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RULES FOR MARINE ENGINE EMISSION VERIFICATION

Chapter 1 GENERAL RULES

1.1 General

In accordance with this rules, necessary procedures are required for emission verification, approval of Technical Files and the issuance of Engine International Air Pollution Prevention certificates (*EIAPP certificate*) (hereinafter referred to as “emission verification, etc.”) for the engine.

1.2 Definition

1.2.1 Terms*

Terms used in the Rules are defined as follows:

- (1) “Engine” means diesel engine of rating exceeding 130 kW.
- (2) “Diesel engine” means any reciprocating internal combustion engine operating on liquid or dual fuel or that which is gas fuelled, including booster/compound systems.
- (3) “*NOx Technical Code*” means the Technical Code on Control of Emission of Nitrogen Oxides from Marine Diesel Engines adopted by the International Conference of Parties to *MARPOL 73/78* in 1997 as resolution 2, as amended by the *IMO*, provided that such amendments are adopted and brought into force in accordance with the provisions of article 16 of the present Convention.
- (4) “Engine manufacturer, etc.” means the engine manufacturer or other responsible party who applies for the emission verification, component confirmation, emission testing, document examination and survey, etc. listed in **2.2.1(2) of the Rules** and **2.1.4-5(3)(b), Part 2 of the Rules for Marine Pollution Prevention Systems**.
- (5) “Measurement procedures for emission verification on a test bed” means procedure specified in Chapter 5 of the *NOx Technical Code*.
- (6) “On-board simplified measurement method” means method specified in 6.3 of the *NOx Technical Code*.
- (7) “On-board direct measurement and monitoring method” means method specified in 6.4 and Appendix VIII of the *NOx Technical Code*.
- (8) “Engine Family” means a series of engines to which the guidance specified in 4.3.8 of the *NOx Technical Code* applies. These engines are series produced, proven to have similar NOx emission characteristics through their design, used as produced, and, during installation on board, and require no adjustments or modifications which could adversely affect the NOx emissions.
- (9) “Engine Group” means a series of engines to which the guidance specified in 4.4.6 of the *NOx Technical Code* applies. These engines form a smaller series, produced for similar engine application, and may require minor adjustments and modifications during installation or in service on board.
- (10) “Parent Engine” means an engine selected as the one which has the highest NOx emission level among all of the engines in an Engine Family in accordance with the provisions specified in 4.3.9 of the *NOx Technical Code* and that chosen for the Engine Group in accordance with the provisions specified in 4.4.8 of the *NOx Technical Code*.
- (11) “Components” of an engine mean those interchangeable parts which influence the NOx emissions performance, identified by their design/parts number.
- (12) “Operating values” of an engine mean engine data, like cylinder peak pressure, exhaust gas temperature, etc., from the engine log which are related to the NOx emission performance. These data are load-dependent.
- (13) “Technical File” means a record containing all details of parameters, including components and settings of an engine, which may influence the NOx emission of the engine.

