



BSI Standards Publication

Maritime navigation and radiocommunication equipment and systems – Bridge alert management

Part 1: Operational and performance requirements, methods of testing and required test results (IEC 62923-1:2018)

National foreword

This British Standard is the UK implementation of EN IEC 62923-1:2018. It is identical to IEC 62923-1:2018.

The UK participation in its preparation was entrusted to Technical Committee EPL/80, Maritime navigation and radiocommunication equipment and systems.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Date	Text affected
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English Version

Maritime navigation and radiocommunication equipment and
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performance requirements, methods of testing and required test
results
(IEC 62923-1:2018)

Matériels et systèmes de navigation et de
radiocommunication maritimes - Gestion des alertes à la
passerelle - Partie 1: Exigences d'exploitation et de
fonctionnement, méthodes d'essai et résultats d'essai
exigés
(IEC 62923-1:2018)

Navigations- und Funkkommunikationsgeräte und -Systeme
für die Seeschifffahrt - Brücken Alert Management - Teil 1:
Betriebs- und Leistungsanforderungen, Prüfverfahren und
geforderte Prüfergebnisse
(IEC 62923-1:2018)

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

European foreword

The text of document 80/892/FDIS, future edition 1 of IEC 62923-1, prepared by IEC/TC 80 "Maritime navigation and radiocommunication equipment and systems" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 62923-1:2018.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2019-07-03
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2021-10-03

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Endorsement notice

The text of the International Standard IEC 62923-1:2018 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60812	NOTE	Harmonized as EN 60812
IEC 61162-2	NOTE	Harmonized as EN 61162-2
IEC 62065	NOTE	Harmonized as EN 62065
IEC 62616	NOTE	Harmonized as EN 62616
IEC 62940	NOTE	Harmonized as EN 62940

Annex ZA

(normative)

Normative references to international publications with their corresponding European publications

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60945	2002	Maritime navigation and radiocommunication equipment and systems - General requirements - Methods of testing and required test results	EN 60945	2002
IEC 61162-1	-	Maritime navigation and radiocommunication equipment and systems - Digital interfaces - Part 1: Single talker and multiple listeners	EN 61162-1	-
IEC 61162-450	-	Maritime navigation and radiocommunication equipment and systems - Digital interfaces - Part 450: Multiple talkers and multiple listeners - Ethernet interconnection	EN IEC 61162-450	-
IEC 61924-2	-	Maritime navigation and radiocommunication equipment and systems - Integrated navigation systems - Part 2: Modular structure for INS - Operational and performance requirements, methods of testing and required test results	EN 61924-2	-
IEC 62288	-	Maritime navigation and radiocommunication equipment and systems - Presentation of navigation-related information on shipborne navigational displays - General requirements, methods of testing and required test results	EN 62288	-
IEC 62923-2	2018	Maritime navigation and radiocommunication equipment and systems - Bridge alert management - Part 2: Alert and cluster identifiers and other additional features	-EN IEC 62923-2	2018
IMO MSC.302(87)	-	Performance standards for Bridge Alert Management (BAM)	-	-

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**MARITIME NAVIGATION AND RADIOCOMMUNICATION
EQUIPMENT AND SYSTEMS – BRIDGE ALERT MANAGEMENT –****Part 1: Operational and performance requirements,
methods of testing and required test results**

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 62923-1 has been prepared by IEC technical committee 80: Maritime navigation and radiocommunication equipment and systems.

The text of this document is based on the following documents:

FDIS	Report on voting
80/892/FDIS	80/897/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 62923 series, published under the general title *Maritime navigation and radiocommunication equipment and systems – Bridge alert management*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

IEC 62923-1 has been written in pursuit of IMO resolution MSC.302(87), to further detail the technical requirements of bridge alert management and to enable testing of any equipment against the requirements of bridge alert management.

Bridge alert management (BAM) is the IMO defined overall concept for the management, handling and harmonized presentation of alerts on the bridge.

This document has been written in such a way that this form of alert management can be applied ship wide, next to, and in cooperation with, cluster(s) on the bridge.

Individual equipment that applies the BAM principles uses

- harmonized states for its alerts,
- harmonized presentation for presentation of its alerts, and
- harmonized alert communications for
 - communication with other equipment (VDR and equipment with more knowledge, as applicable), and
 - communication with a central alert management (CAM) system, if provided on board.

