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# PREVENTION OF AIR POLLUTION FROM SHIPS

## Comments on Energy Efficiency Design Index (EEDI) baseline computations

## Submitted by the International Association of Classification Societies (IACS)

**SUMMARY**

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|---|---|
| ***Executive summary:*** | This document provides comments regarding the baseline computations for Energy Efficiency Design Index (EEDI) as set out in document GHG-WG 2/2/7 (Denmark) |
| ***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 18 |
| ***Related documents:*** | MEPC 59/4/2; GHG-WG 2/2/7, GHG-WG 2/2/9; GHG-WG 1/2/1 and MEPC 58/4/8 |


## Background

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 59/4/2.

2 The second Intersessional Meeting of the Working Group on GHG Emissions from Ships (GHG-WG 2) continued developing an Energy Efficiency Design Index (EEDI) for new ships including the associated baselines for ship types (see document MEPC 59/4/2). The baseline computation was reported by Denmark in documents GHG-WG 1/2/1, MEPC 58/4/8 and GHG-WG 2/2/7. The baseline updates reflected the changes in the underlying EEDI formulations which had been agreed during the previous working group meeting.

3 During GHG-WG 2, the debate on the method of computing baselines considered arguments forwarded by China in document GHG-WG 2/2/9 related to the approach and the accuracy of data. Denmark then suggested that IACS might be requested to provide future baselines. Therefore, this submission discusses important items related to baseline computation and underlying data.

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**Objective**

4 IACS performed, as an exercise, baseline calculations for bulk carriers to identify issues related to data accessibility, integrity and interpretation. The results of this are presented in the ensuing paragraphs addressing data sources and access, ship type definition, blank data, installed power, capacity and speed.

**Data sources and access**

5 The only source of data used until today for baseline computations is Lloyd's Register Fairplay (LRFP). Access to this database is by subscription. The data, which is typically contributed by shipyards, is consolidated by LRFP – taking into account data from other sources such as IACS, owners, and engine manufacturers – before it is made available. A description of the data handling may be provided by LRFP.

6 LRFP data available to IACS members is continuously updated and possibly many different versions of the database are in parallel use. Therefore, different data sets may be used by different organizations or the data may be dependent on the date of its retrieval. Therefore, if LRFP data will be used for future EEDI computations, it may be suggested to only use the LRFP "main" database as reference.

**Ship type definition**

7 Baselines are computed separately for major ship types. Document GHG-WG 2/2/7 lists dry bulk carriers, tankers, gas carriers, container vessels, general cargo ships and ro-ro cargo ships. When LRFP data is used for a baseline computation, the ship type definitions need to be carefully considered. Ship sub-types exist and some of these sub-types contain only very few vessels for specific trades or tasks. To ensure uniform interpretation, it may be suggested to link ship types to LRFP definitions for future baseline computations.

**Blank data entries**

8 For some ships listed in LRFP, some data entries are blank or contain a Zero (0). It may be suggested to remove datasets with blank power, capacity and/or speed data from the baseline computation. For the purpose of later reference, the omitted ships should be listed with their IMO number.

**Installed main power and capacity**

9 A sampling exercise was performed by IACS to identify the level of uncertainty of the data used for baseline computations. The sampling used key design parameters (installed main power and capacity) for recently delivered (1998-2007) bulk carriers and took the data from LRFP and IACS member's databases. The sampling used 100 randomly selected bulk carriers[1] of different size. The results are summarized in table 1.

[1] For the considered bulk carrier fleet of 2,365 vessels, delivered between 1998-01-01 and 2007-12-31, 91 samples are needed for a confidence interval of 10% and a confidence level of 95%.

**Table 1 – Key results of sampling for EEDI baseline input data (100 samples)**

| Number of samples with | Installed maximum main power | Capacity |
|---|---|---|
| no difference | 48 | 80 |
| difference less than 1% | 30 | 15 |
| difference more than 1% | 6 | 2 |
| difference more than 5% | 3 | 2 |
| difference more than 10% | 13 | 1 |

10 The installed main power was considered to be reliably reported. However, it is shown in table 1 that for 13% of the sampled data sets, installed main power differs more than 10% between the sources.

11 The capacity was considered to be reliably reported. This was confirmed by the sampling. It is shown in table 1 that for only 5% of the sampled data sets, capacity differs more than 1% between sources.

12 It is noted that the reported differences may have many causes and that actual data integrity and quality of either source was not determined. Data used for EEDI baseline computation should be carefully documented to ensure future referencing.

**Reference speed**

13 The definition of "reference speed" for the EEDI computation is precise (speed obtained with 75% MCR and 100% capacity in "calm" conditions). However, this precisely defined "reference speed" is not assumed to be currently reported in any database. Therefore, the "reference speed" is the input parameter for the EEDI with the greatest level of uncertainty. Cooperation with LRFP is suggested to further explore whether and how data for "reference speed" may be reliably and uniformly obtained.

14 IACS Members do not have complete speed information in their databases as this parameter is normally not used for classification purposes. Some classification societies may have speed data from sea trials but this data cannot be readily used to check baseline input data. Therefore, the sampling reported above did not address speed.

**General remarks**

15 The current baselines are curves based on a fleet average (50% percentile). Other percentiles may be considered. The harmonization approach for the new damage stability requirement used a 95% percentile, i.e. 95% of the existing fleet would be in compliance with the new requirement.

16 The Committee may wish to consider making the calculation and reporting of the EEDI mandatory to test the formulation for a period of time prior to implementation of any mandatory performance requirements.

**Recommendations**

17 The following recommendations for baseline computations can be made:

.1 close dialogue with LRFP to ensure access to main database;

.2 list the ship types and possible sub-types;

.3 remove datasets with missing power, capacity and/or speed data;

.4 describe the relationship between the speed reported in available database and the EEDI "reference speed"; and

.5 consider random sampling with other data sets to assess uncertainty levels.

**Action requested of the Committee**

18 The Committee is invited to consider the comments and proposals contained in this document and take action as appropriate.