Guideline No.: N-06(201510)

N-06 BRIDGE NAVIGATIONAL WATCH ALARM SYSTEMS

Issued date: October 20,2015

Foreword:

This Guideline is a part of CCS Rules, which contains technical requirements, inspection and testing criteria related to classification and statutory survey of marine products.

This Guideline is published and updated by CCS and can be found through http://www.ccs.org.cn . Comments or suggestions can be sent by email to ps@ccs.org.cn .

Historical versions and release date :

Main changes and effective date:

CONTENTS

BRIDGE NAVIGATIONAL WATCH ALARM SYSTEMS

1 Application

This Guideline is applicable to the approval and inspection of the bridge navigational watch alarm systems installed on ships engaged on international voyages as required by Chapter V of SOLAS, as amended. Reference may be made to this chapter for the bridge navigational watch alarm systems installed on ships engaged on domestic voyages.

2 Normative references

IMO MSC.128(75) Performance Standards for a Bridge Navigational Watch Alarm System (BNWAS);

IMO A.1021(26) Code on Alerts and Indicators 2009;

IEC 62616:2010 Maritime Navigation and Radio Communication Equipment and Systems- Bridge Navigational Watch Alarm System (BNWAS);

IEC 60945:2002 Maritime Navigation and Radio communication Equipment and Systems-General Requirements-Methods of Testing and Required Test Results.

3 Terms and definitions

3.1 BNWAS: the abbreviation of Bridge Navigational Watch Alarm System.

3.2 SOLAS: the abbreviation of International Convention for the Safety of Life at Sea.

3.3 Bridge: the generic term of wheelhouse and bridge wings.

3.4 Dormant period.

3.5 OOW: the abbreviation of the Officer of the Watch.

3.6 INS: the abbreviation of Integrated Navigation System.

3.7 TCS: the abbreviation of Track Control System.

3.8 Performance test: a measurement or a group of measurements carried out during or after a technical test to confirm that the equipment complies with selected parameters as defined in the equipment standard.

3.9 Performance check: a short functional test carried out during or after a technical test to confirm that the equipment operates.

3.10 EUT: the abbreviation of the Equipment Under Test.

4 Drawings and documentation to be submitted

4.1 The following drawings and documentation to be submitted are to be submitted to CCS for approval:

4.1.1 Product technical specifications

4.1.2 Diagram of overall external structure (including panel arrangement plan)

4.1.3 Schematic circuit diagram

4.1.4 Type test plan

4.2 The following drawings and documentation to be submitted are to be submitted to CCS for review:

4.2.1 Schematic block diagram

4.2.2 Operating manual

4.2.3External wiring diagram

5 Product Design and technical requirements

5.1 Performance requirements

5.1.1 Functionality

(1)Operational modes

① BNWAS is to have the following operation modes:

－Automatic (when not started, the system enters into operation automatically once the ship's navigation direction or trajectory control system is started and deactivated)

－Manual switching (continuous operation)

－Manual shutdown (the system is not operating any more in any case)

Note: according to the requirements of 19.2.2.3, Chapter V of SOLAS, the BNWAS is to be in operating condition when the ship is navigating on the sea, therefore, automatic mode is not applicable to the ships governed by SOLAS. However, in order to satisfy the requirements of IMO MSC.128(75) at the same time, the BNWAS must include the automatic operation mode, but it is to be expressly stated in the instructions for use of BNWAS that the automatic mode cannot be used for the ships governed by SOLAS, for the purpose of providing a reminder to the installation and use of the BNWAS.

(2)The operating sequence of indications and alarms

① Once put into operation, the alarm system is to remain dormant for a period of 3~12 minutes (Td). See Fig. 1.