A CAM system, including its human machine interface(s) (HMI),

- uses harmonized states for its alerts,
- uses harmonized presentation for presentation of all alerts generated on the bridge,
- uses harmonized alert communications for communication with other equipment (VDR, alert source equipment),
- provides the function to silence all audible alerts on the bridge, and
- provides the function to individually acknowledge all alerts generated on the bridge for which additional decision support information is not required;

A CAM system may be standalone or combined with other equipment, for example in the case of an integrated navigation system (INS).

All equipment that applies the BAM principles may provide intelligence to deal with the processing of non-BAM "legacy" alarm communications for harmonized presentation at its HMI.

This document provides the harmonization requirements.

MARITIME NAVIGATION AND RADIOCOMMUNICATION EQUIPMENT AND SYSTEMS – BRIDGE ALERT MANAGEMENT –

Part 1: Operational and performance requirements, methods of testing and required test results

1 Scope

This part of IEC 62923 specifies the operational and performance requirements, methods of testing, and required test results for the bridge alert management (BAM) in support of IMO resolution MSC.302(87). It is applicable to all alerts presented on and transferred to the bridge.

NOTE All text of this document whose wording is identical to that of IMO resolution MSC.302(87) is printed in italics, and the resolution and associated performance standard paragraph numbers are indicated in brackets.

(MSC.302/2) *To enhance the safety of operation, the Performance standards given in resolution MSC.302(87) provide requirements for the harmonized presentation and treatment of alerts on the bridge and specify a central alert management (CAM) system.*

Annex E provides guidance on design principles that, when applied, will achieve the desired enhancement of safety.

(MSC.302/3) *Module A (Clause 6) of this document describes the general concept of the BAM and the presentation of alerts on the bridge equipment. Modules B (Clause 7) and D (Clause 9) contain requirements for the CAM and the CAM-HMI. Module C (Clause 8) describes the interface requirements for BAM.*

BAM is a concept that imposes requirements on equipment that handles and presents alerts on the bridge, including equipment that provides central alert management (CAM) system functionalities.

- Equipment is BAM compliant if it meets Module A – Presentation and handling of alerts on the bridge and Module C – Interfacing of this document.
- Equipment is CAM system compliant if it is BAM compliant equipment and, in addition, meets Module B – Central alert management system functionality and Module D – System and equipment documentation for CAM system of this document.

To support retrofitting a ship with BAM compliant equipment handling alert related communication with remaining non-BAM compliant equipment (referred to as "legacy alert sources"), this document includes guidance on how to interface BAM compliant equipment with remaining devices that are not BAM compliant (see 4.4 and Annex H).

IEC 62923-2 provides standardized alert and cluster identifiers and other additional features.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60945:2002, *Maritime navigation and radiocommunication equipment and systems – General requirements – Methods of testing and required test results*

IEC 61162-1, *Maritime navigation and radiocommunication equipment and systems – Digital interfaces – Part 1: Single talker and multiple listeners*

IEC 61162-450, *Maritime navigation and radiocommunication equipment and systems – Digital interfaces – Multiple talkers and multiple listeners – Ethernet interconnection*

IEC 61924-2, *Maritime navigation and radiocommunication equipment and systems – Integrated navigation systems – Part 2: Modular structure for INS – Operational and performance requirements, methods of testing and required test results*

IEC 62288, *Maritime navigation and radiocommunication equipment and systems – Presentation of navigation-related information on shipborne navigational displays – General requirements, methods of testing and required test results*

IEC 62923-2:2018, *Maritime navigation and radiocommunication equipment and systems – Bridge alert management – Part 2: Alert and cluster identifiers and other additional features*

IMO MSC.302(87), *Performance standards for bridge alert management (BAM)*

3 Terms, definitions and abbreviated terms

For the purposes of this document, the following terms, definitions and abbreviated terms apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1 Terms and definitions

3.1.1

active alert

alert that is not in state "normal"

3.1.2

aggregated header alert

(MSC.302/A) *alert indicating the existence of multiple individual alerts of the same kind, transmitted by the aggregation source with alert state and alert ID determined by the associated aggregation-member alerts, with alert instance 0 and with, in the alert title and/or alert description text, an aggregation header representing the aggregation*

