in part 2 of the *Guidelines for verification of damage stability requirements for tankers* (MSC.1/Circ.1461)."

Chapter 4 – Requirements for the cargo area of oil tankers

Regulation 28 – Subdivision and damage stability

2 The existing paragraph 6 is renumbered as paragraph 7.

3 A new paragraph 6 is inserted, as follows:

"6 All oil tankers shall be fitted with a stability instrument, capable of verifying compliance with intact and damage stability requirements approved by the Administration having regard to the performance standards recommended by the Organization*:

.1 oil tankers constructed before 1 January 2016 shall comply with this regulation at the first scheduled renewal survey of the ship after 1 January 2016 but not later than 1 January 2021;

.2 notwithstanding the requirements of subparagraph .1 a stability instrument fitted on an oil tanker constructed before 1 January 2016 need not be replaced provided it is capable of verifying compliance with intact and damage stability, to the satisfaction of the Administration; and

.3 for the purposes of control under regulation 11, the Administration shall issue a document of approval for the stability instrument.

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* Refer to part B, chapter 4, of the International Code on Intact Stability, 2008 (2008 IS Code), as amended; the *Guidelines for the Approval of Stability Instruments* (MSC.1/Circ.1229), annex, section 4, as amended; and the technical standards defined in part 1 of the *Guidelines for verification of damage stability requirements for tankers* (MSC.1/Circ.1461)."

Appendix II – Form of IOPP Certificate and Supplements, Form B

4 The following new paragraphs 5.7.5 and 5.7.6 are inserted:

"5.7.5 The ship is provided with an Approved Stability Instrument in accordance with regulation 28(6)..... ☐

5.7.6 The requirements of regulation 28(6) are waived in respect of the ship in accordance with regulation 3.6. Stability is verified by the following means:

.1 loading only to approved conditions defined in the stability information provided to the master in accordance with regulation 28(5)..... ☐

.2 verification is made remotely by a means approved by the Administration:..... ☐

.3 loading within an approved range of loading conditions defined in the stability information provided to the master in accordance with regulation 28(5)..... ☐

.4 loading in accordance with approved limiting KG/GM curves covering all applicable intact and damage stability requirements defined in the stability information provided to the master in accordance with regulation 28(5) ..... ☐"

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ANNEX 10

RESOLUTION MEPC.249(66)
Adopted on 4 April 2014

AMENDMENTS TO THE CODE FOR THE CONSTRUCTION AND EQUIPMENT OF SHIPS CARRYING DANGEROUS CHEMICALS IN BULK (BCH CODE)

(Cargo containment and Form of Certificate of Fitness)

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee (the Committee) conferred upon it by international conventions for the prevention and control of marine pollution from ships,

RECALLING ALSO resolution MEPC.20(22) by which the Committee adopted the *Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (BCH Code)*,

NOTING article 16 of the International Convention for the Prevention of Pollution from Ships, 1973 (hereinafter referred to as the "1973 Convention") and article VI of the Protocol of 1978 relating to the International Convention for the Prevention of Pollution from Ships, 1973 (hereinafter referred to as the "1978 Protocol") which together specify the amendment procedure of the 1978 Protocol and confer upon the appropriate body of the Organization the function of considering and adopting amendments to the 1973 Convention, as modified by the 1978 Protocol (MARPOL),

CONSIDERING that it is highly desirable for the provisions of the BCH Code which are mandatory under MARPOL and recommendatory from a safety standpoint, to remain identical, when adopted by the Marine Environment Protection Committee and the Maritime Safety Committee,

HAVING CONSIDERED proposed amendments to the BCH Code, developed by the Sub-Committee on Stability and Load Lines and on Fishing Vessels Safety, at its fifty-fifth session,

1. ADOPTS, in accordance with article 16(2)(b), (c) and (d) of the 1973 Convention, amendments to the BCH Code, the text of which is set out in the annex to the present resolution;

2. DETERMINES, in accordance with article 16(2)(f)(iii) of the 1973 Convention, that the amendments to the BCH Code shall be deemed to have been accepted on 1 July 2015 unless, prior to that date, not less than one third of the Parties or Parties, the combined merchant fleets of which constitute not less than 50% of the gross tonnage of the world's merchant fleet, have communicated to the Organization their objection to the amendments;

3. INVITES the Parties to note that, in accordance with article 16(2)(g)(ii) of the 1973 Convention, the amendments to the BCH Code shall enter into force on 1 January 2016 upon their acceptance in accordance with paragraph 2 above;

4. INVITES ALSO the Maritime Safety Committee to note this resolution and take action as appropriate;

5. REQUESTS the Secretary-General, in conformity with article 16(2)(e) of the 1973 Convention, to transmit to all Parties to MARPOL, certified copies of the present resolution and the text of the amendments to the BCH Code contained in the annex;

6. REQUESTS FURTHER the Secretary-General to transmit copies of the present resolution and its annex to the Members of the Organization which are not Parties to MARPOL.

ANNEX

AMENDMENTS TO THE CODE FOR THE CONSTRUCTION AND EQUIPMENT OF SHIPS CARRYING DANGEROUS CHEMICALS IN BULK (BCH CODE)

Chapter II – Cargo containment

Part A – Physical protection (Siting of cargo tanks; ship stability)

1 Existing subparagraph 2.2.1 is replaced by the following:

"2.2.1 General: Ships subject to this Code may be assigned the minimum freeboard permitted by the International Convention on Load Lines, 1966. The additional requirements in paragraph 2.2.4, taking into account any empty or partially filled tank as well as the specific gravities of cargoes to be carried, however, should govern the allowed operating draught for any actual condition of loading.

2.2.1.1 All ships engaged in the transport of chemicals in bulk should be supplied with loading and stability manuals for the information and guidance of the master. These manuals should contain details concerning the loaded conditions of full and empty or partially empty tanks, the position of these tanks in the ship, the specific gravities of the various parcels of cargoes carried, and any ballast arrangements in critical conditions of loading. Provisions for evaluating other conditions of loading should be contained in the manuals.

2.2.1.2 All ships subject to the Code, shall be fitted with a stability instrument, capable of verifying compliance with intact and damage stability requirements approved by the Administration, at the first scheduled renewal survey of the ship after 1 January 2016, but not later than 1 January 2021, having regard to the performance standards recommended by the Organization[*]:

.1 notwithstanding the above, a stability instrument fitted on a ship before 1 January 2016 need not be replaced provided it is capable of verifying compliance with intact and damage stability, to the satisfaction of the Administration; and

.2 for the purposes of control under regulation 16 of MARPOL Annex II, the Administration shall issue a document of approval for the stability instrument.

[*] Refer to part B, chapter 4, of the International Code on Intact Stability, 2008 (2008 IS Code), as amended; the *Guidelines for the Approval of Stability Instruments* (MSC.1/Circ.1229), annex, section 4, as amended; and the technical standards defined in part 1 of the *Guidelines for verification of damage stability requirements for tankers* (MSC.1/Circ.1461).

2.2.1.3 The Administration may waive the requirements of paragraph 2.2.1.2 for the following ships provided the procedures employed for intact and damage stability verification maintain the same degree of safety as being loaded in accordance with the approved conditions[**]. Any such waiver shall be duly noted on the Certificate of Fitness referred to in paragraph 1.6.3:

.1 ships which are on a dedicated service, with a limited number of permutations of loading such that all anticipated conditions have been approved in the stability information provided to the master in accordance with the requirements of paragraph 2.2.1.1;

.2 ships where stability verification is made remotely by a means approved by the Administration;

.3 ships which are loaded within an approved range of loading conditions; or

.4 ships provided with approved limiting KG/GM curves covering all applicable intact and damage stability requirements.

** Refer to operational guidance provided in part 2 of the *Guidelines for verification of damage stability requirements for tankers* (MSC.1/Circ.1461).

Certificate of Fitness

2 Paragraph 6 is replaced with the following:

"6 That the ship must be loaded:

.1*** only in accordance with loading conditions verified compliant with intact and damage stability requirements using the approved stability instrument fitted in accordance with paragraph 2.2.1.2 of the Code;

.2*** where a waiver permitted by paragraph 2.2.1.3 of the Code is granted and the approved stability instrument required by paragraph 2.2.1.2 of the Code is not fitted, loading shall be made in accordance with the following approved methods:

(i) in accordance with the loading conditions provided in the approved loading manual, stamped and dated ..... and signed by a responsible officer of the Administration, or of an organization recognized by the Administration; or

(ii) in accordance with loading conditions verified remotely using an approved means ……..……; or

(iii) in accordance with a loading condition which lies within an approved range of conditions defined in the approved loading manual referred to in (i) above; or

(iv) in accordance with a loading condition verified using approved critical KG/GM data defined in the approved loading manual referred to in (i) above;

.3*** in accordance with the loading limitations appended to this Certificate.

Where it is required to load the ship other than in accordance with the above instruction, then the necessary calculations to justify the proposed loading conditions shall be communicated to the certifying Administration who may authorize in writing the adoption of the proposed loading condition.

*** Delete as appropriate."

***

ANNEX 11

RESOLUTION MEPC.250(66)
Adopted on 4 April 2014

AMENDMENTS TO THE INTERNATIONAL CODE FOR THE CONSTRUCTION AND EQUIPMENT OF SHIPS CARRYING DANGEROUS CHEMICALS IN BULK (IBC CODE)

(General, Ship survival capability and location of cargo tanks, Cargo tank venting and gas-freeing arrangements, Environmental control, Fire protection and fire extinction, Special requirements, Summary of minimum requirements, and Form of Certificate of Fitness)

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee (the Committee) conferred upon it by international conventions for the prevention and control of marine pollution from ships,

RECALLING ALSO resolution MEPC.19(22) by which the Committee adopted the *International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (IBC Code)*,

NOTING article 16 of the International Convention for the Prevention of Pollution from Ships, 1973 (hereinafter referred to as the "1973 Convention") and article VI of the Protocol of 1978 relating to the International Convention for the Prevention of Pollution from Ships, 1973 (hereinafter referred to as the "1978 Protocol") which together specify the amendment procedure of the 1978 Protocol and confer upon the appropriate body of the Organization the function of considering and adopting amendments to the 1973 Convention, as modified by the 1978 Protocol (MARPOL),

CONSIDERING that it is highly desirable for the provisions of the IBC Code, which are mandatory under both MARPOL and the 1974 SOLAS Convention, to remain identical,

HAVING CONSIDERED proposed amendments to the IBC Code,

1. ADOPTS, in accordance with article 16(2)(b), (c) and (d) of the 1973 Convention, the amendments to the IBC Code, the text of which is set out in the annex to the present resolution;

2. DETERMINES, in accordance with article 16(2)(f)(iii) of the 1973 Convention, that the amendments to the IBC Code shall be deemed to have been accepted on 1 July 2015 unless, prior to that date, not less than one third of the Parties or Parties, the combined merchant fleets of which constitute not less than 50% of the gross tonnage of the world's merchant fleet, have communicated to the Organization their objection to the amendments;

3. INVITES the Parties to note that, in accordance with article 16(2)(g)(ii) of the 1973 Convention, the amendments to the IBC Code shall enter into force on 1 January 2016 upon their acceptance in accordance with paragraph 2 above;

4. REQUESTS the Secretary-General, in conformity with article 16(2)(e) of the 1973 Convention, to transmit to all Parties to MARPOL, certified copies of the present resolution and the text of the amendments to the IBC Code contained in the annex; and

5. REQUESTS FURTHER the Secretary-General to transmit copies of the present resolution and its annex to the Members of the Organization which are not Parties to MARPOL.

ANNEX

AMENDMENTS TO THE INTERNATIONAL CODE FOR THE CONSTRUCTION AND EQUIPMENT OF SHIPS CARRYING DANGEROUS CHEMICALS IN BULK (IBC CODE)

Chapter 1 – General

1 New paragraphs 1.3.37 and 1.3.38 are added as follows:

"1.3.37 *Purging* means the introduction of inert gas into a tank which is already in an inert condition with the object of further reducing the oxygen content; and/or reducing the existing hydrocarbon or other flammable vapours content to a level below which combustion cannot be supported if air is subsequently introduced into the tank.

1.3.38 *Gas-freeing* means the process where a portable or fixed ventilation system is used to introduce fresh air into a tank in order to reduce the concentration of hazardous gases or vapours to a level safe for tank entry."

Chapter 2 – Ship survival capability and location of cargo tanks

2.2 – Freeboard and intact stability

2 The title of section 2.2 is amended to read:

"Freeboard and stability"

3 A new subparagraph 2.2.6 is added as follows:

"2.2.6 All ships, subject to the Code, shall be fitted with a stability instrument, capable of verifying compliance with intact and damage stability requirements, approved by the Administration having regard to the performance standards recommended by the Organization[*]:

.1 ships constructed before 1 January 2016 shall comply with this requirement at the first scheduled renewal survey of the ship after 1 January 2016 but not later than 1 January 2021;

.2 notwithstanding the requirements of 2.2.6.1, a stability instrument fitted on a ship constructed before 1 January 2016 need not be replaced provided it is capable of verifying compliance with intact and damage stability, to the satisfaction of the Administration; and

.3 for the purposes of control under regulation 16 of MARPOL Annex II, the Administration shall issue a document of approval for the stability instrument.

[*] Refer to part B, chapter 4, of the International Code on Intact Stability, 2008 (2008 IS Code), as amended; the *Guidelines for the Approval of Stability Instruments* (MSC.1/Circ.1229), annex, section 4, as amended; and the technical standards defined in part 1 of the *Guidelines for verification of damage stability requirements for tankers* (MSC.1/Circ.1461)."

4 A new subparagraph 2.2.7 is added as follows:

"2.2.7 The Administration may waive the requirements of paragraph 2.2.6 for the following ships provided the procedures employed for intact and damage stability verification maintain the same degree of safety, as being loaded in accordance with the approved conditions*. Any such waiver shall be duly noted on the International Certificate of Fitness referred to in paragraph 1.5.4:

.1 ships which are on a dedicated service, with a limited number of permutations of loading such that all anticipated conditions have been approved in the stability information provided to the master in accordance with the requirements of paragraph 2.2.5;

.2 ships where stability verification is made remotely by a means approved by the Administration;

.3 ships which are loaded within an approved range of loading conditions; or

.4 ships constructed before 1 January 2016 provided with approved limiting KG/GM curves covering all applicable intact and damage stability requirements.

* Refer to operational guidance provided in part 2 of the *Guidelines for verification of damage stability requirements for tankers* (MSC.1/Circ.1461)."

Chapter 8 – Cargo tank venting and gas-freeing arrangements

5 In paragraph 8.1.5, the references to "SOLAS regulations II-2/4.5.3 and 4.5.6" are replaced by references to "SOLAS regulations II-2/4.5.3, 4.5.6 and 16.3.2".

6 A new paragraph 8.5 is inserted as follows:

"8.5 Cargo tank purging

When the application of inert gas is required by 11.1.1, before gas-freeing, the cargo tanks shall be purged with inert gas through outlet pipes with cross-sectional area such that an exit velocity of at least 20 m/s can be maintained when any three tanks are being simultaneously supplied with inert gas. The outlets shall extend not less than 2 m above the deck level. Purging shall continue until the concentration of hydrocarbon or other flammable vapours in the cargo tanks has been reduced to less than 2% by volume."

7 The existing paragraph 8.5 and subparagraphs 8.5.1, 8.5.2 and 8.5.3 are renumbered as paragraph 8.6 and subparagraphs 8.6.1, 8.6.2 and 8.6.3, respectively.

Chapter 9 – Environmental control

8 The chapeau of paragraph 9.1.3 is replaced by the following:

"9.1.3 Where inerting or padding of cargo tanks is required by this Code in column "h" of chapter 17:"

Chapter 11 – Fire protection and fire extinction*

9 Subparagraph 11.1.1.1 is replaced by the following:

"11.1.1.1 Regulations 10.8 and 10.9 shall not apply;"

Chapter 15 – Special requirements

10 Paragraph 15.13.5 is replaced by the following:

"15.13.5 When a product containing an oxygen-dependent inhibitor is to be carried:

.1 in a ship for which inerting is required under SOLAS regulation II-2/4.5.5, as amended, the application of inert gas shall not take place before loading or during the voyage, but shall be applied before commencement of unloading*;

.2 in a ship to which SOLAS regulation II-2/4.5.5, as amended, does not apply, the product may be carried without inertion (in tanks of a size not greater than 3,000 m^3). If inertion is to be applied on such a ship, then the application of inert gas shall not take place before loading or during the voyage, but shall be applied before commencement of unloading*.

* Refer to the MSC-MEPC circular on Products requiring oxygen dependent inhibitors."

Chapter 17 – Summary of minimum requirements

11 The explanatory notes for "Tank environment control (column h)" are replaced by the following:

"Tank environmental control (*column h*)	Inert:	inerting (9.1.2.1)
	Pad:	liquid or gas padding (9.1.2.2)
	Dry:	drying (9.1.2.3)
	Vent:	natural or forced ventilation (9.1.2.4)
	No:	no special requirements under this Code (inerting may be required under SOLAS)"

Certificate of Fitness

12 Paragraph 6 is replaced with the following:

"6 That the ship must be loaded:

.1* only in accordance with loading conditions verified compliant with intact and damage stability requirements using the approved stability instrument fitted in accordance with paragraph 2.2.6 of the Code;

.2* where a waiver permitted by paragraph 2.2.7 of the Code is granted and the approved stability instrument required by paragraph 2.2.6 of the Code is not fitted, loading shall be made in accordance with the following approved methods:

(i) in accordance with the loading conditions provided in the approved loading manual, stamped and dated ..... and signed by a responsible officer of the Administration, or of an organization recognized by the Administration; or

(ii) in accordance with loading conditions verified remotely using an approved means ……; or

(iii) in accordance with a loading condition which lies within an approved range of conditions defined in the approved loading manual referred to in (i) above; or

(iv) in accordance with a loading condition verified using approved critical KG/GM data defined in the approved loading manual referred to in (i) above;

.3* in accordance with the loading limitations appended to this Certificate.

Where it is required to load the ship other than in accordance with the above instruction, then the necessary calculations to justify the proposed loading conditions shall be communicated to the certifying Administration who may authorize in writing the adoption of the proposed loading condition.

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* Delete as appropriate."

***

ANNEX 12

RESOLUTION MEPC.251(66)
Adopted on 4 April 2014

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

Amendments to MARPOL Annex VI and the NO_X Technical Code 2008

(Amendments to regulations 2, 13, 19, 20 and 21 and the Supplement to the IAPP Certificate under MARPOL Annex VI and certification of dual-fuel engines under the NO_X Technical Code 2008)

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee conferred upon it by international conventions for the prevention and control of marine pollution from ships,

NOTING article 16 of the International Convention for the Prevention of Pollution from Ships, 1973 (hereinafter referred to as the "1973 Convention"), article VI of the Protocol of 1978 relating to the International Convention for the Prevention of Pollution from Ships, 1973 (hereinafter referred to as the "1978 Protocol") and article 4 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 (hereinafter referred to as the "1997 Protocol"), which together specify the amendment procedure of the 1997 Protocol and confer upon the appropriate body of the Organization the function of considering and adopting amendments to the 1973 Convention, as modified by the 1978 and 1997 Protocols,

NOTING that, by the 1997 Protocol, Annex VI entitled Regulations for the Prevention of Air Pollution from Ships was added to the 1973 Convention (hereinafter referred to as "Annex VI"),

NOTING FURTHER regulation 13 of MARPOL Annex VI which makes the Technical Code on Control of Emission of Nitrogen Oxides from Marine Diesel Engines (NO_X Technical Code 2008) mandatory under that Annex,

NOTING ALSO that both the revised Annex VI, adopted by resolution MEPC.176(58) and the NO_X Technical Code 2008, adopted by resolution MEPC.177(58) entered into force on 1 July 2010,

HAVING CONSIDERED draft amendments to the revised Annex VI and the NO_X Technical Code 2008,

1. ADOPTS, in accordance with article 16(2)(d) of the 1973 Convention, the amendments to Annex VI and the NO_X Technical Code 2008, the text of which is set out in the annex to the present resolution;

2. DETERMINES, in accordance with article 16(2)(f)(iii) of the 1973 Convention, that the amendments shall be deemed to have been accepted on 1 March 2015, unless prior to that date, not less than one third of the Parties or Parties the combined merchant fleets of which constitute not less than 50% of the gross tonnage of the world's merchant fleet, have communicated to the Organization their objection to the amendments;

3. INVITES the Parties to note that, in accordance with article 16(2)(g)(ii) of the 1973 Convention, the said amendments shall enter into force on 1 September 2015 upon their acceptance in accordance with paragraph 2 above;

4. REQUESTS the Secretary-General, in conformity with article 16(2)(e) of the 1973 Convention, to transmit to all Parties to the 1973 Convention, as modified by the 1978 and 1997 Protocols, certified copies of the present resolution and the text of the amendments contained in the annex;

5. REQUESTS FURTHER the Secretary-General to transmit to the Members of the Organization which are not Parties to the 1973 Convention, as modified by the 1978 and 1997 Protocols, copies of the present resolution and its annex.

ANNEX

AMENDMENTS TO MARPOL ANNEX VI AND THE NO_x TECHNICAL CODE 2008

AMENDMENTS TO MARPOL ANNEX VI

Chapter 1 – General

Regulation 2 – Definitions

1 Paragraph 26 is amended to read as follows:

"26 *Gas carrier* in relation to chapter 4 of this Annex means a cargo ship, other than an LNG carrier as defined in paragraph 38 of this regulation, constructed or adapted and used for the carriage in bulk of any liquefied gas."

2 New paragraphs 38 to 43 are added after existing paragraph 37 as follows:

"38 *LNG carrier* in relation to chapter 4 of this Annex means a cargo ship constructed or adapted and used for the carriage in bulk of liquefied natural gas (LNG).

39 *Cruise passenger ship* in relation to chapter 4 of this Annex means a passenger ship not having a cargo deck, designed exclusively for commercial transportation of passengers in overnight accommodations on a sea voyage.

40 *Conventional propulsion* in relation to chapter 4 of this Annex means a method of propulsion where a main reciprocating internal combustion engine(s) is the prime mover and coupled to a propulsion shaft either directly or through a gear box.

41 *Non-conventional propulsion* in relation to chapter 4 of this Annex means a method of propulsion, other than conventional propulsion, including diesel-electric propulsion, turbine propulsion, and hybrid propulsion systems.

42 *Cargo ship having ice-breaking capability* in relation to chapter 4 of this Annex means a cargo ship which is designed to break level ice independently with a speed of at least 2 knots when the level ice thickness is 1.0 m or more having ice bending strength of at least 500 kPa.

43 A ship *delivered on or after* 1 September 2019 means a ship:

.1 for which the building contract is placed on or after 1 September 2015; or

.2 in the absence of a building contract, the keel of which is laid, or which is at a similar stage of construction, on or after 1 March 2016; or

.3 the delivery of which is on or after 1 September 2019."

Chapter 2 – Survey, certification and means of control

Regulation 5 – Surveys

3 In the first sentence of paragraph 4.2, the words "a ship" are replaced with the words "a new ship".

Chapter 3 – Requirements for control of emissions from ships

Regulation 13 – Nitrogen oxides (NO_x)

4 Paragraph 2.2 is amended to read as follows:

"2.2 For a major conversion involving the replacement of a marine diesel engine with a non-identical marine diesel engine, or the installation of an additional marine diesel engine, the standards in this regulation at the time of the replacement or addition of the engine shall apply. In the case of replacement engines only, if it is not possible for such a replacement engine to meet the standards set forth in paragraph 5.1.1 of this regulation (Tier III, as applicable), then that replacement engine shall meet the standards set forth in paragraph 4 of this regulation (Tier II), taking into account guidelines developed by the Organization*.