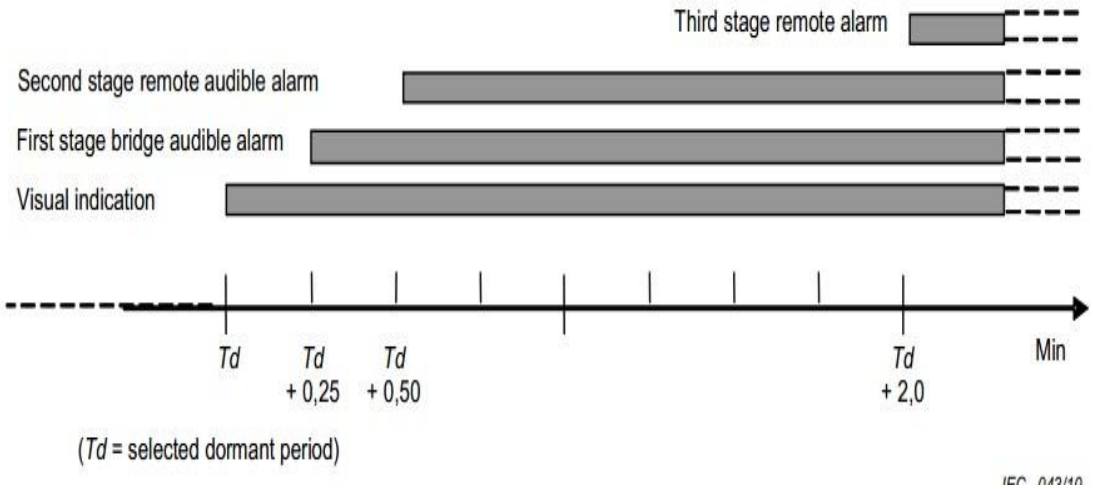

Fig.1 Alarm Sequence without Acknowledgements

②The alarm system is to activate the visual indication in the bridge when the dormant period is over. See Fig. 1. at the end of

③If not reset, the BNWAS is to give the first stage bridge audible alarm 15 seconds after the visual indication is activated. See Fig. 1.

④If not reset, the BNWAS is to give the second stage remote audible alarm in the spaces of the substitute officer and/or the master 15 seconds after the first stage bridge audible alarm is initiated (to better satisfy the requirements, the second stage remote audible alarm may be installed in the spaces of all officers, including the master, chief officer, second officer and third officer). See Fig. 1.

⑤If not reset, the BNWAS is to give the third stage remote audible alarm in the spaces of other crew members capable of taking corrective actions 90 seconds after the second stage audible alarm is initiated. See Fig. 1.

⑥ On ships other than passenger ships, the second stage or third stage remote audible alarm may be given simultaneously in the above spaces. If the second stage audible alarm is so given, the third stage alarm may be dispensed with.

Corresponding means to suppress the third stage alarm is to be provided.

⑦On ships of larger dimensions, the interval time between the second stage and third stage

alarms may be set to a maximum of three minutes during alarm installation so as to reserve adequate time for the substitute officer and/or the master to reach the bridge.

The corresponding means is to be provided to increase the interval time between the second stage and third stage alarms to three minutes.

(3) Reset function

① It is to be ensured that it will not be possible to initiate the reset function or cancel any audible alarm from any device, equipment or system not physically located in areas of the bridge providing proper look out.

② The reset function is, by a single operator action, to be capable of canceling the visual indication and all audible alarms and initiate a further Td. If the reset function is activated before the end of the Td, the Td is to be restarted to run for its full duration from the time of the reset.

③ To initiate the reset function, an input representing a single operator action by the OOW is required. This input may be generated by reset devices forming an integral part of the BNWAS or by external inputs from other equipment capable of registering physical activity and mental alertness of the OOW.

The three methods to initiate the reset function are as follows:

(a) By a single operator action of the device forming an integral part of the BNWAS, such as a manual operation button or a touch screen;

(b) By external inputs from other equipment capable of registering the physical activity of the OOW, such as a motion sensor or a pressure pad;

(c) By external inputs from other equipment capable of registering the mental alertness of the OOW, such as an audio recognition sensor or manual operation of bridge equipment.

④ A continuous activation of any reset device is not to prolong the Td or cause a suspension of the sequence of indications and alarms.

(4) Emergency call facility

①An “Emergency Call” push button or similar device may be provided on the bridge to immediately activate the second stage remote audible alarms, and subsequently activate the third stage remote audible alarm after the set interval time between the second and third stage alarms (90~180 seconds).

②If an “Emergency Call” function is available, the “Emergency Call” push button or similar device forming an integral part of the BNWAS is to be provided.

③If an “Emergency Call” function is available, other devices capable of transferring unacknowledged alarms, such as INS and TCS, are to immediately activate the “Emergency Call” system using ALR sentence via a contact closed or equivalent circuit or an IEC 61162 interface.

5.1.2 Accuracy

The alarm system is to be capable of achieving the timings stated in 5.1.1(2) of the Guidelines with an accuracy of 5% or 5s, whichever is less, under all environmental conditions.

5.1.3Security

The method of selecting the operation mode and the duration of the dormant period Tdis to be security protected so that access to these controls is restricted to the master only.

5.1.4Malfunctions, alarms and indications

(1) Malfunction

If a failure (e.g. internal communication failure) of, or power supply failure to, the BNWAS is detected, it is to be indicated by visual and audible alarms. Means are to be provided to allow the repeat of this indication on a central alarm panel, if fitted.