3.1.3

aggregation

(MSC.302/A) *single combination of an aggregated header alert and associated individual aggregation-member alerts that all have the same alert identifier and the same aggregation source, to provide one alert (one aggregated header alert represents plenty of individual aggregation-member alerts)*

3.1.4

aggregation header

title of an aggregation, under which the associated aggregation-member alerts are sorted, indicating the generic part of the aggregation-member alerts, and defined by the aggregation source

Note 1 to entry: The header may contain the current number of aggregation-member alerts in that aggregation (see 8.1.5).

3.1.5

aggregation source

BAM compliant equipment that defines an aggregation of (some of) its alerts

3.1.6

aggregation-member alert

individual alert that is defined by its source as part of an aggregation

3.1.7

alarm

high-priority alert

(MSC.302/A) *condition requiring immediate attention and action by the bridge team, to maintain the safe navigation and safe operation of the ship*

3.1.8

alert

(MSC.302/A) *announcement of abnormal situations and conditions requiring attention*

Note 1 to entry: *Alerts are divided in four priorities: emergency alarms, alarms, warnings and cautions. An alert provides information about a defined state change in connection with information about how to announce this event in a defined way to the system and the operator.*

3.1.9

alert announcements

(MSC.302/A) *visual and acoustical presentation of alerts*

3.1.10

alert history list

(MSC.302/A) *accessible list of past alerts*

3.1.11

alert management

(MSC.302/A) *concept for the harmonized regulation of the monitoring, handling, distribution and presentation of alerts on the bridge*

3.1.12

alert source

equipment generating and managing alerts

3.1.13

audible indication

sound from the EUT that is not associated with raising an alert of priority alarm or warning in the list of active alerts of the EUT

EXAMPLE 1 A sound indicating a change of control position.

EXAMPLE 2 Table 7.1.1 of IMO Resolution A.1021(26):2009, "Code on Alerts and Indicators".

3.1.14

bridge alert management

BAM

(MSC.302/A) *overall concept for management, handling and harmonized presentation of alerts on the bridge*

3.1.15

BAM compliant equipment

equipment compliant with Modules A and C of MSC.302(87)

3.1.16**central alert management****CAM**

(MSC.302/A) *functionality for the management of the presentation of alerts on the CAM-HMI, the communication of alert states between CAM-HMI and navigational systems and sensors*

Note 1 to entry: *The functions may be centralized or partly centralized in subsystems and interconnected via a standardized alert-related communication.*

3.1.17**central alert management HMI****CAM-HMI**

(MSC.302/A) *human machine interface for centralized presentation and handling of alerts on the bridge*

3.1.18**central alert management system****CAM system**

combined functionality of CAM and CAM-HMI

3.1.19**category A alert**

(MSC.302/A) *alert for which graphical information at the task station directly assigned to the function generating the alert is necessary, as decision support for the evaluation of the alert related condition*

3.1.20**category B alert**

(MSC.302/A) *alert where no additional information for decision support is necessary besides the information which can be presented at the central alert management HMI*

3.1.21**category C alert**

(MSC.302/A) *alert that cannot be acknowledged on the bridge but for which information is required about the status and treatment of the alert*

Note 1 to entry: If the bridge alert management is applied in another cluster than the bridge (see Annex E), this definition applies mutatis mutandis.

3.1.22**caution****lowest-priority alert**

(MSC.302/A) *awareness of a condition which does not warrant an alarm or warning condition, but still requires attention out of the ordinary consideration of the situation or of given information*

3.1.23**cluster**

(MSC.302/A) *group of functions on a high level, e.g., navigation, automation*

Note 1 to entry: For guidance on the use of clusters, see Annex E.