* Refer to the *2013 Guidelines as required by regulation 13.2.2 of MARPOL Annex VI in respect of non-identical replacement engines not required to meet the Tier III limit*, adopted by the MEPC by resolution MEPC.230(65)."

5 Paragraphs 5.1 and 5.2 are amended to read as follows:

"Tier III

5.1 Subject to regulation 3 of this Annex, in an emission control area designated for Tier III NO_X control under paragraph 6 of this regulation, the operation of a marine diesel engine that is installed on a ship:

.1 is prohibited except when the emission of nitrogen oxides (calculated as the total weighted emission of NO_X) from the engine is within the following limits, where n = rated engine speed (crankshaft revolutions per minute):

.1 3.4 g/kWh when n is less than 130 rpm;

.2 $9 \cdot n^{(-0.2)}$ g/kWh when n is 130 or more but less than 2,000 rpm;

.3 2.0 g/kWh when n is 2,000 rpm or more;

when:

.2 that ship is constructed on or after 1 January 2016 and is operating in the North American Emission Control Area or the United States Caribbean Sea Emission Control Area;

when:

.3 that ship is operating in an emission control area designated for Tier III NO_X control under paragraph 6 of this regulation, other than an emission control area described in paragraph 5.1.2 of this regulation, and is constructed on or after the date of adoption of such an emission control area, or a later date as may be specified in the amendment designating the NO_X Tier III emission control area, whichever is later.

5.2 The standards set forth in paragraph 5.1.1 of this regulation shall not apply to:

.1 a marine diesel engine installed on a ship with a length (*L*), as defined in regulation 1.19 of Annex I to the present Convention, of less than 24 metres when it has been specifically designed, and is used solely, for recreational purposes; or

.2 a marine diesel engine installed on a ship with a combined nameplate diesel engine propulsion power of less than 750 kW if it is demonstrated, to the satisfaction of the Administration, that the ship cannot comply with the standards set forth in paragraph 5.1.1 of this regulation because of design or construction limitations of the ship; or

.3 a marine diesel engine installed on a ship constructed prior to 1 January 2021 of less than 500 gross tonnage, with a length *(L)*, as defined in regulation 1.19 of Annex I to the present convention, of 24 m or over when it has been specifically designed, and is used solely, for recreational purposes."

6 Paragraph 10 is deleted.

Chapter 4 – Regulations for energy efficiency of ships

Regulation 19 – Application

7 A new subparagraph 2.2 is added as follows:

".2 ships not propelled by mechanical means, and platforms including FPSOs and FSUs and drilling rigs, regardless of their propulsion."

8 Paragraph 3 is amended to read as follows:

"3 Regulations 20 and 21 of this Annex shall not apply to ships which have non-conventional propulsion, except that regulations 20 and 21 shall apply to cruise passenger ships having non-conventional propulsion and LNG carriers having conventional or non-conventional propulsion, delivered on or after 1 September 2019, as defined in paragraph 43 of regulation 2. Regulations 20 and 21 shall not apply to cargo ships having ice-breaking capability."

Regulation 20 – Attained Energy Efficiency Design Index (attained EEDI)

9 Paragraph 1 is replaced with the following:

"1 The attained EEDI shall be calculated for:

.1 each new ship;

.2 each new ship which has undergone a major conversion; and

.3 each new or existing ship which has undergone a major conversion, that is so extensive that the ship is regarded by the Administration as a newly-constructed ship, which falls into one or more of the categories in regulations 2.25 to 2.35, 2.38 and 2.39 of this Annex. The attained EEDI shall be specific to each ship and shall indicate the estimated performance of the ship in terms of energy efficiency, and be accompanied by the EEDI technical file that contains the information necessary for the calculation of the attained EEDI and that shows the process of calculation. The attained EEDI shall be verified, based on the EEDI technical file, either by the Administration or by any organization duly authorized by it*.

* Refer to *Code for Recognized Organizations (RO Code)*, adopted by the MEPC by resolution MEPC.237(65), as may be amended."

Regulation 21 – Required EEDI

10 Paragraph 1 is replaced with the following:

"1 For each:

.1 new ship;

.2 new ship which has undergone a major conversion; and

.3 new or existing ship which has undergone a major conversion that is so extensive that the ship is regarded by the Administration as a newly-constructed ship, which falls into one of the categories in regulations 2.25 to 2.31, 2.33 to 2.35, 2.38 and 2.39 and to which this chapter is applicable, the attained EEDI shall be as follows:

Attained EEDI ≤ Required EEDI = (1-X/100) x reference line value

where X is the reduction factor specified in table 1 for the required EEDI compared to the EEDI reference line."

11 New rows are added to table 1 in regulation 2 for ro-ro cargo ships (vehicle carrier), LNG carrier, cruise passenger ship having non-conventional propulsion, ro-ro cargo ships and ro-ro passenger ships, and marks ** and *** and their explanations are added, as follows:

"

Ship Type	Size	Phase 0 1 Jan 2013 – 31 Dec 2014	Phase 1 1 Jan 2015 – 31 Dec 2019	Phase 2 1 Jan 2020 – 31 Dec 2024	Phase 3 1 Jan 2025 and onwards
LNG carrier***	10,000 DWT and above	n/a	10**	20	30
Ro-ro cargo ship (vehicle carrier)***	10,000 DWT and above	n/a	5**	15	30
Ro-ro cargo ship***	2,000 DWT and above	n/a	5**	20	30
	1,000 – 2,000 DWT	n/a	0-5***	0-20*	0-30*
Ro-ro passenger ship***	1000 DWT and above	n/a	5**	20	30
	250 – 1,000 DWT	n/a	0-5***	0-20*	0-30*
Cruise passenger ship*** having non-conventional propulsion	85,000 GT and above	n/a	5**	20	30
	25,000 – 85,000 GT	n/a	0-5***	0-20*	0-30*

* Reduction factor to be linearly interpolated between the two values dependent upon ship size. The lower value of the reduction factor is to be applied to the smaller ship size.

** Phase 1 commences for those ships on 1 September 2015.

*** Reduction factor applies to those ships delivered on or after 1 September 2019, as defined in paragraph 43 of regulation 2.

Note: n/a means that no required EEDI applies."

12 New rows are added to table 2 in paragraph 3 for ro-ro cargo ship (vehicle carrier), LNG carrier, cruise passenger ship having non-conventional propulsion, ro-ro cargo ships and ro-ro passenger ships as follows:

"

Ship type defined in regulation 2	a	b	c
2.33 Ro-ro cargo ship (vehicle carrier)	$(DWT/GT)^{-0.7}$ · 780.36 where DWT/GT<0.3 1812.63 where DWT/GT≥0.3	DWT of the ship	0.471
2.34 Ro-ro cargo ship	1405.15	DWT of the ship	0.498
2.35 Ro-ro passenger ship	752.16	DWT of the ship	0.381
2.38 LNG carrier	2253.7	DWT of the ship	0.474
2.39 Cruise passenger ship having non-conventional propulsion	170.84	GT of the ship	0.214

"

Appendix I – Form of International Air Pollution Prevention (IAPP) Certificate (regulation 8)

13 The footnote in the Supplement to International Air Pollution Prevention Certificate (IAPP Certificate) is amended to read as follows:

> "* Completed only in respect of ships constructed on or after 1 January 2016 that are specially designed, and used solely, for recreational purposes and to which, in accordance with regulation 13.5.2.1 and regulation 13.5.2.3, the NO_x emission limit as given by regulation 13.5.1.1 will not apply."

AMENDMENTS TO THE NO_X TECHNICAL CODE 2008

Abbreviations, subscripts and symbols

14 Table 4 is replaced by the following:

"**Table 4 – Symbols for fuel composition**

Symbol	Definition	Unit
w_{ALF}*	H content of fuel	% m/m
w_{BET}*	C content of fuel	% m/m
w_{GAM}	S content of fuel	% m/m
w_{DEL}*	N content of fuel	% m/m
w_{EPS}*	O content of fuel	% m/m
α	Molar ratio (H/C)	1

* Subscripts "$_G$" denotes gas-fuel fraction.
"$_L$" denotes liquid-fuel fraction."

Chapter 1 – General

15 Paragraph 1.3.10 is replaced by the following:

"1.3.10 *Marine diesel engine* means any reciprocating internal combustion engine operating on liquid or dual fuel, to which regulation 13 applies, including booster/compound systems, if applied.

Where an engine is intended to be operated normally in the gas mode, i.e. with the gas fuel as the main fuel and with liquid fuel as the pilot or balance fuel, the requirements of regulation 13 have to be met only for this operation mode. Operation on pure liquid fuel resulting from restricted gas supply in cases of failures shall be exempted for the voyage to the next appropriate port for the repair of the failure."

Chapter 5 – Procedures for NO_x emission measurements on a test bed

16 Existing paragraph 5.3.4 is deleted and new paragraphs 5.3.4, 5.3.5 and 5.3.6 are added after existing paragraph 5.3.3 as follows:

"5.3.4 The selection of gas fuel for testing for dual fuel depends on the aim of tests. In case where an appropriate standard gas fuel is not available, other gas fuels shall be used with the approval of the Administration. A gas fuel sample shall be collected during the test of the parent engine. The gas fuel shall be analysed to give fuel composition and fuel specification.

5.3.5 Gas fuel temperature shall be measured and recorded together with the measurement point position.

5.3.6 Gas mode operation of dual fuel engines using liquid fuel as pilot or balance fuel shall be tested using maximum liquid-to-gas fuel ratio, such maximum ratio means for the different test cycle modes the maximum liquid-to-gas setting certified. The liquid fraction of the fuel shall comply with 5.3.1, 5.3.2 and 5.3.3."

17 A new sentence is added at the end of existing paragraph 5.12.3.3, as follows:

"In case of the use of dual fuel, the calculation shall be in accordance with paragraphs 5.12.3.1 to 5.12.3.3. However, q_{mf}, w_{ALF}, w_{BET}, w_{DEL}, w_{EPS}, f_{fw} values shall be calculated in accordance with the following table:

Factors in the formula (6) (7) (8)		**Formula for factors**
q_{mf}	=	$q_{mf\_G} + q_{mf\_L}$
w_{ALF}	=	$\frac{q_{mf\_G} \times w_{ALF\_G} + q_{mf\_L} \times w_{ALF\_L}}{q_{mf\_G} + q_{mf\_L}}$
w_{BET}	=	$\frac{q_{mf\_G} \times w_{BET\_G} + q_{mf\_L} \times w_{BET\_L}}{q_{mf\_G} + q_{mf\_L}}$
w_{DEL}	=	$\frac{q_{mf\_G} \times w_{DEL\_G} + q_{mf\_L} \times w_{DEL\_L}}{q_{mf\_G} + q_{mf\_L}}$
w_{EPS}	=	$\frac{q_{mf\_G} \times w_{EPS\_G} + q_{mf\_L} \times w_{EPS\_L}}{q_{mf\_G} + q_{mf\_L}}$

"

18 In paragraph 5.12.5.1, table 5 is replaced by the following:

"**Table 5 – Coefficient u_{gas} and fuel-specific parameters for raw exhaust gas**

Gas		NO_X	CO	HC	CO_2	O_2
ρ_{gas} kg/m^3		2.053	1.250	*	1.9636	1.4277
	ρ_e †	Coefficient u_{gas} ‡				
Liquid fuel**	1.2943	0.001586	0.000966	0.000479	0.001517	0.001103
Rapeseed Methyl Ester	1.2950	0.001585	0.000965	0.000536	0.001516	0.001102
Methanol	1.2610	0.001628	0.000991	0.001133	0.001557	0.001132
Ethanol	1.2757	0.001609	0.000980	0.000805	0.001539	0.001119
Natural gas	1.2661	0.001621	0.000987	0.000558	0.001551	0.001128
Propane	1.2805	0.001603	0.000976	0.000512	0.001533	0.001115
Butane	1.2832	0.001600	0.000974	0.000505	0.001530	0.001113

* Depending on fuel.
** Petroleum derived.
† ρ_e is the nominal density of the exhaust gas.
‡ At λ = 2, wet air, 273 K, 101.3 kPa.

Values for *u* given in table 5 are based on ideal gas properties.
In multiple fuel type operation, the u_{gas} value used shall be determined from the values applicable to those fuels in the table set out above proportioned in accordance with the fuel ratio used."

Chapter 6 – Procedures for demonstrating compliance with NOx emission limits on board

19 Paragraph 6.3.1.4 is replaced by the following:

"6.3.1.4 In practical cases, it is often impossible to measure the fuel oil consumption once an engine has been installed on board a ship. To simplify the procedure on board, the results of the measurement of the fuel oil consumption from an engine's pre-certification test-bed testing may be accepted. In such cases, especially concerning residual fuel oil operation (RM-grade fuel oil according to ISO 8217:2005) and dual fuel operation, an estimation with a corresponding estimated error shall be made. Since the fuel oil flow rate used in the calculation (q_{mf}) must relate to the fuel oil composition determined in respect of the fuel sample drawn during the test, the measurement of q_{mf} from the test-bed testing shall be corrected for any difference in net calorific values between the test bed and test fuel oils and gases. The consequences of such an error on the final emissions shall be calculated and reported with the results of the emission measurement."

20 In paragraph 6.3.2.1, table 6 is replaced by the following:

"**Table 6 – Engine parameters to be measured and recorded**

Symbol	Term	Unit
H_a	Absolute humidity (mass of engine intake air water content related to mass of dry air)	g/kg
$n_{d,i}$	Engine speed (at the i^{th} mode during the cycle)	min^{-1}
$n_{turb,i}$	Turbocharger speed (if applicable) (at the i^{th} mode during the cycle)	min^{-1}
P_b	Total barometric pressure (in ISO 3046-1:1995: $p_x = P_X$ = site ambient total pressure)	kPa
$P_{C,i}$	Charge air pressure after the charge air cooler (at the i^{th} mode during the cycle)	kPa
P_i	Brake power (at the i^{th} mode during the cycle)	kW
$q_{mf,i}$	Fuel oil (in case of dual fuel engine, it would be fuel oil and gas) (at the i^{th} mode during the cycle)	kg/h
s_i	Fuel rack position (of each cylinder, if applicable) (at the i^{th} mode during the cycle)	
T_a	Intake air temperature at air inlet (in ISO 3046-1:1995: T_x = TTx = site ambient thermodynamic air temperature)	K
$T_{SC,i}$	Charge air temperature after the charge air cooler (if applicable) (at the i^{th} mode during the cycle)	K
T_{caclin}	Charge air cooler, coolant inlet temperature	°C
$T_{caclout}$	Charge air cooler, coolant outlet temperature	°C
$T_{Exh,i}$	Exhaust gas temperature at the sampling point (at the i^{th} mode during the cycle)	°C
T_{Fuel_L}	Fuel oil temperature before the engine	°C
T_{Sea}	Seawater temperature	°C
T_{Fuel_G}*	Gas fuel temperature before the engine	°C

* Only for dual-fuel engine."

21 A new paragraph 6.3.4.3 is added after existing paragraph 6.3.4.2 as follows:

"6.3.4.3 In case of a dual fuel engine, the gas fuel used shall be the gas fuel available on board."

22 Paragraph 6.3.11.2 is replaced by the following:

"6.3.11.2 The NO_X emission of an engine may vary depending on the ignition quality of the fuel oil and the fuel-bound nitrogen. If there is insufficient information available on the influence of the ignition quality on the NO_X formation during the combustion process and the fuel-bound nitrogen conversion rate also depends on the engine efficiency, an allowance of 10% may be granted for an on board test run carried out on an RM-grade fuel oil (ISO 8217:2005), except that there will be no allowance for the pre-certification test on board. The fuel oil and gas fuel used shall be analysed for its composition of carbon, hydrogen, nitrogen, sulphur and, to the extent given in (ISO 8217:2005) and (ISO 8178-5:2008), any additional components necessary for a specification of the fuel oil and gas fuel."

23 In paragraph 6.4.11.1, table 9 is replaced by the following:

"**Table 9 – Default fuel oil parameters**

	Carbon	Hydrogen	Nitrogen	Oxygen
	w_{BET}	w_{ALF}	w_{DEL}	w_{EPS}
Distillate fuel oil (ISO 8217:2005, DM grade)	86.2%	13.6%	0.0%	0.0%
Residual fuel oil (ISO 8217:2005, RM grade)	86.1%	10.9%	0.4%	0.0%
Natural gas	75.0%	25.0%	0.0%	0.0%

For other fuel oils, default value as approved by the Administration."

Appendix VI – Calculation of exhaust gas mass flow (carbon balance method)

24 A new paragraph 2.5 is added after existing paragraph 2.4 as follows:

"2.5 q_{mf}, w_{ALF}, w_{BET}, w_{DEL}, w_{EPS}, f_{fd} parameters, in formula (1), in case of gas mode operation of dual-fuel engine, shall be calculated as follows:

Factors in formula (1)		Formula of factors
q_{mf}	=	$q_{mf\_G}+q_{mf\_L}$
w_{ALF}	=	$\frac{q_{mf\_G} \times w_{ALF\_G} + q_{mf\_L} \times w_{ALF\_L}}{q_{mf\_G} + q_{mf\_L}}$
w_{BET}	=	$\frac{q_{mf\_G} \times w_{BET\_G} + q_{mf\_L} \times w_{BET\_L}}{q_{mf\_G} + q_{mf\_L}}$
w_{DEL}	=	$\frac{q_{mf\_G} \times w_{DEL\_G} + q_{mf\_L} \times w_{DEL\_L}}{q_{mf\_G} + q_{mf\_L}}$
w_{EPS}	=	$\frac{q_{mf\_G} \times w_{EPS\_G} + q_{mf\_L} \times w_{EPS\_L}}{q_{mf\_G} + q_{mf\_L}}$

"

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ANNEX 1

RESOLUTION MEPC.242(66)
Adopted on 4 April 2014

2014 GUIDELINES IN RESPECT OF THE INFORMATION TO BE SUBMITTED BYAN ADMINISTRATION TO THE ORGANIZATION COVERING THE CERTIFICATION OF AN APPROVED METHOD AS REQUIRED UNDER REGULATION 13.7.1 OF MARPOL ANNEX VI

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee (the Committee) conferred upon it by international conventions for the prevention and control of marine pollution from ships,

RECALLING ALSO that, at its fifty-eighth session, the Committee adopted, by resolution MEPC.176(58), a revised MARPOL Annex VI (hereinafter referred to as "MARPOL Annex VI") which significantly strengthens the emission limits for nitrogen oxides (NO_x) in light of technological improvements and implementation experience,

NOTING that regulation 13.7.1 of MARPOL Annex VI requires notification to the Organization of an Approved Method certified by an Administration of a Party,

RECOGNIZING the need to develop guidelines to set forth the information to be submitted by an Administration to the Organization,

NOTING ALSO the 2014 Guidelines on the approved method process, adopted by resolution MEPC.243(66),

HAVING CONSIDERED, at its sixty-sixth session, the draft *2014 Guidelines in respect of the information to be submitted by an Administration to the Organization covering the certification of an Approved Method as required under regulation 13.7.1 of MARPOL Annex VI*, proposed by the Sub-Committee on Pollution Prevention and Response, at its first session,

1. ADOPTS the *2014 Guidelines in respect of the information to be submitted by an Administration to the Organization covering the certification of an Approved Method as required under regulation 13.7.1 of MARPOL Annex VI*, as set out in the annex to the present resolution;

2. INVITES Administrations to take the annexed Guidelines into account when notification of a new Approved Method is prepared;

3. REQUESTS the Parties to MARPOL Annex VI and other Member Governments to bring the annexed Guidelines to the attention of shipowners, ship operators, shipbuilders, marine diesel engine manufacturers and any other interested groups;

4. AGREES to keep these Guidelines under review in the light of experience gained with their application.

ANNEX

2014 GUIDELINES IN RESPECT OF THE INFORMATION TO BE SUBMITTED BY AN ADMINISTRATION TO THE ORGANIZATION COVERING THE CERTIFICATION OF AN APPROVED METHOD AS REQUIRED UNDER REGULATION 13.7.1 OF MARPOL ANNEX VI

1 PURPOSE

These Guidelines are intended to assist an Administration by providing an outline of the information to be submitted to the Organization for inclusion in the notification of certification of an Approved Method as required under regulation 13.7.1 of MARPOL Annex VI.

2 INFORMATION TO BE SUBMITTED TO THE ORGANIZATION

2.1 Contents of the information to be submitted

The notification to the Organization of the certification of an Approved Method should include, but is not limited to:

.1 the certification reference of the Approved Method together with details of the Approved Method;

.2 a copy of the Approved Method File, or where that is not possible, a sample of the File taking into account paragraph 2.2;

.3 criteria for identification of the engines to which an Approved Method applies as specified in paragraph 2.3; and

.4 Approved Method contact point.

2.2 A copy or sample of the Approved Method File

2.2.1 In accordance with paragraph 7.4 of the NO_X Technical Code 2008, the Approved Method File is an integral part of any Approved Method and should be authenticated by the application of the stamp of the certifying Administration. A copy of this Approved Method File should be included in the notification to the Organization.

2.2.2 However, in cases where, due to differences between individual engines at the time of manufacture, it is not possible to provide a copy of the Approved Method File as being representative of all engines to be covered by the specific Approved Method, a sample of the Approved Method File should instead be included in the notification to the Organization. This sample Approved Method File should contain sufficient detail that will make it possible to correlate with the actual Approved Method File to be supplied for individual engines.

2.2.3 In cases where a sample of the Approved Method File is included, the procedure for approval of individual Approved Method Files should be included in the notification. In all cases the authentication of the Approved Method File should be undertaken by the certifying Administration.

2.2.4 The Approved Method File should also include a description of the engine's onboard verification procedure, in accordance with paragraph 7.5 of the NO_X Technical Code 2008.

2.2.5 A list of the onboard record keeping requirements for the Approved Method should be included.

2.3 Criteria for the identification of an engine to which an Approved Method applies

2.3.1 Criteria for the identification of an engine to which a particular Approved Method applies should be included. This should also cover those cases where the current engine condition differs from the original engine condition at the time of manufacturing due to modifications either at the time of installation or subsequent modifications over its service life.

2.3.2 If the Approved Method developer knows the current condition of a particular engine, those parameters should be listed in the Approved Method File and the engine or engines to which it applies should be identified by engine make, type and serial number in the Approved Method File.

2.3.3 However, the developer of an Approved Method will usually not know the actual current engine condition. Consequently, the criteria which define an engine will relate to the original engine condition at the time of manufacturing. The criteria which define the applicability of a particular Approved Method should include the following items:

.1 manufacturer/licensee, engine type and model;

.2 application cycle(s) e.g. E2, E3, D2 or C1, as specified in chapter 3 of the NO_X Technical Code 2008 as appropriate;

.3 rated power (kW) and rated speed (rpm) as given on the nameplate or as modified by approved re-rating:

.1 the applicable power output/rated speed range is to be clearly shown whether these represent a "line" or a "box", the exception or inclusion on the boundary and any exceptions either inside or outside that boundary; and

.2 in addition, any potentially necessary calculation processes (for example between horsepower (metric/imperial) and kW) including the rounding method is to be clearly specified;

.4 NO_X critical components and how their identity should be established. Where there is a combination of components, it should be described how those are interrelated;

.5 NO_X critical settings or operating values and how those values should be established. Where there are combinations of settings, it should be described how these are interrelated. In addition, any potentially necessary calculation processes (for example to bring Pmax or Pcomp to the ISO specified condition), including the rounding method, is to be clearly specified; and

.6 any other specific points which relate to engines to which the Approved Method applies.

