



SUB-COMMITTEE ON SAFETY OF
NAVIGATION
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Agenda item 6

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CARRIAGE REQUIREMENTS FOR A BRIDGE NAVIGATIONAL WATCH ALARM SYSTEM

Submitted by Denmark

SUMMARY

- Executive summary:** This paper proposes that a bridge navigational watch alarm system is added to the carriage requirements for shipborne navigational systems and equipment in SOLAS regulation V/19.2.2.3 and addresses the human element in connection herewith
- Action to be taken:** Paragraph 23
- Related documents:** Resolution MSC.128(75), MSC 81/23/2 and NAV 51/18

Background

- 1 In document MSC 81/23/2, the Bahamas and Denmark proposed that a bridge navigational alarm system was added to the carriage requirements for shipborne navigational system and equipment in SOLAS regulation V/19.2.2.3. The reason for the submission was a ship collision with the combined road and railway bridge across the Great Belt in Denmark.
- 2 At the fifty-first session of the Sub-Committee on safety of navigation, Denmark informed the Sub-Committee on the use of bridge navigational watch alarm system (BNWAS). This document elaborates on the experiences gained on the use of BNWAS in Danish ships.
- 3 MSC 81/23/2 referred to the occurrence of a number of groundings and collisions related to navigational watch-keeping on board ships. In many cases, the ships were not equipped with a BNWAS or it was switched off.
- 4 The Maritime Safety Committee decided to include a high priority item in the working program of the Sub-Committee on Safety of Navigation with a target completion date of 2008 on carriage requirements for bridge navigational watch alarm system.
- 5 The Sub-Committee at its fifty-second session addressed the issue and invited its members to submit suitable proposals and comments on the carriage requirements for a bridge navigational watch alarm system.

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Proposal on carriage requirement

6 IMO has adopted resolution MSC.128(75) on Performance standards for a bridge navigational watch alarm system (BNWAS). The Organization has, however, not adopted carriage requirements or guidelines for the use of such systems.

7 The purpose of a BNWAS is to monitor bridge activity and detect operator disability, which could lead to maritime accidents, thus enhancing safety of navigation. No reduction in manning of the bridge is intended.

8 It is proposed that the SOLAS-Convention should be amended to require that all ships of 150 gross tonnage and upwards and passenger ships irrespective of size shall be fitted with a BNWAS and that it shall be in operation when the ship is at sea. A proposal for amendments to SOLAS regulation V/19 is attached as annex 1.

9 Costs to the maritime industry will depend on the complexity of the system chosen. In its basic form a BNWAS including an activity sensor detecting movements on the bridge will cost approximately US\$1,500 per ship.

10 BNWAS in operation on the ship's navigation bridge is expected to contribute to minimize the risk of ship accidents caused by an Officer of the Watch (OOW) becoming incapacitated during the watch and this would harmonize with the proactive stance already taken by certain Member States.

Human element

11 Denmark has had a national requirement of a BNWAS on Danish ships for some time. The implementation of the requirement started in March 2003 for ships with gross tonnage below 500 and thereafter gradually for larger ships. On 1 March 2006, the national requirement was in force for all ships. Furthermore, a requirement for fishing vessels is in force.

12 In co-operation with the Danish shipping industry, a low priced BNWAS that causes as little inconvenience to the operator as possible has been developed in connection with the national carriage requirement. The system complies with resolution MSC.128(75) on performance standards for a bridge navigational watch alarm system. The system may include sensors that detect activity on the bridge, so that the OOW does not have to press a reset button at regular intervals.

13 At the fifty-second session of the Sub-Committee concern about the human aspect of BNWAS was raised. In the report from fifty-second session the Sub-Committee was asked to take a view to enhancing the safety of navigation taking into account the human element. On this basis, Denmark has tried to achieve a better picture of the use of BNWAS on Danish ships and on how navigators view the system by asking the users themselves.

14 In the winter of 2006-07, the Danish Maritime Authority made an inquiry concerning the use of BNWAS on Danish ships. The inquiry was based on a questionnaire that could be answered by e-mail. 237 answers to the questionnaire were received from OOW's familiar to the use of BNWAS.

15 The questionnaire and the results are attached as annex 2. In the following text, the most important results will be mentioned.

16 93% of the navigators answered “Yes” to the question: “Do you regard the BNWAS to be part of the safety equipment on the bridge protecting the ship and her crew?” This clearly indicates that the OOW’s generally regard the BNWAS as a factor that enhances the safety of navigation.

17 In most cases the procedures and routines for Bridge Resource Management on board the ships had been changed to ensure proper use of the BNWAS.

18 The number of times the BNWAS had been activated varied according to the way the alarm was reset. Approximately half of the received answers were given from ships equipped with reset button system only. A reset button must be activated manually in order to reset or postpone an alarm.

