INTERNATIONAL MARITIME ORGANIZATION

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MARINE ENVIRONMENT PROTECTION COMMITTEE
60th session
Agenda item 4

MEPC 60/4/3
18 December 2009
Original: ENGLISH

PREVENTION OF AIR POLLUTION FROM SHIPS

Energy Efficiency Design Index for Tankers

Submitted by INTERTANKO

SUMMARY

Executive summary:	This document provides information on the impact of the application of the method of calculation of the Energy Efficiency Design Index for conventionally powered tankers and the appropriateness of the proposed equation for the derivation of the EEDI for individual ships
Strategic direction:	7.3
High-level action:	7.3.1
Planned output:	7.3.1.3
Action to be taken:	Paragraph 8
Related documents:	MEPC.1/Circ.681; GHG-WG 2/2/7, GHG-WG 2/2/20 and MEPC 59/4/14

Introduction

1 The Marine Environment Protection Committee, at its fifty-ninth session, approved the interim Guidelines on the method of calculation of the Energy Efficiency Design Index for new ships. The Committee also invited Member Governments and observer organizations to use the interim guidelines for the purpose of test and trials on a voluntary basis and to provide the outcome and experiences in applying the interim Guidelines to future sessions of the Committee for further improvement of the method of calculation of the EEDI for new ships.

2 INTERTANKO has collected data on a significant number of tankers of various sizes and of various categories and used the interim Guidelines in assessing the EEDI values for each of these tankers. The results of this work and the conclusions to drawn are as follows.

EEDI database and results of modelling

3 The database consisted of 217 vessels that were ordered or built during the years 2004 to 2009. A broad breakdown by vessel type is as follows:

Vessel Type	Total Database	Outside one Standard Deviation	Revised Database
VLCCs	32	0	32
Suezmax	34	1	33
Aframax	30	4	26
Panamax	19	0	19
Product/Chemical	102	19	83
Totals	217	24	193

Table 1 – the database characteristics

4 The calculation methodology followed precisely that defined in MEPC.1/Circ.681 using the defined C_F factors and the various definitions for the equation variables. The above mentioned database contained 19 ships with ice class. The only difficulty that arose during calculation process was the application of the ice class factors f_i and f_j due to interpretation of the requirements within the guidelines. These difficulties relate to:

.1 the application of either of the f_i and f_j factors when the relevant calculated factor is outside the allowed limiting scope of a specific factor. The choice in this regard is either to set the factor to be used as 1 or use the maximum/minimum allowed limiting factor as calculated by use of the ship's capacity or length, as applicable, in the individual equations; and

.2 the reference to P_{iME} for the calculation of the f_j factor. This is defined within the Guidelines, in paragraph .5.5.1, as being the installed power at 75% MCR but where the original document GHG-WG 2/2/20 developing this equation used the actual installed power of 100% MCR.

Given the foregoing clarifications, the specific factors for ice class were not applied (factor 1 applied) in the individual ship's calculation. All other factors were also set to 1.

5 Analysis of the individual ship's calculated EEDI was undertaken in accordance with the methodology defined in MEPC.1/Circ.681. A first trial regression line using the whole database was undertaken and thereafter data points outside of one standard deviation from this regression line were removed. The extent of this data removal is shown in table 1 above. The modified regression line for tankers is shown below in figure 1 and compared with the regression line and equation as reported in document GHG-WG 2/2/7 (Denmark) for tankers.