- (14) “Setting” of an engine means adjustment of an adjustable feature influencing the NO_x emissions performance of an engine.
- (15) “Substantial modification” of an engine means as follows.
- (a) For engines installed on ships at beginning stage of construction on or after 1 January 2000 (19 May 2005 for ships not engaged in international voyages), substantial modification means any modification to an engine that could potentially cause the NO_x emission from the engine to exceed the limits specified in **2.2.2-1**. Routine replacement of components of an engine by parts specified in the Technical File that do not alter NO_x emission characteristics is not be considered a “substantial modification”.
 - (b) For engines installed on ships at beginning stage of construction before 1 January 2000 (19 May 2005 for ships not engaged in international voyages), substantial modification means any modification made to an engine which increases its existing NO_x emission characteristics in excess of the limits established by the on-board simplified measurement method. These changes include, but are not limited to, changes in its operations or in its technical parameters (e.g., changing camshafts, fuel injection systems, air systems, combustion chamber configuration, or timing calibration of the engine). However, the installation of a certified approved method pursuant to *Regulation 13.7.1.1 of Annex VI* or certification pursuant to *Regulation 13.7.1.2 of Annex VI* is not considered to be a substantial modification for the purpose of the application of **(16)** and **2.2.2-1(2)**.
- (16) “Major conversion” of an engine means a modification of an engine on or after 1 January 2000 (19 May 2005 for ships not engaged in international voyages) which corresponds to any of the following **(a)** to **(c)**.
- (a) The engine is replaced or supplemented with a non-identical engine manufactured.
 - (b) Any substantial modification of an engine is made to the engine.
 - (c) The maximum continuous output (referred to in **2.1.23, Part A of the Rules for the Survey and Construction of Steel ships**, hereinafter the same) of the engine is increased to more than 10%.
- (17) “Emission Control Areas” means an area where the adoption of special mandatory measures for emissions from ships is required to prevent, reduce and control air pollution from NO_x or SO_x and particulate matter or all three types of emissions and their attendant adverse impacts on human health and the environment. Emission Control Areas are to include those listed in, or designated under the following **(18)**.
- (18) “NO_x Emission Control Areas” means the following areas:
- (a) The North American Area
 - i) The sea area located off the Pacific coasts of the United States and Canada, enclosed by geodesic lines connecting the coordinates specified in Appendix VII.1 to *Annex VI*.
 - ii) The sea areas located off the Atlantic coasts of the United States, Canada, and France (Saint-Pierre-et-Miquelon) and the Gulf of Mexico coast of the United States enclosed by geodesic lines connecting the coordinates specified in Appendix VII.2 to *Annex VI*.
 - iii) The sea area located off the coasts of the Hawaiian Islands of Hawaii, Maui, Oahu, Molokai, Niihau, Kauai, Lanai, and Kahoolawe, enclosed by geodesic lines connecting the coordinates specified in Appendix VII.3 to *Annex VI*.
 - (b) The United States Caribbean Sea Area
The sea area located off the Atlantic and Caribbean coasts of the Commonwealth of Puerto Rico and the United States Virgin Islands, enclosed by geodesic lines connecting the coordinates specified in Appendix VII.3 to *Annex VI*.
 - (c) The Baltic Sea Area
The Baltic Sea proper with the Gulf of Bothnia, the Gulf of Finland and the entrance to the Baltic Sea bounded by the parallel of the Skaw in the Skagerrak at 57°44.8’N.
 - (d) The North Sea Area
The North Sea proper including seas therein with the boundary between:
 - i) the North Sea southwards of latitude 62° N and eastwards of longitude 4° W;
 - ii) the Skagerrak, the southern limit of which is determined east of the Skaw by latitude 57° 44.8’N; and
 - iii) the English Channel and its approaches eastwards of longitude 5° W and northwards of latitude 48° 30’N.
 - (e) A sea area, including port areas, designated by the *IMO* in accordance with criteria and procedures set forth in Appendix III to *Annex VI* other than those specified in **(a)** to **(d)** above.
- (19) “A ship at beginning stage of construction” is a ship whose keel is laid or a ship at a similar stage of construction. For this

purpose, the term “a similar stage of construction” means the stage at which:

- (a) construction identifiable with a specific ship begins; and
 - (b) assembly of that ship has commenced comprising at least 50 *tonnes* or 1% of the estimated mass of all structural material, whichever is less.
- (20) “*Annex VI*” means the annex VI of 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.

Chapter 2 EMISSION VERIFICATION, ETC.

