



INTERSESSIONAL MEETING OF THE
WORKING GROUP ON ENERGY
EFFICIENCY MEASURES FOR SHIPS
1st session
Agenda item 4

EE-WG 1/4
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ENGLISH ONLY

CONSIDERATION OF SAFETY ISSUES RELATED TO THE EEDI

Minimum required speed to ensure safe navigation in adverse conditions

Submitted by the International Association of Classification Societies (IACS)

SUMMARY

Executive summary: This document contributes to setting a possible requirement on minimum installed engine power to ensure safe navigation in adverse conditions within the framework of the EEDI

Strategic direction: 7.3

High-level action: 7.3.2

Planned output: 7.3.2.1

Action to be taken: Paragraph 8

Related documents: MEPC 59/4/2 and MEPC 60/WP.9

Introduction

1 During the discussions in the Working Group on Energy Efficiency Measures for Ships during MEPC 60, it was proposed by the Bahamas that "... in the drive to make ships as environmentally efficient as possible; there will be an incentive to build underpowered or reduced strength ships. To avoid this, a minimum safety level based upon engine power and speed should be developed" (paragraph 6.3 of MEPC 60/WP.9). It is further recalled that during the second Intersessional Meeting of the Working Group on Greenhouse Gas Emissions from Ships the issue was already touched upon and "Responding to questions of other delegations, the observer representative of IACS stated that potential negative effects on safety features were investigated but no significant impact was identified for the time being. However, IACS would continue to monitor these developments." (paragraph 2.44bis of MEPC 59/4/2).

2 IACS is now establishing an internal activity to outline possible performance criteria for safe navigation in adverse conditions. However, due to its complexity the work is planned to be reported to MEPC 62. To initiate timely discussion, this document lists relevant information based on the available requirements of IACS classification societies for ships with an additional class notation related to the redundancy or duplication of the propulsion system. It should be noted that not all IACS classification societies have such requirements.

Overview of requirements related to class notations on redundant propulsion

3 Annex 1 to this document provides a summary of the requirements of IACS classification societies for ships with an additional class notation related to the redundancy or duplication of the propulsion system. The reason for collecting this information is the expected interest in what constitutes a minimum installed power to maintain a safe navigation in adverse/extreme conditions.

Discussion

4 Six IACS classification societies have requirements related to redundant propulsion. A minimum speed to ensure manoeuvrability in case one engine fails is defined by five IACS classification societies. These are listed for ease of reference in annex 2 to this document.

5 The redundant propulsion performance criteria relate to a minimum speed and to environmental conditions.

6 Two IACS classification societies also requires certain manoeuvrability as follows:

- .1 "... that the vessel is capable of manoeuvring into an orientation of least resistance to the weather, and once in that orientation, maintaining position such that the vessel will not drift for at least 36 hours"; and
- .2 "... the manoeuvrability of the ship can be maintained so that even under unfavourable weather conditions the ship can be manoeuvred into a position of less resistance to the weather and can be maintained in this position".

7 It is concluded that in order to define requirements for minimum installed propulsion power, a set of performance criteria need to be established. In this context it is noted that this task may potentially be addressed at MSC and not at MEPC.