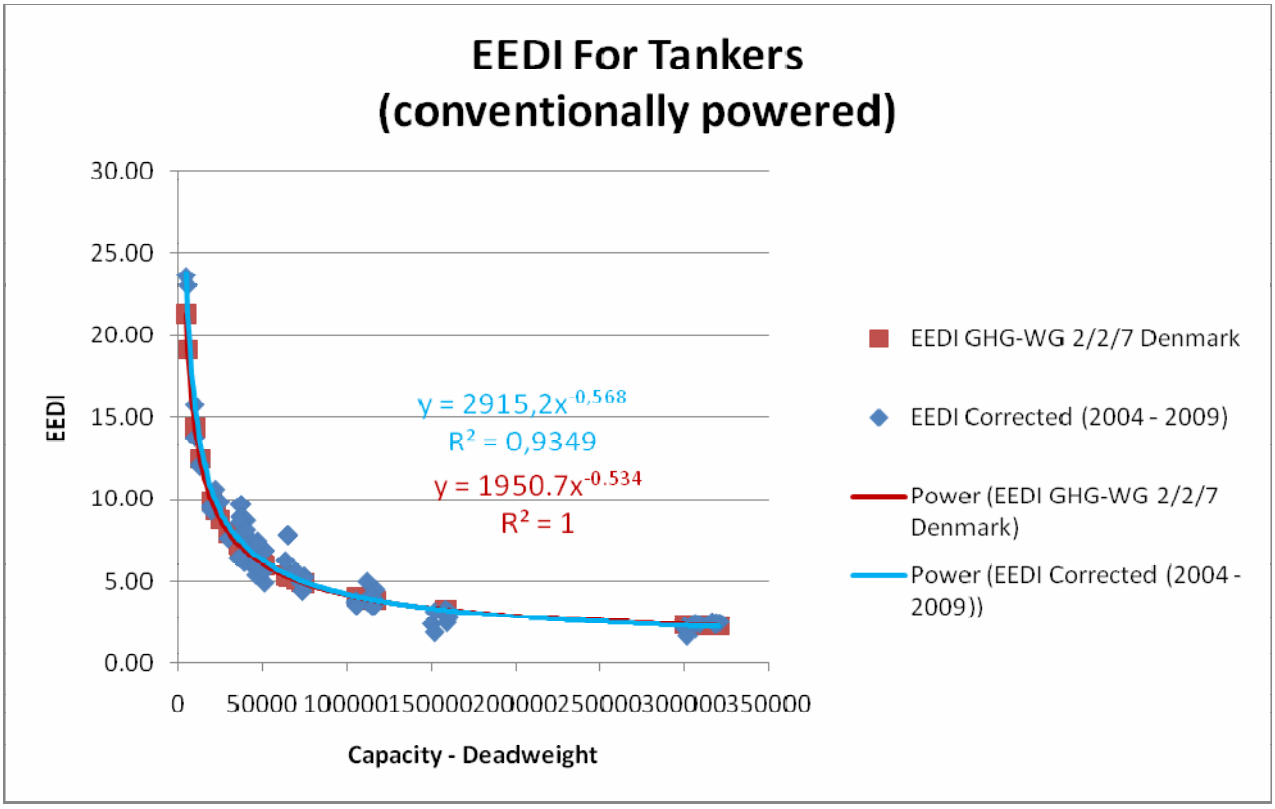

Figure 1 – EEDI for Tankers

6 One of the results of this assessment, and in compliance with the request in MEPC.1/Circ.681, was that, although the EEDI formula is adequate for a large majority of oil and chemical tankers with conventionally powered designs, the EDDI formula would not be appropriate for a certain category of tankers, namely, the diesel-electrically powered tankers. Although a few of these type of ships were tested and included in the first regression analysis, they were automatically excluded from the final regression as their normally calculated EEDI using the standard equation gave results that were outside of the one standard deviation from the regression line.

Conclusions from the Study

7 As a result of this work, INTERTANKO has formed the following conclusions:

.1 the EEDI equation as formulated in MEPC.1/Circ.681 is applicable to conventionally powered tankers and adjusted using the relevant and applicable correction factors;

.2 the regression curve representing a possible base line format in the future is best modelled using the "power function" in the form y=a*(x^-c);

.3 the two control coefficients ("a" and "c") for the "power" equation could form a basis for regulatory control for future energy efficient design of tankers;

.4 the form of the respective regression curves and their equations, as shown in figure 1 above, that have been generated are sufficiently similar to one another so as to confirm the trendline for a conventionally powered tanker's EEDI versus its capacity (deadweight); and

.5 the gradient function "c" to the curve equations; namely, -0.568 and -0.5337 represent a small deviation to the respective curves at their inflection points only, whilst the coefficient "a" is different due to the extent of the tankers' deadweight data covered by the respective curves; i.e. 310,000 tonnes deadweight and approximately 440,000 tonnes deadweight.

Action requested of the Committee

8 The Committee is invited to consider the conclusions presented in paragraph 7, when agreeing on the method of calculation for the Energy Efficiency Design Index for new conventionally powered tankers. The Committee is also invited to note the need for further clarifications in the application of the *fi* and *fj* coefficients for the purpose of EEDI calculation of ice class tankers.