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ANNEX 2

RESOLUTION MEPC.243(66)
Adopted on 4 April 2014

2014 GUIDELINES ON THE APPROVED METHOD PROCESS

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee (the Committee) conferred upon it by international conventions for the prevention and control of marine pollution from ships,

RECALLING ALSO that, at its fifty-eighth session, the Committee adopted, by resolution MEPC.176(58), a revised MARPOL Annex VI (hereinafter referred to as "MARPOL Annex VI") which significantly strengthens the emission limits for nitrogen oxides (NO_X) in light of technological improvements and implementation experience,

NOTING that regulation 13.7.1 of MARPOL Annex VI requires an Approved Method to be certified by an Administration of a Party,

RECOGNIZING the need to develop guidelines to set forth the process of approving an Approved Method,

NOTING ALSO the 2014 Guidelines in respect of the information to be submitted by an Administration to the Organization covering the certification of an approved method as required under regulation 13.7.1 of MARPOL Annex VI, adopted by resolution MEPC.242(66),

HAVING CONSIDERED, at its sixty-sixth session, the draft *2014 Guidelines on the Approved Method process*, proposed by the Sub-Committee on Pollution Prevention and Response, at its first session,

1. ADOPTS the *2014 Guidelines on the Approved Method process*, as set out in the annex to the present resolution;

2. INVITES Administrations to take the annexed Guidelines into account when an application for a new Approved Method is being considered;

3. REQUESTS the Parties to MARPOL Annex VI and other Member Governments to bring the annexed Guidelines to the attention of shipowners, ship operators, shipbuilders, marine diesel engine manufacturers, and any other interested groups; and

4. AGREES to keep these Guidelines under review in the light of experience gained with their application.

ANNEX

2014 GUIDELINES ON THE APPROVED METHOD PROCESS

1 PURPOSE

The purpose of these Guidelines is to assist Administrations, port State inspectors, shipowners and others to understand the Approved Method process and responsibilities. For clarity the Approved Method process is illustrated in figure 1. Further details are given in the following paragraphs.

2 IDENTIFICATION AS TO THE APPLICABILITY OF AN APPROVED METHOD

2.1 After notification of the certification of an Approved Method by an IMO circular, shipowners potentially affected by the Approved Method should investigate as to whether that Approved Method is applicable to engines under their control by checking against the criteria for identification of applicable engines included in the circular.

2.2 In those instances where items specified in paragraphs .1 to .3 of the appendix as listed in the notification do not apply, the Approved Method does not apply and no further action is required.

2.3 In those instances where an engine corresponds in full with the items specified in paragraphs .1 to .6 of the appendix as listed in the notification, as confirmed by the ship's Administration, the shipowner should arrange through the contact point given in the IMO circular for the installation of the Approved Method within the given time period as specified in regulation 13.7.2 of MARPOL Annex VI. In making that arrangement, the shipowner should provide such engine specific information as is necessary for the preparation of that engine's Approved Method File.

2.4 In those instances where it is considered that an Approved Method is not applicable since, although conforming with the items specified in paragraphs .1 to .3 of the appendix as listed in the notification, it does not conform to one or more points specified in paragraphs .4 to .6 of the appendix, due to installation or post manufacture modification, the shipowner should contact the relevant contact point as given in the IMO circular. In that communication, information should be given as to why it is considered that one or more of points specified in paragraphs .4 to .6 of the appendix do not apply. The contact point should assess that application for non-applicability of fitting the Approved Method against their knowledge of the Approved Method. The outcome of that review (agreement or disagreement) should be passed to the certifying Administration and ship's Administration for their review and confirmation of that finding.

.1 In the case of agreement as to non-applicability, the certifying Administration should duly document the non-applicability giving the Approved Method approval reference, details of the engine to which the non-applicability applies (make, model, serial number or other verifiable and unique identifiers) and details of the reason(s) for which the engine is found non-applicable together with any other relevant information. Any agreement on non-applicability should have the concurrence of the ship's Administration. The non-applicability documentation should be retained on board as evidence of non-applicability of a particular Approved Method. In this it must be noted that although non-applicability documentation has

been issued against a particular Approved Method, a subsequently certified Approved Method may apply.

.2 In those instances where those Administrations agree with the contact point that the shipowner's reason for claiming non-applicability is not valid, the shipowner will be advised and informed that fitting of the Approved Method is required within the given time period.

3 ALTERNATIVE TO THE INSTALLATION OF AN APPROVED METHOD

For an engine identified in above paragraph 2.3 or 2.4.2 as being applicable to an Approved Method, regulation 13.7.1.2 of MARPOL Annex VI allows that the engine may alternatively be certified to Tier I, II or III.* In such instances the issue of the EIAPP Certificate, approval of the associated Technical File and the initial and subsequent survey procedures should be in accordance with the given NO_X Technical Code 2008 procedures for engines installed on ships constructed on or after 1 January 2000. The IAPP Certificate of the ship on which that engine is installed should be duly updated within the time period given by regulation 13.7.2 of MARPOL Annex VI relevant to the Approved Method to which it is an alternative.

*__Note:__ Typically it may be expected that this option may be adopted in those cases where a series of ships spanned the introduction date of the NO_X certification requirement. In such cases those ships in the series which were constructed on or after 1 January 2000 will have NO_X certified engines, however, those ships in the series constructed before that date may have identical engines installed, except that they were not NO_X certified. In these instances it may be possible to back-certify those previously uncertified engines on the basis of being additional member engines of the engine groups/families to which the certified engines belong.

4 APPROVED METHOD NOT COMMERCIALLY AVAILABLE

4.1 In case where the Approved Method is not commercially available despite best efforts to obtain it within the time period given by regulation 13.7.2 of MARPOL Annex VI (noting that this does not cover instances when not convenient in relation to the ship's schedule to fit the Approved Method) then application should be made to the ship's Administration, giving details of the efforts made to have installed the Approved Method. The ship's Administration should review that information and, if in agreement that the Approved Method is not at that time commercially available, a statement to that effect should be duly provided to the shipowner. That statement should be retained on board and be available at surveys or inspections as required.

4.2 Thereafter the shipowner should, in accordance with regulation 13.7.2 of MARPOL Annex VI, reassess the commercial availability in a timely manner prior to the next annual survey, and if available, to have the Approved Method installed no later than that annual survey. If the Approved Method is still not available the process in paragraph 4.1 of these guidelines should be repeated. Thereafter, this process should be repeated for each annual survey until the Approved Method is commercially available and hence installed.

5 SURVEY CONFIRMING INSTALLATION OF THE APPROVED METHOD

5.1 Upon completion of the installation of the Approved Method, an initial (onboard confirmation) survey should be undertaken by the ship's Administration in accordance with the onboard verification procedure specified in the Approved Method File.

5.2 A chronological record should be maintained, covering the installation of the Approved Method and all changes, including like-for-like replacements, of components and adjustments/operating values as covered by the Approved Method. This record should accompany the Approved Method File as evidence of the initial installation.

6 SURVEYS CONFIRMING RETENTION OF THE APPROVED METHOD

6.1 The in-service surveys after the installation of the Approved Method should be carried out in accordance with the onboard verification procedure specified in the Approved Method File. The survey is to be conducted as part of a ship's survey in accordance with regulation 5 of MARPOL Annex VI.

6.2 The Approved Method record should be maintained and be available on board at the relevant surveys.

7 APPROVED METHOD PROCESS FLOWCHART

Figure 1 illustrates the overall Approved Method process.

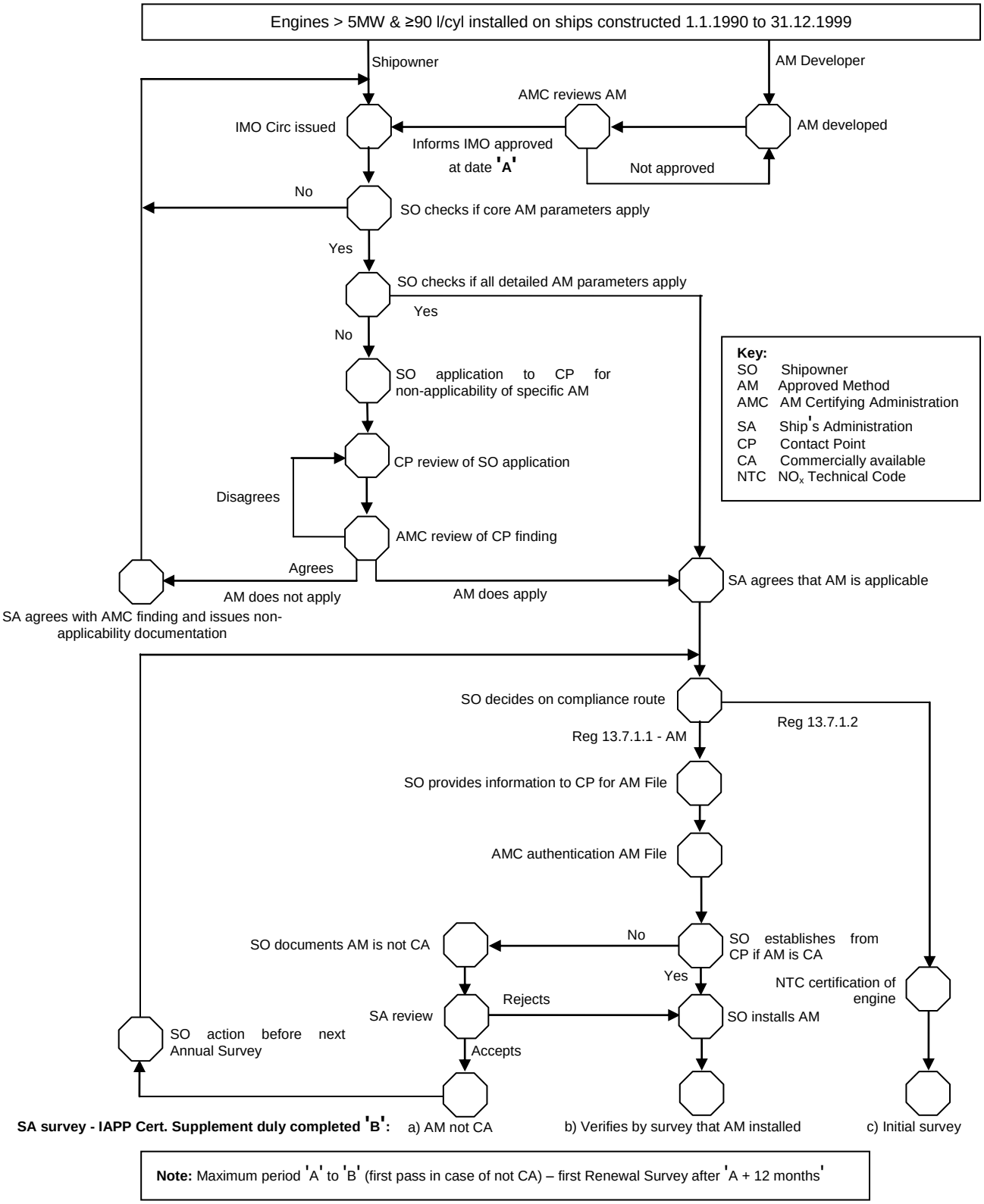

Figure 1 – Approved Method process flowchart

APPENDIX

EXTRACT FROM THE 2014 GUIDELINES IN RESPECT OF THE INFORMATION TO BE SUBMITTED BY AN ADMINISTRATION TO THE ORGANIZATION COVERING THE CERTIFICATION OF AN APPROVED METHOD AS REQUIRED UNDER REGULATION 13.7.1 OF MARPOL ANNEX VI

Criteria for the identification of an engine to which an Approved Method applies

The criteria, relating to original engine condition, which define the applicability of a particular Approved Method should include the following items:

.1 manufacturer/licensee, engine type and model;

.2 application cycle(s) e.g. E2, E3, D2 or C1, as specified in chapter 3 of the NO_X Technical Code 2008 as appropriate;

.3 rated power (kW) and rated speed (rpm) as given on the nameplate or as modified by approved re-rating:

.1 the applicable power output/rated speed range is to be clearly shown whether these represent a "line" or a "box", the exception or inclusion on the boundary and any exceptions either inside or outside that boundary; and

.2 in addition, any potentially necessary calculation processes (for example between horsepower (metric/imperial) and kW) including the rounding method is to be clearly specified;

.4 NO_X critical components and how their identity should be established. Where there is a combination of components, it should be described how those are interrelated;

.5 NO_X critical settings or operating values and how those values should be established. Where there are combinations of settings, it should be described how these are interrelated. In addition, any potentially necessary calculation processes (for example to bring Pmax or Pcomp to the ISO specified condition), including the rounding method, is to be clearly specified; and

.6 any other specific points which relate to engines to which the Approved Method applies.

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ANNEX 3

RESOLUTION MEPC.244(66)
Adopted on 4 April 2014

2014 STANDARD SPECIFICATION FOR SHIPBOARD INCINERATORS

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the function of the Marine Environment Protection Committee (the Committee) conferred upon it by international conventions for the prevention and control of marine pollution from ships,

RECALLING ALSO that, at its fortieth session, the Committee adopted, by resolution MEPC.76(40), the *Standard specification for shipboard incinerators*, in respect of regulation 16.6.1 and appendix IV to MARPOL Annex VI,

NOTING that, at its forty-fifth session, the Committee adopted, by resolution MEPC.93(45), *Amendments to the standard specification for shipboard incinerators*,

NOTING ALSO that, at its sixty-fourth session, the Committee decided that incinerators with a capacity greater than 1,500 kW and up to 4,000 kW can be type-approved under the existing standard specification for shipboard incinerators,

BEING AWARE of the need to update the definition section, as well as references to the SOLAS Convention and IEC standards in the *Standard specification for shipboard incinerators*,

HAVING CONSIDERED, at its sixty-sixth session, the 2014 Standard specification for shipboard incinerators,

1. ADOPTS the *2014 Standard specification for shipboard incinerators*, as set out in the annex to the present resolution;

2. INVITES Administrations to take the annexed Standard specification into account when certifying a shipboard incinerator;

3. INVITES Governments to note that, taking into account regulation 16.5.2 of MARPOL Annex VI, the standard specification for shipboard incinerators does not apply to the design, installation and operation of alternative designs of shipboard thermal waste treatment devices including those which use thermal processes to convert ship generated wastes to gas;

4. REQUESTS the Parties to MARPOL Annex VI and other Member Governments to bring the annexed standard specification to the attention of shipowners, ship operators, shipbuilders, manufacturers of shipboard incinerators and any other interested groups;

5. SUPERSEDES the *Standard specification for shipboard incinerators* adopted by resolution MEPC.76(40), as amended by resolution MEPC.93(45).

ANNEX

2014 STANDARD SPECIFICATION FOR SHIPBOARD INCINERATORS

Table of contents

1 SCOPE

1.1 The 2014 Standard specification for shipboard incinerators (the Specification) covers the design, manufacture, performance, operation and testing of incinerators intended to incinerate garbage and other shipboard wastes generated during the ship's normal service.

1.2 This Specification applies to those incinerator plants with capacities up to 4,000 kW per unit.

1.3 This Specification does not apply to systems on special incinerator ships, e.g. for burning industrial wastes such as chemicals, manufacturing residues, etc.

1.4 This Specification does not address the electrical supply to the unit, nor the foundation connections and stack connections.

1.5 This Specification provides emission requirements in annex 1, and fire protection requirements in annex 2. Provisions for incinerators integrated with heat recovery units and provisions for flue gas temperature are given in annex 3 and annex 4, respectively.

1.6 This Specification may involve hazardous materials, operations, and equipment. It does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use, including possible port State limitations.

2 DEFINITIONS

For the purpose of the Specification, the following definitions apply:

2.1 *Ship* means a vessel of any type whatsoever operating in the marine environment and includes hydrofoil boats, air-cushioned vehicles, submersibles, floating craft and fixed or floating platforms.

2.2 *Shipboard incinerator* or *incinerator* means a shipboard facility designed for the primary purpose of incineration.

2.3 *Garbage* means all kinds of food wastes, domestic wastes and operational wastes, all plastics, cargo residues, incinerator ashes, cooking oil, fishing gear, and animal carcasses generated during the normal operation of the ship and liable to be disposed of continuously or periodically except those substances which are defined or listed in Annexes to MARPOL. Garbage does not include fresh fish and parts thereof generated as a result of fishing activities undertaken during the voyage, or as a result of aquaculture activities which involve the transport of fish including shellfish for placement in the aquaculture facility and the transport of harvested fish including shellfish from such facilities to shore for processing.

2.4 *Waste* means useless, unneeded or superfluous matter which is to be discarded.

2.5 *Food wastes* means any spoiled or unspoiled food substances and includes fruits, vegetables, dairy products, poultry, meat products and food scraps generated aboard ship.

2.6 *Plastic* means a solid material which contains as an essential ingredient one or more high molecular mass polymers and which is formed (shaped) during either manufacture of the polymer or the fabrication into a finished product by heat and/or pressure. Plastics have

material properties ranging from hard and brittle to soft and elastic. For the purposes of this specification, plastic means all garbage that consists of or includes plastic in any form, including synthetic ropes, synthetic fishing nets, plastic garbage bags and incinerator ashes from plastic products.

2.7 *Domestic wastes* means all types of wastes not covered by Annexes to MARPOL that are generated in the accommodation spaces on board the ship. Domestic wastes does not include grey water.

2.8 *Operational wastes* means all solid wastes (including slurries) not covered by Annexes to MARPOL that are collected on board during normal maintenance or operations of a ship, or used for cargo stowage and handling. Operational wastes also includes cleaning agents and additives contained in cargo hold and external wash water. Operational wastes does not include grey water, bilge water or other similar discharges essential to the operation of a ship, taking into account the guidelines developed by the Organization.

2.9 *Oil residue (sludge)* means the residual waste oil products generated during the normal operation of a ship such as those resulting from the purification of fuel or lubricating oil for main or auxiliary machinery, separated waste oil from oil filtering equipment, waste oil collected in drip trays, and waste hydraulic and lubricating oils.

2.10 *Oily rags* means rags which have been saturated with oil as controlled in Annex I to MARPOL. Contaminated rags are rags which have been saturated with a substance defined as a harmful substance in Annexes to MARPOL.

2.11 *Cargo residues* means the remnants of any cargo which are not covered by Annexes to MARPOL and which remain on the deck or in holds following loading or unloading, including loading and unloading excess or spillage, whether in wet or dry condition or entrained in wash water but does not include cargo dust remaining on the deck after sweeping or dust on the external surfaces of the ship.

2.12 *Fishing gear* means any physical device or part thereof or combination of items that may be placed on or in the water or on the sea-bed with the intended purpose of capturing or controlling for subsequent capture or harvesting, marine or fresh water organisms.

3 MATERIALS AND MANUFACTURE

3.1 The materials used in the individual parts of the incinerator are to be suitable for the intended application with respect to heat resistance, mechanical properties, oxidation, corrosion, etc. as in other auxiliary marine equipment.

3.2 Piping for fuel and oil residue (sludge) should be seamless steel of adequate strength and to the satisfaction of the Administration. Short lengths of steel, or annealed copper nickel, nickel copper, or copper pipe and tubing may be used at the burners. The use of non-metallic materials for fuel lines is prohibited. Valves and fittings may be threaded in sizes up to and including 60 mm O.D. (outside diameter), but threaded unions are not to be used on pressure lines in sizes 33 mm O.D. and over.

3.3 All rotating or moving mechanical and exposed electrical parts should be protected against accidental contact.

3.4 Incinerator walls are to be protected with insulated fire bricks/refractory and a cooling system. Outside surface temperature of the incinerator casing being touched during normal operations should not exceed 20°C above ambient temperature.

3.5 Refractory should be resistant to thermal shocks and resistant to normal ship's vibration. The refractory design temperature should be equal to the combustion chamber design temperature plus 20% (see paragraph 4.1).

3.6 Incinerating systems should be designed such that corrosion will be minimized on the inside of the systems.

3.7 In systems equipped for incinerating liquid wastes, safe ignition and maintenance of combustion should be ensured, e.g. by a supplementary burner using gas oil/diesel oil or equivalent.

3.8 The combustion chamber(s) should be designed for easy maintenance of all internal parts including the refractory and insulation.

3.9 The combustion process should take place under negative pressure which means that the pressure in the furnace under all circumstances should be lower than the ambient pressure in the room where the incinerator is installed. A flue gas fan may be fitted to secure negative pressure.

3.10 The incinerating furnace may be charged with solid waste either by hand or automatically. In every case, fire dangers should be avoided and charging should be possible without danger to the operating personnel.

.1 For instance, where charging is carried out by hand, a charging lock may be provided which ensures that the charging space is isolated from the fire box as long as the filling hatch is open.

.2 Where charging is not effected through a charging lock, an interlock should be installed to prevent the charging door from opening while the incinerator is in operation with burning of garbage in progress or while the furnace temperature is above 220°C.

3.11 Incinerators equipped with a feeding sluice or system should ensure that the material charged will move to the combustion chamber. Such system should be designed such that both operator and environment are protected from hazardous exposure.

3.12 Interlocks should be installed to prevent ash removal doors from opening while burning is in progress or while the furnace temperature is above 220°C.

3.13 The incinerator should be provided with a safe observation port of the combustion chamber in order to provide visual control of the burning process and waste accumulation in the combustion chamber. Neither heat, flame, nor particles should be able to pass through the observation port. An example of a safe observation port is high-temperature glass with a metal closure.

3.14 Electrical requirements[7]

3.14.1 Electrical installation requirements should apply to all electrical equipment, including controls, safety devices, cables, and burners and incinerators.

[7] International Electrotechnical Commission (IEC) Standards, particularly IEC Publication 60092 – Electrical Installations in Ships, are applicable for this equipment.

3.14.1.1 A disconnecting means capable of being locked in the open position should be installed at an accessible location at the incinerator so that the incinerator can be disconnected from all sources of potential. This disconnecting means should be an integral part of the incinerator or adjacent to it (see paragraph 5.1).

3.14.1.2 All uninsulated live metal parts should be guarded to avoid accidental contact.

3.14.1.3 The electrical equipment should be so arranged so that failure of this equipment will cause the fuel supply to be shut off.

3.14.1.4 All electrical contacts of every safety device installed in the control circuit should be electrically connected in series. However, special consideration should be given to arrangements when certain devices are wired in parallel.

3.14.1.5 All electrical components and devices should have a voltage rating commensurate with the supply voltage of the control system.

3.14.1.6 All electrical devices and electric equipment exposed to the weather should meet the requirements of international standards acceptable to the Organization.[8]

3.14.1.7 All electrical and mechanical control devices should be of a type tested and accepted by a nationally recognized testing agency, according to international standards.

3.14.1.8 The design of the control circuits should be such that limit and primary safety controls should directly open a circuit that functions to interrupt the supply of fuel to combustion units.

3.14.2 Overcurrent protection

3.14.2.1 Conductors for interconnecting wiring that is smaller than the supply conductors should be provided with overcurrent protection based on the size of the smallest interconnecting conductors external to any control box, in accordance with the requirements of international standards acceptable to the Organization.[9]

3.14.2.2 Overcurrent protection for interconnecting wiring should be located at the point where the smaller conductors connect to the larger conductors. However, overall overcurrent protection is acceptable if it is sized on the basis of the smallest conductors of the interconnecting wiring, or in accordance with the requirements of international standards acceptable to the Organization.[10]

3.14.2.3 Overcurrent protection devices should be accessible and their function should be identified.

3.14.3 Motors

3.14.3.1 All electric motors should have enclosures corresponding to the environment where they are located, at least IP 44, in accordance with the requirements of international standards acceptable to the Organization.[11]

8 Refer to IEC Publication 60092-201, table V (1994-08 edition).

9 Refer to IEC Publication 60092-202 (1994-03 edition with amendment).

10 Refer to IEC Publication 60092-202 (1994-03 edition with amendment).

11 Refer to IEC Publication 60529 (2013-08 edition with amendment).

3.14.3.2 Motors should be provided with a corrosion-resistant nameplate specifying information in accordance with the requirements of international standards acceptable to the Organization.[12]

3.14.3.3 Motors should be provided with running protection by means of integral thermal protection, by overcurrent devices, or a combination of both in accordance with manufacturer's instruction that should meet the requirements of international standards acceptable to the Organization.[13]

3.14.3.4 Motors should be rated for continuous duty and should be designed for an ambient temperature of 45°C or higher.

3.14.3.5 All motors should be provided with terminal leads or terminal screws in terminal boxes integral with, or secured to, the motor frames.

