

MARINE ENVIRONMENT PROTECTION
COMMITTEE
81st session
Agenda item 6

MEPC 81/6/3*
15 December 2023
Original: ENGLISH
Pre-session public release:

ENERGY EFFICIENCY OF SHIPS

Addressing the emerging risks associated with the use of shaft or engine power limitation systems on ships

Submitted by ICS, IMPA and IHMA

SUMMARY

Executive summary: This document discusses the experience of maritime pilots and industry with overridable shaft or engine power limitation systems on ships complying with regulation 25 of MARPOL Annex VI, and outlines two challenges. The emergent risks to the safe navigation of ships and pollution prevention arising from delays in the availability of the power reserve on ships, and the challenge associated with approval of shaft or engine power limitation systems which are consistent with IACS Recommendation 172 and which do not physically limit shaft or engine power. It is proposed to make amendments to resolution MEPC.335(76), as amended by resolution MEPC.375(80), to address this situation.

Strategic direction, 3 if applicable:

Output: 3.2

Action to be taken: Paragraph 21

Related documents: Resolutions MEPC.328(76), MEPC.335(76), MEPC.375(80), MEPC 75/6/10 and MEPC 80/17

Introduction

1 MEPC 76 adopted amendments to Chapter 4 of MARPOL Annex VI, the 2021 Revised MARPOL Annex VI, to introduce mandatory goal-based technical and operational measures to reduce carbon intensity of international shipping (resolution MEPC.328(76)):

- .1 regulation 25 of MARPOL Annex VI contains a mandatory requirement for existing ships to improve their technical efficiency, required Energy Efficiency Existing Ship Index (EEXI). In this regard, existing ships may be equipped with a shaft or engine power limitation system. To support the uniform and

* Paragraph 19 of this document has been revised upon request by the co-sponsors on 9 January 2024.

effective implementation of regulation 25, MEPC 76 also adopted the *2021 Guidelines on the shaft / engine power limitation system to comply with the EEXI requirements and use of a power reserve* (MEPC.335(76), as amended by resolution MEPC.375(80)); and

- .2 regulation 28 of MARPOL Annex VI introduced mandatory requirements for operational carbon intensity reduction (CII). In this context shaft or engine power limitation systems also have a role in helping Companies manage the operational carbon intensity of their ships.

2 MEPC 80 noted the Working Group's discussion on proposals on the use of overridable SHaPoLi/EPL systems and invited Member States and international organizations to work informally to progress work on the potential use of overridable shaft or engine power limitation systems in Energy Efficiency Design Index (EEDI) calculations (paragraph 6.28, MEPC 80/17 (Secretariat)).

3 Paragraph 2.2.1 of resolution MEPC.335(76), as amended by resolution MEPC.375(80), provides a broad statement of the functionality of shaft (SHaPoLi) or engine power (EPL) limitation systems:

"The SHaPoLi/EPL system should be non-permanent but should require the deliberate action of the ship's master or Officer in Charge of a Navigational Watch (OICNW) to enable the use of unlimited shaft/engine power (power reserve) of the ship..."

4 Paragraph 3.1 of resolution MEPC.335(76), as amended by resolution MEPC.375(80), provides for the use of power reserve on ships using overridable power limitation (OPL) as follows:

"The use of a power reserve is only allowed for the purpose of securing the safety of a ship or saving life at sea, consistent with regulation 3.1 of MARPOL Annex VI (e.g. operating in adverse weather and ice-infested waters, participation in search and rescue operations, avoidance of pirates and engine maintenance). Use of a power reserve should not have adverse impact on the propeller, shaft and related systems. It is important that the ship master and OICNW are not restricted from exercising judgement to override the SHaPoLi/EPL when required for safety purposes. The authority for this should be clearly set out in the OMM and/or the Safety Management System manual, as appropriate."

5 Paragraph 3.3 of resolution MEPC.335(76), as amended by resolution MEPC.375(80), provides for the activation of the override, even if the power reserve is not subsequently used, as follows:

"Where an EPL/SHaPoLi override is activated but the power reserve is not subsequently used, this event should be recorded in the bridge and engine-room logbooks..."

6 Paragraph 3.5 of resolution MEPC.335(76), as amended by resolution MEPC.375(80), provides for the immediate reactivation or replacement of any power limit, as follows:

"Once the risks have been mitigated, the ship should be operated below the certified level of engine power under the SHaPoLi/EPL. The SHaPoLi/EPL system should be

reactivated or replaced by the crew immediately after the risks have been prevented and the ship can be safely operated with the limited shaft/engine power...

