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CONSIDERATION AND ADOPTION OF AMENDMENTS TO MANDATORY INSTRUMENTS

Revision of MARPOL Annex VI and the NO_x Technical Code

Guidelines for certification of Tier III engines utilizing exhaust gas after-treatment

Submitted by the United States

SUMMARY

Executive summary: The United States expresses full support for the adoption of the amendments to MARPOL Annex VI, including the provisions applicable to the control of NO_x emissions from Tier II, Tier III, and existing engines, and provides comment and guidance for Tier III engine certification. This submission elaborates on the discussions during MEPC 57 regarding the need for development of guidelines for certification of Tier III exhaust gas after-treatment systems

Strategic direction: 7.3

High-level action: 7.3.1

Planned output: 7.3.1.1

Action to be taken: Paragraph 9

Related documents: MEPC 58/5/2, MEPC 58/5/4, MEPC 57/4/23/Add.1 and MEPC 57/4/46

Introduction

1 This document is submitted in accordance with the provisions of paragraph 4.10.5 of the Guidelines on the organization and method of work of the Maritime Safety Committee and the Marine Environment Protection Committee and their subsidiary bodies (MSC-MEPC.1/Circ.2). It comments on MEPC 58/5/2, submitted by the Secretariat, as it relates to guidelines to be developed under the revised MARPOL Annex VI and the NO_x Technical Code.

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2 The United States fully supports the adoption of the amendments to MARPOL Annex VI, including the provisions applicable to the control of NO_x emissions from Tier II, Tier III, and existing engines. In support of these provisions and in response to the Secretariat's identification of the potential need for guidance as called out in MEPC 58/5/2, the United States would like to provide information for the Committee to consider with respect to guidance for certification of Tier III compliant engines that utilize exhaust gas after-treatment systems.

Need for guidance for Tier III certification

3 The Tier III NO_x limits contained in regulation 13 are long-term standards that will achieve significant emission reductions from marine diesel engines. These limits are expected to be achieved through a combination of engine-based improvements and the use of after-treatment systems including selective catalytic reduction (SCR) systems, although some engine manufacturers are pursuing techniques that may rely only on engine-based controls. Because the technologies that will be used for the Tier III standards are still under development, it is appropriate to consider developing guidance with respect to the certification of these engines and, more specifically, whether certification should be performed based on the procedures currently contained in the NO_x Technical Code or whether an alternative process should be considered.

4 It should be noted that the certification concerns for Tier III standards stem from the size of the after-treatment units that would be applied to large-bore marine diesel engines. These concerns which involve the testing of after-treatment systems are resolvable for engines with per cylinder displacement less than 30 litres. Therefore, the United States recommends that such guidance be limited to large bore engines only.

Alternatives to the NO_x Technical Code Certification Procedures

5 One alternative procedure, described in MEPC 57/4/46, calls for a "group certificate" certification concept where the Tier III certification could take place on board a ship. This approach is based on a survey scheme that would not require full certification of the Tier III engines on board. Instead, the survey would check whether a pre-certified Tier II engine when combined with a "type-approved" after-treatment system, after assembly in the yard, meets the Tier III emission requirement for that engine. Such a "group certificate" scheme could be applied across the whole operating regime of the engine and would only require an onboard survey. Verification of NO_x emissions would be based on measurement of NO_x emissions at a single operating point to ensure Tier III compliance. This survey would take place during the sea trial.

6 The United States understands the complexity and logistics involved with test-bed certification of after-treatment equipped large bore engines, and support the concept of developing guidance with respect to certifying such engines to Tier III standards. At the same time, however, we see no significant hurdle for a method such as that described in MEPC 57/4/46 to verify the NO_x emissions at all the E2 and E3 test cycle points during sea trial. Testing at all the test cycle points would provide greater assurance that the engine and after-treatment system are performing as expected over an appropriately wide range of conditions.

7 In such an approach, measurement would be made at the operating modes of the engine's certification cycle. While it is widely recognized that it is difficult during an onboard certification to precisely hit all the certification cycle load points, the United States does not believe this would prevent effective onboard verification of the expected after-treatment system performance through direct measurement of NO_x reduction across the after-treatment system's.

The after-treatment device(s) would be expected to provide similar NO_x reduction efficiency when tested at conditions that vary slightly from the nominal test conditions of the regulated cycle. If, for example, on the E3 test cycle, a test is carried out at 80% speed and 48% load (instead of the E3 test cycle defined 50% load) the resulting NO_x reduction efficiency would be expected to be fundamentally the same as if the test were actually run at 50% load.

8 The measurements described above could be performed using DMM (Direct Measurement and Monitoring) or other Portable Emission Measurement System technology. Since the brake-specific engine out NO_x values will be known (Tier II certification values), measurement of NO_x pre and post after-treatment could be used to determine the NO_x reduction efficiency across the after-treatment system. This could then be used in conjunction with the Tier II certification values to calculate Tier III certification values. This NO_x measurement could be performed with a chemiluminescent NO_x analyser, NDUV NO_x analyser, or something as simple as a zirconia NO_x sensor. The resulting calculated Tier III certification values can then be used to determine if the engine is Tier III compliant. If the engine is deemed compliant, then the Tier III EIAPP may be issued.

Action requested of the Committee

9 The Committee is invited to consider the comments and information provided above and take action as appropriate.