2.1 Application for Emission Verification, etc.

2.1.1 Application for Emission Verification, etc.*

- 1 The emission verification, etc. of an engine is done based upon the application of the applicant.
- 2 The application is to be submitted by the engine manufacturer, etc.
- 3 The applicant is to use the prescribed format (APP-EIAPP(E)) for the application and submit it to the Society.
- 4 Three copies each of the following drawings and documents are to be submitted to the Society together with the application.
 - (1) Specifications of the engine (excluding cases where submitted separately)
 - (2) Drawings showing the construction and layout of the engine (excluding cases where submitted separately)
 - (3) Documents showing the materials used for the engine (excluding cases where submitted separately)
 - (4) Documents showing the scope of the target engine
 - (5) Documents showing the criteria for selection (for parent engine only)
 - (6) Technical File
 - (7) NOx measuring plans (for parent engine only)
 - (8) Other documents considered necessary by the Society
- 5 At the emission verification, etc., the Society may require from the applicant other documents, etc. determined to be necessary by the Society in addition to the drawings and documents specified in -4 above. In such cases, applicant is to submit the documents, etc. requested by the Society.
- 6 Technical File is to include at least the information in the following (1) to (11).
 - (1) Identification of those components, including detailed information to enable to find out whether they are modified or not, settings and operating values of the engine which influence its NOx emissions including any NOx-reducing device or system.
 - (2) Identification of the full range of allowable adjustments or alternatives for the components of the engine.
 - (3) Full record of the relevant engine's performance, including the number of maximum continuous revolutions and maximum continuous output of the engine consistent with those specified on the nameplate.
 - (4) At least one of the following methods to verify NOx emissions: the on-board simplified measurement method, the on-board direct measurement and monitoring method, or an on-board engine parameter check method specified otherwise by the Society. When on-board direct measurement and monitoring method is applied, procedures for calibration and operation of the measuring equipment specified by the engine manufacturer, etc. are to be contained. In addition, when exhaust gas cleaning system to reduce NOx emissions is installed, on-board NOx verification procedures for the system to ensure it is operating correctly are also to be contained.
 - (5) A copy of the test report on the testing required in 2.2.1(2)(a). (In the case where the method in 2.2.1(2)(d)ii) applied in accordance with 2.2.1(2)(a)iv)2) was conducted for emission verification, both the test reports are to be included.) For a Member Engine of an Engine Family or Engine Group, it may be substituted for that for the Parent Engine.
 - (6) If applicable, the designation and restrictions for an engine which is a member of an Engine Family or Engine Group in consistent with the requirement specified in Chapter 4 of the *NOx Technical Code*.
 - (7) Specifications of those spare parts/components of the engine which, when used in the engine, according to those specifications, will result in continued compliance of the NOx emission with the limits specified in 2.2.2-1.
 - (8) *EIAPP certificate*, where it has been issued.
 - (9) In case the exhaust gas cleaning system to reduce NOx emissions is installed, record of the presence of the system as an essential component of the engine.
 - (10) Where an additional substance is introduced, such as ammonia, urea, steam, water, fuel additives, etc., sufficient information to allow a ready means of demonstrating that the consumption of such additional substances is consistent with achieving compliance with the applicable NOx limit.
 - (11) Other information considered necessary by the Society.

2.2 Emission Verification and Approval of Technical File of the Engine

2.2.1 Emission Verification and Approval of Technical File of the Engine*

The Society will conduct emission verification, components verification and approval of the Technical File of an engine in accordance with the *NOx Technical Code* for the following **(1)** to **(3)** items.

- (1) Preparations for emission verification, etc.

For emission verification and approval of the Technical File of the engine, the following preparation is, in principle, required; the Society may, however, require additional preparation it deems to be necessary. Omission of the part of the following may be accepted by the Society in some cases.

 - (a) To be able to drive the engine
 - (b) To be able to measure the NOx emission from the engine
 - (c) Open the engine so as to be able to check its interior as well as to discharge its contents and any hazardous gases contained therein.
- (2) Emission verification
 - (a) Emission verification
 - i) It is to be verified that NOx emissions are within the limits specified in **2.2.2-1** in accordance with the measurement procedures for emission verification on a test bed.
 - ii) For a Member Engine of an Engine Family or Engine Group, the testing specified in **i)** above may be omitted provided that it has been verified by the testing that the NOx emissions from the Parent Engine representing the Engine Family or Engine Group is within the limits specified in **2.2.2-1**.
 - iii) Notwithstanding **i)** above, the following **1)** and **2)** may be applied.
 - 1) In cases where verification cannot be carried out in accordance with the measurement procedures for emission verification on a test bed due to their size, construction and delivery schedule, the following **(d)i)** may be applied upon request by the engine manufacturer, etc., shipowner or shipbuilder.
 - 2) The provisions of **1)** above may be applied to an individual engine or an Engine Group represented by the Parent Engine, but are not to be applied to an Engine Family.
 - iv) In the case of engines fitted with a NOx-reducing device, the following **1)** or **2)** is to be applied.
 - 1) The NOx-reducing device is to be recognized as a component of the engine, and the testing is to be carried out as separately specified by the Society. However, the pre-certification in accordance with the procedure not involving the testing for the combined engine/NOx-reducing device on a test bed is subject to the limitations specified in **iii)2)** above.
 - 2) In cases where a NOx-reducing device has been fitted to engines due to failure to meet the required emission limits in accordance with the measurement procedures for emission verification on a test bed, re-testing is to be carried out with the device fitted. In such cases, the re-testing may be carried out in accordance with the following **(d)ii)** provided that the effectiveness of the NOx-reducing device was demonstrated.
 - (b) Confirmation of the components of an engine at the emission verification