Action requested of the Intersessional Meeting

8 The Intersessional Meeting is invited to consider the above information and take action as appropriate.

ANNEX 1

**SUMMARY OF THE REQUIREMENTS RELATED TO THE REDUNDANCY OR
DUPLICATION OF THE PROPULSION SYSTEM**

| Society | Source for requirement | Minimum speed | Comments |
|----------------|-------------------------------|----------------------|---|
| ABS | Part 4-3-6 | No value | <p>3-v: ... The mark + will be affixed to the end of any of the above class notations (e.g., R1+, R2-S+) to denote that the vessel's propulsion capability is such that, upon a single failure, propulsive power can be maintained or immediately restored to the extent necessary to withstand adverse weather conditions without drifting, in accordance with 4-3-6/7.3.</p> <p>7.3 ... that the vessel is capable of manoeuvring into an orientation of least resistance to the weather, and once in that orientation, maintaining position such that the vessel will not drift for at least 36 hours. ...</p> <p>This is to be possible in all weather conditions up to a wind speed of 17 m/s (33 knots) and significant wave height of 4.5 m (15 ft) with 7.3 seconds mean period, both of which are acting concurrently in the same direction.</p> |
| DNV | Part 6, Chapter 2 | 6 knots | 204 The propulsion system power capacity shall be such that the required remaining propulsion power, as recovered after any failure, will enable the vessel to maintain a speed of not less than 6 knots while heading into BF 8 weather conditions with corresponding wave conditions. The requirement shall be documented by computation where relevant wave spectrum is utilized. |
| LR | Part 5, Chapter 19 | 7 knots | As part of steering performance requirements, minimum speed is to be half of the maximum ahead service speed or 7 knots, whichever is the greater, when the ship is at its deepest seagoing draught. |
| | Part 5, Chapter 22 | 7 knots | Where a ship is given the optional notations such as PSMR or PSMR* for steering and propulsion redundancy, is to be capable of retaining steering capability at a service speed of not less than 7 knots in the event of a single failure of a system or item of equipment. The ship is to retain the ability to use not less than 50 per cent of the installed prime mover capacity and not less than 50 per cent of the installed propulsion systems. |
| BV | Part E, Chapter 2, Section 1 | 7 knots | <p>AVM -APS (Alternative propulsion system)</p> <p>2.2.1 The alternative propulsion machinery is to be so arranged that, in case the main propulsion system becomes inoperative, the propulsion power of the ship remains available or can be recovered, allowing the ship to proceed at a speed of not less than 7 knots assuming that:</p> <ul style="list-style-type: none"> • the ship is fully laden • normal weather conditions: BF 5. |

| Society | Source for requirement | Minimum speed | Comments |
|---------|------------------------------|--|---|
| | Part E, Chapter 2, Section 2 | 7 knots | <p>AVM-DPS (Duplicated Propulsion System)</p> <p>2.2.1 The propulsion machinery is to consist of at least two mechanically independent propulsion systems so arranged that, in case one propulsion system becomes inoperative, at least 50% of the propulsion power of the ship remains available and allows the ship to proceed at a speed of not less than 7 knots assuming that:</p> <ul style="list-style-type: none"> • the ship is fully laden • normal weather conditions: BF 5. |
| | Part E, Chapter 2, Section 3 | 7 knots | <p>AVM-IPS Independent Propulsion System</p> <p>2.3.1 The propulsion machinery is to consist of at least two mechanically independent propulsion systems located in separate compartments and so arranged that, in case one propulsion system becomes inoperative due to a system failure, at least 50% of the propulsion power of the ship remains available and allows the ship to proceed at a speed of not less than 7 knots assuming that:</p> <ul style="list-style-type: none"> • the ship is fully laden • normal weather conditions: BF 5. |
| GL | | 7 knots or corresponding to 50% propulsion power | <p>It must be ensured that when a failure in a propulsion or steering system occurs,</p> <ol style="list-style-type: none"> 1. the manoeuvrability of the ship can be maintained so that even under unfavourable weather conditions the ship can be manoeuvred into a position of less resistance to the weather and can be maintained in this position, 2. a minimum speed can be maintained to keep the ship under control and ensure that it is able to make speed over the ground in waters where there is a strong current. The minimum speed under normal weather conditions must be at least 7 knots or half the design speed (the lower value may be applied). <p>Normal weather conditions are regarded as being a wind speed of up to and including 11 m/sec. (5 on the Beaufort scale) and a significant wave height of 2.8 m with an average wave period of 6.7 secs.</p> |
| RINA | Part F, Chapter 2, Section 1 | 7 knots | <p>The additional class notations AVM-APS, AVM-APS-NS, AVM-IAPS, AVM-DPS, AVM-DPS-NS, AVM-IPS are assigned to ships which are fitted with systems and/or arrangements enabling them to maintain operating conditions with some limitations in speed (full load speed not less than 7 knots), range (1,000 nautical miles) and comfort, in the case of any single failure of specific items relative to the propulsion.</p> |

ANNEX 2

MINIMUM SPEED TO ENSURE MANOEUVRABILITY IN CASE ONE ENGINE FAILS

| IACS classification society | Performance objective | Minimum Speed (knots) | Related environmental conditions |
|------------------------------------|--|------------------------------|---|
| BV | ... the ship remains available and allows the ship to proceed at a speed not less than | 7 | BF 5 |
| DNV | ... will enable the vessel to maintain a speed of not less than | 6 | BF 8 |
| GL | The minimum speed under normal weather conditions must be at least | 7, or half design speed | BF 5 |
| LR | ... the ship is to be capable of retaining steering capability at a service speed of not less than 7 knots in the event of a single failure of a system or item of equipment | 7 | - |
| RINA | Operating condition to be achieved in case of a casualty | 7 | Calm sea, according to MSC.1/Circ.1053 |