3.1.24**converted alert**

alert resulting from translation of a legacy alert into BAM compliant alert

3.1.25

emergency alarm

highest-priority alert

(MSC.302/A) *alarm which indicates immediate danger to human life or to the ship and its machinery exists and requires immediate action*

3.1.26

EUT function type P

function required in EUT to make it BAM compliant equipment

3.1.27

EUT function type Q

function additional to functions of type P required in EUT to make it a BAM compliant CAM system

3.1.28

EUT function type R

optional function additional to functions of type P required in EUT performing revaluation of alerts from alert sources (responsibility transfer)

3.1.29

EUT function type S

optional function additional to functions of type P necessary in EUT performing conversion of legacy alert communication from legacy alert sources to BAM compliant alert communication

3.1.30

EUT function type T

function additional to functions of type Q required in an INS to make it a BAM compliant INS

3.1.31

failure analysis

(MSC.302/A) *logical, systematic examination of an item, including its diagrams or formulas, to identify and analyse the probability, causes and consequences of potential and real failures*

3.1.32

functional alert group

single combination of a functional alert group header alert and associated individual group-member alerts, defined by a functional alert group source, to provide one alert

Note 1 to entry: One functional alert group header alert represents a large number of individual group-member alerts.

3.1.33

functional alert group source

BAM compliant equipment that defines a functional alert group, consisting of alerts it has received and/or generated

Note 1 to entry: This may be an alert source, BAM compliant equipment receiving alerts from the alert source, or a CAM system.

3.1.34

functional alert group header

title of a functional alert group, under which the associated group-member alerts are sorted, indicating the commonality of the group-member alerts, defined by the functional alert group source

Note 1 to entry: The header may contain the current number of group-member alerts in that functional alert group (see 6.7).

3.1.35**functional alert group header alert**

alert indicating the existence of multiple individual alerts with commonality in terms of their function and/or priority, transmitted by the functional alert group source with alert state determined by the associated group-member alerts, with a unique alert ID, with alert instance 0 and with, in the alert title and/or alert description text, a functional alert group header representing the functional alert group

3.1.36**functional alert grouping**

(MSC.302/A) *arrangement of alerts in terms of their function and/or priority*

3.1.37**group-member alert**

individual alert that is defined by a functional alert group source as part of a functional alert group

3.1.38**human machine interface****HMI**

(MSC.302/A) *part of a system an operator interacts with*

Note 1 to entry: *The interface is the aggregate of means by which the users interact with a machine, device, and system (the system). The interface provides means for input, allowing the users to control the system and output, allowing the system to inform the users.*

3.1.39**individual alert**

(MSC.302/A) *alert announcing one abnormal situation and condition requiring attention*

3.1.40**legacy alert source**

equipment generating and managing alerts not in conformity with the interfaces specified in Annex C

Note 1 to entry: Legacy alert sources may be encountered in equipment carried on a ship when the ship is retrofitted with a CAM system or when suitable BAM compliant equipment does not exist.

3.1.41**multifunction display****MFD**

(MSC.302/A) *single visual display unit that can present, either simultaneously or through a series of selectable pages, information from more than a single function*

3.1.42**ship's time**

time reference used on board

3.1.43**simple operator action**

(MSC.302/A) *procedure achieved by no more than two hard-key or soft-key actions, excluding any necessary cursor movements, or voice actuation using programmed codes*

3.1.44**single operator action**

(MSC.302/A) *procedure achieved by no more than one hard-key or soft-key action, excluding any necessary cursor movements, or voice actuation using programmed codes*

3.1.45

task station

(MSC.302/A) *multifunction display with dedicated controls providing the possibility to display and operate any tasks*

Note 1 to entry: A task station is part of a workstation.

3.1.46

warning

(MSC.302/A) *condition requiring immediate attention, but no immediate action by the bridge team*

Note 1 to entry: Warnings are presented for precautionary reasons to make the bridge team aware of changed conditions which are not immediately hazardous, but may become so if no action is taken.

3.1.47

workstation

combination of all job-related items, including the console with all devices, equipment and the furniture, to fulfil certain tasks

Note 1 to entry: Workstations for the bridge are specified in MSC/Circ.982.