7 SOLAS Chapter V (Safety of navigation), Regulation 34-1 (Master's discretion) states:

"The owner, the charterer, the company operating the ship as defined in regulation IX/1, or any other person shall not prevent or restrict the master of the ship from taking or executing any decision which, in the master's professional judgement, is necessary for safety of life at sea and protection of the marine environment."

8 The 2022 *Interim Guidelines on correction factors and voyage adjustments for CII calculations (CII Guidelines, G5)* (MEPC.355(78)) are already sufficiently broad to address the identified challenges, the *CII Guidelines, G5*, contain the following:

- .1 *FCvoyage*,j can be applied in all "scenarios specified in regulation 3.1 of MARPOL Annex VI, which may endanger safe navigation of a ship"; and
- .2 in appendix 2, on reporting fuel oil consumption and distance travelled when applying voyage adjustments, it is also stated to apply in any "scenario specified in regulation 3.1 of MARPOL Annex VI applies, which may endanger safe navigation of a ship".

9 IMPA has previously expressed concern regarding the impact of limiting power on the handling and manoeuvrability of ships in restricted waters in document MEPC 75/6/10 (IMPA).

10 Under section 2.1 of resolution MEPC.335(76), as amended by resolution MEPC.375(80), describing main arrangements for SHaPoLi EPL systems, paragraph 2.1.1.3 includes:

"a control unit for calculation and limitation of the power transmitted by the shaft to the propeller(s) ".

11 IACS Recommendation 172 includes the following interpretation of paragraph 2.1.1.3 of MEPC.335(76), as amended by resolution MEPC.375(80):

"6.6 Onboard Management Manual (OMM)

Regarding resolution MEPC.335(76), section 2.1.1.3 "a control unit for calculation and limitation of the power transmitted by the shaft to the propeller(s)": If this control is independent from the engine automation the following shall be satisfied:

- .1 override of limitation is indicated by giving an alarm on the bridge, clearly informing the ship's master or OICNW;
- .2 in case of exceedance, the ship's master or OICNW to manually reduce the power within the limit;
- .3 in case of deliberate use of power reserve, data recording to commence automatically; and
- 4 data recording device as defined in section 2.1.1.2.

The OMM should clearly define this confirmation of the alarm as the deliberate action in agreement with requirement in chapter 2.2.1."

Discussion

12 While maritime pilots direct a ship's navigation in a manner consistent with the minimum power necessary and generally within a percentage range of the maximum continuous rating (MCR) below a shaft or engine power limit required to comply with EEXI, the pilot needs to know the power that the ship is limited to and to be provided with information during the master-pilot information exchange (MPX) about the handling characteristics and performance of a ship.

13 Additionally, there are occasions when there is an acute need for power at or above the shaft or engine power limit required to comply with EEXI. In general, this is in response to either the specific environmental conditions in a port (e.g. the presence of a bar), or exceptional environmental conditions or traffic situations. The critical factor is the urgency attached to the availability of power in these situations, which is more acute than during operations in the open sea.

14 It is recognized that the delivery of the *2023 IMO Strategy on Reduction of GHG Emissions from Ships* (resolution MEPC.377(80)) requires improving the energy efficiency of new and existing ships. Notwithstanding, the experience of maritime pilots indicates that shaft or engine power limitation systems are introducing new challenges when it comes to the manoeuvrability of ships in waters where pilotage is organized by Governments pursuant to the Recommendation on pilotage (resolution A.159(ES.IV)) on a mandatory or recommendatory basis.

15 This experience has so far been captured in a higher risk of near-miss incidents arising from the following:

- .1 notwithstanding the provisions of SOLAS Chapter V (Safety of navigation), Regulation 34-1 and the approach in resolution MEPC.355(76), as amended by resolution MEPC.375(80), reluctance has been observed in decisions to override shaft or engine power limitation systems. Uncertainty has been observed as to who has authority to make these decisions, even when this is set out in the Onboard Management Manual (OMM) and/or the approved Safety Management System;
- .2 as mentioned in paragraph 18.1, pilots are not always being advised that the ship has a shaft or engine power limitation system engaged, or do not have access to detailed information on the system's impact on the ship's manoeuvrability. In the latter case, this is generally because the ship does not have the information needed to advise the pilot;
- .3 shaft or engine power limitation systems which cannot be un-limited immediately or within a time frame compatible with operations in restricted or congested waters designated for mandatory or recommendatory pilotage. This is particularly relevant in the cases of software-controlled engines where the override password is not available on board and mechanically controlled engines where un-limiting can take between 5 and 20 minutes, depending on the arrangement. In this regard:
 - .1 a ship can be unable to immediately respond to a pilot's order for needed engine power – both forward and astern – to ensure the necessary flow of water across the rudder for manoeuvring large vessels in confined areas, as well as the sufficient ability to stop or