5.2 Ergonomic criteria

5.2.1Operational controls

(1) A protective measure for selecting the operation mode of the BNWAS.

(2) A protective measure for selecting the Td of the BNWAS.

(3) A means of activating the “Emergency Call” function (if this emergency call device is incorporated within the BNWAS).

(4)Reset facilities

Means of activating the reset function are only to be provided in the positions on the bridge giving proper look out and preferably adjacent to visual indications.

Means of activating the reset function easily accessible from the coning position, the workstation for navigating and maneuvering, the workstation for monitoring and the bridge wings are to be provided.

Note: provision of means of activating the reset function in the positions not favorable for lookout is not allowed. Positions such as the chart room, radio station, etc. are usually shielded appropriately by doors and/or curtains and therefore they are not favorable for look out. In this case, the visual indication and first stage bridge audible alarm (where applicable) without reset push button are to be installed based on the actual conditions. The above requirements are to be

expressly stated in the instructions for use of the BNWAS for reminding purpose during installation.

5.2.2 Presentation of information

(1) Operation mode

The operation mode of the equipment is to be indicated to the OOW.

(2) Visual indications

The visual indication initiated at the end of the Td is to take the form of a flashing indication. Flashing indications are to be visible from all operational positions on the bridge where the OOW may reasonably be expected to be stationed (to better satisfy the requirements, visual indications may be provided on some manually operated reset push buttons and the first stage audible alarm devices). The color of the visual indication(s) (which is to be yellow) is to be so chosen as not to impair night vision, and the devices, dimming but not to extinction, are to be incorporated.

(3) First stage bridge audible alarm

The first stage audible alarm which sounds on the bridge at the end of the visual indication period is to have its own characteristic tone or modulation intended to alert, but not to startle, the OOW. This alarm is to be audible from all operational positions on the bridge where the OOW may be expected to be stationed. This function may be achieved using one or more sounding devices. Tone/modulation characteristics and volume level are to be controllable during commissioning of the system.

(4) Second and third stage remote audible alarm

The remote audible alarm which sounds in the spaces of the Master, officers and further crew members capable of taking corrective actions at the end of the bridge audible alarm period is to be easily identifiable by its sound and to indicate urgency. The volume of this alarm is to be sufficient for it to be heard throughout the spaces above and to wake sleeping persons up.

5.3 Design and installation

5.3.1 General requirements

The equipment is to comply with IMO resolutions A.694 (17), A.813 (19), the associated international standard IEC 60945 and MSC/Circ.982.

5.3.2 Specific requirements

(1) Physical integrity of system

All items of equipment forming part of the BNWAS are to be tamper-proof to ensure any of the crew members cannot interfere with the system’s operation.

(2) Reset devices

Reset devices are to be so designed and installed as to minimize the possibility of their operation by any means other than activation by the OOW. Manual reset devices are all to be of a uniform design and to be illuminated for identification at night.

(3) The reset function may also be initiated from other equipment on the bridge which is to be capable of recording operator actions in the positions favorable for look out.

5.3.3 Power supply

The BNWAS is to be powered from the ship's main power supply. In the event of failure of the ship's main power supply, all components of failure indication and emergency call devices, if provided, are to be powered from storage batteries.

5.4 Interfacing

5.4.1 Inputs

Inputs are to be available for additional reset devices or for connection to bridge equipment capable of generating are set signal by contacts, equivalent circuits or serial data described in IEC 61162.

In addition, inputs are to be capable of being used to activate the emergency call system described in 5.1.1(4)of the Guidelines.

5.4.2 Outputs

Outputs are to be available for connection of additional bridge visual indications and audible alarms and remote audible alarms.

The outputs generated by contacts, equivalent circuits or IEC 61162 compatible interface are also to be capable of being used for connection to the central alarm screen to allow the repeat of the failure indication required in 5.1.4(1) of the Guidelines.
In addition, the BNWAS is to be provided with an IEC 61162-1 interface for output of alarm information using ALR sentence. See 6.2 of IEC 62616:2010.

6 Type test

6.1 Sampling principle: one set of sample is to be randomly selected for type test of all items listed in 6.2 of the Guidelines.