3.14.4 Ignition system

3.14.4.1 When automatic electric ignition is provided, it should be accomplished by means of either a high-voltage electric spark, a high-energy electric spark, or a glow coil.

3.14.4.2 Ignition transformers should have an enclosure corresponding to the environment where they are located, at least IP 44 in accordance with the requirements of international standards acceptable to the Organization.[14]

3.14.4.3 Ignition cable should meet the requirements of international standards acceptable to the Organization.[15]

3.14.5 Wiring

All wiring for incinerators should be rated and selected in accordance with the requirements of international standards acceptable to the Organization.[16]

3.14.6 Bonding and grounding

3.14.6.1 Means should be provided for grounding the major metallic frame or assembly of the incinerators.

3.14.6.2 Non-current carrying enclosures, frames and similar parts of all electrical components and devices should be bonded to the main frame or assembly of the incinerator. Electrical components that are bonded by their installation do not require a separate bonding conductor.

3.14.6.3 When an insulated conductor is used to bond electrical components and devices, it should show a continuous green colour, with or without a yellow stripe.

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12 Refer to IEC Publication 60092-301 (1980-01 edition with amendment).

13 Refer to IEC Publication 60092-202 (1994-03 edition with amendment).

14 Refer to IEC publication 60529 (2013-08 edition with amendment).

15 Refer to IEC Publication 60092-503 (2007-06 edition with amendment).

16 Refer to IEC Publication 60092-352 (2005-09 edition with amendment).

4 OPERATING REQUIREMENTS

4.1 The incinerator system should be designed and constructed for operation with the following conditions:

Maximum combustion chamber flue gas outlet temperature	1,200°C
Minimum combustion chamber flue gas outlet temperature	850°C
Preheat temperature of combustion chamber	650°C

4.2 For batch loaded incinerators, there are no preheating requirements. However, the incinerator should be designed that the temperature in the actual combustion space should reach 600°C within 5 minutes after start.

Prepurge, before ignition:	at least 4 air changes in the chamber(s) and stack, but not less than 15 s.
Time between restarts:	at least 4 air changes in the chamber(s) and stack, but not less than 15 s.
Postpurge, after shut-off fuel oil:	not less than 15 s after the closing of the fuel oil valve.
Incinerator discharge gases:	Minimum 6% O2 (measured in dry flue gas).

4.3 Outside surface of combustion chamber(s) should be shielded from contact such that people in normal work situations will not be exposed to extreme heat (20°C above ambient temperature) or direct contact of surface temperatures exceeding 60°C. Examples for alternatives to accomplish this are a double jacket with an air flow in between or an expanded metal jacket.

4.4 Incinerating systems are to be operated with underpressure (negative pressure) in the combustion chamber such that no gases or smoke can leak out to the surrounding areas.

4.5 The incinerator should have warning plates attached in a prominent location on the unit, warning against unauthorized opening of doors to combustion chamber(s) during operation and against overloading the incinerator with garbage.

4.6 The incinerator should have instruction plate(s) attached in a prominent location on the unit that clearly addresses the following:

4.6.1 Cleaning ashes and slag from the combustion chamber(s) and cleaning of combustion air openings before starting the incinerator (where applicable).

4.6.2 Operating procedures and instructions. These should include proper start-up procedures, normal shut-down procedures, emergency shut-down procedures, and procedures for loading garbage (where applicable).

4.7 To avoid building up of dioxins, the flue gas should be shock-cooled to a maximum 350°C within 2.5 m from the combustion chamber flue gas outlet.

5 OPERATING CONTROLS

5.1 The entire unit should be capable of being disconnected from all sources of electricity by means of one disconnect switch located near the incinerator (see paragraph 3.14.1.1).

5.2 There should be an emergency stop switch located outside the compartment which stops all power to the equipment. The emergency stop switch should also be able to stop all power to the fuel pumps. If the incinerator is equipped with a flue gas fan, the fan should be capable of being restarted independently of the other equipment on the incinerator.

5.3 The control equipment should be so designed that any failure of the following equipment will prevent continued operations and cause the fuel supply to be cut off.

5.3.1 Safety thermostat/draft failure

5.3.1.1 A flue gas temperature controller, with a sensor placed in the flue gas duct, should be provided that will shut down the burner if the flue gas temperature exceeds the temperature set by the manufacturer for the specific design.

5.3.1.2 A combustion temperature controller, with a sensor placed in the combustion chamber, should be provided that will shut down the burner if the combustion chamber temperature exceeds the maximum temperature.

5.3.1.3 A negative pressure switch should be provided to monitor the draft and the negative pressure in the combustion chamber. The purpose of this negative pressure switch is to ensure that there is sufficient draft/negative pressure in the incinerator during operations. The circuit to the program relay for the burner will be opened and an alarm activated before the negative pressure rises to atmospheric pressure.

5.3.2 *Flame failure/fuel oil pressure*

5.3.2.1 The incinerator should have a flame safeguard control consisting of a flame sensing element and associated equipment for shut down of the unit in the event of ignition failure and flame failure during the firing cycle. The flame safeguard control should be so designed that the failure of any component will cause a safety shut down.

5.3.2.2 The flame safeguard control should be capable of closing the fuel valves in not more than 4 s after a flame failure.

5.3.2.3 The flame safeguard control should provide a trial-for-ignition period of not more than 10 s during which fuel may be supplied to establish flame. If flame is not established within 10 s, the fuel supply to the burners should be immediately shut off automatically.

5.3.2.4 Whenever the flame safeguard control has operated because of failure of ignition, flame failure, or failure of any component, only one automatic restart may be provided. If this is not successful then manual reset of the flame safeguard control should be required for restart.

5.3.2.5 Flame safeguard controls of the thermostatic type, such as stack switches and pyrostats operated by means of an open bimetallic helix, are prohibited.

5.3.2.6 If fuel oil pressure drops below that set by the manufacturer, a failure and lock out of the program relay should result. This also applies to an oil residue (sludge) burner (applies where pressure is important for the combustion process or a pump is not an integral part of the burner).

5.3.3 *Loss of power*

If there is a loss of power to the incinerator control/alarm panel (not remote alarm panel), the system should shut down.

5.4 Fuel supply

Two fuel control solenoid valves should be provided in series in the fuel supply line to each burner. On multiple burner units, a valve on the main fuel supply line and a valve at each burner will satisfy this requirement. The valves should be connected electrically in parallel so that both operate simultaneously.

5.5 Alarms

5.5.1 An outlet for an audible alarm should be provided for connection to a local alarm system or a central alarm system. When a failure occurs, a visible indicator should show what caused the failure (The indicator may cover more than one fault condition.).

5.5.2 The visible indicators should be designed so that, where failure is a safety related shutdown, manual reset is required.

5.6 After shutdown of the oil burner, provision should be made for the fire box to cool sufficiently (as an example, of how this may be accomplished, the exhaust fan or ejector could be designed to continue to operate. This would not apply in the case of an emergency manual trip).

6 OTHER REQUIREMENTS

6.1 Documentation

A complete instruction and maintenance manual with drawings, electric diagrams, spare parts list, etc. should be furnished with each incinerator.

6.2 Installation

All devices and components should, as fitted in the ship, be designed to operate when the ship is upright and when inclined at any angle of list up to and including 15° either way under static conditions and 22.5° under dynamic conditions (rolling) either way and simultaneously inclined dynamically (pitching) 7.5° by bow or stern.

6.3 Incinerator

6.3.1 Incinerators are to be fitted with an energy source with sufficient energy to ensure a safe ignition and complete combustion. The combustion is to take place at sufficient negative pressure in the combustion chamber(s) to ensure no gases or smoke leaking out to the surrounding areas (see paragraph 5.3.1.3).

6.3.2 A driptray is to be fitted under each burner and under any pumps, strainers, etc. that require occasional examination.

7 TESTS

7.1 Prototype tests

An operating test for the prototype of each design should be conducted, with a test report completed indicating results of all tests. The tests should be conducted to ensure that all of the control components have been properly installed and that all parts of the incinerator, including controls and safety devices, are in satisfactory operating condition. Tests should include those described in paragraph 7.3 below.

7.2 Factory tests

For each unit, if preassembled, an operating test should be conducted to ensure that all of the control components have been properly installed and that all parts of the incinerator, including controls and safety devices, are in satisfactory operating condition. Tests should include those described in paragraph 7.3 below.

7.3 Installation tests

An operating test after installation should be conducted to ensure that all of the control components have been properly installed and that all parts of the incinerator, including controls and safety devices, are in satisfactory operating condition. The requirements for prepurge and time between restarts referred to in paragraph 4.1 should be verified at the time of the installation test.

7.3.1 Flame safeguard. The operation of the flame safeguard system should be verified by causing flame and ignition failures. Operation of the audible alarm (where applicable) and visible indicator should be verified. The shutdown times should be verified.

7.3.2 Limit controls. Shutdown due to the operation of the limit controls should be verified.

7.3.2.1 Oil pressure limit control. The lowering of the fuel oil pressure below the value required for safe combustion should initiate a safety shutdown.

7.3.2.2 Other interlocks. Other interlocks provided should be tested for proper operation as specified by the unit manufacturer.

7.3.3 Combustion controls. The combustion controls should be stable and operate smoothly.

7.3.4 Programming controls. Programming controls should be verified as controlling and cycling the unit in the intended manner. Proper prepurge, ignition, postpurge, and modulation should be verified. A stopwatch should be used for verifying intervals of time.

7.3.5 Fuel supply controls. The satisfactory operation of the two fuel control solenoid valves for all conditions of operation and shutdown should be verified.

7.3.6. Low voltage test. A low voltage test should be conducted on the incinerator unit to satisfactorily demonstrate that the fuel supply to the burners will be automatically shut off before an incinerator malfunction results from the reduced voltage.

7.3.7 Switches. All switches should be tested to verify proper operation.

8 CERTIFICATION

Manufacturer's certification that an incinerator has been constructed in accordance with this standard should be provided (by letter, certificate, or in the instruction manual).

9 MARKING

Each incinerator should be permanently marked, indicating:

.1 manufacturer's name or trademark

.2 style, type, model or other manufacturer's designation for the incinerator.

.3 capacity – to be indicated by net designed heat release of the incinerator in heat units per timed period; for example, British Thermal Units per hour, megajoules per hour, kilocalories per hour.

10 QUALITY ASSURANCE

Incinerators should be designed, manufactured and tested in a manner that ensures they meet the requirements of this Specification.

* * *

ANNEX 1

EMISSION STANDARD FOR SHIPBOARD INCINERATORS WITH CAPACITIES OF UP TO 4,000 kW

Minimum information to be provided

1 An IMO type approval certificate should be required for each shipboard incinerator. In order to obtain such certificate, the incinerator should be designed and built to an IMO approved standard. Each model should go through a specified type approval test operation at the factory or an approved test facility, and under the responsibility of the Administration.

2 Type approval tests should include measuring of the following parameters:

Max capacity	:	kW or kcal/h kg/h of specified waste kg/h per burner
Pilot fuel consumption	:	kg/h per burner
O_2 average in combustion chamber/zone	:	%
CO average in flue gas	:	mg/MJ
Soot number average	:	Bacharach or ringelman Scale
Combustion chamber flue gas outlet temperature average	:	°C
Amount of unburned components in ashes	:	% by weight

3 **Duration of test operation**

For oil residue (sludge) burning	:	6-8 hours
For solid waste burning	:	6-8 hours

4 **Fuel/waste specification for type approval test (% by weight)**

Oil residue (sludge) consisting of:	75% oil residue (sludge) from heavy fuel oil 5% waste lubricating oil 20% emulsified water
Solid waste (class 2) consisting of:	50% Food Waste 50% rubbish Containing Approx. 30% paper, " 40% cardboard, " 10% rags, " 20% plastic The mixture will have up to 50% moisture and 7% incombustible solids.

Classes of waste

Reference: Waste classification from Incinerator Institute of America (information for type approval tests only).

Class 2 Refuse, consisting of approximately even mixture of rubbish and garbage by weight. This type waste is common to passenger ships occupancy, consisting of up to 50% moisture, 7% incombustible solids and has a heating value of about 10,000 kJ/kg as fired.

Calorific values	**kJ/Kg**	**kcal/kg**
Vegetable and putrescibles	5,700	1,360
Paper	14,300	3,415
Rag	15,500	3,700
Plastics	36,000	8,600
Oil sludge	36,000	8,600
Sewage sludge	3,000	716

Densities	**kg/m^3**
Paper (loose)	50
Refuse (75% wet)	720
Dry rubbish	110
Scrap wood	190
Wood sawdust	220

Density of loose general waste generated on board ship will be about 130 kg/m^3.

5 **Required emission standards to be verified by type approval test**

O_2 in combustion chamber	6 – 12%
CO in flue gas maximum average	200 mg/MJ
Soot number maximum average	BACHARACH 3 or RINGELMAN 1 (A higher soot number is acceptable only during very short periods such as starting up.)
Unburned components in ash residues	Max 10% by Weight
Combustion chamber flue gas outlet temperature range	850 – 1200 °C

Flue gas outlet temperature and O_2 content should be measured during the combustion period, and not during the preheating or cooling periods. For a batch loaded incinerator, it is acceptable to carry out the type approval test by means of a single batch.

A high temperature in the actual combustion chamber/zone is an absolute requirement in order to obtain a complete and smoke free incineration, including that of plastic and other synthetic materials while minimizing dioxins, VOC (Volatile Organic Compounds), and emissions.

6 Fuel related emission

6.1 Even with good incineration technology the emission from an incinerator will depend on the type of material being incinerated. If for instance a vessel has bunkered a fuel with high sulphur content, then oil residue (sludge) from separators which is burned in the incinerator will lead to emission of SO_X. But again, the SO_X emission from the incinerator would only amount to less than one per cent of the SO_X discharged with the exhaust from main and auxiliary engines.

6.2 Principal organic constituents (POC) cannot be measured on a continuous basis. Specifically, there are no instruments with provision for continuous time telemetry that measures POC, HCl, or waste destruction efficiency, to date. These measurements can only be made using grab sample approaches where the sample is returned to a laboratory for analysis. In the case of organic constituents (undestroyed wastes), the laboratory work requires considerable time to complete. Thus, continuous emission control can only be assured by secondary measurements.

6.3 Onboard operation/emission control

6.3.1 For a shipboard incinerator with IMO type approval, emission control/monitoring should be limited to the following:

.1 control/monitor O_2 content in combustion chamber (spot checks only; an O_2 content analyser is not required to be kept on board).

.2 control/monitor temperature in combustion chamber flue gas outlet.

6.3.2 By continuous (auto) control of the incineration process, ensure that the above-mentioned two parameters are kept within the prescribed limits. This mode of operation will ensure that particulates and ash residue contain only traces of organic constituents.

7 Passenger/cruise ships with incinerator installations having a total capacity of more than 1,500 kW

7.1 On board this type of vessel, the following conditions will probably exist:

.1 Generation of huge amounts of burnable waste with a high content of plastic and synthetic materials.

.2 Incinerating plant with a high capacity operating continuously over long periods.

.3 This type of vessel will often be operating in very sensitive coastal areas.

7.2 In view of the fuel related emission from a plant with such a high capacity, installation of a flue gas sea water scrubber should be considered. This installation can perform an efficient after-cleaning of the flue gases, thus minimizing the content of:

HCl
SO_X
particulate matter.

ANNEX 2

**FIRE PROTECTION REQUIREMENTS
FOR INCINERATORS AND WASTE STOWAGE SPACES**

For the purpose of construction, arrangement and insulation, incinerator spaces and waste stowage spaces should be treated as category A machinery spaces (SOLAS II-2/3.31) and service spaces (SOLAS II-2/3.45), respectively. To minimize the fire hazards these spaces represent, the following SOLAS requirements in chapter II-2 should be applied:

1 For passenger ships carrying more than 36 passengers:

.1 regulation 9.2.2.3.2.2(12) should apply to incinerator and combined incinerator/waste storage spaces, and the flue uptakes from such spaces; and

.2 regulation 9.2.2.3.2.2(13) should apply to waste storage spaces and garbage chutes connected thereto.

2 For all other ships including passenger ships carrying not more than 36 passengers:

.1 regulation 9.2.3.3.2.2(6) should apply to incinerator and combined incinerator/waste spaces, and the flue uptakes from such spaces; and

.2 regulation 9.2.3.3.2.2(9) should apply to waste storage spaces and garbage chutes connected thereto.

3 Incinerators and waste stowage spaces located on weather decks (SOLAS II-2/3.50) need not meet the above requirements but should be located:

.1 as far aft on the vessel as possible;

.2 not less than 3 m from entrances, air inlets and openings to accommodations, service spaces and control stations;

.3 not less than 5 m measured horizontally from the nearest hazardous area, or vent outlet from a hazardous area; and

.4 not less than 2 m should separate the incinerator and the waste material storage area, unless physically separated by a structural fire barrier;

4 A fixed fire detection and fire-extinguishing system should be installed in enclosed spaces containing incinerators, in combined incinerator/waste storage spaces, and in any waste storage space in accordance with the following table:

	Automatic sprinkler system	Fixed fire-extinguishing system	Fixed fire detection system
Combined incinerator and waste storage space	X		
Incinerator space		X	X
Waste storage space	X		

5 Where an incinerator or waste storage space is located on weather decks it should be accessible with two means of fire extinguishment; either fire hoses, semi-portable fire extinguishers, fire monitors or combination of any two of these extinguishing devices. A fixed fire-extinguishing system is acceptable as one means of extinguishment.

6 Flue uptake piping/ducting should be led independently to an appropriate terminus via a continuous funnel or trunk.

ANNEX 3

INCINERATORS INTEGRATED WITH HEAT RECOVERY UNITS

1 The flue gas system, for incinerators where the flue gas is led through a heat recovery device, should be designed so that the incinerator can continue operation with the economizer coils dry. This may be accomplished with bypass dampers if needed.

2 The incinerator unit should be equipped with a visual and an audible alarm in case of loss of feed-water.

3 The gas-side of the heat recovery device should have equipment for proper cleaning. Sufficient access should be provided for adequate inspection of external heating surfaces.

ANNEX 4

FLUE GAS TEMPERATURE

When deciding upon the type of incinerator, consideration should be given as to what the flue gas temperature will be. The flue gas temperature can be a determining factor in the selection of materials for fabricating the stack. Special high temperature material may be required for use in fabricating the stack when the flue gas temperatures exceed 430°C.

ANNEX 5

FORM OF IMO TYPE APPROVAL CERTIFICATE FOR SHIPBOARD INCINERATORS WITH CAPACITIES OF UP TO 4,000 KW

CERTIFICATE OF SHIPBOARD INCINERATOR

NAME OF ADMINISTRATION

BADGE
OR
CYPHER

This is to certify that the shipboard incinerator listed has been examined and tested in accordance with the *Standard for Shipboard Incinerators for disposing of ship-generated waste*, as amended by resolution MEPC.244(66), and as required by regulation 16.6.1 of MARPOL Annex VI.

Incinerator manufactured by .....
Style, type or model for the incinerator* .....

Max. capacity	.....	kW or kcal/h
	.....	kg/h of specified waste
	.....	kg/h per burner
O_2 Average In combustion chamber/zone	.....	%
CO Average in flue gas	.....	mg/MJ
Soot number average	.....	Bacharach or ringelman scale
Combustion chamber flue gas outlet temperature average	.....	°C
Amount of unburned components in ashes	.....	% by weight

A copy of this certificate should be carried on board a vessel fitted with this equipment at all times.

Signed .....
Official stamp Administration of .....
.....
Dated this ..... day of.....

* Delete as appropriate

***

ANNEX 5

RESOLUTION MEPC.245(66)

Adopted on 4 April 2014

2014 GUIDELINES ON THE METHOD OF CALCULATION OF THE ATTAINED ENERGY EFFICIENCY DESIGN INDEX (EEDI) FOR NEW SHIPS

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee (the Committee) conferred upon it by international conventions for the prevention and control of marine pollution from ships,

RECALLING ALSO that, at its sixty-second session, the Committee adopted, by resolution MEPC.203(62), *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* (inclusion of regulations on energy efficiency for ships in MARPOL Annex VI),

NOTING that the amendments to MARPOL Annex VI adopted at its sixty-second session by resolution MEPC.203(62), including a new chapter 4 for regulations on energy efficiency for ships in Annex VI, entered into force on 1 January 2013,

NOTING ALSO that regulation 20 (Attained EEDI) of MARPOL Annex VI, as amended, requires that the Energy Efficiency Design Index shall be calculated taking into account the guidelines developed by the Organization,

NOTING FURTHER the *2012 Guidelines on the method of calculation of the attained Energy Efficiency Design Index (EEDI) for new ships*, adopted at its sixty-third session by resolution MEPC.212(63), and the amendments thereto, adopted at its sixty-fourth session by resolution MEPC.224(64),

RECOGNIZING that the amendments to MARPOL Annex VI require the adoption of relevant guidelines for the smooth and uniform implementation of the regulations and to provide sufficient lead time for industry to prepare,

HAVING CONSIDERED, at its sixty-sixth session, the *2014 Guidelines on the method of calculation of the attained Energy Efficiency Design Index (EEDI) for new ships*,

1. ADOPTS the *2014 Guidelines on the method of calculation of the attained Energy Efficiency Design Index (EEDI) for new ships*, as set out in the annex to the present resolution;

2. INVITES Administrations to take the annexed Guidelines into account when developing and enacting national laws which give force to and implement provisions set forth in regulation 20 of MARPOL Annex VI, as amended;

3. REQUESTS the Parties to MARPOL Annex VI and other Member Governments to bring the annexed Guidelines related to the Energy Efficiency Design Index (EEDI) to the attention of shipowners, ship operators, shipbuilders, ship designers and any other interested parties;

4. AGREES to keep these Guidelines under review in the light of experience gained with their implementation;

5. SUPERSEDES the *2012 Guidelines on the method of calculation of the attained Energy Efficiency Design Index (EEDI) for new ships* adopted by resolution MEPC.212(63), as amended by resolution MEPC.224(64).

ANNEX

2014 GUIDELINES ON THE METHOD OF CALCULATION OF THE ATTAINED ENERGY EFFICIENCY DESIGN INDEX (EEDI) FOR NEW SHIPS

CONTENTS

1 Definitions

1.1 MARPOL means the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocols of 1978 and 1997relating thereto, as amended.

1.2 For the purpose of these Guidelines, the definitions in chapter 4 of MARPOL Annex VI, as amended, apply.

2 Energy Efficiency Design Index (EEDI)

The attained new ship Energy Efficiency Design Index (EEDI) is a measure of ships' energy efficiency (g/t · nm) and calculated by the following formula:

$$\frac{\left(\prod_{j=1}^{n} f_j\right)\left(\sum_{i=1}^{nME} P_{ME(i)} \cdot C_{FME(i)} \cdot SFC_{ME(i)}\right) + \left(P_{AE} \cdot C_{FAE} \cdot SFC_{AE}\,*\right) + \left(\left(\prod_{j=1}^{n} f_j \cdot \sum_{i=1}^{nPTI} P_{PTI(i)} - \sum_{i=1}^{neff} f_{eff(i)} \cdot P_{AEeff(i)}\right) C_{FAE} \cdot SFC_{AE}\right) - \left(\sum_{i=1}^{neff} f_{eff(i)} \cdot P_{eff(i)} \cdot C_{FME} \cdot SFC_{ME}\,**\right)}{f_i \cdot f_c \cdot f_l \cdot Capacity \cdot f_w \cdot V_{ref}}$$

* If part of the Normal Maximum Sea Load is provided by shaft generators, SFC_{ME} and C_{FME} may – for that part of the power – be used instead of SFC_{AE} and C_{FAE}

** In case of $P_{PTI(i)}>0$, the average weighted value of (SFC_{ME} · C_{FME}) and (SFC_{AE} · C_{FAE}) to be used for calculation of P_{eff}

Note: This formula may not be applicable to a ship having diesel-electric propulsion, turbine propulsion or hybrid propulsion system, except for cruise passenger ships and LNG carriers.

