INTERNATIONAL MARITIME ORGANIZATION

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PREVENTION OF AIR POLLUTION FROM SHIPS

Comments on corrective coefficients for the mandatory new ship design CO_2 index: a suggested method to determine coefficients for ice strengthened vessels

Submitted by Canada

SUMMARY

Executive summary:	The Report of the GHG Working Group set out a formula to calculate the attained new ship design CO_2 index which included a corrective coefficient for vessels with inherent needs for extra mass or power. Canada proposes a way to determine this coefficient for ice strengthened vessels, under the Polar and Baltic classes
Strategic direction:	7.3
High-level action:	7.3.1
Planned output:	7.3.1.3
Action to be taken:	Paragraph 14
Related document:	MEPC 58/4

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 At its first intersessional meeting in Oslo, Norway in June 2008, the Working Group on Greenhouse Gases developed a formula for a mandatory new ship design CO_2 index, comprising a calculated attained index that is to be compared to a required index derived from a reduction target. This design index is to be implemented for a trial period as Guidelines adjusting it, if required, based on experience gained. After this trial period, it is to be implemented as legally binding measure.

3 The formula for the attained index is set out below; its terms are fully explained in document MEPC 58/4:

$$Attained\ new\ ship\ design CO_2\ index = \frac{\left(\prod_{j=1}^{M} f_j\right)\left(\sum_{i=1}^{NME} C_{FMEi}\ SFC_{MEi}\ P_{MEi}\right) + \left(\prod_{k=1}^{L} f_k\right)\left(\sum_{i=1}^{NAE} C_{FAEi}\ SFC_{AEi}\ P_{AEi}\right)}{Capacity \times\ V_{ref} \times f_W}$$

4 A key aspect for this formula was the inclusion of corrective coefficients f_j and f_k to account for the inherent mass and power disadvantages of certain specialized vessels, namely ice strengthened and refrigerated ships.

5 Canada is currently coordinating a correspondence group developing Guidelines for Ships Operating in Polar Waters under the auspices of the Design and Equipment Sub-Committee. Canada, as other polar States, has an interest in deriving corrective coefficients for ice strengthened cargo vessels. While there are many classes of ice strengthened vessels, the globally recognized standards are the Polar and Baltic ice classes. Canada believes the coefficients should be developed for these accepted ice class vessels, given their globally accepted safety benefits of the Polar and Baltic classes.

6 Ice strengthening inherently requires more steel to reinforce the hull, resulting in additional mass to the ship. The amount of extra steel depends on the specific ice class for intended ice conditions that the ship is designed to navigate.

7 While ice strengthened ships logically require more power, there is no generally accepted view on this as the designed engine power for ice class vessels varies considerably. As well as operational efficiency, selecting the engine power must consider safety needs to ensure propulsion and manoeuvrability in expected adverse sea conditions.

8 Given the practical need to account for the extra mass of Polar and Baltic classes of vessels, Canada would like to suggest the following approach to derive the corrective coefficients in the formula of the proposed mandatory CO_2 design index.

Method for derivation of corrective coefficient

9 To correct for disadvantages of the additional mass of Polar and Baltic class vessels, the coefficient f_j should reduce the function:

$$\sum_{i=1}^{NME} C_{FMEi}\ SFC_{MEi}\ P_{MEi}$$

within the formula of the attained new ship CO_2 design index set out above.

10 A function to derive the corrective coefficient f_j in the attained new ship CO_2 design index would be:

$$f_j = \frac{1}{1 + m_{extra}}$$

where:

m_{extra} is the percentage of additional mass required to strengthen the hull of a specific ice class ship.

11 The term m_{extra} may be calculated as follows:

$$m_{extra} = \frac{m_{ice} - m_{normal}}{m_{normal}}$$

where:

m_{ice} is the mass of the ice strengthened ship; and
m_{normal} is the mass of an equivalent vessel without ice strengthening.

12 As a simplistic example, a ship that is 10% heavier due to its ice-strengthening would have an f_j coefficient of 0.91 as follows.

$$f_j = \frac{1}{1 + m_{extra}} = \frac{1}{1 + 0.10} = \frac{1}{1.10} = 0.91$$

13 Canada, will be developing a table of coefficients for each of the Polar and Baltic classes, based on their additional mass requirements. This work could of interest to the development of the new Polar Guidelines. Interested parties are welcome to participate or may seek additional information from our national contact below[1]. Unfortunately, document deadlines for MEPC after the intersessional GHG working group meeting did not allow this information to be developed in the timeframe to submit this paper.

Action requested of the Committee

14 The Committee is invited to take note of the information provided and to consider the proposed method for derivation of corrective coefficients for ice strengthened vessels and take action as appropriate.

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