3.2 Abbreviated terms

AT	alarm transition
BNWAS	bridge navigational watch alarm system
CCRS	consistent common reference system
CPA	closest point of approach
CT	caution transition
ECDIS	electronic chart display and information system
ET	emergency alarm transition
FMEA	failure mode and effect analysis
IMO	International Maritime Organization
EUT	equipment under test
HMI	human machine interface
IBS	integrated bridge system
IEC	International Electrotechnical Commission
INS	integrated navigation system
MSC	Maritime Safety Committee
OOW	officer of the watch
PNT	positioning, navigation and timing
SOLAS	International Convention for the Safety of Life at Sea
TAG	transport annotate and group
TCPA	time to closest point of approach
VDR	voyage data recorder
WT	warning transition

4 Description

4.1 Purpose

(MSC.302/1.1) *The purpose of the bridge alert management (BAM) concept is to enhance the handling, distribution and presentation of alerts, applying the Guidelines on the application of SOLAS regulation V/15 to INS, IBS and bridge design (SN.1/Circ.265).*

(MSC.302/1.2) *The BAM concept harmonizes the priority, classification, handling, distribution and presentation of alerts, to enable the bridge team to devote full attention to the safe operation of the ship and to immediately identify any alert situation requiring action to maintain the safe operation of the ship.*

(MSC.302/1.3) *A central alert management human machine interface (CAM-HMI) for presenting alerts as individual alerts or as aggregated alerts supports the bridge team in the immediate identification of any abnormal situation, of the source and reason for the abnormal situation and supports the bridge team in its decisions for the necessary actions to be taken.*

Annex E provides guidance on the application of alert management.

(MSC.302/1.4) *The BAM architecture and the acknowledgement/silencing concept specified avoid unnecessary distraction of the bridge team by redundant and superfluous audible and visual alarm announcements. It reduces the cognitive load on the operator by minimizing the information presented to which is necessary to assess the situation.*

(MSC.302/1.5) *Further guidance on the presentation of alerts is provided in the Code on Alerts and Indicators, 2009 (resolution A.1021(26)) which is intended to provide general design guidance and to promote uniformity of type, location and priority for alerts and indicators.*

4.2 EUT function types

Because of the variety of BAM-related functionality possible in EUT and because of the complexity of this document and its application, various EUT function types are identified:

- EUT function type P (3.1.26);
- EUT function type Q (3.1.27);
- EUT function type R (3.1.28);
- EUT function type S (3.1.29);
- EUT function type T (3.1.30).

For each EUT, the manufacturer should declare which function types are embedded in the EUT. The scope of the declared function types determines the applicable requirements and tests from this document.

Indications have been added for Clauses 6 to 9 and the annexes for which function type the various subclauses are applicable.

An EUT may, or may be required according to MSC.302(87) (see Clause 1 and 6.1.4) to, embed multiple function types at the same time:

- EUT with functions of type P may also have additional functions of types Q, R and/or S;
- EUT with functions of types P and Q may also have functions of types R, S and/or T;
- EUT with functions of types P and R may also have functions of types Q and/or S;
- EUT with functions of types S and P may also have functions of types Q and/or R;
- EUT with functions of types P, Q and T may also have functions of types R and/or S;

4.3 Application

(MSC.302/3.4) *In addition to the general requirements set out in the General requirements for shipborne radio equipment performing part of the GMDSS and for electronic navigational aids (resolution A.694(17) and the related standard IEC 60945) and the presentation requirements set out in the Performance standards for the presentation of navigation-related information on shipborne navigational displays (resolution MSC.191(79) and the related standard IEC 62288), CAM system should meet the requirements of these performance standards (MSC.302(87), and the related standard (IEC 62923)) and follow the relevant guidelines on ergonomic principles adopted by the IMO in MSC/Circ.982.*

(MSC.302/3.5) *If an INS is installed on the bridge it should be assured that the functionality of module C of the INS Performance standards (resolution MSC.252(83) and the related standard IEC 61924-2) is included in one CAM system. See 6.1.4.2.2.*

(MSC.302/3.6) *In case of conflict with alert requirements of existing performance and test standards, the Performance standards given in resolution MSC.302(87), and requirements and tests in this document, will take precedence.*

(MSC.302/3.7) *The Performance standards of resolution MSC.302(87) should apply for all alerts presented on, and transferred to, the bridge.*

NOTE This does not include audible indications (see 3.1.13).