Where:

.1 C_F is a non-dimensional conversion factor between fuel consumption measured in g and CO_2 emission also measured in g based on carbon content. The subscripts $_{ME(i)}$ and $_{AE(i)}$ refer to the main and auxiliary engine(s) respectively. C_F corresponds to the fuel used when determining *SFC* listed in the applicable test report included in a Technical File as defined in paragraph 1.3.15 of NO_X Technical Code ("test report included in a NO_X technical file" hereafter). The value of C_F is as follows:

Type of fuel	Reference	Carbon content	C_F (t-CO_2/t-Fuel)
1 Diesel/Gas Oil	ISO 8217 Grades DMX through DMB	0.8744	3.206
2 Light Fuel Oil (LFO)	ISO 8217 Grades RMA through RMD	0.8594	3.151
3 Heavy Fuel Oil (HFO)	ISO 8217 Grades RME through RMK	0.8493	3.114
4 Liquefied Petroleum Gas (LPG)	Propane	0.8182	3.000
	Butane	0.8264	3.030
5 Liquefied Natural Gas (LNG)		0.7500	2.750
6 Methanol		0.3750	1.375
7 Ethanol		0.5217	1.913

In case of a ship equipped with a dual-fuel main or auxiliary engine, the C_F-factor for gas fuel and the C_F-factor for fuel oil should apply and be multiplied with the specific fuel oil consumption of each fuel at the relevant EEDI load point.

Example:

$C_{F,Gas}$ = 2.750
$C_{F-Pilotfuel}$ = 3.114
$SFC_{ME\ Pilotfuel}$ = 6 g/kWh
$SFC_{ME\ Gas}$ = 160 g/kWh

EEDI = (P_{ME} x ($C_{F\ Pilotfuel}$ x $SFC_{ME\ Pilotfuel}$ + $C_{F\ Gas}$ x $SFC_{ME\ Gas}$)) + …
EEDI = (P_{ME} x (3.114 x 6 + *2.750 x 160*)) + …

Calculation examples are set out in appendix 4.

.2 V_{ref} is the ship speed, measured in nautical miles per hour (knot), on deep water in the condition corresponding to the *capacity* as defined in paragraphs 2.3.1 and 2.3.3 (in case of passenger ships and cruise passenger ships, this condition should be summer load draught as provided in paragraph 2.4) at the shaft power of the engine(s) as defined in paragraph 2.5 and assuming the weather is calm with no wind and no waves.

.3 *Capacity* is defined as follows:

.1 For bulk carriers, tankers, gas carriers, LNG carriers, ro-ro cargo ships (vehicle carriers), ro-ro cargo ships, ro-ro passenger ships, general cargo ships, refrigerated cargo carrier and combination carriers, deadweight should be used as *capacity*.

.2 For passenger ships and cruise passenger ships, gross tonnage in accordance with the International Convention of Tonnage Measurement of Ships 1969, annex I, regulation 3, should be used as *capacity*.

.3 For containerships, 70% of the deadweight (DWT) should be used as *capacity*. EEDI values for containerships are calculated as follows:

.1 attained EEDI is calculated in accordance with the EEDI formula using 70% deadweight for *capacity*.

.2 estimated index value in the Guidelines for calculation of the reference line is calculated using 70% deadweight as:

$$Estimated\ \ Index\ Value = 3.1144 \cdot \frac{190 \cdot \sum_{i=1}^{NME} P_{MEi} + 215 \cdot P_{AE}}{70\%\mathrm{DWT} \cdot V_{ref}}$$

.3 parameters a and c for containerships in table 2 of regulation 21 of MARPOL Annex VI are determined by plotting the estimated index value against 100% deadweight i.e. a = 174.22 and c=0.201 were determined.

.4 required EEDI for a new containership is calculated using 100% deadweight as:

Required EEDI = (1-X/100) · a · 100% deadweight $^{-c}$

Where X is the reduction factor (in percentage) in accordance with table 1 in regulation 21 of MARPOL Annex VI relating to the applicable phase and size of new containership.

.4 *Deadweight* means the difference in tonnes between the displacement of a ship in water of relative density of 1,025 kg/m^3 at the summer load draught and the lightweight of the ship. The summer load draught should be taken as the maximum summer draught as certified in the stability booklet approved by the Administration or an organization recognized by it.

.5 *P* is the power of the main and auxiliary engines, measured in kW. The subscripts $_{ME(i)}$ and $_{AE(i)}$ refer to the main and auxiliary engine(s), respectively. The summation on *i* is for all engines with the number of engines ($_{nME}$) (see diagram in appendix 1).

.1 $P_{ME(i)}$ is 75% of the rated installed power (MCR*) for each main engine (*i*).

For LNG carriers having diesel electric propulsion system, $P_{ME(i)}$ should be calculated by the following formula:

$$P_{ME(i)} = 0.83 \times \frac{MPP_{Motor(i)}}{\eta_{(i)}}$$

Where:

$MPP_{Motor(i)}$ is the rated output of motor specified in the certified document.

$\eta_{(i)}$ is to be taken as the product of electrical efficiency of generator, transformer, converter, and motor, taking into consideration the weighted average as necessary.

The electrical efficiency, $\eta_{(i)}$, should be taken as 91.3% for the purpose of calculating attained EEDI. Alternatively, if the value more than 91.3% is to be applied, the $\eta_{(i)}$ should be obtained by measurement and verified by method approved by the verifier.

* The value of MCR specified on the EIAPP certificate should be used for calculation. If the main engines are not required to have an EIAPP certificate, the MCR on the nameplate should be used.

For LNG carriers having steam turbine propulsion systems, $P_{ME(i)}$ is 83% of the rated installed power ($MCR_{SteamTurbine}$) for each steam turbine$_{(i)}$.

The influence of additional shaft power take off or shaft power take in is defined in the following paragraphs.

.2 **Shaft generator**

In case where shaft generator(s) are installed, $P_{PTO(i)}$ is 75% of the rated electrical output power of each shaft generator. In case that shaft generator(s) are installed to steam turbine, $P_{PTO(i)}$ is 83% of the rated electrical output power and the factor of 0.75 should be replaced to 0.83.

For calculation of the effect of shaft generators two options are available:

Option 1:

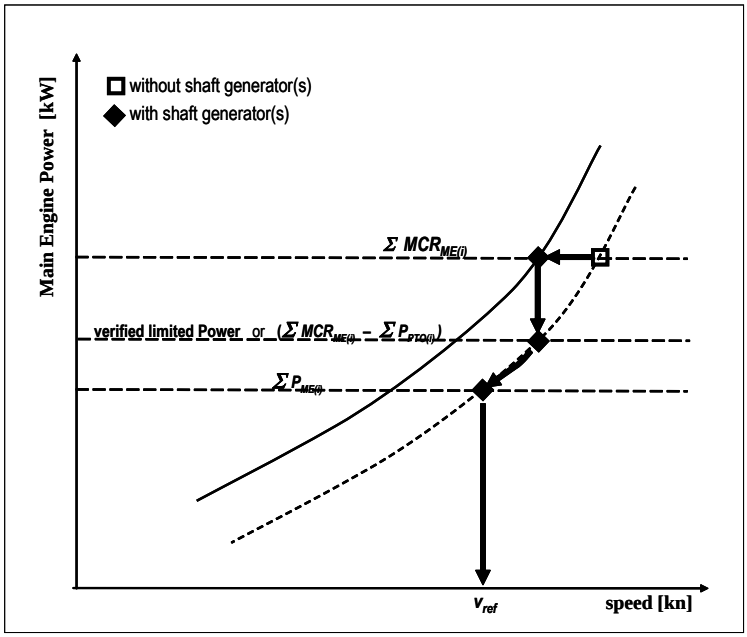
.1 The maximum allowable deduction for the calculation of $\Sigma P_{ME(i)}$ is to be no more than P_{AE} as defined in paragraph 2.5.6. For this case, $\Sigma P_{ME(i)}$ is calculated as:

$$\sum_{i=1}^{nME} P_{ME(i)} = 0.75 \times \left(\sum MCR_{ME(i)} - \sum P_{PTO(i)} \right) \quad with \;\; 0.75 \times \sum P_{PTO(i)} \le P_{AE}$$

or

Option 2:

.2 Where an engine is installed with a higher rated power output than that which the propulsion system is limited to by verified technical means, then the value of $\Sigma P_{ME(i)}$ is 75% of that limited power for determining the reference speed, V_{ref} and for EEDI calculation. The following figure gives guidance for determination of $\Sigma P_{ME(i)}$:



.3 **Shaft motor**

In case where shaft motor(s) are installed, $P_{PTI(i)}$ is 75% of the rated power consumption of each shaft motor divided by the weighted average efficiency of the generator(s), as follows:

$$\sum P_{PTI(i)} = \frac{\sum \left(0.75 \cdot P_{SM,\max(i)}\right)}{\eta_{\overline{Gen}}}$$

Where:

$P_{SM,\max(i)}$ is the rated power consumption of each shaft motor

$\eta_{\overline{Gen}}$ is the weighted average efficiency of the generator(s)

In case that shaft motor(s) are installed to steam turbine, $P_{PTI(i)}$ is 83% of the rated power consumption and the factor of 0.75 should be replaced to 0.83.

The propulsion power at which V_{ref} is measured, is:

$$\sum P_{ME(i)} + \sum P_{PTI(i),Shaft}$$

Where:

$$\sum P_{PTI(i),Shaft} = \sum \left(0.75 \cdot P_{SM,\max(i)} \cdot \eta_{PTI(i)}\right)$$

$\eta_{PTI(i)}$ is the efficiency of each shaft motor installed

Where the total propulsion power as defined above is higher than 75% of the power the propulsion system is limited to by verified technical means, then 75% of the limited power is to be

used as the total propulsion power for determining the reference speed, V_{ref} and for EEDI calculation.

In case of combined PTI/PTO, the normal operational mode at sea will determine which of these to be used in the calculation.

Note: The shaft motor's chain efficiency may be taken into consideration to account for the energy losses in the equipment from the switchboard to the shaft motor, if the chain efficiency of the shaft motor is given in a verified document.

.4 $P_{eff(i)}$ is the output of the innovative mechanical energy efficient technology for propulsion at 75% main engine power.

Mechanical recovered waste energy directly coupled to shafts need not be measured, since the effect of the technology is directly reflected in the V_{ref}.

In case of a ship equipped with a number of engines, the C_F and *SFC* should be the power weighted average of all the main engines.

In case of a ship equipped with dual-fuel engine(s), the C_F and *SFC* should be calculated in accordance with paragraphs 2.1 and 2.7.

.5 $P_{AEeff\ (i)}$ is the auxiliary power reduction due to innovative electrical energy efficient technology measured at $P_{ME(i)}$.

.6 P_{AE} is the required auxiliary engine power to supply normal maximum sea load including necessary power for propulsion machinery/systems and accommodation, e.g. main engine pumps, navigational systems and equipment and living on board, but excluding the power not for propulsion machinery/systems, e.g. thrusters, cargo pumps, cargo gear, ballast pumps, maintaining cargo, e.g. reefers and cargo hold fans, in the condition where the ship engaged in voyage at the speed (V_{ref}) under the condition as mentioned in paragraph 2.2.

.1 For ships with a total propulsion power ($\sum MCR_{ME(i)} + \frac{\sum P_{PTI(i)}}{0.75}$) of 10,000 kW or above, P_{AE} is defined as:

$$P_{AE\ (\Sigma MCR_{ME(i)} \geq 10,000kW)} = \left(0.025 \times \left(\sum_{i=1}^{nME} MCR_{ME(i)} + \frac{\sum_{i=1}^{nPTI} P_{PTI(i)}}{0.75} \right) \right) + 250$$

.2 For ships with a total propulsion power ($\sum MCR_{ME(i)} + \frac{\sum P_{PTI(i)}}{0.75}$) below 10,000 kW, P_{AE} is defined as:

$$P_{AE\ (\Sigma MCR_{ME(i)} < 10,000kW)} = \left(0.05 \times \left(\sum_{i=1}^{nME} MCR_{ME(i)} + \frac{\sum_{i=1}^{nPTI} P_{PTI(i)}}{0.75} \right) \right)$$

.3 For LNG carriers with a reliquiefaction system or compressor(s), designed to be used in normal operation and essential to maintain the LNG cargo tank pressure below the maximum allowable relief valve setting of a cargo tank in normal operation, the following terms should be added to above P_{AE} formula in accordance with 1, 2 or 3 as below:

.1 For ships having re-liquefaction system:

$$+ CargoTankCapacity_{LNG} \times BOR \times COP_{reliquefy} \times R_{reliquefy}$$

Where:

$CargoTankCapacity_{LNG}$ is the LNG Cargo Tank Capacity in m^3.

BOR is the design rate of boil-off gas of entire ship per day, which is specified in the specification of the building contract.

$COP_{reliquefy}$ is the coefficient of design power performance for reliquefying boil-off gas per unit volume, as follows.

$$COP_{reliquefy} = \frac{425\,(kg/m^3) \times 511\,(kJ/kg)}{24\,(h) \times 3600\,(\sec) \times COP_{cooling}}$$

$COP_{cooling}$ is the coefficient of design performance of reliquefaction and 0.166 should be used. Another value calculated by the manufacturer and verified by the Administration or an organization recognized by the Administration may be used.

$R_{reliquefy}$ is the ratio of boil-off gas (BOG) to be re-liquefied to entire BOG, calculated as follows.

$$R_{reliquefy} = \frac{BOG_{reliquefy}}{BOG_{total}}$$

.2 For LNG carriers with direct diesel driven propulsion system or diesel electric propulsion system, having compressor(s) which are used for supplying high-pressured gas derived from boil-off gas to the installed engines (typically intended for 2-stroke dual fuel engines):

$$+ COP_{comp} \times \sum_{i=1}^{nME} SFC_{ME(i),gasmode} \times \frac{P_{ME(i)}}{1000}$$

Where:

COP_{comp} is the design power performance of compressor and 0.33 (kWh/kg) should be used. Another value calculated by the manufacturer and verified by the Administration or an organization recognized by the Administration may be used.

.3 For LNG carriers with direct diesel driven propulsion system or diesel electric propulsion system, having compressor(s) which are used for supplying low-pressured gas derived from boil-off gas to the installed engines (typically intended for 4-stroke dual fuel engines):

$$+0.02\times\sum_{i=1}^{nME}P_{ME(i)}$$ [1]

For LNG carriers having diesel electric propulsion system, $MPP_{Motor(i)}$ should be used instead $MCR_{ME(i)}$ for P_{AE} calculation.

For LNG carriers having steam turbine propulsion system and of which electric power is primarily supplied by turbine generator closely integrated into the steam and feed water systems, P_{AE} may be treated as 0(zero) instead of taking into account electric load in calculating $SFC_{SteamTurbine}$.

.4 For ship where the P_{AE} value calculated by paragraphs 2.5.6.1 to 2.5.6.3 is significantly different from the total power used at normal seagoing, e.g. in cases of passenger ships (see NOTE under the formula of EEDI), the P_{AE} value should be estimated by the consumed electric power (excluding propulsion) in conditions when the ship is engaged in a voyage at reference speed (V_{ref}) as given in the electric power table[2], divided by the average efficiency of the generator(s) weighted by power (see appendix 2).

.6 V_{ref}, *Capacity* and *P* should be consistent with each other. As for ships having diesel electric or steam turbine propulsion systems, V_{ref} is the relevant speed at 83% of MPP_{Motor} or $MCR_{SteamTubine}$ respectively.

.7 *SFC* is the certified specific fuel consumption, measured in g/kWh, of the engines or steam turbines.

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[1] With regard to the factor of 0.02, it is assumed that the additional energy needed to compress BOG for supplying to a 4-stroke dual fuel engine is approximately equal to 2% of P_{ME}, compared to the energy needed to compress BOG for supplying to a steam turbine.

[2] The electric power table should be examined and validated by the verifier. Where ambient conditions affect any electrical load in the power table, such as that for heating ventilation and air conditioning systems, the contractual ambient conditions leading to the maximum design electrical load of the installed system for the ship in general should apply.

.1 The subscripts $_{ME(i)}$ and $_{AE(i)}$ refer to the main and auxiliary engine(s), respectively. For engines certified to the E2 or E3 test cycles of the NO_X Technical Code 2008, the engine Specific Fuel Consumption ($SFC_{ME(i)}$) is that recorded in the test report included in a NO_X technical file for the engine(s) at 75% of MCR power of its torque rating. For engines certified to the D2 or C1 test cycles of the NO_X Technical Code 2008, the engine Specific Fuel Consumption ($SFC_{AE(i)}$) is that recorded on the test report included in a NO_X technical file at the engine(s) 50% of MCR power or torque rating. If gas fuel is used as primary fuel in accordance with paragraph 4.2.3 of the *Guidelines on survey and certification of the energy efficiency design index (EEDI)*, *SFC* in gas mode should be used. In case that installed engine(s) have no approved NO_X Technical File tested in gas mode, the *SFC* of gas mode should be submitted by the manufacturer and confirmed by the verifier.

The *SFC* should be corrected to the value corresponding to the ISO standard reference conditions using the standard lower calorific value of the fuel oil (42,700kJ/kg), referring to ISO 15550:2002 and ISO 3046-1:2002.

For ships where the P_{AE} value calculated by paragraphs 2.5.6.1 to 2.5.6.3 is significantly different from the total power used at normal seagoing, e.g. conventional passenger ships, the Specific Fuel Consumption (SFC_{AE}) of the auxiliary generators is that recorded in the test report included in a NO_X technical file for the engine(s) at 75% of MCR power of its torque rating.

SFC_{AE} is the power-weighted average among $SFC_{AE(i)}$ of the respective engines *i*.

For those engines which do not have a test report included in a NO_X technical file because its power is below 130 kW, the *SFC* specified by the manufacturer and endorsed by a competent authority should be used.

At the design stage, in case of unavailability of test report in the NO_X file, the *SFC* specified by the manufacturer and endorsed by a competent authority should be used.

For LNG driven engines of which *SFC* is measured in kJ/kWh should be corrected to the *SFC* value of g/kWh using the standard lower calorific value of the LNG (48,000 kJ/kg), referring to the 2006 IPCC Guidelines.

.2 The $SFC_{SteamTurbine}$ should be calculated by manufacturer and verified by the Administration or an organization recognized by the Administration as follows:

$$SFC_{SteamTurbine} = \frac{FuelConsumption}{\sum_{i=1}^{nME} P_{ME(i)}}$$

Where:

.1 *Fuel consumption* is fuel consumption of boiler per hour (g/h). For ships of which electric power is primarily supplied by Turbine Generator closely integrated into the steam and feed water systems, not only P_{ME} but also *electric loads* corresponding to paragraph 2.5.6 should be taken into account.

.2 The *SFC* should be corrected to the value of LNG using the standard lower calorific value of the LNG (48,000 kJ/kg) at SNAME Condition (condition standard; air temperature 24°C , inlet temperature of fan 38°C, sea water temperature 24°C).

.3 In this correction, the difference of the boiler efficiency based on lower calorific value between test fuel and LNG should be taken into account.

.8 f_j is a correction factor to account for ship specific design elements:

.1 The power correction factor, f_j, for ice-classed ships should be taken as the greater value of f_{j0} and $f_{j,min}$ as tabulated in table 1 but not greater than $f_{j,max}$ = 1.0.

For further information on approximate correspondence between ice classes, see HELCOM Recommendation 25/7[3].

Table 1: Correction factor for power f_j for ice-classed ships

Ship type	f_{j0}	$f_{j,min}$ depending on the ice class			
		IA Super	IA	IB	IC
Tanker	$\frac{0.308 L_{PP}^{1.920}}{\sum_{i=1}^{nME} P_{ME(i)}}$	$0.15 L_{PP}^{0.30}$	$0.27 L_{PP}^{0.21}$	$0.45 L_{PP}^{0.13}$	$0.70 L_{PP}^{0.06}$
Bulk carrier	$\frac{0.639 L_{PP}^{1.754}}{\sum_{i=1}^{nME} P_{ME(i)}}$	$0.47 L_{PP}^{0.09}$	$0.58 L_{PP}^{0.07}$	$0.73 L_{PP}^{0.04}$	$0.87 L_{PP}^{0.02}$
General cargo ship	$\frac{0.0227 \cdot L_{PP}^{2.483}}{\sum_{i=1}^{nME} P_{ME(i)}}$	$0.31 L_{PP}^{0.16}$	$0.43 L_{PP}^{0.12}$	$0.56 L_{PP}^{0.09}$	$0.67 L_{PP}^{0.07}$
Refrigerated cargo ships	$\frac{0.639 L_{PP}^{1.754}}{\sum_{i=1}^{nME} P_{ME(i)}}$	$0.47 L_{PP}^{0.09}$	$0.58 L_{PP}^{0.07}$	$0.73 L_{PP}^{0.04}$	$0.87 L_{PP}^{0.02}$

.2 The factor f_j, for shuttle tankers with propulsion redundancy should be f_j = 0.77. This correction factors applies to shuttle tankers with propulsion redundancy between 80,000 and 160,000 dwt. Shuttle tankers with propulsion redundancy are tankers used for loading of crude oil from offshore installations equipped with dual-engine and

[3] HELCOM Recommendation 25/7 may be found at http://www.helcom.fi.

twin-propellers need to meet the requirements for dynamic positioning and redundancy propulsion class notation.

.3 For ro-ro cargo and ro-ro passenger ships f_{jRoRo} is calculated as follows:

$$f_{jRoRo} = \frac{1}{F_{n_L}^{\alpha} \cdot \left(\frac{L_{pp}}{B_s}\right)^{\beta} \cdot \left(\frac{B_s}{d_s}\right)^{\gamma} \cdot \left(\frac{L_{pp}}{\nabla^{1/3}}\right)^{\delta}} \quad ; \quad \text{If } f_{jRoRo} > 1 \text{ then } f_j = 1$$

where the Froude number, F_{n_L}, is defined as:

$$F_{n_L} = \frac{0.5144 \cdot V_{ref}}{\sqrt{L_{pp} \cdot g}}$$

and the exponents α, β, γ and δ are defined as follows:

Ship type	Exponent:			
	α	β	γ	δ
Ro-ro cargo ship	2.00	0.50	0.75	1.00
Ro-ro passenger ship	2.50	0.75	0.75	1.00

.4 The factor f_j for general cargo ships is calculated as follows:

$$f_j = \frac{0.174}{Fn_{\nabla}{}^{2.3} \cdot C_b{}^{0.3}} \quad ; \quad \text{If } f_j > 1 \text{ then } f_j = 1$$

Where

$$Fn_{\nabla} = \frac{0.5144 \cdot V_{ref}}{\sqrt{g \cdot \nabla^{\frac{1}{3}}}} \quad ; \quad \text{If } Fn_{\nabla} > 0.6 \text{ then } Fn_{\nabla} = 0.6$$

and

$$C_b = \frac{\nabla}{L_{pp} \cdot B_s \cdot d_s}$$

.5 For other ship types, f_j should be taken as 1.0.

