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PREVENTION OF AIR POLLUTION FROM SHIPS

The New Ship Design Index for Tankers

Submitted by INTERTANKO

SUMMARY

Executive summary:	This document provides comments and suggestions for a simplification of the New Ship Design Index equation. The simplified form removes the necessity to collect further data to tabulate the "weather" coefficient and the subsequent use of the *"f_w"* coefficient as currently required within the equation. The document also suggests verification of the calculated New Ship Design Index is undertaken during sea trials of the finally constructed ship in calm waters at the simulated "Capacity" of the ship
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 15
Related documents:	MEPC 58/4, paragraph 2.13.7 and annex 5

1 This document suggests: (a) a simplification of the New Ship Design Index equation as discussed at the intersessional meeting (annex 5 of document MEPC 58/4) and (b) verification of the calculated New Ship Design Index is undertaken during sea trials of the finally constructed ship in calm waters at the simulated capacity of the ship. The suggestions in this document are primarily related to oil and chemical tankers.

Background

2 As a result of work done at the GHG Working Group intersessional meeting, the equations for this index, as proposed by Japan and Denmark, were consolidated into one equation which maintained the basic principle to be observed for this index; namely, *Environmental Cost* divided by *Benefit to Society*. However, the consolidated index equation, as reported in annex 5 to MEPC 58/4, still contains a number of coefficients that may complicate the equation and could, as a result, expose the resulting factor to misinterpretation.

3 For such an index to be robust, transparent and be of guidance to shipowners seeking the best design of tanker for future use, the equation of the index has to be simple with the variables in the equation well defined so that the final factor, derived by calculation, can be easily verifiable.

Proposal

4 INTERTANKO supports the concept of a New Ship Design Index and sees the value and benefit of such an index that is simple to assess with variables that are easily verifiable from existing certification or documentation. The current form of the index equation could easily meet this requirement with some minor modifications. This proposal addresses ideas to achieve such a target with proposed modifications.

5 The concept that lays at the heart of this index is to enable a characterization of the energy requirements necessary for a new tanker design but excludes consideration of gas carriers. Thus, the minimization of energy usage stands as the prime operator to the equation for the index to achieve the contracted speed and carriage capacity of a new tanker design. Energy in this instance is represented in the equation by the Power (both primary and secondary) to operate the tanker of a contracted size (deadweight) at the contracted or design speed which can be subsequently verified by sea trial performance.

6 Thus, the definition and allocation of the Power requirement together with the rate of fuel consumption to achieve the required Power stand central to the assessment of the extent of CO_2 emission from the proposed design of tanker. If this basic premise is accepted it will induce a review of hull form and design to optimize its energy efficiency together with energy system layout on board to minimize power requirements.

The Main Engine

7 INTERTANKO would therefore propose that a simplification to the currently proposed equation can be achieved by deletion of the currently unknown factors associated with the "f_w" coefficient in the equation and replace the use of this coefficient with a "sea margin" to the extent of Main Engine Power requirement within the definition and for this variable in the equation. To formulate this proposal the Power requirement of the main engine is calculated by applying a 15% "Sea Margin" to the 90% Maximum Continuous Rating (MCR) of the main engine giving approximate power requirement of the main engine of 75% MCR (90% x 85%) to achieve the design speed in calm water and conditions during speed trials of the proposed ship.

8 The definition of Power for the New Ship Design Index would become:

P_{ME} is the required main engine Power at 75% of its Maximum Continuous Rating to obtain the design speed (V_{ref}) under the loaded condition of Capacity.

9 This amendment would, in turn, allow accurate verification of the Specific Fuel Consumption (SFC) that is used within the Index equation to determine the fuel consumption of the main engine and thus its CO_2 emission after application of the relevant Carbon to Carbon Dioxide factor. As the Power rating of 75% MCR is a test bed criterion for the testing of the engine for its EIAPP certificate under either the E2 or E3 test cycles (NO_x Technical Code paragraph 3.2), the SFC at this rating will be known, certified and thus verifiable. Given this circumstance the definition for SFC for the New Ship Design Index would become:

SFC is the test certified specific fuel consumption, measured in g/kWh, of the engines at the Power output of P determined from the EIAPP certificate for the group or family engine. The subscripts ……..

The Auxiliary Engines

10 INTERTANKO would propose a similar amendment to the Power definition and Power allocation for the auxiliary engines or generators together with the determination of their Specific Fuel Consumption (SFC). To simplify this section of the New Ship Design Index equation it is considered that the design sea load requirement for the specific ship design, in kWatts, of the auxiliary engines would fulfil this criterion. To use the current proposal would significantly over estimate any Power consumption requirement and may cause or induce designs to be significantly under Powered for auxiliary power.

11 To enable calculation of the fuel consumption associated with the "sea load" the specific fuel consumption, in g/kWhr, of the generator engines must be known and verifiable. This can be achieved by setting an engine load or torque criterion within the definition for the SFC of the generator engines that matches the test-bed testing criterion for these types of engines with the results as reported on the EIAPP certificate for the parent engine. The proposed setting of the engine load or torque would be 50% as per the D2 or C1 test cycles (reference paragraphs 3.2.5 and 3.2.6 of the NO_x Technical Code) where the SFC for these engines will be documented and certified.

12 Given this circumstance a modification is necessary to the definition of P_{AE} and would become:

P_{AE} is the required auxiliary Power to supply normal maximum sea load including necessary Power for machinery, systems, equipment and hotel requirements where the ship is engaged on a voyage at the designed speed (V_{ref}) under the design loaded condition of Capacity. The auxiliary engine Specific Fuel Consumption (SFC) is that recorded on the EIAPP certificate at the engine's 50% MCR Power or torque rating. Required fuel consumption for boiler(s)……..

Verification

13 INTERTANKO proposes that the verification of the calculated New Ship Design Index will be undertaken during the speed trials of the finally constructed tanker in calm waters and weather at the simulated capacity of the ship. In the case for tankers due to their respective periods of time in the ballast condition this verification should be undertaken in both the Capacity condition and the Ballast condition as defined in MARPOL Annex VI, regulation 18.2.

Future development of the index

14 Once the research and development is completed for a robust and verifiable coefficient to account for hull performance in a standardized sea state then this coefficient can be applied to the current calculated proposed New Ship Design Index in calm seas to create a secondary index termed "Sea State Design Index".

Action requested of the Committee

15 The Committee is invited to consider these proposals provided by this document and take action as appropriate.