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PREVENTION OF AIR POLLUTION FROM SHIPS

Normal Maximum Sea Load for Auxiliary Engines

Submitted by Denmark

SUMMARY

Executive summary:	This document comments on the report from the Intersessional Working Group (MEPC 58/4), and offers considerations on how to express the normal maximum sea load for auxiliary engines for the purpose of the new ship design CO_2 index
Strategic direction:	7.3
High-level action:	7.3.1
Planned output:	7.3.1.1 and 7.3.1.3
Action to be taken:	Paragraph 12
Related documents:	MEPC 58/4 and MEPC 58/4/10

Introduction

1 This document is submitted in accordance with paragraph 4.10.5 of the Guidelines on the organization and method of work of the Committees and their subsidiary bodies (MSC-MEPC.1/Circ.2) and comments on document MEPC 58/4.

2 MEPC 57 tasked the first Intersessional meeting of the Working Group on GHG Emissions from Ships (GHG-WG 1), to develop a mandatory design CO_2 index for new ships and, if deemed appropriate, for approval at MEPC 58. Based on the two submissions from Denmark and Japan, GHG-WG 1 developed a concept for a mandatory design CO_2 index for new ships.

3 This document comments on document MEPC 58/4, report on the outcome of the first Intersessional Meeting of the Working Group on Greenhouse Gas Emissions from Ships. The method, formula and parameters being considered in this document are described in annex 5 of that document. It also elaborates further on the considerations and discussions in document MEPC 58/4/10 – Design CO_2 Index formula and Auxiliary Engine Power Considerations – by Denmark.

Objective

4 With reference to document MEPC 58/4, paragraphs 2.15 to 2.23, the objective of this document is to consider how the method and formula used for calculating a design CO_2 index could appropriately take the auxiliary power into account.

Normal maximum sea load

5 In order to ensure consistent use of the proposed method, it is essential that parameters used in the formula are defined in an unambiguous manner. The Intersessional Working Group defined the auxiliary engine power P_{AE}, as the required auxiliary engine power to supply the normal maximum sea load including, the necessary power for machinery, systems, equipment, and living on board, where the ship's engaged in a voyage at design speed (V_{ref}) and the design loading condition of Capacity. Required fuel consumption for boiler(s) should also be included as one of P_{AEi}, where any steam generated is not obtained from the exhaust gas.

6 However, the normal maximum sea load is a non-standardized contractual value, subject to agreement between the owner and the yard, and therefore not explicitly defined. Thus, the normal maximum sea load needs to be defined. This can in principle be done by two different approaches, which, for the purpose of this document, is called a top down approach and a bottom up approach.

7 In document MEPC 58/4/10, Denmark discusses pros and cons of the two approaches, and elaborates on the top down approach, using the certified 75% of the MCR of auxiliary engines in combination with a number of correction factors, to exclude redundant auxiliary power, and excess auxiliary power needed for reefer container etc. 75% of the MCR of auxiliary engines is indeed a well defined and certified value provided by the engine manufacturer, but the correction factors will have to be developed. It is Denmark's understanding that in particular the industry, questioned whether this could be done in a fair and robust way without getting very complicated.

8 Therefore, under considerable time constraints, Denmark has tried to look into a possible way forward to define the normal maximum sea load, by a simple bottom up approach.

9 The idea is that the normal maximum sea load could be looked upon as stemming from two parts, a so called hotel load, and a load necessary to keep the main engine running. The asumption was that the hotel load would be reasonably constant for the type of cargo ships under consideration at this stage, and that the load necessary to keep the main engine running, would be a linear contribution depending on the size of the main engine. A sample pool of 12 ships was investigated, and the result is the following formula, where P_{AE} is the normal maximum seaload, and P_{ME} is 100% of MCR of the main engines:

$$P_{AE} = 250 + 0.025\,P_{ME} \ \text{[kW]}$$

10 The actual normal maximum sea loads for the 12 sample ships are compared to the estimate, provided by the formula in the annex to this document. In worst cases the formula overestimates the normal maximum sea load by around 20%, but since the auxiliary power is only a minor fraction of the total power, the influence of the deviation from the actual value on the overall index will only be around 1.5% in these cases, and even better in the other ones. Other parameters in the index, such as the speed and specific oil consumption, cannot be determined by a higher accuracy.

11 Denmark believes that it is not an option to disregard CO_2 emissions from auxiliary engines. On the other hand, the contribution from auxiliary engines are obviously much lesser than that of the main engine. Hence, the complexity of determining the contribution of the auxiliary engine must not be a stumbling stone, and delay the achievement of the overall objective. Therefore, Denmark offers the considerations above.

Action requested of the Committee

12 The Committee is invited to discuss the considerations above and take action as appropriate.

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ANNEX

Type of Ship	DWT (mt)	Main engine MCR (kW)	Actual normal maximum sea load (kW)	Estimated by the formula (kW)	Deviation from actual value (%)	Influence on the overall index value (%)
Chemical/Product Tanker	16500	6300	418	408	2.5	0.20
Chemical/Product Tanker	39000	9500	572	488	14.8	1.10
5000 PCTC	15500	13500	763	588	23.0	1.61
VLGC	58000	13500	762	588	22.9	1.60
Aframax Tanker	110000	15500	589	638	-8.2	-0.40
3500 TEU Container	41000	29000	1034	975	5.7	0.26
VLCC	308000	30000	892	1000	-12.1	-0.46
6200 TEU Container	57500	57000	1668	1675	-0.4	-0.02
6050 TEU Container	87500	63000	1701	1825	-7.3	-0.25
6600 TEU Container	116000	68000	1931	1950	-1.0	-0.04
9000 TEU Container	110000	68500	1829	1963	-7.3	-0.25
8100 TEU Container	107000	68500	1806	1963	-8.7	-0.29