

ENERGY EFFICIENCY EXISTING SHIP INDEX (EEXI)

Overview:

The Energy Efficiency Existing Ship Index, or EEXI, is a measure of the International Maritime Organization (IMO) with the aim of improving the technical efficiency of existing ships in order to reduce CO₂ emissions. On January 01, 2023, the EEXI will come into force and will affect ships over 400 GT according to MARPOL Annex VI, which applies to approx. 80% of the world's ocean fleet. Ships already built under consideration of EEDI Phase 2 and 3 are excluded, as the new EEXI requirements are based on EEDI Phase 2 and 3. No later than upon the first survey of the classification society after January 01, 2023, the EEXI Technical File (explanation below) must be approved and the international energy efficiency certificate must be newly issued by the classification society. If a ship does not meet the EEXI requirements at the time of the first inspection, this may result in detention of the ship in port or a fine.

General procedure for meeting the EEXI requirements:

- I. Calculation of the individual EEXI of the vessel
- II. Elaboration of possible technical adaptation to meet the requirements.
- III. Approval of the chosen technical adaptation by the classification society
- IV. Implementation of the technical solution
- V. Preparation of the final EEXI Technical File
- VI. Approval of the EEXI Technical File by the Classification Society

Possible methods for meeting the EEXI:

To meet the EEXI requirements, there are a number of technical options for improving energy efficiency, including:

- Engine power limitation (EPL)
- Shaft power limitation (ShaPoli)
- Energy-saving devices (ESD) such as conversion to LNG, retrofitting of more efficient propellers, solar cells, rotosails, steam turbines, exhaust gas heat recovery or optimization of the hull design

Calculation formula:

The formula below is used to calculate the EEXI. It takes into account specific data such as the power of the main, shaft and auxiliary engines as well as any energy-efficient technologies installed. In addition, ship type dependent correction factors are included. The result of the calculation is the CO₂ emission per ton moved by distance.

$\frac{(\prod_{j=1}^n f_j) (\sum_{i=1}^{nME} P_{ME(i)} \cdot C_{FME(i)} \cdot SFC_{ME(i)}) + (P_{AE} \cdot C_{FAE} \cdot SFC_{AE}) + ((\prod_{j=1}^n f_j \cdot \sum_{i=1}^{nPTI} P_{PTI(i)} - \sum_{i=1}^{neff} f_{eff(i)} \cdot P_{AEff(i)}) \cdot C_{FAE} \cdot SFC_{AE}) - (\sum_{i=1}^{neff} f_{eff(i)} \cdot P_{eff(i)} \cdot C_{FME} \cdot SFC_{ME^{**}})}{f_i \cdot f_c \cdot f_t \cdot Capacity \cdot f_w \cdot V_{ref} \cdot f_m}$	
<ul style="list-style-type: none"> ■ Main engine ■ Auxiliary engine ■ Shaft motor ■ Energy-efficient technologies to reduce auxiliary machine power ■ Energy-efficient technologies to reduce the main machine power ■ Correction factors by ship type 	<p>Formula symbols:</p> <p>Engine power (P)</p> <p>CO₂ emission factor (C)</p> <p>Fuel consumption (SFC)</p> <p>Correction factors (f)</p> <p>Speed (V)</p>

Terms:

- **EEDI:** Energy Efficiency Design Index - Applies to new built ships
- **EEXI:** Energy Efficiency Existing Ship Index - Applies to existing ships
- **EEXI Technical File:** The EEXI Technical File contains technical information about the ship and the calculated **and** required EEXI values. Also included are copies of documents containing values and data used for the calculation of the individual EEXI.
- **EPL:** Engine Power Limitation
- **ESD:** Energy Saving Devices, which consider the ship as a whole system and are not limited to the engine
- **IMO:** International Maritime Organization
- **ShaPoli:** Shaft Power Limitation

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