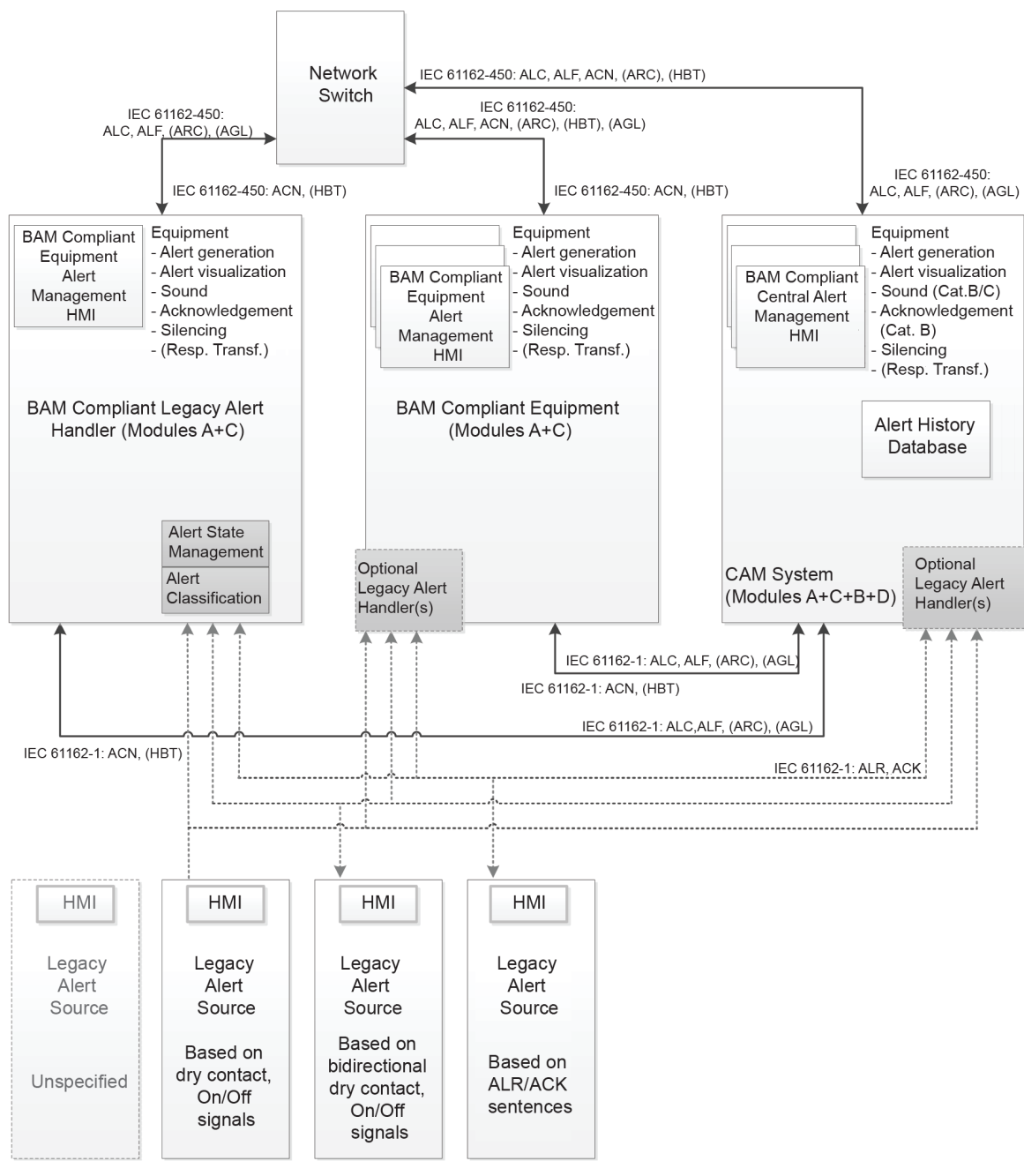
4.4 Implementation of BAM interfaces

This document includes a communication protocol based on an interface using a series of sentences, ALF, ALC, ACN, ARC and HBT as described in Annex C, which provides harmonized alert communications.

It is recognized that for some time not all equipment installed on a bridge that may generate alerts will have this interface or that bridges with non-BAM compliant equipment may be retrofitted with a CAM system. Some equipment may have a legacy interface based on ALR/ACK sentences, some equipment may only be able to interface using relay contact signals, and other equipment may have other types of interfaces. In order to achieve BAM, there needs to be BAM compliant equipment having the capability to transform the alert handling of such legacy alert sources to emulate as well as possible BAM compliant presentation and handling of alerts (see Annex H).