19 On ships with a reset button system, an innumerable number of alarms were seen or heard. BNWAS was in many cases only reset after the alarm was activated. The OOW on such ships generally felt the BNWAS to be a source of irritation and distraction. In total, approximately 20% of the OOW’s found the BNWAS irritating due to the many alarms.

20 On ships with a system including activity sensors that detects movement on the bridge, the BNWAS gave very few alarms. Furthermore, the OOW on such ships generally viewed the BNWAS to be reassuring. No element of irritation was found in the answers in connection with this type of BNWAS.

21 It is thus evident on the basis of the answers to the questionnaire that BNWAS with only a reset button should be avoided. It is advisable to equip ships with systems where a combination of sensors, primarily an activity sensor, is used. This will reduce the number of alarms and avoid unnecessary stress and inconvenience to the OOW.

22 Only 0.1% of all alarms went to the second stage giving audible alarm in the back-up officer’s and/or master’s locations. No alarms went to third stage giving audible alarm in the locations of further crewmembers.

Action requested of the Sub-Committee

23 The Sub-Committee is invited to consider the proposal as set out in annex 1 and note the information given in this document and take appropriate action as appropriate.

ANNEX 1**DRAFT RESOLUTION MSC. [...] (xx)****ADOPTION OF AMENDMENT TO THE INTERNATIONAL CONVENTION
FOR THE SAFETY OF LIFE AT SEA, 1974, AS AMENDED**

THE MARITIME SAFETY COMMITTEE,

RECALLING Article 28(b) of the Convention on the International Maritime Organization concerning the functions of the Committee,

RECALLING FURTHER article VIII(b) of the International Convention for the Safety of Life at Sea (SOLAS), 1974, hereinafter referred to as "the Convention", concerning the procedures for amending the Annex to the Convention, other than the provisions of chapter I thereof,

HAVING CONSIDERED, at its eighty-third session, amendments to the Convention proposed and circulated in accordance with article VIII(b)(i) thereof,

1. ADOPTS, in accordance with article VIII(b)(iv) of the Convention, amendments to the Convention, the text of which is set out in the Annex to the present resolution;
2. DETERMINES, in accordance with article VIII(b)(vi)(2)(bb) of the Convention, that the amendments shall be deemed to have been accepted on [1 January 2009], unless, prior to that date, more than one third of the Contracting Governments to the Convention or Contracting Governments the combined merchant fleets of which constitute not less than 50% of the gross tonnage of the world's merchant fleet, have notified their objections to the amendments;
3. INVITES Contracting Governments to note that, in accordance with article VIII(b)(vii)(2) of the Convention, the amendments shall enter into force on [1 July 2009] upon their acceptance in accordance with paragraph 2 above;
4. URGES Contracting Governments to recommend that bridge navigational watch alarm systems are equipped with activity sensors detecting movement, as such systems limit the stress factor on the bridge of the ship.
5. REQUESTS the Secretary-General, in conformity with article VIII(b)(v) of the Convention, to transmit certified copies of the present resolution and the text of the amendments contained in the Annex to all Contracting Governments to the Convention;
6. FURTHER REQUESTS the Secretary-General to transmit copies of this resolution and its Annex to Members of the Organization, which are not Contracting Governments to the Convention.

Regulation 19

- 1 Add a new sub-paragraph V/19.2.2.3 as follows:

After sub-paragraph 2.2.2, the following new sub-paragraph is added:

“.3 a bridge navigational watch alarm system (BNWAS) complying with standards not inferior to those adopted by the Organization^{*}, as follows:

- .1 ships constructed on or after [1 July 2009];
- .2 ships of 3,000 gross tonnage and upwards constructed before [1 July 2009] not later than [1 July 2009];
- .3 ships of 500 gross tonnage and upwards but less than 3,000 gross tonnage constructed before [1 July 2009] not later than [1 July 2010]; and
- .4 ships of 150 gross tonnage and upwards but less than 500 gross tonnage constructed before [1 July 2009] not later than [1 July 2011].

The bridge navigational watch alarm system shall be in operation whenever the ship is at sea.”

* Refer to the recommendation adopted by the Organization by resolution MSC.128(75) on Performance standards for a bridge navigational watch alarm system (BNWAS).

ANNEX 2

**THE QUESTIONNAIRE ON THE USE OF BNWAS
AND THE SUMMARIZING OF THE ANSWERS**

The questionnaire contained the following statements:

The purpose with a bridge navigational watch alarm system is to monitor activities on the bridge and to ascertain if the OOW's ability to perform his duties is reduced, which then could lead to marine accidents, e.g. during the daytime, when the OOW is alone on the bridge. At the same time, the BNWAS is also a tool which can be used to immediately call for assistance, if necessary.