It is to be verified using the same method as the parameter check method referred to in **2.1.1-6(4)** that engines which passed the emission verification required in **(a)** above and their components are in compliance with the Technical File. In cases where the engine is not a Parent Engine but a Member Engine of an Engine Family or Engine Group, verification may be made by checking the records of any equivalent confirmation carried out by the engine manufacturer, etc.
 - (c) Examination of the Technical File
 - i) For engines other than those to which **(a)iii)1)** or **(a)iv)2)** above is applied, the engine manufacturer, etc. is to submit the Technical File to the Society for approval prior to the test after installation on board.
 - ii) For engines to which **(a)iii)1)** or **(a)iv)2)** above is applied, the engine manufacturer, etc. is to submit the Technical File to the Society for approval after the test required in the following **(d)**.
 - (d) Test after installation on board
 - i) For engines to which **(a)iii)1)** above is applied, it is to be verified on board that NOx emissions are within the limits specified in **2.2.2-1** using the same method as the measurement procedures for emission verification on a test bed.

- ii) For engines to which (a)iv)2) above is applied, it is to be verified on board that NOx emissions are within the limits specified in 2.2.2-1 in accordance with the on-board simplified measurement method. In such cases, the allowances specified in 6.3.11 of the *NOx Technical Code* are not allowed.

(3) Omission of verification and inspection

For engines with certificates, etc. recognized by the Society as being equivalent to the *EIAPP certificate* issued according to this Rules, the verification and inspection specified in 2.2.1(2)(a), (b) and (d) may be omitted.

2.2.2 Maximum Allowable NOx Emission Limits*

1 On each engine, the exhaust gas cleaning system to reduce NOx emissions specified in the approved Technical File is to be installed, otherwise the equivalent method to reduce NOx emissions deemed appropriate by the Society is to be carried out in order to keep the NOx emission measured and calculated in accordance with the following -2 within the limits specified in Table 1.1(a) to 1.1(c) at the number of maximum continuous revolutions (referred to in 2.1.24, Part A of the Rules for the Survey and Construction of Steel ships, hereinafter the same) of the engine.

- (1) Engines which are installed on ships at beginning stage of construction on or after 1 January 2000

(a) Tier I

For ships at beginning stage of construction on or after 1 January 2000 and prior to 1 January 2011 installed with engines

Table 1.1(a) Maximum Allowable NOx Emission Limits (Tier I)

Number of maximum continuous revolutions N_0 (rpm)	Maximum allowable NOx emission limits (g/kWh)
$N_0 < 130$	17.0
$130 \leq N_0 < 2000$	$45.0 \times N_0^{(-0.2)}$
$2000 \leq N_0$	9.8

(b) Tier II

For ships at beginning stage of construction on or after 1 January 2011 installed with engines

Table 1.1(b) Maximum Allowable NOx Emission Limits (Tier II)

Number of maximum continuous revolutions N_0 (rpm)	Maximum allowable NOx emission limits (g/kWh)
$N_0 < 130$	14.4
$130 \leq N_0 < 2000$	$44.0 \times N_0^{(-0.23)}$
$2000 \leq N_0$	7.7

(c) Tier III

For either of the following ships which operate in applicable NOx emission control areas installed with engines:

- i) Ships at beginning stage of construction on or after 1 January 2016 which operate in the NOx emission control areas specified in (a) and (b) of 1.2.1(18);
- ii) Ships at beginning stage of construction on or after 1 January 2021 which operate in the NOx emission control areas specified in (c) and (d) of 1.2.1(18); or
- iii) Ships at beginning stage of construction on or after the date of the adoption of such a NOx emission control area by the *IMO* or a later date as may be specified by the *IMO* in accordance with Regulation 13.5.1.3 of Annex VI, whichever is later which operate in NOx emission control areas other than those specified in (a) to (d) of 1.2.1(18).