.9 f_w is a non-dimensional coefficient indicating the decrease of speed in representative sea conditions of wave height, wave frequency and wind speed (e.g. Beaufort Scale 6), and is determined as follows:

.1 for the attained EEDI calculated under regulations 20 and 21 of MARPOL Annex VI, f_w is 1.00;

.2 when f_w is calculated according to the subparagraph .2.1 or .2.2 below, the value for attained EEDI calculated by the formula in

paragraph 2 using the obtained f_w should be referred to as "*attained EEDI$_{weather}$*";

.1 f_w can be determined by conducting the ship specific simulation on its performance at representative sea conditions. The simulation methodology should be based on the Guidelines developed by the Organization[4] and the method and outcome for an individual ship should be verified by the Administration or an organization recognized by the Administration; and

.2 in cases where a simulation is not conducted, f_w should be taken from the "Standard f_w " table/curve. A "Standard f_w " table/curve is provided in the Guidelines[4] for each ship type defined in regulation 2 of MARPOL Annex VI, and expressed as a function of capacity (e.g. deadweight). The "Standard f_w " table/curve is based on data of actual speed reduction of as many existing ships as possible under the representative sea condition.

f_w and *attained EEDI$_{weather}$*, if calculated, with the representative sea conditions under which those values are determined, should be indicated in the EEDI Technical File to distinguish it from the attained EEDI calculated under regulations 20 and 21 of MARPOL Annex VI.

.10 $f_{eff(i)}$ is the availability factor of each innovative energy efficiency technology. $f_{eff(i)}$ for waste energy recovery system should be one (1.0)[5].

.11 f_i is the capacity factor for any technical/regulatory limitation on capacity, and should be assumed to be one (1.0) if no necessity of the factor is granted

.1 The capacity correction factor, f_i, for ice-classed ships should be taken as the lesser value of f_{i0} and $f_{i,max}$ as tabulated in Table 2, but not less than $f_{i,min}$ = 1.0. For further information on approximate correspondence between ice classes, see HELCOM Recommendation 25/7[6].

Table 2: Capacity correction factor f_i for ice-classed ships

Ship type	f_{i0}	$f_{i,max}$ depending on the ice class			
		IA Super	IA	IB	IC
Tanker	$\frac{0.00138 \cdot L_{PP}^{3.331}}{capacity}$	$2.10 L_{PP}^{-0.11}$	$1.71 L_{PP}^{-0.08}$	$1.47 L_{PP}^{-0.06}$	$1.27 L_{PP}^{-0.04}$
Bulk carrier	$\frac{0.00403 \cdot L_{PP}^{3.123}}{capacity}$	$2.10 L_{PP}^{-0.11}$	$1.80 L_{PP}^{-0.09}$	$1.54 L_{PP}^{-0.07}$	$1.31 L_{PP}^{-0.05}$

4 Refer to *Interim Guidelines for the calculation of the coefficient f_w for decrease in ship speed in a representative sea condition for trial use*, approved by the Organization and circulated by MEPC.1/Circ.796.

5 EEDI calculation should be based on the normal seagoing condition outside Emission Control Area designated under regulation 13.6 of MARPOL ANNEX VI.

6 HELCOM Recommendation 25/7 may be found at http://www.helcom.fi.

Ship type	f_{i0}	$f_{i,max}$ depending on the ice class			
		IA Super	IA	IB	IC
General cargo ship	$\frac{0.0377 \cdot L_{PP}^{2.625}}{capacity}$	$2.18 L_{PP}^{-0.11}$	$1.77 L_{PP}^{-0.08}$	$1.51 L_{PP}^{-0.06}$	$1.28 L_{PP}^{-0.04}$
Containership	$\frac{0.1033 \cdot L_{PP}^{2.329}}{capacity}$	$2.10 L_{PP}^{-0.11}$	$1.71 L_{PP}^{-0.08}$	$1.47 L_{PP}^{-0.06}$	$1.27 L_{PP}^{-0.04}$
Gas carrier	$\frac{0.0474 \cdot L_{PP}^{2.590}}{capacity}$	1.25	$2.10 L_{PP}^{-0.12}$	$1.60 L_{PP}^{-0.08}$	$1.25 L_{PP}^{-0.04}$

Note: Containership capacity is defined as 70% of the *DWT*.

.2 $f_{i\,VSE}$[7] for ship specific voluntary structural enhancement is expressed by the following formula:

$$f_{iVSE} = \frac{DWT_{referencedesign}}{DWT_{enhanceddesign}}$$

where:

$$DWT_{referencedesign} = \Delta_{ship} - lightweight_{referencedesign}$$

$$DWT_{enhanceddesign} = \Delta_{ship} - lightweight_{enhanceddesign}$$

For this calculation the same displacement (Δ) for reference and enhanced design should be taken.

DWT before enhancements ($DWT_{reference\ design}$) is the deadweight prior to application of the structural enhancements. DWT after enhancements ($DWT_{enhanced\ design}$) is the deadweight following the application of voluntary structural enhancement. A change of material (e.g. from aluminum alloy to steel) between reference design and enhanced design should not be allowed for the $f_{i\ VSE}$ calculation. A change in grade of the same material (e.g. in steel type, grades, properties and condition) should also not be allowed.

In each case, two sets of structural plans of the ship should be submitted to the verifier for assessment. One set for the ship without voluntary structural enhancement; the other set for the same ship with voluntary structural enhancement (alternatively, one set of structural plans of the reference design with annotations of voluntary structural enhancement should also be acceptable). Both sets of structural plans should comply with the applicable regulations for the ship type and intended trade.

.3 for bulk carriers and oil tankers, built in accordance with the Common Structural Rules (CSR) of the classification societies and assigned the class notation CSR, the following capacity correction factor f_{iCSR} should apply:

[7] Structural and/or additional class notations such as, but not limited to, "strengthened for discharge with grabs" and "strengthened bottom for loading/unloading aground", which result in a loss of deadweight of the ship, are also seen as examples of "voluntary structural enhancements".

$f_{iCSR} = 1 + (0.08 \cdot LWT_{CSR} / DWT_{CSR})$

Where DWT_{CSR} is the deadweight determined by paragraph 2.4 and LWT_{CSR} is the light weight of the ship.

.4 for other ship types, f_i should be taken as one (1.0).

.12 f_c is the cubic capacity correction factor and should be assumed to be one (1.0) if no necessity of the factor is granted.

.1 for chemical tankers, as defined in regulation 1.16.1 of MARPOL Annex II, the following cubic capacity correction factor f_c should apply:

$f_c = R^{-0.7} - 0.014$, where R is less than 0.98
or
$f_c = 1.000$, where R is 0.98 and above;

where: R is the capacity ratio of the deadweight of the ship (tonnes) as determined by paragraph 2.4 divided by the total cubic capacity of the cargo tanks of the ship (m^3).

.2 for gas carriers having direct diesel driven propulsion system constructed or adapted and used for the carriage in bulk of liquefied natural gas, the following cubic capacity correction factor f_{cLNG} should apply:

$f_{cLNG} = R^{-0.56}$

where: R is the capacity ratio of the deadweight of the ship (tonnes) as determined by paragraph 2.4 divided by the total cubic capacity of the cargo tanks of the ship (m^3).

Note: This factor is applicable to LNG carriers defined as gas carriers in regulation 2.26 of MARPOL Annex VI and should not be applied to LNG carriers defined in regulation 2.38 of MARPOL Annex VI.

.3 For ro-ro passenger ships having a DWT/GT-ratio of less than 0.25, the following cubic capacity correction factor, f_{cRoPax}, should apply:

$$f_{cRoPax} = \left(\frac{(DWT/GT)}{0.25} \right)^{-0.8}$$

Where DWT is the Capacity and GT is the gross tonnage in accordance with the International Convention of Tonnage Measurement of Ships 1969, annex I, regulation 3.

.13 *Length between perpendiculars*, L_{pp}, means 96% of the total length on a waterline at 85% of the least moulded depth measured from the top of the keel, or the length from the foreside of the stem to the axis of the rudder stock on that waterline, if that were greater. In ships designed with a rake

of keel the waterline on which this length is measured should be parallel to the designed waterline. L_{pp} should be measured in metres.

.14 f_l is the factor for general cargo ships equipped with cranes and other cargo-related gear to compensate in a loss of deadweight of the ship.

$f_l = f_{cranes} \cdot f_{sideloader} \cdot f_{roro}$

f_{cranes} = 1 If no cranes are present.
$f_{sideloader}$ = 1 If no side loaders are present.
f_{roro} = 1 If no ro-ro ramp is present.

Definition of f_{cranes}:

$$f_{cranes} = 1 + \frac{\sum_{n=1}^{n} \left(0.0519 \cdot SWL_n \cdot \mathrm{Re}\,ach_n + 32.11\right)}{Capacity}$$

where:

SWL = Safe Working Load, as specified by crane manufacturer in metric tonnes
Reach = Reach at which the Safe Working Load can be applied in metres
N = Number of cranes

For other cargo gear such as side loaders and ro-ro ramps, the factor should be defined as follows:

$$f_{sideloader} = \frac{Capacity_{No\ sideloaders}}{Capacity_{sideloaders}}$$

$$f_{RoRo} = \frac{Capacity_{No\ RoRo}}{Capacity_{RoRo}}$$

The weight of the side loaders and ro-ro ramps should be based on a direct calculation, in analogy to the calculations as made for factor f_{ivse}.

.15 Summer load line draught, d_s, is the vertical distance, in metres, from the moulded baseline at mid-length to the waterline corresponding to the summer freeboard draught to be assigned to the ship.

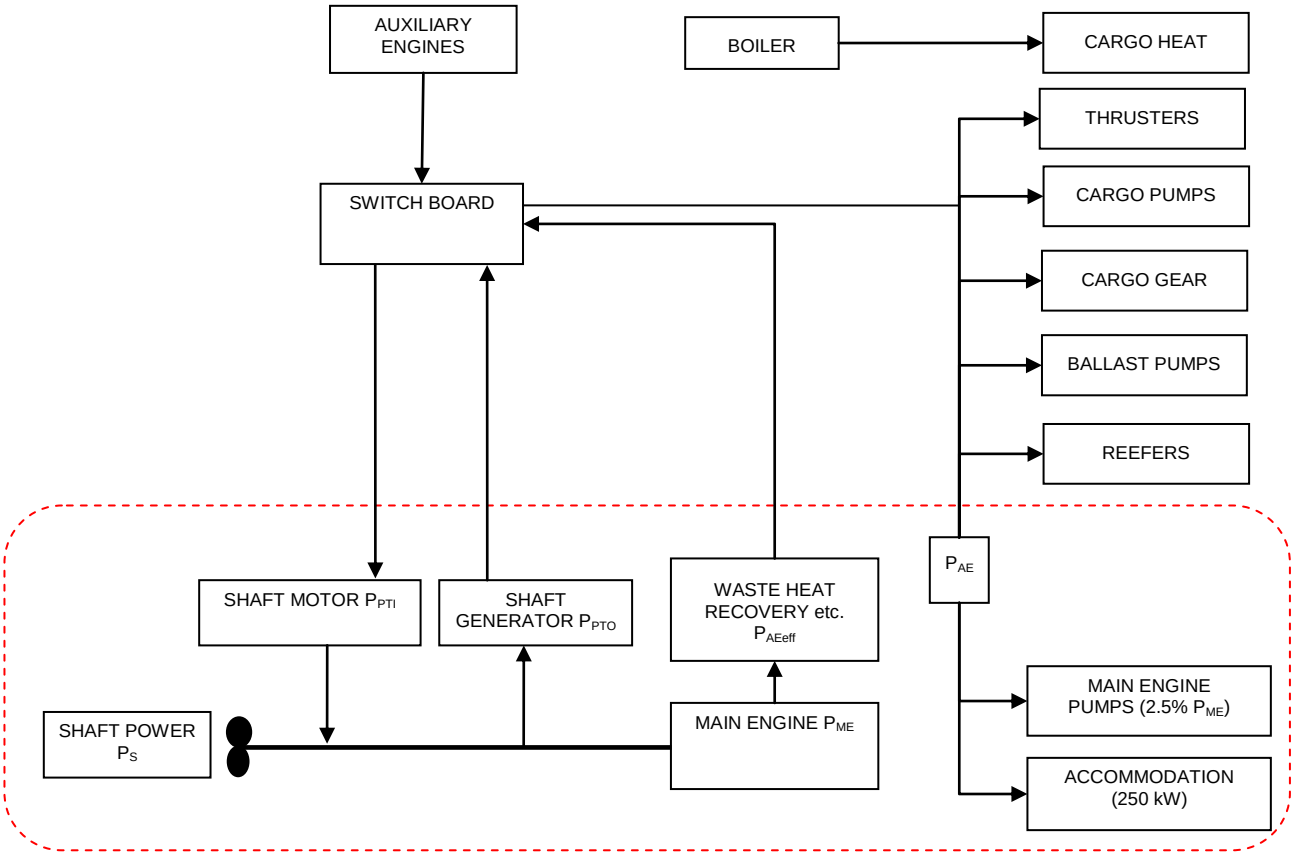
.16 Breadth, B_s, is the greatest moulded breadth of the ship, in metres, at or below the load line draught, d_s.

.17 Volumetric displacement, ∇, in cubic metres (m^3), is the volume of the moulded displacement of the ship, excluding appendages, in a ship with a metal shell, and is the volume of displacement to the outer surface of the hull in a ship with a shell of any other material, both taken at the summer load line draught, d_s, as stated in the approved stability booklet/loading manual.

.18 g is the gravitational acceleration, 9.81m/s^2.

APPENDIX 1

A GENERIC AND SIMPLIFIED MARINE POWER PLANT



Note 1: Mechanical recovered waste energy directly coupled to shafts need not be measured, since the effect of the technology is directly reflected in the V_{ref} .

Note 2: In case of combined PTI/PTO, the normal operational mode at sea will determine which of these to be used in the calculation.

APPENDIX 2

GUIDELINES FOR THE DEVELOPMENT OF ELECTRIC POWER TABLES FOR EEDI (EPT-EEDI)

1 Introduction

This appendix contains a guideline for the document "Electric power table for EEDI" which is similar to the actual shipyards' load balance document, utilizing well defined criteria, providing standard format, clear loads definition and grouping, standard load factors, etc. A number of new definitions (in particular the "groups") are introduced, giving an apparent greater complexity to the calculation process. However, this intermediate step to the final calculation of P_{AE} stimulates all the parties to a deep investigation through the global figure of the auxiliary load, allowing comparisons between different ships and technologies and eventually identifying potential efficiencies improvements.

2 Auxiliary load power definition

P_{AE} is to be calculated as indicated in paragraph 2.5.6 of the Guidelines, together with the following additional three conditions:

.1 non-emergency situations (e.g. "no fire", "no flood", "no blackout", "no partial blackout");

.2 evaluation time frame of 24 hours (to account loads with intermittent use); and

.3 ship fully loaded with passengers and/or cargo and crew.

3 Definition of the data to be included in the electric power table for EEDI

The electric power table for EEDI calculation should contain the following data elements, as appropriate:

.1 Load's group;
.2 Load's description;
.3 Load's identification tag;
.4 Load's electric circuit Identification;
.5 Load's mechanical rated power "*Pm*" [*kW*];
.6 Load's electric motor rated output power [*kW*];
.7 Load's electric motor efficiency "*e*" [*/*];
.8 Load's Rated electric power "*Pr*" [*kW*];
.9 Service factor of load "*kl*" [*/*];
.10 Service factor of duty "*kd*" [*/*];
.11 Service factor of time "*kt*" [*/*];
.12 Service total factor of use "*ku*" [*/*], where *ku=kl·kd·kt;*
.13 Load's necessary power "*Pload*" [*kW*], where *Pload=Pr·ku;*
.14 Notes;
.15 Group's necessary power [*kW*]; and
.16 Auxiliaries load's power P_{AE} [*kW*].

4 Data to be included in the electric power table for EEDI

Load groups

4.1 The loads are divided into defined groups, allowing a proper breakdown of the auxiliaries. This eases the verification process and makes it possible to identify those areas where load reductions might be possible. The groups are listed below:

.1 A – Hull, deck, navigation and safety services;
.2 B – Propulsion service auxiliaries;
.3 C – Auxiliary engine and main engine services;
.4 D – Ship's general services;
.5 E – Ventilation for engine-rooms and auxiliaries room;
.6 F – Air conditioning services;
.7 G – Galleys, refrigeration and laundries services;
.8 H – Accommodation services;
.9 I – Lighting and socket services;
.10 L – Entertainment services;
.11 N – Cargo loads; and
.12 M – Miscellaneous.

All the ship's loads should be delineated in the document, excluding only *PAeff*, the shaft motors and shaft motors chain (while the propulsion services auxiliaries are partially included below in paragraph 4.1.2 B). Some loads (i.e. thrusters, cargo pumps, cargo gear, ballast pumps, maintaining cargo, reefers and cargo hold fans) still are included in the group for sake of transparency, however their service factor is zero in order to comply with rows 4 and 5 of paragraph 2.5.6 of the Guidelines, therefore making it easier to verify that all the loads have been considered in the document and there are no loads left out of the measurement.

4.1.1 A – Hull, deck, navigation and safety services

.1 loads included in the hull services typically are: ICCP systems, mooring equipment, various doors, ballasting systems, bilge systems, stabilizing equipment, etc. Ballasting systems are indicated with service factor equal to zero to comply with row 5 of paragraph 2.5.6 of the Guidelines;

.2 loads included in the deck services typically are: deck and balcony washing systems, rescue systems, cranes, etc.;

.3 loads included in the navigation services typically are: navigation systems, navigation's external and internal communication systems, steering systems, etc.; and

.4 loads included in the safety services typically are: active and passive fire systems, emergency shutdown systems, public address systems, etc.

4.1.2 B – Propulsion service auxiliaries

This group typically includes: propulsion secondary cooling systems such as LT cooling pumps dedicated to shaft motors, LT cooling pumps dedicated to propulsion converters, propulsion UPSs, etc. Propulsion service loads do not include shaft motors (*PTI(i)*) and the auxiliaries which are part of them (shaft motor own cooling fans and pump, etc.) and the

shaft motor chain losses and auxiliaries which are part of them (i.e. shaft motor converters including relevant auxiliaries such as converter own cooling fans and pumps, shaft motor transformers including relevant auxiliaries losses such as propulsion transformer own cooling fans and pumps, shaft motor harmonic filter including relevant auxiliaries losses, shaft motor excitation system including the relevant auxiliaries consumed power, etc.). Propulsion service auxiliaries include manoeuvring propulsion equipment such as manoeuvring thrusters and their auxiliaries whose service factor is to be set to zero.

4.1.3 C – Auxiliary engine and main engine services

This group includes: cooling systems, i.e. pumps and fans for cooling circuits dedicated to alternators or propulsion shaft engines (seawater, technical water dedicated pumps, etc.), lubricating and fuel systems feeding, transfer, treatment and storage, ventilation system for combustion air supply, etc.

4.1.4 D – Ship's general services

This group includes loads which provide general services which can be shared between shaft motor, auxiliary engines and main engine and accommodation support systems. Loads typically included in this group are: cooling systems, i.e. pumping seawater, technical water main circuits, compressed air systems, fresh water generators, automation systems, etc.

4.1.5 E – Ventilation for engine-rooms and auxiliaries room

This group includes all fans providing ventilation for engine-rooms and auxiliary rooms that typically are: engine-rooms cooling supply-exhaust fans, auxiliary rooms supply and exhaust fans. All the fans serving accommodation areas or supplying combustion air are not included in this group. This group does not include cargo hold fans and garage supply and exhaust fans.

4.1.6 F – Air conditioning services

All loads that make up the air conditioning service that typically are: air conditioning chillers, air conditioning cooling and heating fluids transfer and treatment, air conditioning's air handling units ventilation, air conditioning re-heating systems with associated pumping, etc. The air conditioning chillers service factor of load, service factor of time and service factor of duty are to be set as 1 (*kl=1, kt*=1 and *kd*=1) in order to avoid the detailed validation of the heat load dissipation document (i.e. the chiller's electric motor rated power is to be used). However, *kd* is to represent the use of spare chillers (e.g. four chillers are installed and one out four is spare then *kd=0* for the spare chiller and *kd*=1 for the remaining three chillers), but only when the number of spare chillers is clearly demonstrated via the heat load dissipation document.

4.1.7 G – Galleys, refrigeration and laundries services

All loads related to the galleys, pantries refrigeration and laundry services that typically are: galleys various machines, cooking appliances, galleys' cleaning machines, galleys auxiliaries, refrigerated room systems including refrigeration compressors with auxiliaries, air coolers, etc.

4.1.8 H – Accommodation services

All loads related to the accommodation services of passengers and crew that typically are: crew and passengers' transportation systems, i.e. lifts, escalators, etc. environmental services, i.e. black and grey water collecting, transfer, treatment, storage, discharge, waste systems including collecting, transfer, treatment, storage, etc. accommodation fluids transfers, i.e. sanitary hot and cold water pumping, etc., treatment units, pools systems, saunas, gym equipment, etc.

4.1.9 I – Lighting and socket services

All loads related to the lighting, entertainment and socket services. As the quantity of lighting circuits and sockets within the ship may be significantly high, it is not practically feasible to list all the lighting circuits and points in the EPT for EEDI. Therefore circuits should be grouped into subgroups aimed to identify possible improvements of efficient use of power. The subgroups are:

.1 Lighting for 1) cabins, 2) corridors, 3) technical rooms/stairs, 4) public spaces/stairs, 5) engine-rooms and auxiliaries' room, 6) external areas, 7) garages and 8) cargo spaces. All should be divided by main vertical zones; and

.2 Power sockets for 1) cabins, 2) corridors, 3) technical rooms/stairs, 4) public spaces/stairs, 5) engine-rooms and auxiliaries' room, 6) garages and 7) cargo spaces. All should be divided by main vertical zones.

The calculation criteria for complex groups (e.g. cabin lighting and power sockets) subgroups are to be included via an explanatory note, indicating the load composition (e.g. lights of typical cabins, TV, hair dryer, fridge, etc., typical cabins).

4.1.10 L – Entertainment services

This group includes all loads related to entertainment services, typically: public spaces audio and video equipment, theatre stage equipment, IT systems for offices, video games, etc.

4.1.11 N – Cargo loads

This group will contain all cargo loads such as cargo pumps, cargo gear, maintaining cargo, cargo reefers loads, cargo hold fans and garage fans for sake of transparency. However, the service factor of this group is to be set to zero.

4.1.12 M – Miscellaneous

This group will contain all loads which have not been associated to the above-mentioned groups but still are contributing to the overall load calculation of the normal maximum sea load.

Loads description

4.2 This identifies the loads (for example "seawater pump").

Loads identification tag

4.3 This tag identifies the loads according to the shipyard's standards tagging system. For example, the "PTI1 fresh water pump" identification tag is "SYYIA/C" for an example ship and shipyard. This data provides a unique identifier for each load.

Loads electric circuit Identification

4.4 This is the tag of the electric circuit supplying the load. Such information allows the data validation process.

Loads mechanical rated power "***Pm***"

4.5 This data is to be indicated in the document only when th electric load is made by an electric motor driving a mechanical load (for example a fan, a pump, etc.). This is the rated power of the mechanical device driven by an electric motor.

Loads electric motor rated output power [kW]

4.6 The output power of the electric motor as per maker's name plate or technical specification. This data does not take part of the calculation but is useful to highlight potential over rating of the combination motor-mechanical load.

Loads electric motor efficiency "***e***" **[*/*]**

4.7 This data is to be entered in the document only when the electric load is made by an electric motor driving a mechanical load.