1. *Do you regard the BNWAS to be part of the safety equipment on the bridge protecting the ship and its crew?*

Yes ___

No ___

2. *Has watch routines and watch procedures (Bridge Resource Management) been adjusted or modified after the installation of the bridge navigational watch alarm system?*

Yes ___

No ___

The purpose with the BNWAS is achieved by a number of indications and alarms. There are three steps in the process.

- Step 1: The BNWAS alerts the OOW.
- Step 2: If there is no reaction, the BNWAS alerts the master or another qualified OOW.
- Step 3: If there is still no reaction, the BNWAS alerts the rest of the crew.

3. *In your experience, how often has the BNWAS been activated?*

Step 1 ___ times within the past _____ year(s)?

Step 2 ___ times within the past _____ year(s)?

Step 3 ___ times within the past _____ year(s)?

The BNWAS can be activated in several ways. Some are activated automatically and others require certain actions performed by the OOW.

4. *Which reset function does the BNWAS have on the ship that you are working or worked on last?*

- Automatic sensor (movement, infrared etc.) _____
- Manually by pushing a button _____
- Automatically by using other instrument on the bridge _____
- Otherwise. Please state how: _____

5. *This question is to be answered in consideration of the answers given in no. 4. Does or did the BNWAS have a negative effect on your work as OOW?*
Yes ___
No ___

If yes, please state how and why.

6. *Further information, if any* _____

Summary of answers

237 respondents (working navigators) answered the questionnaire.

It has not been possible to categorize the answers according to ship type, ship size, type of operation and area of operation or nationality of the OOW.

Add 1) *Do you regard the BNWAS to be part of the safety equipment on the bridge protecting the ship and its crew?*

221 of the respondents replied affirmatively to this question, which corresponds to approximately 93%. An overwhelming majority thus regards the BNWAS as being part of the ship's safety equipment and that it protects the ship and its crew.

Add 2) *Has watch routines and watch procedures (Bridge Resource Management) been adjusted or modified after the installation of the bridge navigational watch alarm system?*

Only 24 respondents answered yes to this question which corresponds to approximately 10%. Primarily, procedures and routines had been modified to ensure that the BNWAS was engaged especially at departure from port. The reason for the relatively small number of navigators, who experienced changes in the ships' Bridge Resource Management, could be due to the fact that modifications in routines and procedures had already been made at the time the questionnaire was being answered.

Add 3) *In your experience, how often has the BNWAS been activated?*

In total, the 237 navigators had experienced 265,000 step 1 alarms. This very significant number of alarms may seem difficult to relate to since some navigators only had experience with the BNWAS for a couple of months while others had up to 7 years of experience. Some had never experienced alarms and others had experienced 5 alarms going off every hour. Statistically, this means that a navigator currently on average will witness approximately 800 alarms a year. However, this greatly depends on the way the alarms are reset, cf. No.4.

However, the BNWAS' efficiency can be seen by the fact that of all of these alarms, only 1 out of 100 went to step 2 and none to step 3.

Add 4) *Which reset function does the BNWAS have on the ship that you are working or worked on last?*

13% of the respondents had worked on ships that were equipped with systems that had an activity sensor detecting movements as the only reset function. During navigation with an activity sensor detecting movements there were almost no alarms.

28% of the respondents had worked on ships that were equipped with systems where a push button was the only reset function. These navigators experienced a great number of alarms. Many stated that they did not activate the reset function until after the alarm went off. In many of these cases, this gave rise to stress, cf. No.5.

7% of the respondents had worked on ships that were equipped with systems where activating navigational instruments was the only reset function. This caused surprisingly many alarms, probably due to the fact that instruments are not activated often during oceanic voyages or other long passages.

The remainder covers systems with 2 or more reset functions. It was clear from the answers that the more reset functions a system have, the less alarms go off.

Add 5) *This question is to be answered in consideration of the answers given in No.4. Does or did the BNWAS have a negative effect on your work as OOW?*

20% answered the question affirmatively. The respondents mainly stated that it was a stress factor to experience the alarm going off and that it was stressful and distracting - especially in cases where the reset function was manual push button - to have to remember to reset the alarm at such short intervals or as an alternative let the alarm go off.

Add 6) *Further information, if any*

There were many recommendations to change the design of the BNWAS to make activity sensor detecting movements and possibly combined with other sensors mandatory to reduce the number of distracting alarms. Especially systems which can only be reset manually by a push button were advised against.

Many took the opportunity to express that they found BNWAS to be a good measure which genuinely increased the navigators' the sense of safety.

Some believed that it could be difficult to distinguish between the different alarms on the bridge.