INTERNATIONAL MARITIME ORGANIZATION

E

MARITIME SAFETY COMMITTEE
108th session
Agenda item 19

MSC 108/19/6
26 March 2024
Original: ENGLISH
Pre-session public release: ☒

ANY OTHER BUSINESS

Comments on document MSC 108/19

Submitted by IACS

SUMMARY	
Executive summary:	This document comments on document MSC 108/19 and provides explanations and answers to the main concerns presented therein.
Strategic direction, if applicable:	7
Output:	7.24
Action to be taken:	Paragraph 24
Related documents:	MSC 96/5, MSC 96/5/1/Add.1; MSC 108/19 and resolution MSC.454(100)

Introduction

1 This document is submitted in accordance with paragraph 6.12.5 of the *Organization and method of work of the Maritime Safety Committee and the Marine Environment Protection Committee and their subsidiary bodies* (MSC-MEPC.1/Circ.5/Rev.5) and comments on document MSC 108/19 (ICS, INTERTANKO, INTERCARGO and RINA).

Background

2 Following the findings of the initial IMO audit on the GBS compliance of the IACS members' class rules containing IACS Common Structural Rules for Bulk Carriers and Oil Tankers (IACS CSR) as a core part, IACS provided Corrective Action Plans on observations in document MSC 96/5/1/Add.1.

3 The work of IACS on addressing observation IACS/2015/FR1-8/OB/02 resulted in Rev.2 of IACS Rec.34 "Standard Wave Data". Rev.2 of IACS Rec.34 was published in December 2022 containing an updated wave scatter diagram and updated recommendations to determine rule loads for ships.

4 According to paragraph 27.6 of resolution MSC.454(100), IACS requested the GBS audit of Rev.2 of IACS Rec.34, as this document forms an important basis for the development and update of design loads in IACS CSR.

5 Document MSC 108/19 provides comments on the review of the North Atlantic wave data (IACS Recommendation 34/Rev.2) and discusses several concerns related to the new data. In this document IACS provides explanations and answers to the main concerns presented in document MSC 108/19.

Discussion

6 IACS understands that the four main concerns discussed in document MSC 108/19 are:

.1 use of hindcast AIS tracks for weather-routed ships;

.2 selection of sea areas;

.3 future wave height trends; and

.4 impact of the new revision on hull strength.

Use of hindcast AIS tracks

7 The aim of Rev.2 of IACS Rec.34 is to provide more reliable and accurate wave data and to offer further recommendations which can be used to determine the wave loads applied to merchant ships with a length *L* above 90 metres in unrestricted service. To obtain a design standard for wave loads (design loads) for the purpose of designing a safe merchant ship, it is of great importance to determine the extreme loads that a ship will experience within the design life and with a certain probability of occurrence.

8 One of the main concerns expressed in paragraphs 6 to 12 of document MSC 108/19 is that IACS has used AIS tracks from all ships that navigated in the North Atlantic in the period between 2013 and 2020, having combined the ship position data with wave hindcast data, resulting in the data in Rev.2 of IACS Rec.34, missing the most onerous conditions seen by ships in the North Atlantic. The document concludes that Rev.2 of IACS Rec.34 does not represent the worst-case conditions.

9 In fact, the IACS procedure does not consider the extreme weather conditions that might have occurred during that period somewhere on the ocean where no ship was operating. However, in line with paragraph 7 above, this methodology very accurately considers the aspect of ship operation in terms of position, speed and course in actual wave conditions, including the most onerous ones. It reflects the practical application of what is required by SOLAS regulation V/34.

10 The used AIS data is not filtered, except by ship length (*L* above 90 metres) and type (merchant ships), as mentioned in paragraph 7 above, and, therefore, includes all effects listed in paragraph 9 of document MSC 108/19. Therefore, the data contains and reflects the "most onerous conditions seen by ships on the North Atlantic" mentioned in paragraph 10 of document MSC 108/19 during the referred period.

Selection of sea areas

11 Paragraphs 13 to 19 of document MSC 108/19 discuss the selection of sea areas for the extraction of data as a basis for the scatter diagram in Rev.2 of IACS Rec.34.

12 The observation in document MSC 108/19, that the sea area was extended substantially to the south, is correct. This is mainly driven by the fact that based on the available AIS data, significant traffic crossing the North Atlantic Ocean is through these areas. Therefore, the data including these areas represents a better and more realistic reflection of ship operations in the North Atlantic. In addition, it is to be noted that all coastal/sheltered areas are excluded from the sea areas to avoid the effect of less onerous conditions of coastal/sheltered areas on the overall data collected.

