SHIP ENERGY EFFICIENCY REGULATIONS AND RELATED GUIDELINES

Energy efficiency regulations for ships covers both ship design and ship operation as shown in the above and below figures

SEEMP (Ship Energy Efficiency Management Plan)
Based on regulation 22 of MARPOL Annex VI:
- Each ship shall keep on board a ship specific SEEMP. This may form part of the ship’s Safety Management System (SMS)
- The SEEMP shall be developed taking into account guidelines adopted by the IMO.

SEEMP Framework
The SEEMP works according to the continuous improvement cycle and comprises four steps:
- Planning
- Implementation
- Monitoring
- Self-evaluation

Relevant IMO guidelines provides details of the above 4 step and how a SEEMP should be developed.

EEOI (Energy Efficiency Operational Indicator) for Voluntary Use
EEOI is an IMO key performance indicator for measurement and monitoring of a ship’s energy performance. It is calculated using the actual fuel consumption and actual distance travelled and actual cargo carried by the ship.
EEOI is calculated according to the following formula using the relevant IMO guidelines:

\[ \text{EEOI} = \frac{\text{fuel mass (ton)} \times \text{speed (kn)\times \text{duration (h)\times 10}}}{\text{carried cargo\ (ton) \times \text{distance\ (nautical miles) \times \text{reference\ speed\ (kn)}}} \]

Where:  
- f is the fuel type;  
- v is the voyage number;  
- F is the mass of consumed fuel at voyage s;  
- is cargo mass (tonne) or work done (number of TEU, passengers, etc.) depending on ship type; and  
- D is the distance in nautical miles corresponding to the cargo carried.

International Energy Efficiency (EIE) Certificates for Ship
- An EIE Certificate must be issued to all applicable ships of 400 gross tonnage and above that are going to be engaged in voyages to ports or offshore terminals under the jurisdiction of other Parties.
- The EIE Certificate will be valid throughout the life of the ship unless there is a major conversion of the ship or a transfer of flag to another State.

Promotion of Technical Co-operation and Transfer of Technology
- MARPOL Annex VI regulation 23 specifies that all maritime Administrations, in co-operation with the IMO and other international bodies, should promote and provide support, especially to developing States, for implementation of energy efficiency regulations.

EEOI phases 0 to 3: Future EEOI of ships will be reduced via setting lower reduction factor (X), thus lower Required EEDI as shown above.

EEDI Condition
The EEDI needs to be calculated and verified for a specific ship condition. This is referred to as “EEDI Condition” and includes the following:
- Draft: Summer load line draft.
- Capacity: Deadweight (or gross tonnage for passenger ships) for the above draft (container ship will be 70% value).
- Weather condition: Calm with no wind and no waves.
- Propulsion shaft power: 75% of main engine MCR, with some provisions for shaft motor or shaft generator or shaft-limited power cases.
- Reference speed : is the speed under the above conditions

EEDI Verification Process
EEDI verification is performed in two stages:
- Preliminary verification at design stage; based on model tank test results.
- Final verification at the ship delivery; based on actual ship’s speed trial data.
As part of the verification process:
- The ship’s speed power curve needs to be developed using actual trial results, tank test data, speed trial data plus use of ISO 15016 standard for data correction.
- The calculations must be documented in an EEDI Technical File and submitted as part of the verification documents.
- Verification is required to witness both tank test and sea trials.

Chronology of IMO Regulatory Developments:
- 1997: Started debate on GHG emissions from ships.
- 2000: Carried out the first major study on GHG emissions from shipping.
- 2003: IMO Assembly adopted resolution A.963(23) on relevant policies.
- 2005: First draft of the EEEOI published.
- 2009: Drafts on voluntary use of EEDI, SEEMP and EEOI developed and circulated.
- 2011: Mandatory regulations for use of EEDI and SEEMP were adopted; to come into force in 2013.
- 2013: Debate on further energy efficiency measures focused on “IMO data collection system”.
- 2014: Third IMO GHG Study 2014 published.
- 2015: Debate on “data collection” continued.

Chapter 4 of MARPOL Annex VI
Regulations:
IMO MEPC in July 2011 adopted the following set of regulations as the first ever international energy efficiency standard of its kind for ship:
- Regulation 19 - Application
- Regulation 20 - Attained EEDI
- Regulation 21 - Required EEDI
- Regulation 22 - SEEMP
- Regulation 23 - Promotional of technical co-operation and transfer of technology

Required EEDI
For the applicable ships, and based on Chapter 4 regulations, the following applies:
- Attained EEDI ≤ Required EEDI; and
- Required EEDI = (1-X/200) * reference line value
Where:
- X is the reduction factor
- “Reference line value” is estimated from EEDI Reference line.

IMO Energy Efficiency Regulatory Developments

Required EEDI (EEOI) for Voluntary Use
EEOI performance Indicator (EEOI) for Voluntary Use
Chapter 4 of MARPOL Annex VI

Ships EEDI calculation formula and main terms

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EEDI verification process and main activities

This poster is for training purposes and developed for use within IMO capacity building activities. It is subject to change by IMO. November 2018