Table 1.1(c) Maximum Allowable NOx Emission Limits (Tier III)

Number of maximum continuous revolutions N_0 (rpm)	Maximum allowable NOx emission limits (g/kWh)
$N_0 < 130$	3.4
$130 \leq N_0 < 2000$	$9.0 \times N_0^{(-0.2)}$
$2000 \leq N_0$	2.0

- (d) The requirements specified in (c) above do not apply to the following ships:
- i) Ships with a length of less than 24 m that have been specifically designed, and are used solely for recreational purposes; or
 - ii) Ships with a combined nameplate engine propulsion power of less than 750 kW if it can be demonstrated, to the satisfaction of the Administration, that the ship cannot comply with the standards specified in **Table 1.1(c)** because of design or construction limitations; or
 - iii) Ships of less than 500 gross tonnage with a length of 24 m or over at beginning stage of construction on or after 1 January 2021 specifically designed, and used solely, for recreational purposes.

(2) Major conversions of engines performed on or after 1 January 2000

When replacing an engine with a non-identical engine or when installing an additional engine, the standards in force at the time of the replacement or addition of the engine are to be applied. However, for engine replacements, if the Administration deems it impossible for such a replacement engine to meet the standards set forth in **Table 1.1(c)**, then that replacement engine is to meet the standards set forth in **Table 1.1(b)**. The criteria for determining when it is not possible for a replacement engine to meet the standards in **Table 1.1(c)** are to be in accordance with relevant guidelines established by the *IMO*.

2 Measurement and calculation is to be in accordance with the following:

- (1) NOx emissions are to be measured and calculated applying a test cycle in accordance with the following (a) to (e).
- (a) For constant-speed engines for ship main propulsion, including diesel electric drive, test cycle E2 specified in **Table 1.2** is to be applied.
 - (b) For controllable-pitch propeller sets test cycle E2 specified in **Table 1.2** is to be applied, irrespective of combinatory curve.
 - (c) For propeller-law-operated main and propeller-law-operated auxiliary engines test cycle E3 specified in **Table 1.3** is to be applied.
 - (d) For constant-speed auxiliary engines, test cycle D2 specified in **Table 1.4** is to be applied.
 - (e) For variable-speed, variable-load auxiliary engines, not included in (a) to (d) above, test cycle C1 specified in **Table 1.5** is to be applied.
- (2) The measurement is to be carried out using the fuel specified otherwise by the Society.
- (3) NOx emission value and the limit, rounded to one decimal place, are to be obtained.

Table 1.2 Test Cycle Type E2

Number of revolutions	100%	100%	100%	100%*(2)
Output	100%	75%	50%	25%
Weighting factor*(1)	0.2	0.5	0.15	0.15

Table 1.3 Test Cycle Type E3

Number of revolutions	100%	91%	80%	63%
Output	100%	75%	50%	25%
Weighting factor*(1)	0.2	0.5	0.15	0.15

Table 1.4 Test Cycle Type D2

Number of revolutions	100%	100%	100%	100%	100%
Output	100%	75%	50%	25%	10%
Weighting factor ^{*(1)}	0.05	0.25	0.3	0.3	0.1

Table 1.5 Test Cycle Type C1

Number of revolutions	Number of maximum continuous revolutions				Intermediate ^{*(4)}			Idle
	100%	75%	50%	10%	100%	75%	50%	
Torque ^{*(3)}	100%	75%	50%	10%	100%	75%	50%	0%
Weighting factor ^{*(1)}	0.15	0.15	0.15	0.1	0.1	0.1	0.1	0.15

Notes:

- *(1) Those specified in 5.12.6 of the *NOx Technical Code*.
- *(2) There are exceptional cases, including large bore engines intended for E2 applications, in which, due to their oscillating masses and construction, engines cannot be run at low load at nominal speed without the risk of damaging essential components. In such cases, the engine manufacturer is to make application to the Administration that the test cycle as given in [Table 1.2](#) may be modified for the 25% power mode with regard to the engine speed. The adjusted engine speed at 25% power, however, is to be as close as possible to the rated engine speed, as recommended by the engine manufacturer and approved by the Administration. The applicable weighting factors for the test cycle are to remain unchanged.
- *(3) The ratio of the required torque to the maximum possible torque at the given number of revolutions.
- *(4) To be declared by the engine manufacturer, etc., taking into account the following requirements:
 - (a) For engines which are designed to operate over a speed range on a full load torque curve:
 - i) If the maximum torque is obtained at the number of revolutions less than 60% of the number of maximum continuous revolutions, it is to be 60% of the number of maximum continuous revolutions.
 - ii) If the maximum torque is obtained at the number of revolutions between 60% and 75% of the number of maximum continuous revolutions, it is to be that number of revolutions.
 - iii) If the maximum torque is obtained at the number of revolutions greater than 75% of the number of maximum continuous revolutions, it is to be 75% of the number of maximum continuous revolutions.
 - (b) For engines other than those referred to in (a) above, it is typically to be between 60% and 70% of the number of maximum continuous revolutions.