Loads rated electric power "***Pr***" ***[kW]***

4.8 Typically the maximum electric power absorbed at the load electric terminals at which the load has been designed for its service, as indicated on the maker's name plate and/or maker's technical specification. When the electric load is made by an electric motor driving a mechanical load the load's rated electric power is: *Pr=Pm/e [kW].*

Service factor of load "***kl***" ***[/]***

4.9 Provides the reduction from the loads rated electric power to loads necessary electric power that is to be made when the load absorb less power than its rated power. For example, in case of electric motor driving a mechanical load, a fan could be designed with some power margin, leading to the fact that the fan rated mechanical power exceeds the power requested by the duct system it serves. Another example is when a pump rated power exceed the power needed for pumping in its delivery fluid circuit. Another example in case of electric self-regulating semi-conductors electric heating system is oversized and the rated power exceeds the power absorbed, according a factor *kl.*

Service factor of duty "***kd***" **[*/*]**

4.10 Factor of duty is to be used when a function is provided by more than one load. As all loads are to be included in the EPT for EEDI, this factor provides a correct summation of the loads. For example when two pumps serve the same circuit and they run in duty/stand-by their *Kd* factor will be ½ and ½. When three compressors serves the same circuit and one runs in duty and two in stand-by, then *kd* is 1/3, 1/3 and 1/3.

Service factor of time "***kt***" **[*/*]**

4.11 A factor of time based on the shipyard's evaluation about the load duty along 24 hours of ship's navigation as defined at paragraph 3. For example the Entertainment loads operate at their power for a limited period of time, 4 hours out 24 hours; as a consequence *kt=4/24.*

For example, the seawater cooling pumps operate at their power all the time during the navigation at *Vref*. As a consequence *kt=1*.

Service total factor of use "***ku***" **[*/*]**

4.12 The total factor of use that takes into consideration all the service factors: *ku=kl·kd·kt.*

Loads necessary power "***Pload***" ***[kW]***

4.13 The individual user contribution to the auxiliary load power is *Pload=Pr·ku.*

Notes

4.14 A note, as free text, could be included in the document to provide explanations to the verifier.

Groups necessary power **[*kW*]**

4.15 The summation of the "Loads necessary power" from group A to N. This is an intermediate step which is not strictly necessary for the calculation of *PAE*. However, it is useful to allow a quantitative analysis of the *PAE*, providing a standard breakdown for analysis and potential improvements of energy saving.

Auxiliaries load's power PAE **[*kW*]**

4.16 Auxiliaries load's power *PAE* is the summation of the "Load's necessary power" of all the loads divided by the average efficiency of the generator(s) weighted by power.

PAE=ΣPload(i)/(average efficiency of the generator(s) weighted by power)

Layout and organization of the data indicated in the electric power table for EEDI

5 The document "Electric power table for EEDI" is to include general information (i.e. ship's name, project name, document references, etc.) and a table with:

.1 one row containing column titles;

.2 one Column for table row ID;

.3 one Column for the groups identification ("A", "B", etc.) as indicated in paragraphs 4.1.1 to 4.1.12 of this guideline;

.4 one Column for the group descriptions as indicated in paragraphs 4.1.1 to 4.1.12 of this guideline;

.5 one column each for items in paragraphs 4.2 to 4.14 of this guideline (e.g. "load tag", etc.);

.6 one row dedicated to each individual load;

.7 the summation results (i.e. summation of powers) including data from paragraphs 4.15 to 4.16 of this guideline; and

.8 explanatory notes.

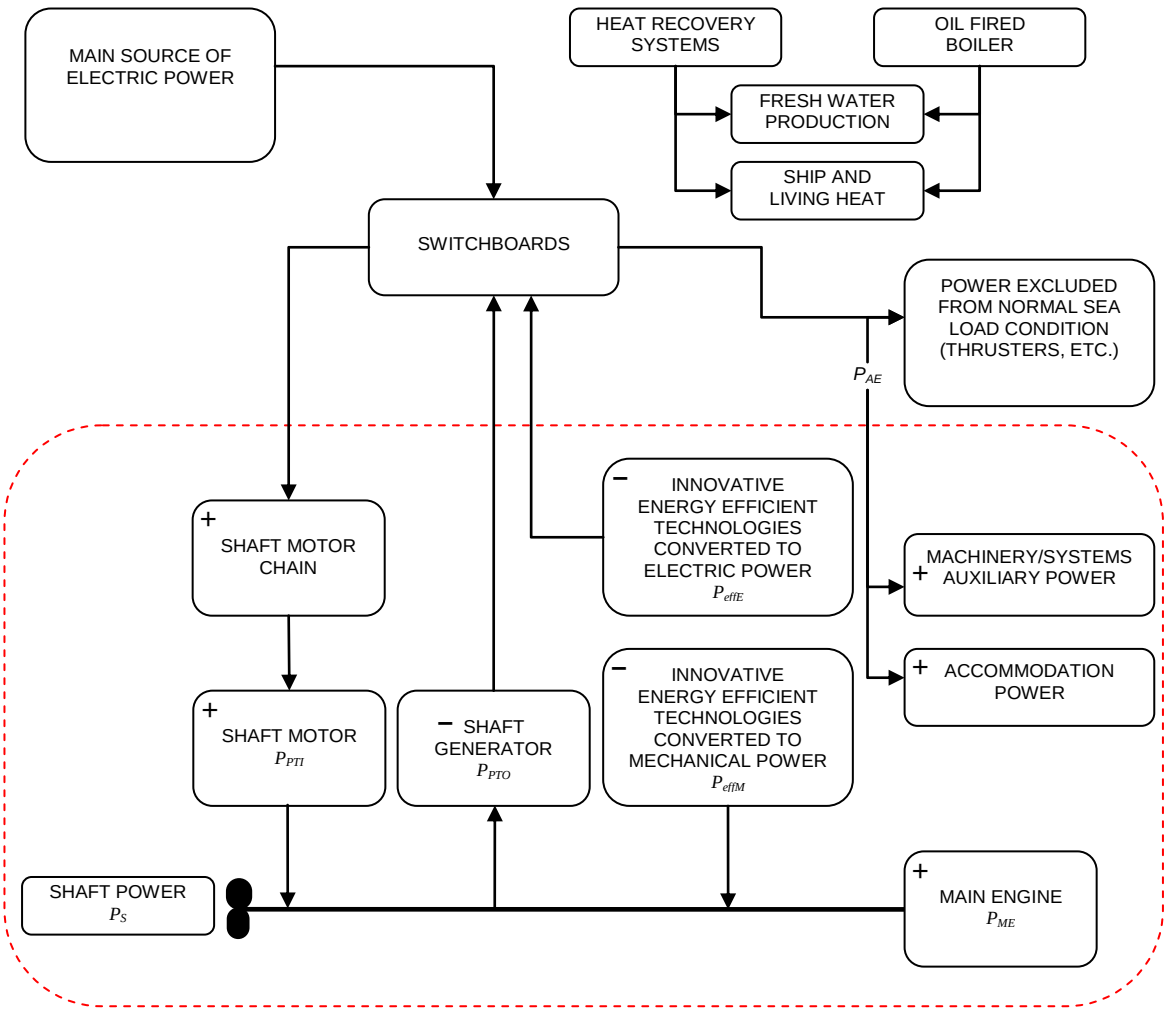
An example of an electric power table for EEDI for a cruise postal ship which transports passengers and has a car garage and reefer holds for fish trade transportation is indicated below. The data indicated and the type of ship is for reference only.

ELECTRIC POWER TABLE FOR EEDI			HULL "EXAMPLE"	PROJECT "EXAMPLE"										(NMSL=Normal Maximun Sea Load)
id	Load group	Load description	Load identification tag	Load electric circuit Identification	Load mechanical rated power *"Pm" [kW]*	Load electric motor rated output power *[kW]*	Load electric motor efficiency *"e" [/]*	Load Rated electric power *"Pr" [kW]*	service factor of load *"kl" [/]*	service factor of duty *"kd" [/]*	service factor of time *"kt" [/]*	service total factor of use *"ku" [/]*	Load necessary power *"Pload" [kW]*	Note
1	A	Hull cathodic protection Fwd	xxx	yyy	n.a.	n.a.	n.a.	5.2	1	1	1*	1	5.2	*in use 24hours/day
2	A	Hull cathodic protection mid	xxx	yyy	n.a.	n.a.	n.a.	7.0	1	1	1*	1	7	*in use 24hours/day
3	A	Hull cathodic protection aft	xxx	yyy	n.a.	n.a.	n.a.	4.8	1	1	1*	1	4.8	*in use 24hours/day
4	A	Ballast pump 3	xxx	yyy	30	36	0.92	32.6	0.9	0.5	1	0*	0	*not in use at **NMSL** see para 2.5.6 of Circ.681
5	A	Fwd Stb mooring winch motor n.1	xxx	yyy	90	150	0.92	97.8	0.8	1	0*	0*	0	*not in use at **NMSL** see para 2.5.6 of Circ.681
6	A	WTDs system main control panel	xxx	yyy	n.a.	n.a.	n.a.	0.5	1	1	1*	1	0.5	*in use 24hours/day
7	A	WTD 1, deck D frame 150	xxx	yyy	1.2	3	0.91	1.3	0.7	1	0.104*	0.0728	0.096	*180 secs to open/close x 100 opening a day
8	A	WTD 5, deck D frame 210	xxx	yyy	1.2	3	0.91	1.3	0.7	1	0.156*	0.1092	0.14	*180 secs to open/close x 150 opening a day
9	A	Stabilisers control unit	xxx	yyy	n.a.	n.a.	n.a.	0.7	1	1	1*	1	0.7	*in use 24hours/day
10	A	Stabilisers Hydraulic pack power pump 1	xxx	yyy	80	90	0.9	88.9	0.9	1	0*	0	0	*NMSL=> calm sea,=> stabiliser not in use
11	A	S-band Radar 1 controller	xxx	yyy	n.a.	n.a.	n.a.	0.4	1	1	1*	1	0.4	*in use 24hours/day
12	A	S-band Radar 1 motor	xxx	yyy	0.8	1	0.92	0.9	1	1	1*	1	0.9	*in use 24hours/day
13	A	Fire detection system bridge main unit	xxx	yyy	n.a.	n.a.	n.a.	1.5	1	1	1*	1	1.5	*in use 24hours/day
14	A	Fire detection system ECR unit	xxx	yyy	n.a.	n.a.	n.a.	0.9	1	1	1*	1	0.9	*in use 24hours/day
15	A	High pressure water fog contol unit	xxx	yyy	n.a.	n.a.	n.a.	1.2	1	1	1*	1	1.2	*in use 24hours/day
16	A	High pressure water fog engines rooms pump 1a	xxx	yyy	25	30	0.93	26.9	0.9	0.5	0*	0	0	*NMSL=> not emergency =>Load not in use
17	A	High pressure water fog engines rooms pump 1b	xxx	yyy	25	30	0.93	26.9	0.9	0.5	0*	0	0	* not emergency situations
18	B	PTi port fresh water pump 1	xxx	yyy	30	36	0.92	32.6	0.9	0.5*	1	0.45	14.7	* pump1,2 one is duty and one is stand-by
19	B	PTi port fresh water pump 2	xxx	yyy	30	36	0.92	32.6	0.9	0.5*	1	0.45	14.7	* pump1,2 one is duty and one is stand-by
20	B	Thrusters control system	xxx	yyy	n.a.	n.a.	n.a.	0.5	1	1	1*	1	0.5	in use 24hours/day (even if thruster motor isn't)
21	B	Bow thruster 1	xxx	yyy	3000	3000	0.96	3125.0	1	1	0*	0	0	*NMSL=>thrusters motor are not in use
22	B	PEM port cooling fan 1	xxx	yyy	20	25	0.93	21.5	0.9	1	n.a.	n.a	n.a.*	*this load is included in the propulsion chain data
23	C	HT circulation pump 1 DG 3	xxx	yyy	8	10	0.92	8.7	0.9	0.5*	1	0.45	3.9	* pump1,2 one is duty and one is stand-by
24	C	HT circulation pump 2 DG 3	xxx	yyy	8	10	0.92	8.7	0.9	0.5*	1	0.45	3.9	* pump1,2 one is duty and one is stand-by
25	C	DG3 combustion air fan	xxx	yyy	28	35	0.92	30.4	0.9	1	1*	0.9	27.4	*in use 24hours/day
26	C	DG3 exhaust gas boiler circulationg pump	xxx	yyy	6	8	0.93	6.5	0.8	1	1*	0.8	5.2	*in use 24hours/day
27	C	Alternator 3 external cooling fan	xxx	yyy	3	5	0.93	3.2	0.8	1	1*	0.8	2.75	*in use 24hours/day
28	C	fuel feed fwd booster pump a	xxx	yyy	7	9	0.92	7.6	0.9	0.5*	1	0.45	3.4	* pump1,2 one is duty and one is stand-by
29	C	fuel feed fwd booster pump b	xxx	yyy	7	9	0.92	7.6	0.9	0.5*	1	0.45	3.4	* pump1,2 one is duty and one is stand-by
30	D	Fwd main LT cooling pump 1	xxx	yyy	120	150	0.95	126.3	0.9	0.5*	1	0.45	56.8	* pump1,2 one is duty and one is stand-by
31	D	Fwd main LT cooling pump 2	xxx	yyy	120	150	0.95	126.3	0.9	0.5*	1	0.45	56.8	* pump1,2 one is duty and one is stand-by
32	E	FWD engine room supply fan 1	xxx	yyy	87.8	110	0.93	94.4	0.95	1	1*	0.95	89.7	*in use 24hours/day
33	E	FWD engine room exhaust fan 1	xxx	yyy	75	86	0.93	80.6	0.96	1	1*	0.96	77.4	*in use 24hours/day
34	E	purifier room supply fan 1	xxx	yyy	60	70	0.93	64.5	0.96	0.5	1*	0.48	31.0	*in use 24hours/day
35	E	purifier room supply fan 2	xxx	yyy	60	70	0.93	64.5	0.96	0.5	1*	0.48	31.0	*in use 24hours/day
36	F	HVAC chiller a	xxx	yyy	1450	1600	0.95	1526.3	1	2/3*	1	0.66	1007.4	*1 Chiller is spare; see heat load dissipation doc.
37	F	HVAC chiller b	xxx	yyy	1450	1600	0.95	1526.3	1	2/3*	1	0.66	1007.4	*1 Chiller is spare; see heat load dissipation doc.
38	F	HVAC chiller C	xxx	yyy	1450	1600	0.95	1526.3	1	2/3*	1	0.66	1007.4	*1 Chiller is spare; see heat load dissipation doc.
39	F	A.H.U. Ac station 5.4 supply fan	xxx	yyy	50	60	0.93	53.8	0.9	1	1*	0.9	48.4	*in use 24hours/day
40	F	A.H.U. Ac station 5.4 exhaust fan	xxx	yyy	45	55	0.93	48.4	0.9	1	1*	0.9	43.5	*in use 24hours/day
41	F	Chilled water pump a	xxx	yyy	80	90	0.93	86.0	0.88	0.5*	1	0.44	37.8	* pump1,2 one is duty and one is stand-by
42	F	Chilled water pump b	xxx	yyy	80	90	0.93	86.0	0.88	0.5*	1	0.44	37.8	* pump1,2 one is duty and one is stand-by
43	G	Italian's espresso coffee machine	xxx	yyy	n.a.	n.a.	n.a.	7.0	0.9	1	0.2*	0.18	1.3	*in use 4.8hours/day
44	G	deep freezer machine	xxx	yyy	n.a.	n.a.	n.a.	20.0	0.8	1	0.16*	0.128	3.2	*in use 4hours/day
45	G	washing machine 1	xxx	yyy	n.a.	n.a.	n.a.	8.0	0.8	1	0.33*	0.264	3.2	*in use 8hours/day
46	H	lift pax mid 4	xxx	yyy	30	40	0.93	32.3	0.5	1	0.175*	0.0875	0.9	*in use 4hours/day
47	H	vaccum collecting system 4 pump a	xxx	yyy	10	13	0.92	10.9	0.9	1	1*	0.9	8.7	*in use 24hours/day
48	H	sewage treatmet system 1 pump 1	xxx	yyy	15	17	0.93	16.1	0.9	1	1*	0.9	8.7	*in use 24hours/day
49	H	Gym running machine	xxx	yyy	n.a.	n.a.	n.a.	2.5	1	1	0.3*	0.3	0.8	*in use 7.2hours/day
50	I	Cabin's lighting MVZ3	n.a.	n.a.	n.a.	n.a.	n.a.	80*	1	1	1	1	80.0	* see explainatory note
51	I	corridors ligthing MVZ3	n.a.	n.a.	n.a.	n.a.	n.a.	10*	1	1	1	1	10.0	* see explainatory note
52	I	Cabin's sockets MVZ3	n.a.	n.a.	n.a.	n.a.	n.a.	5*	1	1	1	1	5.0	* see explainatory note
53	L	Main Theatre audio booster amplifier	xxx	yyy	n.a.	n.a.	n.a.	15.0	1	1	0.3*	0.3	4.5	*in use 7.2hours/day
54	L	Video wall atrium	xxx	yyy	n.a.	n.a.	n.a.	2.0	1	1	0.3*	0.3	0.6	*in use 7.2hours/day
55	M	Car Garage supply fan1	xxx	yyy	28	35	0.92	30.4	0.9	1	1*	0*	0	*not in use at **NMSL** see para 2.5.6 of Circ.681
56	M	Fish transportation refeer hold n.2	xxx	yyy	25	30	0.93	26.9	0.9	0.5	0*	0*	0	*not in use at **NMSL** see para 2.5.6 of Circ.681
57	N	Sliding glass roof	xxx	yyy	30	40	0.93	32.3	0.9	1	0.3*	0.27	0.2	*in use 7.2hours/day
											ΣPload(i)=		**3764**	

***PAE* =3764/(weighted average efficiency of generator(s)) [kW]** Group's necessary power (group A=22.9kW, B=29.8kW,C=49.9kW, D=113.7kW, E=229kW , F=3189kW, G=7.6kW, H=19kW, I=95kW, L=5.1kW, M=0kW, N=0.22kW)

APPENDIX 3

A GENERIC AND SIMPLIFIED MARINE POWER PLANT FOR A CRUISE PASSENGER SHIPS HAVING NON-CONVENTIONAL PROPULSION



Note: Symbols for plus (+) and minus (−) indicate CO_2 contribution to EEDI formula.

APPENDIX 4

EEDI CALCULATION EXAMPLES FOR USE OF DUAL FUEL ENGINES

Standard main engine (HFO), standard auxiliary engines (HFO), no shaft generator:

MCR_{ME}	= 15,000 kW	
Capacity	= 25,000 DWT	
$C_{F\,ME}$	= 3.114	
$C_{F\,AE}$	= 3.114	
SFC_{ME}	= 190 g/kWh	
SFC_{AE}	= 215 g/kWh	
v_{ref}	= 18 kn	
P_{ME}	= 0.75 x MCR_{ME} = 0.75 x 15,000 kW	= 11,250 kW
P_{AE}	= (0.025 x MCR_{ME}) + 250 kW	= 625 kW

EEDI = [(P_{ME} x $C_{F\,ME}$ x SFC_{ME}) + (P_{AE} x $C_{F,AE}$ x SFC_{AE})] / (v_{ref} x *Capacity*)
EEDI = [(11,250 x 3.114 x 190) + (625 x 3.114 x 215)] / (18 x 25,000)
EEDI = 15.721 gCO_2/tnm

Dual-fuel main engine and auxiliary engine (LNG, pilot fuel MDO; no shaft generator), LNG condition for tank capacity and/or operating time is fulfilled:

MCR_{ME}	= 15,000 kW	
Capacity	= 25,000 DWT	
$C_{F,Gas}$	= 2.750	
$C_{F\,Pilotfuel}$	= 3.206	
$SFC_{ME\,Pilotfuel}$	= 6 g/kWh	
$SFC_{ME\,Gas}$	= 160 g/kWh	
$SFC_{AE\,Pilotfuel}$	= 7 g/kWh	
$SFC_{AE\,Gas}$	= 180 g/kWh	
v_{ref}	= 18 kn	
P_{ME}	= 0.75 x MCR_{ME} = 0.75 x 15,000 kW	= 11,250 kW
P_{AE}	= (0.025 x MCR_{ME}) + 250 kW	= 625 kW

EEDI = [(P_{ME} x ($C_{F\,Pilotfuel}$ x $SFC_{ME\,Pilotfuel}$ + $C_{F\,Gas}$ x $SFC_{ME\,Gas}$)) + (P_{AE} x ($C_{F\,Pilotfuel}$ x $SFC_{AE\,Pilotfuel}$ + $C_{F\,Gas}$ x $SFC_{AE\,Gas}$))] / (v_{ref} x *Capacity*)

EEDI = [(11,250 x (3.206 x 6 + 2.750 x 160)) + (625 x (3.206 x 7 + 2.750 x 180))] / (18 x 25,000)

EEDI = 12.200 gCO_2/tnm

Dual-fuel main engine, standard auxiliary engines (HFO), no shaft generator, LNG condition for tank capacity and/or operating time for main engine is fulfilled:

MCR_{ME}	= 15,000 kW	
Capacity	= 25,000 DWT	
$C_{F\ Gas}$	= 2.750	
$C_{F\ Pilotfuel}$	= 3.114	
$C_{F\ AE}$	= 3.114	
$SFC_{ME\ Pilotfuel}$	= 6 g/kWh	
$SFC_{ME\ Gas}$	= 160 g/kWh	
SFC_{AE}	= 215 g/kWh	
v_{ref}	= 18 kn	
P_{ME}	= 0.75 x MCR_{ME} = 0.75 x 15,000 kW	= 11,250 kW
P_{AE}	= (0.025 x MCR_{ME}) + 250 kW	= 625 kW

EEDI = [(P_{ME} x ($C_{F\ Pilotfuel}$ x $SFC_{ME\ Pilotfuel}$ + $C_{F\ Gas}$ x $SFC_{ME\ Gas}$)) + (P_{AE} x $C_{F,\ AE}$ x SFC_{AE})] / (v_{ref} x *Capacity*)

EEDI = [(11,250 x (3.114 x 6 + 2.750 x 160)) + (625 x 3.114 x 215)] / (18 x 25,000)

EEDI = 12.397 gCO_2/tnm

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MEPC.1/Circ.795/Rev.1
21 May 2014

UNIFIED INTERPRETATIONS TO MARPOL ANNEX VI

1 The Marine Environment Protection Committee has approved Unified Interpretations to MARPOL Annex VI as follows:

.1 at its sixty-first session (27 September to 1 October 2010), Unified Interpretations on scope of application of regulations 15.6 and 15.7 of MARPOL Annex VI (VOC management plan) (MEPC.1/Circ.735);

.2 at its sixty-fourth session (1 to 5 October 2012), Unified Interpretations to regulations 2, 5, 6, 8, 16 and 22 of MARPOL Annex VI (MEPC.1/Circ.795 and MEPC.1/Circ.795/Corr.1);

.3 at its sixty-fifth session (13 to 17 May 2013), Unified Interpretations to MARPOL Annex VI on time of replacement of an engine and identical replacement engines (MEPC.1/Cir.812 and MEPC.1/Circ.813), and Unified Interpretations to regulations 5, 6 and 22 of MARPOL Annex VI on Ship Energy Efficiency Management Plan (SEEMP) (MEPC.1/Cir.814); and

.4 at its sixty-sixth session (31 March to 4 April 2014), amendments to the Unified Interpretation to regulation 2.24 of MARPOL Annex VI on major conversion.

2 MEPC 66 also instructed the Secretariat to issue a consolidated text of the Unified Interpretations to MARPOL Annex VI, incorporating all amendments (MEPC 66/21, paragraph 4.52).

3 Consequently, the Secretariat prepared a consolidated text of all existing Unified Interpretations to MARPOL Annex VI, including those set out in circulars MEPC.1/Circ.735, MEPC.1/Circ.795, MEPC.1/Circ.795/Corr.1, MEPC.1/Circ.812, MEPC.1/Circ.813 and MEPC.1/Circ.814, as set out in the annex to this circular.