6.2 Type test items

6.2.1 Visual inspection

6.2.2 Operational check

6.2.3 Information display

6.2.4 Operation test

(1) Operation mode

(2) Time of dormancy

(3) Alarm

(4) Alarm selectivity

(5) Reset function description

(6) Initiation of reset function

(7) Continuous reset

(8) Emergency call facility and alarm transmission

(9) Accuracy

(10) Security

(11) Failure

(12) Operational controls

(13) Indication of operation mode

(14) Visual indications

(15) Volume level and tone of first stage audible alarm

(16) Volume level of second and third stage audible alarm

(17) General requirements for design and installation

(18) Physical integrity of system

(19) Reset devices

(20) Power supply

(21) Installation document

(22) Interfacing

6.2.5 Power test

(1) Maximum steady-state power fluctuation test

(2) Power anomaly test

(3) Transient power fluctuation test (where applicable)

6.2.6 Environmental conditions test

(1) Dry heat test

(2) Damp heat test

(3) Low temperature test

(4) Vibration test

(5) Rain and spray test (where applicable)

(6) Salt mist (corrosion) test

6.2.7 Electromagnetic compatibility test

(1) Conducted emission

(2) Shell port radiated emission

(3) Test of immunity to conducted disturbances, induced by radio-frequency field

(4) Radiated, radio-frequency electromagnetic field immunity test

(5) Electrical fast transient/burst immunity test

(6) Surge (shock) immunity test (where applicable)

(7) Electrostatic discharge immunity test

6.2.8 Special test

(1) Noise and audible signal

(2) Compass safe distance

6.2.9 Personal safety test

(1) Prevention of contact with dangerous voltage

(2) Radio-frequency electromagnetic radiation

(2) Emission of visual display unit (VDU)

(4) X-ray radiation

6.2.10 Voltage withstanding test

6.2.11 Insulation resistance measurement

6.3 Type test method

6.3.1 Visual inspection: see 7~9 of IMO A.694(17).

6.3.2 Operational check: see 6.1~6.4 of IEC 60945:2002.

6.3.3 Information display: see 7.3 of IEC 62616:2010.

6.3.4 Operation tests

(1) Operation mode: see 7.4.1 of IEC 62616:2010.

(2) Dormant period: see 7.4.2 of IEC 62616:2010.

(3) Alarm: see 7.4.3 of IEC 62616:2010.

(4) Alarm selectivity: see 7.4.4 of IEC 62616:2010.

(5) Reset function description: see 7.4.5 of IEC 62616:2010.

(6) Initiation of reset function: see 7.4.6 of IEC 62616:2010.

(7) Continuous reset: see 7.4.7 of IEC 62616:2010.

(8) Emergency call facility and alarm transmission: see 7.4.8 of IEC 62616:2010.

(9) Accuracy: see 7.4.9 of IEC 62616:2010.

(10) Security: see 7.4.10 of IEC 62616:2010.

(11) Malfunction: see 7.4.11 of IEC 62616:2010.

(12) Operational controls: see 7.4.12 of IEC 62616:2010.

(13) Indication of operation mode: see 7.4.13 of IEC 62616:2010.

(14) Visual indication: see 7.4.14 of IEC 62616:2010.

(15) Volume level and tone of first stage audible alarm: see 7.4.15 of IEC 62616:2010.

(16) Volume level of second and third stage audible alarm: see 7.4.16 of IEC 62616:2010.

(17) General requirements for design and installation: see 7.4.17 of IEC 62616:2010.

(18) System physical integrity of system: see 7.4.18 of IEC 62616:2010.

(19) Reset devices: see 7.4.19 of IEC 62616:2010.

(20) Power supply: see 7.4.20 of IEC 62616:2010.

(21) Installation document: see 7.4.21 of IEC 62616:2010.

(22) Interfacing: see 7.4.22 of IEC 62616:2010.

6.3.5Power test

(1) Maximum steady-state power fluctuation test: see 7.1 and 5.2.2 of IEC 60945:2002.

(2) Power anomaly test: see 7.2 and 5.2.3 of IEC 60945:2002.

(3) Instantaneous power fluctuation test: applicable when power supply is AC. See 7.3 and 10.7 of IEC 60945:2002.

6.3.6 Environmental conditions test

(1) Dry heat test: includes dry heat function test and dry heat storage test (only applicable to outdoor components). See 8.2 of IEC 60945:2002.

(2) Damp heat test: see 8.3 of IEC 60945:2002.

(3) Low temperature test: the test temperature for indoor and outdoor components is -15 ℃ and -25 ℃ respectively. See 8.4 of IEC 60945:2002.

(4) Vibration test: see 8.7 of IEC 60945:2002.

(5) Rain and spray test: only applicable to outdoor components. See 8.8 of IEC 60945:2002.

(6) Salt mist (corrosion) test: see 8.12 of IEC 60945:2002.

6.3.7 Electromagnetic compatibility test

(1) Conducted emission: see 9.2 of IEC 60945:2002.

(2) Shell port radiated emission: see 9.3 of IEC 60945:2002.