3 Where an additional substance is introduced, such as ammonia, urea, steam, water, fuel additives, etc., a means of monitoring the consumption of such substance is to be provided.

4 When a new test cycle is applied to an engine already verified using a different test cycle listed in [-2\(1\)\(a\) to \(e\)](#), the verification may be carried out by recalculation, by applying the measurement results from the specific modes of the first verification to the calculation of the total weighted emissions for the new test cycle application, using the corresponding weighting factors from the new test cycle.

2.3 Engine International Air Pollution Prevention Certificate (*EIAPP Certificate*)

2.3.1 Issue of Certificate

1 The Society will issue an *EIAPP certificate* for engines which satisfy the requirements of the *NOx Technical Code* and this Rules.

2 An *EIAPP certificate* will be issued for engines which have completed emission verification before installation on board in cases where the engine's Technical File is approved and it is deemed to comply with the Rules.

2.3.2 Reissue of Certificate

The engine manufacturer, etc., when the *EIAPP certificate* is soiled or lost, is to submit a written application (APP-EIAPP(E)) for the reissue of the certificate to the Society in due course together with the *EIAPP certificate* (if it is soiled) and approved technical file.

2.3.3 Rewriting of Certificate

The engine manufacturer, etc., when the descriptions of the *EIAPP certificate* are changed, is to submit a written application (APP-EIAPP(E)) for rewriting the certificate to the Society together with the *EIAPP certificate* and approved technical file.

2.3.4 Returning Certificates

The engine manufacturer, etc., who encounters any of the following, is to return the *EIAPP certificate* issued by the Society at the earliest convenience.

- (1) The engine is scrapped or demolished.
- (2) The original *EIAPP certificate* is found out after obtaining the replacement thereof in accordance with [2.3.2](#) (In this case, the original *EIAPP certificate* is to be returned to the Society.)
- (3) Aside from those stated above, when the engine no longer needs to have an *EIAPP certificate*.

Chapter 3 FEES AND EXPENSES

3.1 Fees

Fees will be charged in accordance with the provisions provided separately when the following (1) and (2) are applicable:

- (1) an emission verification, etc. is performed in accordance with these Regulations; or
- (2) an *EIAPP certificate* is reissued or rewritten in accordance with these Regulations.

3.2 Expenses

Travelling and other expenses will be charged in accordance with the provisions provided separately when an emission verification, etc. is performed in accordance with these Regulations.

Chapter 4 CONDITIONS OF SERVICE

4.1 Confidentiality

All documents and information provided to the Society are treated as confidential by the Society and are not to, without the prior consent of the party providing such documents or information, be disclosed for any purpose other than that for which they are provided. The results of emission verification, etc. conducted by the Society are treated in the same manner as the above documents. The contents and/or copies of the documents, information and/or the results of emission verification, etc. may be disclosed as required by applicable legislation, court order, legal proceedings or adherence to the requests of any port states whose ports ships with the concerned engine call at. Further, the following information is considered public information and available to any interested party.

4.2 Independence

The Society acts independently in the performance of its services relating to emission verification, etc. and neither the Society nor any of its officers, directors, employees, agents or sub-contractors are to be considered as an employee, or agent of any other party, including but not limited to an engine manufacturer, etc., shipyard, shipowner, charterer or insurer.

Chapter 5 MISCELLANEOUS

5.1 Maintenance of Record Book

Regarding the emission verification, etc. of an engine and those engines for which an *ELAPP certificate* was reissued or rewritten, the Society adds the necessary information to the record book and then keeps it on file.

5.2 Disagreement

In case of disagreement regarding the emission verification, etc. of an engine, the reissue of an *ELAPP certificate* or the rewriting of an *ELAPP certificate* performed by the Society in accordance with these Regulations, the engine manufacturer, etc. or shipowner may apply to the Society in writing within thirty (30) days counted from the day after the emission verification, etc. of engine, reissue of the *ELAPP certificate* or rewriting of the *ELAPP certificate* is completed to perform another emission verification, etc. of engine, another reissue of the *ELAPP certificate* or another rewriting of the *ELAPP certificate*.