4 Member Governments are invited to apply the annexed Unified Interpretations to MARPOL Annex VI, as appropriate, and bring them to the attention of all Parties concerned.

5 This circular revokes MEPC.1/Circ.735, MEPC.1/Circ.795, MEPC.1/Circ.795/Corr.1, MEPC.1/Circ.812, MEPC.1/Circ.813 and MEPC.1/Circ.814.

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ANNEX

UNIFIED INTERPRETATIONS TO MARPOL ANNEX VI

1 Definition of "new ship"

Regulation 2
Definitions

Regulation 2.23 reads as follows:

"23 *New ship* means a ship:

.1 for which building contract is placed on or after 1 January 2013; or

.2 in the absence of a building contract, the keel of which is laid or which is at a similar stage of construction on or after 1 July 2013; or

.3 the delivery of which is on or after 1 July 2015."

***Interpretation*:**

1.1 For the application of the definition "new ship" as specified in regulation 2.23 to each Phase specified in table 1 of regulation 21, it should be interpreted as follows:

.1 the date specified in regulation 2.23.1 should be replaced with the start date of each Phase;

.2 the date specified in regulation 2.23.2 should be replaced with the date six months after the start date of each Phase; and

.3 the date specified in regulation 2.23.3 should for Phase 1, 2 and 3 be replaced with the date 48 months after the start date of each Phase.

1.2 With the above interpretations, the required EEDI of each Phase is applied to the following new ship which falls into one of the categories defined in regulations 2.25 to 2.31 and to which chapter 4 is applicable:

.1 The required EEDI of Phase 0 is applied to the following new ship:

.1 the building contract of which is placed in Phase 0, and the delivery is before 1 January 2019; or

.2 the building contract of which is placed before Phase 0, and the delivery is on or after 1 July 2015 and before 1 January 2019; or

in the absence of a building contract,

.3 the keel of which is laid or which is at a similar stage of construction on or after 1 July 2013 and before 1 July 2015, and the delivery is before 1 January 2019; or

.4 the keel of which is laid or which is at a similar stage of construction before 1 July 2013, and the delivery is on or after 1 July 2015 and before 1 January 2019.

.2 The required EEDI of Phase 1 is applied to the following new ship:

.1 the building contract of which is placed in Phase 1, and the delivery is before 1 January 2024; or

.2 the building contract of which is placed before Phase 1, and the delivery is on or after 1 January 2019 and before 1 January 2024; or

in the absence of a building contract,

.3 the keel of which is laid or which is at a similar stage of construction on or after 1 July 2015 and before 1 July 2020, and the delivery is before 1 January 2024; or

.4 the keel of which is laid or which is at a similar stage of construction before 1 July 2015, and the delivery is on or after 1 January 2019 and before 1 January 2024.

.3 The required EEDI of Phase 2 is applied to the following new ship:

.1 the building of which contract is placed in Phase 2, and the delivery is before 1 January 2029; or

.2 the building contract of which is placed before Phase 2, and the delivery is on or after 1 January 2024 and before 1 January 2029; or

in the absence of a building contract,

.3 the keel of which is laid or which is at a similar stage of construction on or after 1 July 2020 and before 1 July 2025, and the delivery is before 1 January 2029; or

.4 the keel of which is laid or which is at a similar stage of construction before 1 July 2020, and the delivery is on or after 1 January 2024 and before 1 January 2029.

.4 The required EEDI of Phase 3 is applied to the following new ship:

.1 the building of which contract is placed in Phase 3; or

.2 in the absence of a building contract, the keel of which is laid or which is at a similar stage of construction on or after 1 July 2025; or

.3 the delivery of which is on or after 1 January 2029.

2 Major conversion

Regulation 2.24 reads as follows:

> "24 *Major conversion* means in relation to chapter 4 of this Annex a conversion of a ship:
>
> .1 which substantially alters the dimensions, carrying capacity or engine power of the ship; or
>
> .2 which changes the type of the ship; or
>
> .3 the intent of which in the opinion of the Administration is substantially to prolong the life of the ship; or
>
> .4 which otherwise so alters the ship that, if it were a new ship, it would become subject to relevant provisions of the present Convention not applicable to it as an existing ship; or
>
> .5 which substantially alters the energy efficiency of the ship and includes any modifications that could cause the ship to exceed the applicable required EEDI as set out in regulation 21 of this Annex."

***Interpretation*:**

2.1 For regulation 2.24.1, any substantial change in hull dimensions and/or capacity (e.g. change of length between perpendiculars (L_{PP}) or change of assigned freeboard) should be considered a major conversion. Any substantial increase of total engine power for propulsion (e.g. 5% or more) should be considered a major conversion. In any case, it is the Administration's authority to evaluate and decide whether an alteration should be considered as major conversion, consistent with chapter 4.

> **Note:** Notwithstanding paragraph 2.1, assuming no alteration to the ship structure, both decrease of assigned freeboard and temporary increase of assigned freeboard due to the limitation of deadweight or draft at calling port should not be construed as a major conversion. However, an increase of assigned freeboard, except a temporary increase, should be construed as a major conversion.

2.2 Notwithstanding paragraph 2.1, for regulation 2.24.5, the effect on Attained EEDI as a result of any change of ships' parameters, particularly any increase in total engine power for propulsion, should be investigated. In any case, it is the Administration's authority to evaluate and decide whether an alteration should be considered as major conversion, consistent with chapter 4.

2.3 A company may, at any time, voluntarily request re-certification of the EEDI, with IEE Certificate reissuance, on the basis of any new improvements to the ships' efficiency that are not considered to be major conversions.

2.4 In regulation 2.24.4, the terms "new ship" and "existing ship" should be understood as they are used in MARPOL Annex I, regulation 1.9.1.4, rather than as the defined terms in regulations 2.22 and 2.23.

2.5 The term "a ship" referred to in regulation 5.4.2 is interpreted as "new ship".

3 Ships dedicated to the carriage of fruit juice in refrigerated cargo tanks

Regulation 2.30 reads as follows:

> "30 *Refrigerated cargo carrier* means a ship designed exclusively for the carriage of refrigerated cargoes in holds."

***Interpretation*:**

Ships dedicated to the carriage of fruit juice in refrigerated cargo tanks should be categorized as refrigerated cargo carrier.

4 Timing for existing ships to have on board a SEEMP

Regulation 5
Surveys

Regulation 5.4.4 reads as follows:

> ".4 For existing ships, the verification of the requirement to have a SEEMP on board according to regulation 22 shall take place at the first intermediate or renewal survey identified in paragraph 1 of this regulation, whichever is the first, on or after 1 January 2013."

Regulation 6
Issue or endorsement of a Certificates

Regulation 6.4 reads as follows:

> "4 An International Energy Efficiency Certificate for the ship shall be issued after a survey in accordance with the provisions of regulation 5.4 of this Annex to any ship of 400 gross tonnage and above before that ship may engage in voyages to ports or offshore terminals under the jurisdiction of other Parties."

Regulation 22
Ship Energy Efficiency Management Plan (SEEMP)

Regulation 22.1 reads as follows:

> "1 Each ship shall keep on board a ship specific Ship Energy Efficiency Management Plan (SEEMP). This may form part of the ship's Safety Management System (SMS)."

***Interpretation*:**

4.1 The International Energy Efficiency Certificate (IEEC) should be issued for both new and existing ships to which chapter 4 applies. Ships which are not required to keep an SEEMP on board are not required to be issued with an IECC.

4.2 The SEEMP required by regulation 22.1 is not required to be placed on board an existing ship to which this regulation applies until the verification survey specified in regulation 5.4.4 is carried out.

4.3 For existing ships, a SEEMP required in accordance with regulation 22 should be verified on board according to regulation 5.4.4, and an IEEC should be issued, not later than the first intermediate or renewal survey, in accordance with chapter 2, whichever is earlier, on or after 1 January 2013, i.e. a survey connected to an intermediate/renewal survey of the IAPP Certificate.

4.4 The intermediate or renewal survey referenced in paragraph 4.3 relates solely to the timing of the verification of the SEEMP on board, i.e. these IAPP Certificate survey windows will also become the IEEC initial survey date for existing ships. The SEEMP is, however, a survey item solely under chapter 4 and is not a survey item relating to IAPP Certificate surveys.

4.5 In the event that the SEEMP is not available on board during the first intermediate/renewal survey of the IAPP Certificate on or after 1 January 2013, the RO should seek the advice of the Administration concerning the issuance of an IEEC and be guided accordingly. However, the validity of the IAPP Certificate is not impacted by the lack of a SEEMP as the SEEMP is a survey item solely under chapter 4 and not under the IAPP Certificate surveys.

4.6 With respect to ships required to keep on board a SEEMP, such ships exclude platforms (including FPSOs and FSUs) and drilling rigs, regardless of their propulsion, and any other ship without means of propulsion.

4.7 The SEEMP should be written in a working language or languages understood by ships' personnel.

5 Section 2.3 of the supplement to the IAPP Certificate

Regulation 8
Form of Certificates

Regulation 8.1 reads as follows:

> "1 The International Air Pollution Prevention Certificate shall be drawn up in a form corresponding to the model given in appendix I to this Annex and shall be at least in English, French or Spanish. If an official language of the issuing country is also used, this shall prevail in case of a dispute or discrepancy."

Appendix 1
Form of International Air Pollution Prevention (IAPP) Certificate (Regulation 8)

Section 2.3 of the supplement to International Air Pollution Prevention Certificate reads as follows:

"2.3 Sulphur oxides (SO_x) and particulate matter (regulation 14)

2.3.1 When the ship operates outside of an Emission Control Area specified in regulation 14.3, the ship uses:

.1 fuel oil with a sulphur content as documented by bunker delivery notes that does not exceed the limit value of:

- 4.50% m/m (not applicable on or after 1 January 2012); or ☐
- 3.50% m/m (not applicable on or after 1 January 2020); or ☐
- 0.50% m/m, and/or ☐

.2 an equivalent arrangement approved in accordance with regulation 4.1 as listed in 2.6 that is at least as effective in terms of SO_x emission reductions as compared to using a fuel oil with a sulphur content limit value of:

- 4.50% m/m (not applicable on or after 1 January 2012); or ☐
- 3.50% m/m (not applicable on or after 1 January 2020); or ☐
- 0.50% m/m ☐

2.3.2 When the ship operates inside an Emission Control Area specified in regulation 14.3, the ship uses:

.1 fuel oil with a sulphur content as documented by bunker delivery notes that does not exceed the limit value of:

- 1.00% m/m (not applicable on or after 1 January 2015); or ☐
- 0.10% m/m, and/or ☐

.2 an equivalent arrangement approved in accordance with regulation 4.1 as listed in 2.6 that is at least as effective in terms of SO_x emission reductions as compared to using a fuel oil with a sulphur content limit value of:

- 1.00% m/m (not applicable on or after 1 January 2015); or ☐
- 0.10% m/m ☐

***Interpretation*:**

Section 2.3 of the Supplement ("as documented by bunker delivery notes") allows for an "x" to be entered in advance of the dates indicated in all of the relevant check boxes recognizing that the bunker delivery notes, required to be retained on board for a minimum period of three years, provide the subsequent means to check that a ship is actually operating in a manner consistent with the intent as given in section 2.3.

6 Identical replacement engines

Regulation 13
Nitrogen oxides (NO_x)

Regulation 13.1.1.2 reads as follows:

".2 each marine diesel engine with a power output of more than 130 kW which undergoes a major conversion on or after 1 January 2000 except when demonstrated to the satisfaction of the Administration that such engine is an

identical replacement to the engine which it is replacing and is otherwise not covered under paragraph 1.1.1 of this regulation."

Regulation 13.2.2 reads as follows:

"2.2 For a major conversion involving the replacement of a marine diesel engine with a non-identical marine diesel engine or the installation of an additional marine diesel engine, the standards in this regulation in force at the time of the replacement or addition of the engine shall apply."

Interpretation:

In regulation 13.1.1.2, the term "identical" (and hence, by application of the converse, in regulation 13.2.2 the term "non-identical") as applied to engines under regulation 13 should be taken as:

An "identical engine" is, as compared to the engine being replaced[1], an engine which is of the same:

.1 design and model;

.2 rated power;

.3 rated speed;

.4 use;

.5 number of cylinders; and

.6 fuel system type (including, if applicable, injection control software):

.1 for engines without EIAPP certification, have the same NO_x critical components and settings[2]; or

.2 for engines with EIAPP certification, belonging to the same Engine Group/Engine Family.

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[1] In those instances where the replaced engine will not be available to be directly compared with the replacing engine at the time of updating the Supplement to the IAPP Certificate reflecting that engine change it is to be ensured that the necessary records in respect of the replaced engine are available in order that it can be confirmed that the replacing engine represents "an identical engine".

[2] For engines without EIAPP Certification there will not be the defining NO_x critical component markings or setting values as usually given in the approved Technical File. Consequently in these instances the assessment of "... same NO_x critical components and settings ..." shall be established on the basis that the following components and settings are the same:

Fuel system:

.1 fuel pump model and injection timing; and

.2 injection nozzle model;

Charge air:

.1 configuration and, if applicable, turbocharger model and auxiliary blower specification; and

.2 cooling medium (seawater/freshwater).

7 Time of replacement of an engine

Regulation 13.2.2 reads as follows:

> "2.2 For a major conversion involving the replacement of a marine diesel engine with a non-identical marine diesel engine, or the installation of an additional marine diesel engine, the standards in this regulation in force at the time of the replacement or addition of the engine shall apply."

Interpretation:

7.1 The term "time of the replacement or addition" of the engine in regulation 13.2.2 should be taken as the date of:

.1 the contractual delivery date of the engine to the ship[3]; or

.2 in the absence of a contractual delivery date, the actual delivery date of the engine to the ship[3], provided that the date is confirmed by a delivery receipt; or

.3 in the event the engine is fitted on board and tested for its intended purpose on or after 1 July 2016, the actual date that the engine is tested on board for its intended purpose applies in determining the standards in this regulation in force at the time of the replacement or addition of the engine.

7.2 The date in paragraph 7.1 above, provided the conditions associated with those dates apply, is the "Date of major conversion – According to regulation 13.2.2" to be entered in the Supplement of IAPP Certificate. In this case, the "Date of installation", which applies only for identical replacement engines, should be filled in with "N.A.".

7.3 If the engine is delivered in accordance with either paragraphs 7.1.1 or 7.1.2 above before 1 January 2016, but not tested before 1 July 2016 due to unforeseen circumstances beyond the control of the shipowner, then the provisions of "unforeseen delay in delivery" may be considered by the Administration in a manner similar to UI4 of MARPOL Annex I.

8 VOC management plan

Regulation 15
Volatile organic compounds (VOCs)

Regulations 15.6 and 15.7 read as follows:

> "6 A tanker carrying crude oil shall have on board and implement a VOC management plan approved by the Administration. Such a plan shall be prepared taking into account the guidelines developed by the Organization. The plan shall be specific to each ship and shall at least:
>
> .1 provide written procedures for minimizing VOC emissions during the loading, sea passage and discharge of cargo;
>
> .2 give consideration to the additional VOC generated by crude oil washing;
>
> .3 identify a person responsible for implementing the plan; and

[3] The engine is to be fitted on board and tested for its intended purpose before 1 July 2016.

.4 for ships on international voyages, be written in the working language of the master and officers and, if the working language of the master and officers is not English, French or Spanish, include a translation into one of these languages.

7 This regulation shall also apply to gas carriers only if the types of loading and containment systems allow safe retention of non-methane VOCs on board or their safe return ashore.[†]"

***Interpretation*:**

The requirement for a VOC management plan applies only to a tanker carrying crude oil.

9 Continuous-feed type shipboard incinerators

Regulation 16.9
Shipboard incineration

Regulation 16.9 reads as follows:

"9 For incinerators installed in accordance with the requirements of paragraph 6.1 of this regulation the combustion chamber gas outlet temperature shall be monitored at all times the unit is in operation. Where that incinerator is of the continuous-feed type, waste shall not be fed into the unit when the combustion chamber gas outlet temperature is below 850°C. Where that incinerator is of the batch-loaded type, the unit shall be designed so that the combustion chamber gas outlet temperature shall reach 600°C within five minutes after start-up and will thereafter stabilize at a temperature not less than 850°C."

***Interpretation*:**

For the application of this regulation, the term "waste shall not be fed into the unit" should be interpreted as follows:

The introduction of sludge oil, generated during normal operation of a ship, into a continuous-feed type incinerator during the warm-up process at combustion chamber temperatures above 500°C[4] in order to achieve the normal operation combustion chamber temperature of 850°C is allowed. The combustion chamber flue gas outlet temperature should reach 850°C within the period of time specified in the manufacturer's operations manual but should not be more than five minutes.

[†] Resolution MSC.30(61), International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk.

[4] For the introduction of sludge oil into the incinerator, two conditions need to be fulfilled to secure smokeless and complete combustion:

.1 the combustion chamber flue gas outlet temperature has to be above 850°C as required by regulation 16.9 of MARPOL Annex VI to ensure smokeless combustion; and

.2 the combustion chamber temperature (material temperature of the fire brickwork) has to be above 500°C to ensure a sufficient evaporation of the burnable components of the sludge oil.

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Circular Letter No.3445
11 April 2014

To: All IMO Members
Parties to the MARPOL Convention which are not Members of IMO

Subject: **Amendments to MARPOL***

1 MEPC 66 (31 March to 4 April 2014) considered and approved the following draft amendments with a view to adoption at MEPC 67 (13 to 17 October 2014):

.1 draft amendments to MARPOL Annex I (amendments to regulation 43);

.2 draft amendments to MARPOL Annex III (amendments to the appendix on criteria for the identification of harmful substances in packaged form); and

.3 draft amendments to MARPOL Annex VI (amendments to regulations 2 and 13 and the Supplement to the IAPP Certificate).

2 The Secretary-General has the honour to transmit herewith, in accordance with article 16(2)(a) of the MARPOL Convention, the text of the draft amendments referred to above, given in the annex, with a view to their consideration for adoption at MEPC 67 in accordance with article 16(2)(b), (c) and (d) of the said Convention.

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* MEPC 66 also deferred the adoption of draft amendments to MARPOL Annex V on Record of Garbage Discharges, as circulated under cover of Circular Letter No.3370, to MEPC 67.

ANNEX 1

DRAFT AMENDMENTS TO MARPOL ANNEX I
(Amendments to regulation 43)

Regulation 43 – Special requirements for the use or carriage of oils in the Antarctic area

In the chapeau of paragraph 43.1, between the words "the carriage in bulk as cargo" and "or carriage", the words ", use as ballast," are inserted.

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ANNEX 2

DRAFT AMENDMENTS TO MARPOL ANNEX III
(Amendments to the appendix on criteria for the identification of harmful substances in packaged form)

APPENDIX TO ANNEX III

Criteria for the identification of harmful substances in packaged form

The first sentence of the appendix to Annex III of MARPOL is replaced with the following:

> "For the purpose of this Annex, substances, other than radioactive material,* identified by any one of the following criteria are harmful substances**.

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* Refer to class 7 of the IMDG Code.

** The criteria are based on those developed by the United Nations Globally Harmonized System of Classification and Labelling of Chemicals (GHS), as amended. For definitions of acronyms or terms used in this appendix, refer to the relevant paragraphs of the IMDG Code."

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ANNEX 3

DRAFT AMENDMENTS TO MARPOL ANNEX VI
(Amendments to regulations 2 and 13 and the Supplement to the IAPP Certificate)

Regulation 2 (Definitions)

1 Paragraphs 2.9 and 2.14 are amended to read as follows:

"2.9 *Fuel oil* means any fuel delivered to and intended for combustion purposes for propulsion or operation on board a ship, including gas, distillate and residual fuels."

"2.14 *Marine diesel engine* means any reciprocating internal combustion engine operating on liquid or dual fuel, to which regulation 13 of this Annex applies, including booster/compound systems if applied. In addition, a gas fuelled engine installed on a ship constructed on or after [date] or a gas fuelled additional or non-identical replacement engine installed on or after that date is also considered as a marine diesel engine."

Regulation 13 (Nitrogen oxides (NO_X))

2 Paragraph 13.7.3 is amended to read as follows:

"7.3 With regard to a marine diesel engine with a power output of more than 5,000 kW and a per cylinder displacement at or above 90 litres installed on a ship constructed on or after 1 January 1990 but prior to 1 January 2000, the International Air Pollution Prevention Certificate shall, for a marine diesel engine to which paragraph 7.1 of this regulation applies, indicate that either an approved method has been applied pursuant to paragraph 7.1.1 of this regulation; or the engine has been certified pursuant to paragraph 7.1.2 of this regulation; or an approved method is not yet commercially available as described in paragraph 7.2 of this regulation or is not applicable."

Appendix I (Supplement to IAPP Certificate)

3 Paragraph 2.2.1 of the Supplement to the International Air Pollution Prevention Certificate (IAPP Certificate) is amended to read as follows:

"2.2 Nitrogen oxides (NO_X) (regulation 13)

2.2.1 The following marine diesel engines installed on this ship are in accordance with the requirements of regulation 13 as indicated:

Applicable regulation of MARPOL Annex VI (NTC = NO_X Technical Code 2008) (AM = Approved Method)			Eng #1	Eng #2	Eng #3	Eng #4	Eng #5	Eng#6
1	Manufacturer and model							
2	Serial number							
3	Use (applicable application cycle(s) – NTC 3.2)							
4	Rated power (kW) (NTC 1.3.11)							
5	Rated speed (RPM) (NTC 1.3.12)							
6	Identical engine installed ≥ 1/1/2000 exempted by 13.1.1.2		☐	☐	☐	☐	☐	☐
7	Identical engine installation date (dd/mm/yyyy) as per 13.1.1.2							
8a	Major Conversion (dd/mm/yyyy)	13.2.1.1 & 13.2.2						
8b		13.2.1.2 & 13.2.3						
8c		13.2.1.3 & 13.2.3						
9a	Tier I	13.3	☐	☐	☐	☐	☐	☐
9b		13.2.2	☐	☐	☐	☐	☐	☐
9c		13.2.3.1	☐	☐	☐	☐	☐	☐
9d		13.2.3.2	☐	☐	☐	☐	☐	☐
9e		13.7.1.2	☐	☐	☐	☐	☐	☐
10a	Tier II	13.4	☐	☐	☐	☐	☐	☐
10b		13.2.2	☐	☐	☐	☐	☐	☐
10c		13.2.2 (Tier III not possible)	☐	☐	☐	☐	☐	☐
10d		13.2.3.2	☐	☐	☐	☐	☐	☐
10e		13.5.2 (Exemptions)	☐	☐	☐	☐	☐	☐
10f		13.7.1.2	☐	☐	☐	☐	☐	☐
11a	Tier III (ECA-NOx only)	13.5.1.1	☐	☐	☐	☐	☐	☐
11b		13.2.2	☐	☐	☐	☐	☐	☐
11c		13.2.3.2	☐	☐	☐	☐	☐	☐
11d		13.7.1.2	☐	☐	☐	☐	☐	☐
12	AM*	installed	☐	☐	☐	☐	☐	☐
13		not commercially available at this survey	☐	☐	☐	☐	☐	☐
14		not applicable	☐	☐	☐	☐	☐	☐

* Refer to the 2014 Guidelines on the approved method process (resolution MEPC.243(66)) ."

4 Paragraph 2.5 of the Supplement to the International Air Pollution Prevention Certificate (IAPP Certificate) is amended to read as follows:

"2.5 Shipboard incineration (regulation 16)

The ship has an incinerator:

.1 installed on or after 1 January 2000 that complies with:

.1 resolution MEPC.76(40) ☐

.2 resolution MEPC.244(66) ☐

.2 installed before 1 January 2000 that complies with:

.1 resolution MEPC.59(33) ☐

.2 resolution MEPC.76(40) ☐"