Figure 1 shows examples of alert sources with different interface arrangements and how they might be connected to the CAM system, either directly in case the CAM system provides the transformation capability, or via a dedicated BAM compliant legacy alert handler or via other BAM compliant equipment.

NOTE In Figure 1 parentheses are used to indicate conditional features.



IEC

Figure 1 – Interfacing legacy alert sources with BAM compliant equipment

4.5 Clusters

Although this document is applicable to bridge alert management, aimed at the navigator, the concept of alert management as described in this document can also be applied in all other clusters on the ship. See 8.1.1.1.2 and, for guidance on the use of clusters, E.4.4.

Equipment that belongs to one cluster may present alerts on its own HMI and on the CAM in that cluster (category A/B alerts) to inform the operator of that cluster of a situation that warrants his attention and/or action. These alerts can only be handled from either the HMI of the alert source or the CAM-HMI of the cluster that the source belongs to and not from a CAM in another cluster.

Simultaneously, that same equipment may raise an additional alert to inform the operator of another cluster if the situation warrants also his attention (e.g. "Engine shutdown" in Figure 2, originating in the engine room cluster, but also important for the bridge team as they may need to be aware of that situation and/or to act on that situation). At the CAM of that other cluster, this category C alert can only be temporarily silenced.

NOTE All other clusters on a ship (see Annex E and IEC 62923-2:2018, Annex B) can also each have its own CAM installed, according to the CAM requirements of this document, but dedicated to the alerts in that cluster. See Figure 2.

The category C alert will be acknowledged/rectified only at the source cluster, typically connected to the acknowledgement/rectification of the related category A/B alert.

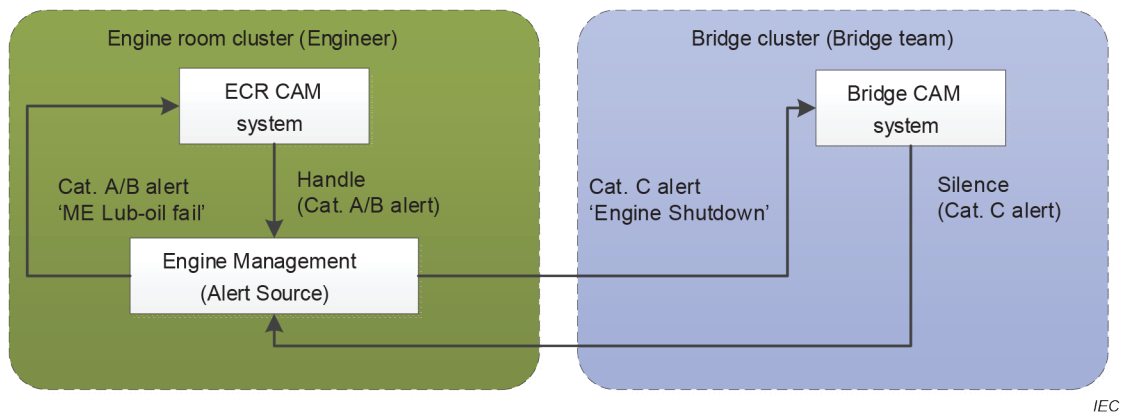


Figure 2 – Example of cluster-dependent alert management limitations

5 Test methods

5.1 Subject of tests

The tests in this document shall be used to demonstrate BAM compliance for individual alert source(s). These tests may be supplemented with tests in applicable individual equipment standards. This document contains all tests required for CAM systems.

If the EUT supports operation of multiple CAM-HMIs simultaneously, the tests of Clauses 6 and 7 shall be performed on at least 2 CAM-HMIs simultaneously.

If the EUT is not a CAM system, and supports operation of multiple HMIs simultaneously, the tests of Clause 6 shall be performed on at least 2 HMIs simultaneously.

The tests in Clauses 6 and/or 7 that refer to multiple HMIs shall at least be performed on the HMIs selected under Clause 5.

5.2 Test set-ups

Examples of test set-ups which may be used for testing BAM-related functionality and interfaces are described in Annex A.

5.3 General requirements

The equipment used for BAM shall comply with the general requirements contained in IEC 60945, as applicable to the equipment category, for example "protected".