-
- .2 slow the vessel promptly;
a ship can be prevented from being able to take action as required by regulation 6 (safe speed) and regulation 8 (action to avoid collision) of International Regulations for Preventing Collisions at Sea (COLREGs); and
 - .3 an inconsistency in resolution MEPC.335(76), as amended by resolution MEPC.375(80), exists. Whilst paragraph 3.5 describes the immediate replacement or reinstatement of any mechanical or software-imposed limit, there is no equivalent for the immediacy of un-limiting. Paragraph 2.2.1 only states that the systems should be non-permanent. Paragraphs 4.3.1.11 and 4.3.2.7 only state that the OMM should contain information on "the time required for unlimiting", without indicating a maximum acceptable time. Whilst reinstating the limit is essential for environmental objectives, immediate un-limiting is essential for safety.
 - .4 the use of power limitations, which, as a percentage of MCR, exceed the minimum required to comply with regulation 25 of MARPOL Annex VI (required EEI).

16 The co-sponsors are aware of actions being taken by the appropriate authorities of port States to:

- 1 review operational risk assessments for pilotage in ports; and
- .2 require ships to have all shaft or engine power, including the power reserve, available for immediate use while in mandatory pilotage waters; and if the shaft or engine power limitation system is SHaPoLi/EPL system is not capable of being immediately overridden, the system should be overridden before a pilot's embarkation and remain overridden until the ship departs mandatory pilotage waters. This should not be construed as an invitation, obligation or intent to use the power reserve. It is a measure which allows the risks identified through the experience in paragraph 13 to be avoided in the event of an acute need for power.

17 The co-sponsors draw Member States' attention to this situation with a view to enhancing the guidance on the use of shaft or engine power limitation systems to ensure that these systems do not become an impediment to safe navigation and pollution prevention.

18 The co-sponsors are also aware of several inconsistencies in the approaches to OPL taken by administrations and ROs. These include:

- .1 provision of information to the crew and pilots relating to the manoeuvring characteristics of the ship, both with and without the power reserve (e.g. on the Pilot Card); and
- .2 IACS Recommendation 172 includes an interpretation of paragraph 2.1.1.3 of MEPC.355(76), as amended by MEPC.375(80), which allows for a shaft or engine power limitation system where there is no physical shaft or engine power limitation. Instead, if the power limit is exceeded, a bridge alarm will be triggered, and data recording commences. The system described in IACS Recommendation 172 has the advantage that the power reserve can be accessed without any delay (i.e. when needed for any purpose provided for

in regulation 3.1 of MARPOL Annex VI). However, this arrangement is not explicitly addressed in resolution MEPC 335(76), as amended by resolution MEPC.375(80), and flag State Administrations have different approaches when:

- .1 accepting systems which do not impose a physical shaft or engine power limitation; and
- .2 accepting a delay between an exceedance of the power limit and the initiation of the alarm and data recording. This is relevant when a ship is operating close to the overridable power limit and there may be occasional short-term unintentional exceedance of the power limit (e.g. due to heavy weather). To avoid the burdensome and unnecessary reporting requirements initiated by such short-term exceedance, some, but not all flag State Administrations have accepted a short delay between an exceedance of the power limit and the initiation of the alarm and data recording.

Proposal

19 To support a uniform and consistent approach to the immediate availability of power, including the power reserve, whenever provided for in regulation 3.1 of MARPOL Annex VI, the following amendments to resolution MEPC.335(76), as amended by resolution MEPC.375(80), are proposed:

- .1 paragraph 2.1.1.3 is amended to read:
 - .3 a control unit for calculation and limitation of the power transmitted by the shaft to the propeller(s); if this control unit is independent from the engine automation the following shall be satisfied:
 - .1 override of limitation is indicated by giving an alarm on the bridge, clearly informing the ship's master or OICNW. Acceptance of this alarm by the master or OICNW is the deliberate action referred to in paragraph 2.2.1;
 - .2 in case of exceedance, the ship's master or OICNW to manually reduce the power within the limit;
 - .3 in case of deliberate use of power reserve, data recording to commence automatically;
 - .4 data recording device as defined in section 2.1.1.2; and
 - .5 in case of short-term unintentional exceedance of the power limit the system may inhibit the initiation of the exceedance alarm for up to a maximum of [10][60] minutes."

