ANNEX 17

RESOLUTION MEPC.233(65)

Adopted on 17 May 2013

2013 GUIDELINES FOR CALCULATION OF REFERENCE LINES FOR USE WITH THE ENERGY EFFICIENCY DESIGN INDEX (EEDI) FOR CRUISE PASSENGER SHIPS HAVING NON-CONVENTIONAL PROPULSION

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee (the Committee) conferred upon it by international conventions for the prevention and control of marine pollution,

RECALLING ALSO that, at its sixty-second session, the Committee adopted, by resolution MEPC.203(62), amendments to the Annex of the Protocol of 1997 to amend the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (inclusion of regulations on energy efficiency for ships in MARPOL Annex VI),

NOTING that regulation 21 (required EEDI) of MARPOL Annex VI, as amended, requires reference lines to be established for each ship type to which regulation 21 is applicable,

HAVING CONSIDERED, at its sixty-fifth session, the draft 2013 Guidelines for calculation of reference lines for use with the Energy Efficiency Design Index (EEDI) for cruise passenger ships having non-conventional propulsion for extension of the application of the EEDI to these ship type,

1. ADOPTS the 2013 Guidelines for calculation of reference lines for use with the Energy Efficiency Design Index (EEDI) for cruise passenger ships having non-conventional propulsion, as set out at annex to the present resolution; and

2. AGREES to keep these Guidelines under review in light of the experience gained.

2013 GUIDELINES FOR CALCULATION OF REFERENCE LINES FOR USE WITH THE ENERGY EFFICIENCY DESIGN INDEX (EEDI) FOR CRUISE PASSENGER SHIPS HAVING NON-CONVENTIONAL PROPULSION

Introduction

1 Reference lines are established for each ship type to which regulation 21 (required EEDI) of MARPOL Annex VI is applicable.

2 A reference line is defined as a curve representing an average index value fitted on a set of individual index values for a defined group of ships. One reference line will be developed for each ship type to which regulation 21 of MARPOL Annex VI is applicable, ensuring that only data from comparable ships are included in the calculation of each reference line.

3 The purpose of the EEDI is to provide a fair basis for comparison, to stimulate development of more efficient ships in general and to establish the minimum efficiency of new ships depending on ship type and size. Hence, the reference lines for each ship type must be calculated in a transparent and robust manner.

4 Ship types are defined in regulation 2 of MARPOL Annex VI. The reference line for each ship type is used for calculation of the required EEDI as defined in regulation 21 of MARPOL Annex VI.

Applicability

5 These guidelines apply to cruise passenger ships having non-conventional propulsion, including diesel-electric propulsion, turbine propulsion, and hybrid propulsion systems.

6 For other ship types, refer to the *Guidelines for calculation of reference lines for use with the Energy Efficiency Design Index (EEDI)* in resolution MEPC.215(63).

Reference line value

7 The reference line value for cruise passenger ships having non-conventional propulsion is formulated as

$$\textit{Reference line value} = 170.84 \cdot b^{-0.214}$$

where b is the gross tonnage of the ship.

Calculating the reference line

8 To calculate the reference line, an index value for each cruise passenger ship having non-conventional propulsion is calculated using the following assumption:

.1 The carbon emission factor is constant for all engines, including engines for diesel-electric and hybrid propulsion cruise passenger ships, i.e. $C_{F,ME} = C_{F,AE} = C_F = 3.1144$ g CO_2/g fuel.

The carbon factor for hybrid propulsion ships equipped with gas turbines $C_{F,AE}$ is calculated as an average of the carbon factors of auxiliary engines (i.e. 3.1144 g CO_2/g fuel) and the carbon factor of gas turbines (i.e. 3.206 g CO_2/g fuel) weighted with their installed rated power.

.2 $P_{ME(i)}$ is reflected as 75 % of the rated installed main power ($MCR_{ME(i)}$). Where a ship only has electric propulsion $P_{ME(i)}$ is zero (0).

.3 The specific fuel consumption for all ship types, including diesel-electric and hybrid propulsion cruise passenger ships, is constant for all auxiliary engines, i.e. SFC_{AE}=215g/kWh.

The specific fuel consumption for hybrid propulsion cruise passenger ships equipped with gas turbines SFC_{AE} is calculated as an average of the specific fuel oil consumption of the auxiliary engines (i.e. 215 g/kWh) and the specific fuel oil consumption of the gas turbines (i.e. 250 g/kWh) weighted according to their installed rated power.

.4 P_{AE} is calculated according to paragraph 2.5.6.3 of the *2012 Guidelines on the Method of Calculation of the Attained Energy Efficiency Design Index (EEDI) for new ships* (resolution MEPC.212(63)) considering a given average efficiency of generator(s) weighted by power of 0.95.

.5 Innovative mechanical energy efficiency technology, shaft generators and other innovative energy efficient technologies are all excluded from the reference line calculation, i.e. $P_{AE,eff}$ = 0 and P_{eff} = 0.

.6 $P_{PTI(i)}$ is 75% of the rated power consumption of each shaft motor divided by a given efficiency of generators of 0.95 and divided by a given propulsion chain efficiency of 0.92.

9 The equation for calculating the index value for cruise passenger ships having non-conventional propulsion is as follows:

$$Estimated\,Index\,Value = \frac{3.1144 \cdot 190 \cdot \sum_{i=1}^{nME} P_{ME(i)} + C_{F,AE} \cdot SFC_{AE} \cdot \left(P_{AE} + \sum_{i=1}^{nPTI} P_{PTI(i)}\right)}{Gross\,tonnage \cdot V_{ref}}$$

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