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GUIDANCE FOR MARINE ENGINE EMISSION VERIFICATION

Chapter 1 GENERAL RULES

1.2 Definition

1.2.1 Terms

1 In applying **1.2.1(3) of the Rules**, the procedures for engines fitted with selective catalytic reduction systems are also to be in accordance with *IMO* resolution *MEPC.291(71)*, as amended. In applying the resolution and the *NOx Technical Code* referred to in the resolution, IACS MPC series unified interpretations (MPC30(Rev.1), MPC58(Rev.1), MPC59(Rev.1), MPC74(Rev.1), MPC77(Rev.1), MPC106, MPC112(Rev.1), MPC115(Rev.1), MPC116(Rev.1) and MPC125(Rev.1)) related thereto are also to be applied.

2 For the “Engine Family” and “Engine Group” referred to in **1.2.1(8)** and **(9) of the Rules**, IACS Unified Interpretation MPC53(Rev.1) is also to be applied.

3 For the increase in “emission characteristics” and for the “substantial modification” referred to in **1.2.1(15)(b) of the Rules**, IACS Unified Interpretation MPC32(Rev.1) is also to be applied.

Chapter 2 EMISSION VERIFICATION, ETC.

2.1 Application for Emission Verification, etc.

2.1.1 Application for Emission Verification, etc.

1 For engines fitted with selective catalytic reduction systems, the “other documents considered necessary by the Society” specified in **2.1.1-4(8) of the Rules** include, but are not limited to, such documents as the following:

- (1) Explanatory documents for modelling tools
- (2) Test plans and test records of the testing of chambers
- (3) Explanations of the reasons why it is not appropriate to test with the exhaust gas cleaning system to reduce NO_x emissions attached during emission verification by means of measurement procedures for emission verification on a test bed
- (4) Test plans of the on board confirmation tests specified in 7, Annex of *IMO* resolution *MEPC.291(71)*, as amended

2 In applying the “on-board direct measurement and monitoring method” referred to in **2.1.1-6(4) of the Rules**, the following (1) to (7) are also to be complied with:

- (1) Data are to be taken within the last 30 *days* and in accordance with either the following (a) or (b):
 - (a) Spot checks logged with other engine operating data on a regular basis and over the full range of engine operation; or
 - (b) Results from continuous monitoring and data storage
- (2) These monitoring records are to be kept on board for 3 *months*.
- (3) Data are to be corrected for ambient conditions and fuel specification.
- (4) Measuring equipment is to be checked for correct calibration and operation, in accordance with the procedures specified in the engine’s Technical File by the measurement equipment manufacturer.
- (5) Where exhaust gas after-treatment devices are fitted which influence the NO_x emissions, the measuring point(s) are to be located downstream of such devices.
- (6) Sufficient data is to be collected to calculate the weighted average NO_x emissions.
- (7) In case an exhaust gas cleaning system to reduce NO_x emissions is installed on the engine, other relevant parameters may be monitored where approved by the Society.

3 The wording “on-board engine parameter check method specified otherwise by the Society” in **2.1.1-6(4) of the Rules** means the method in accordance with 6.2 of the *NO_x Technical Code*.

4 For the “specifications” referred to in **2.1.1-6(7) of the Rules**, IACS Unified Interpretation MPC45(Rev.1) is also to be applied.

5 The wording “other information considered necessary by the Society” in **2.1.1-6(11) of the Rules** include, but are not limited to, such information as the following:

- (1) If the engine has more than one mode of operation (e.g., one mode to comply with the Tier II and another mode to comply with Tier III), details of the control guidelines for the selection of the different modes of operation and the recording of the modes of operation along with the method of changing between the modes.
- (2) The auxiliary control device (if applicable) specified in *Regulation 2.4 of Annex VI*
- (3) For engines fitted with selective catalytic reduction systems, the information specified in paragraph 3.2 of the Annex of *IMO* resolution *MEPC.291(71)*, as amended.

2.2 Emission Verification and Approval of Technical File of the Engine

2.2.1 Emission Verification and Approval of Technical File of the Engine

1 In applying **2.2.1(2)(a)i) of the Rules**, refers to *IMO* resolution *MEPC.291(71)*, as amended, or others deemed appropriate by the Administration taking into account this resolution.