This would allow the consistent use of SHaPoLi systems, which avoids any risk of inappropriate delays in the availability of the power reserve in any situation consistent with regulation 3.1 of MARPOL Annex VI.

.2 paragraph 2.2.1 is amended to read:

"The SHaPoLi/EPL system should be non-permanent but should require the deliberate action of the ship's master or OICNW to enable the immediate use of unlimited shaft/engine power (power reserve) by the ship in a scenario specified in regulation 3.1 of MARPOL Annex VI, which may endanger safe navigation of ship... Immediate use may be achieved by technical arrangements which allow instantaneous use of the power reserve, or equivalent procedural arrangements for pre-emptive un-limiting the SHaPoLi/EPL system."

By using language from *CII Guidelines, G5*, this amendment would ensure that, either by design or practice, the power reserve is immediately available. In addition, it would address the inconsistency described in paragraph 15.3.2 of this document.

It would not require modifications to existing shaft or engine power limitation system installations. For those systems where immediate use of the power reserve is not possible, it would promote pre-emptive un-limiting where this is necessary and appropriate, or required by a port State. In the latter case, the record-keeping instructions in paragraph 3.3 of resolution MEPC.335(76), as amended by resolution MEPC.375(80), would continue to support implementation and enforcement in the event the power reserve is un-limited but not used.

.3 paragraph 3.1 is amended to read:

"The use of a power reserve is only allowed for the purpose of securing the safety of a ship or saving life at sea, consistent within scenarios specified in regulation 3.1 of MARPOL Annex VI, which may endanger safe navigation of the ship (e.g. operating in adverse weather and ice-infested waters, participation in search and rescue operations, avoidance of pirates and engine maintenance, roadsteads, harbours, rivers, lakes, inland waterways and ice-infested waters, participation in search and rescue operations, avoidance of pirates, grounding, allision or collision and engine maintenance) Use of a power reserve should not have adverse impact on the propeller, shaft and related systems. It is important that the ship master and OICNW are not restricted from exercising judgement to override the SHaPoLi/EPL when required or anticipated to be required for safety purposes. The authority for this should be clearly set out in the OMM and/or the Safety Management System manual, as appropriate."

This would align resolution MEPC.335(76), as amended by resolution MEPC.375(80), guidance on using the power reserve with the approach in the *CII Guidelines, G5* and provide a complete illustrative list of relevant and appropriate example scenarios. These can be reflected in the OMM and approved Safety Management System. This does not change the intent that the use of the power reserve is by exception.

In addition, it is clarified that the use of judgement by the master or OICNW applies when it is necessary to use the power reserve, and when it is anticipated that it may be necessary to use the power reserve.

.4 paragraph 3.3 is amended to read:

"The use of the power reserve should be distinguished from the precautionary un-limiting of a shaft or engine power limitation system. Where an EPL/ShaPoLi override is activated as a precaution and in advance of a scenario described in paragraph 3.1, but the power reserve is not subsequently used, this event should be recorded in the bridge and engine-room logbooks."

This would provide more explicit guidance on recording events, including but not limited to instances where an appropriate port State authority requires the un-limiting of shaft or engine power limits.

.5 a new paragraph 6 is added as follows:

"6 The following documents described in the appendices to *Recommendation on the Provision and Display of Manoeuvring Information on Board Ships* (annex, resolution A.601(15)) should be updated to include the manoeuvring characteristics of the ship when the ship has all shaft and engine power available, and when shaft or engine power has been limited:

.1 the Pilot card;

.2 the wheelhouse poster; and

.3 the manoeuvring booklet."

20 It is recommended that action to address this situation be taken independently of the review of EEXI in accordance with regulation 25.3 of MARPOL Annex VI if this yields an accelerated response to the risks outlined in this document. In any event, action to address this situation should be taken as part of the review of EEXI in accordance with regulation 25.3 of MARPOL Annex VI.

Action requested of the Committee

21 The Committee is requested to note the information provided, consider the action proposed in paragraphs 19 and 20, and take action as appropriate.