(3) Radio-frequency induced field conducted disturbances immunity test: see 10.3 of IEC 60945:2002.

(4) Radiated, radio-frequency electromagnetic field immunity test: see 10.4 of IEC 60945:2002.

(5) Electrical fast transient/burst immunity test: see 10.5 of IEC 60945:2002.

(6) Surge (shock) immunity test: applicable when power supply is AC electricity. See 10.6 of IEC 60945:2002.

(7) Electrostatic discharge immunity test: see 10.9 of IEC 60945:2002.

6.3.8 Special tests

(1) Noise and audible signal: see 11.1 of IEC 60945:2002. Only the audible signals of noise and malfunction alarm are to be tested. Refer to6.3.4(15) and 6.3.4(16) of the Guidelines for the testing of the audible signals of the first, second and third stage audible alarms.

(2) Compass safe distance: see 11.2 of IEC 60945:2002.

6.3.9 Personal safety tests

(1) Prevention of contact with dangerous voltage: see 12.1 of IEC 60945:2002.

(2) Radio-frequency electromagnetic radiation: see 12.2 of IEC 60945:2002.

(3) Emission of visual display unit (VDU): see 12.3 of IEC 60945:2002.

(4) X-ray radiation: see 12.4 of IEC 60945:2002.

6.3.10 Voltage withstanding test: see 2.14 of Guidelines for Type Approval Test of Electric and Electronic Products (2006).

6.3.11 Insulation resistance measurement: see 2.3 of Guidelines for Type Approval Test of Electric and Electronic Products (2006).

6.4 Requirements for performance test and performance check:

Performance test or performance check is to be carried out under the conditions listed in Table 1 in accordance with the requirements of Table 2 of IEC 60945:2002:

Performance Test and Performance Check List **Table 6.4**

Environmental conditions	Normal power supply	Maximum steady-state power fluctuation
Dry heat test	Performance test	Performance check
Damp heat test	Performance check	—
Low temperature test	Performance test	Performance check
Normal temperature	Performance test	Performance test

According to the requirements of 7.2 of IEC 62616, the performance test referred to in Table 6.4 is as follows:

Set the EUT to manual switching mode, set the Td to 3min and 12min respectively, and set the interval time between the second and third stage alarms to 1.5min and 3min respectively.

Allow the EUT to operate freely and do not reset before EUT generates the third stage audible alarm. Measure the time of various stages.

Requirements for test results:

The EUT is to be capable of generating in sequence the visual indications and the first, second and third stage audible alarm with time accuracy to5% or 5s, whichever is less;

The reset function is to be normal.

According to the requirements of 7.2 of IEC 62616, the performance check referred to in Table 1 is as follows:

Set the EUT to manual switching mode and set the Td to 3min.

Allow the EUT to operate freely and do not reset before EUT generates the third stage audible alarm.

Requirements for test results:

The EUT is to be capable of generating in sequence the visual indications and the first stage audible alarm;

The reset function is to be normal.

7 Product inspection

7.1 Product inspection by CCS may be requested only after type approval has been obtained.

7.2 Product inspection by CCS may be requested only after the manufacturer has completed the manufacturer inspections and the products have been qualified thereby.

7.3 Ratio of random inspection by CCS: the ratio of random inspection is to be 5% and two sets at minimum (except when there is only one set of product for which the inspection is being requested).

7.4 Items and methods of manufacturer test and CCS random inspection:

7.4.1 Visual inspection: see Regulation 7~9 of IMO A.694(17).

7.4.2 Operation tests

(1) Operation mode: see 7.4.1 of IEC 62616:2010.

(2) Time of dormancy: see 7.4.2 of IEC 62616:2010.

(3) Alarm selectivity: see 7.4.4 of IEC 62616:2010.

(4) Reset function description: see 7.4.5 of IEC 62616:2010.

(5) Security: see 7.4.10 of IEC 62616:2010.

(6) Failure: see 7.4.11 of IEC 62616:2010.

(7) Indication of Operation mode: see 7.4.13 of IEC 62616:2010.

(8) Visual indications: see 7.4.14 of IEC 62616:2010.

(9) Volume level and tone of first stage audible alarm: see 7.4.15 of IEC 62616:2010.

(10) Volume level of second and third stage audible alarm: see 7.4.16 of IEC 62616:2010.

7.4.3 Voltage withstanding test: see 2.14 of Guidelines for Type Approval Test of Electric and Electronic Products (2006).

7.4.4 Insulation resistance measurement: see 2.3 of Guidelines for Type Approval Test of Electric and Electronic Products (2006).