2 The “separately specified by the Society” referred to in **2.2.1(2)(a)iv)1) of the Rules** for engines fitted with selective catalytic reduction systems means the following (1) and (2):

- (1) At the emission verification by means of measurement procedures for emission verification on a test bed, engines fitted with a

NO_x-reducing device are also subject to Section 5 of the Annex of *IMO* resolution *MEPC.291(71)*, as amended.

- (2) At the emission verification by means of measurement procedures for emission verification on a test bed, engines tested in a condition other than that specified in (1) above are also to be subject to Section 6 of the Annex of *IMO* resolution *MEPC.291(71)*, as amended. For such engines, it is necessary to ensure that the additional on board confirmation tests specified in Section 7 of the Annex of *IMO* resolution *MEPC.291(71)*, as amended, are performed.

3 Engines undergoing the onboard certification test specified in **2.2.1(2)(d)i) of the Rules** are to have a preliminary approved Technical File, pending the results of the emission test. Where the result of the emission test does not comply with the applicable NO_x regulation, the engines are to be re-adjusted to the compliance condition originally approved, if any, or the applicant is to apply to the Administration for acceptance of further testing.

2.2.2 Maximum Allowable NO_x Emission Limits

1 Major conversion of an engine is to be accordance with following:

- (1) The wording “time of the replacement or addition” of the engine specified in **2.2.2-1(2) of the Rules** means any of the following (a) to (c):
- (a) The contractual delivery date of the engine to the ship. However, the engine is to be fitted on board and tested within 6 months after the date specified in **2.2.2-1(1)(c)i) to iii) of the Rules**, as appropriate.
 - (b) In the absence of a contractual delivery date, the actual delivery date of the engine to the ship, provided that the date is confirmed by a delivery receipt. However, the engine is to be fitted on board and tested within 6 months after the date specified in **2.2.2-1(1)(c)i) to iii) of the Rules**, as appropriate.
 - (c) In the event the engine is fitted on board and tested for its intended purpose on or after 6 months from the date specified in **2.2.2-1(1)(c)i) to iii) of the Rules**, as appropriate, the actual date that the engine is tested on board.

Entry of the date in (a) to (c) above, provided the conditions associated with those dates apply, is to be made in item 8.a “Major conversion – According to regulations 13.2.1.1 and 13.2.2” of the Supplement of International Air Pollution Prevention Certificate. However, if the diesel engine is not tested within 6 months after the date specified in **2.2.2-1(1)(c)i) to iii) of the Rules**, as appropriate 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 the unified interpretation of MARPOL Annex I.

- (2) The wording “guidelines established by the *IMO*” specified in **2.2.2-1(2) of the Rules** means 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 (*IMO Res.MEPC.230(65)*, as amended)”.
- (3) Any substantial modification of an engine or increasing of the maximum continuous rating of the engine by more than 10% compared to the maximum continuous rating of the original certification of the engine is to be made in accordance with following (a) to (e):
- (a) For ships at beginning stage of construction prior to 1 January 2011
The engine is to comply with the standard in **2.2.2-1(1)(a) of the Rules**.
 - (b) For ships at beginning stage of construction on or after 1 January 2011
The engine is to comply with the standard in **2.2.2-1(1)(b) of the Rules**.
 - (c) For ships at beginning stage of construction on or after 1 January 2016 which operate in NO_x emission control areas specified in (a) and (b) of **1.2.1(18) of the Rules**
The engine is to comply with the standard in **2.2.2-1(1)(c) of the Rules**.
 - (d) For ships at beginning stage of construction on or after 1 January 2021 which operate in NO_x emission control areas specified in (c) and (d) of **1.2.1(18) of the Rules**
The engine is to comply with the standard in **2.2.2-1(1)(c) of the Rules**.
 - (e) For ships at beginning stage of construction on or after the date specified in **2.2.2-1(1)(c)iii) of the Rules** which operate in NO_x emission control areas other than those specified in (a) to (d) of **1.2.1(18) of the Rules**
The engine is to comply with the standard in **2.2.2-1(1)(c) of the Rules**.

2 The wording “fuel specified otherwise by the Society” in **2.2.2-2(2) of the Rules** refers to a DM-grade marine fuel oil or RM-grade fuel oil (for the measurement procedures for emission verification on a test bed only in cases where a DM-grade fuel oil is not available) specified in *ISO 8217:2005*, or a gas fuel selected in accordance with the *NO_x Technical Code*.