13 The impact of the increase of the area to the south was carefully investigated by IACS. It was found that the extreme loads determined based on the extended area were, on average, 3% lower compared to the extreme loads determined based on the northern envelope. This was considered acceptable with respect to the increase in statistical relevance caused by the 217% increase in the amount of available data, compared with the northern envelope.

Comparison of Rev.1 and Rev.2 of IACS Rec.34 and future wave height trends

14 IACS is considering that a comparison of wave data in Rev.1 and Rev.2 of IACS Rec.34 is of very limited value, as the low data quality in Rev.1 (which was based on human observations) is well known. It was much improved by the more reliable and accurate data of Rev.2 of IACS Rec.34. Therefore, significant differences between these two data sets can be expected and these are, in fact, the reason for the work on updating IACS Rec.34.

15 Furthermore, differences in the comparison between significant wave height data, based on pure met-ocean data and based on data considering the operation of ships, should be expected. In that respect, reference is made to the arguments in paragraphs 9 and 10 above.

16 With respect to future wave height trends, reference is made to the Technical Background document of Rev.2 of IACS Rec.34, which refers to projections made by the Intergovernmental Panel on Climate Change (IPCC). Those projections result in +/-0.5 metre (positive or negative) in extreme and average wave heights for the North Atlantic. It needs to be noted that the use of atmospheric models for long-term hindcasting is impeded by the lack of reliable measured data over a long time. On the other hand, long-term forecasting is impeded by the lack of confidence in the scenarios themselves (which may be dependent on future trends of greenhouse gas emissions) and the uncertainties in the wind models used in these forecasts.

17 The updated scatter diagram in Rev.2 of IACS Rec.34 is considered robust with respect to changes in extreme and average wave heights in the range of 0.5 metre. Furthermore, substantial improvements in weather forecasting and bad weather avoidance have been observed. It is expected to evolve further in the coming years, further limiting the effect of changes in extreme wave heights on safe ship operations.

Impact of new revision of IACS Rec.34 on hull strength

18 Paragraph 33 of document MSC 108/19 discusses several strength aspects that might be impacted by the change of the wave scatter diagram in Rev.2 of IACS Rec.34.

19 It needs to be noted that software to determine wave loads has been significantly improved in recent years. Nowadays, wave loads on ship structures can be predicted with much higher accuracy and reliability, compared to the time when the loads required by IACS Unified Requirement UR S11 were developed. Furthermore, the spectrum shape, as well as the spreading function, have been revised in Rev.2 of IACS Rec.34. These two changes tend to increase the maximum design loads and the fatigue design loads.

20 In general, IACS considers it premature to discuss the impact on the strength of the ship hull, as the final loads for the strength calculations are still under development. However, compared with the current IACS CSR, preliminary results for the hull girder loads indicate a slightly higher midship wave bending moment, at least in hogging condition for ships with a length L>200 metres, and a higher wave shear force for all IACS CSR ships.

21 Paragraph 34 of document MSC 108/19 references a DNV document from 2013 ("Ship and Offshore Structure Design in Climate Change Perspective") stating an increase in the probability of deck failure due to an increase in significant wave height. Considering that this statement is correct in principle, it must be noted that the risk increases only if the hull girder design loads (loads for strength calculations) are generally reduced. However, as mentioned in paragraph 20 above, this will not be the case. The safety level of ships with respect to hull girder failure due to wave loading will not be compromised by Rev.2 of IACS Rec.34. The reason for this confidence is the currently weak linkage between the hull girder loads, as defined in IACS CSR/IACS UR S11, and the wave data in Rev.1 of IACS Rec.34, which will be strengthened significantly by the newly developed rule loads for IACS CSR.

22 With respect to the impact on fatigue strength, as discussed in paragraphs 37 and 38 of document MSC 108/19, IACS would like to note that fatigue strength, even if the load part is calculated by sophisticated spectral analysis, is highly dependent on the capacity part of the structural detail under consideration. Of course, the new scatter diagram will produce favourable fatigue loads, compared with the scatter diagram in Rev.1 of IACS Rec.34. However, the data quality of the updated scatter diagram in Rev.2 of IACS Rec.34 is considered much higher. Hence, IACS considers the results of a fatigue check based on Rev.2 of IACS Rec.34 data to be more accurate. Furthermore, conclusions on the impact on fatigue assessments, at this point in time, are premature since the rule fatigue loads are still under development by IACS.

General comment

23 In order to promote the exchange of views and provide technical clarifications, IACS hosted a workshop in London on 29 February 2024, where a wider industry consultation was held on the upcoming revisions in IACS CSR, including addressing the concerns raised by the co-sponsors of document MSC 108/19.

Action requested of the Committee

24 The Committee is invited to consider the comments and information provided and to take action, as appropriate.