If the performance requirements are not given elsewhere in IEC standards, the following definitions shall be used for the purpose of testing to IEC 60945.

- **Performance test**
Perform any operator action in the EUT and confirm by non-quantitative observation that the system is still operative.
- **Performance check**
Identical to the "performance test".

5.4 Configuration for testing

The manufacturer shall specify the type(s) and maximum number of each type of interface available in the EUT.

The test set-up shall include all types of interfaces available in the EUT.

The tests involving interfacing shall be conducted on each type of interface available.

6 Module A – Presentation and handling of alerts on the bridge

6.1 General

6.1.1 Provisions

6.1.1.1 Applicability

EUT with functions of type P "all BAM compliant equipment functions".

6.1.1.2 Requirement

(MSC.302/5.1) *The BAM compliant equipment shall provide:*

- 1) *the means used to draw the attention of the bridge team to the existence of alert situations;*
- 2) *the means to enable the bridge team to identify and address that condition;*
- 3) *the means for the bridge team and pilot to assess the urgency of different alert situations in cases where more than one alert situation has to be handled;*
- 4) *the means to enable the bridge team to handle alert announcements; and*
- 5) *the means to manage all alert-related states in a distributed system structure in a consistent manner.*

6.1.1.3 Methods of test and required results

The EUT is verified by tests in 6.1.2 and 6.1.3, and the applicable subclauses of 6.2, 6.3 and 6.4.

6.1.2 Number of alerts for one situation

6.1.2.1 Applicability

EUT with functions of type P "all BAM compliant equipment functions".

6.1.2.2 Requirement

(MSC.302/5.2) *If practicable, there shall be not more than one audible alert for one situation that requires attention.*

Unless required by IMO, if there is a situation that requires attention, a functional alert (see Annex E) shall be raised, while the underlying causes (e.g. technical situations or symptoms) shall not provide (additional) audible alert(s). See also 6.4.6.1.

NOTE 1 Additional diagnostic interfaces could be provided by the EUT, which could provide information on technical situations (e.g. loss of input signal) and symptoms (e.g. temperature outside normal operating range).

The "responsibility transfer"-mechanism may be used to control the number of audible alerts for one situation. See 6.9 for requirements for the "responsibility transfer"-mechanism.

NOTE 2 "If practicable" is facilitated by the optional "responsibility transfer"-mechanism as described in this document. An INS contains elements that have the knowledge and capability to decide on the matter described here to make use of this mechanism to prevent superfluous audible alerts. Also, individual BAM compliant equipment containing this mechanism can be configured to interact with other equipment using this mechanism for the purpose of supporting this requirement (for guidance see Annex E).

NOTE 3 The same alert can be presented on more than one task station (see 6.1.3).

NOTE 4 One failure can result in additional different alerts from subsequent functions which have dependency on the failed function. If practicable, all available methods could be used to avoid multiple audible alerts (for example use of caution and use of responsibility transfer). See Annex E.

NOTE 5 Aggregation of alerts is a means to reduce the number of visually presented alerts of the same kind and with the same priority. Typical candidates for aggregation are collision alerts (see 6.8).

NOTE 6 Audible alerts include ("active – unacknowledged") alarms and ("active – unacknowledged") warnings.

6.1.2.3 Methods of test and required results

Refer to the manufacturer's documentation. Confirm by analytic evaluation that, if there is a situation that requires attention, the EUT raises a functional alert (see Annex E), while the underlying causes (e.g. technical situations or symptoms) do not provide (additional) audible alerts.

See 6.9 for tests for the "responsibility transfer"-mechanism.

6.1.3 Alert presentation at several locations

6.1.3.1 Applicability

EUT with functions of type P "all BAM compliant equipment functions".

6.1.3.2 Requirement

(MSC.302/5.3) *As alerts can be displayed or presented at several locations, the presentation of the alert on the bridge equipment shall be consistent as far as practicable with respect to how alerts are displayed or presented, silenced and acknowledged. The states of alerts shall be consistent on the bridge as far as practicable.*

In case the EUT is not a CAM system, the list of active alerts of the EUT shall only include alerts raised by the EUT.

6.1.3.3 Methods of test and required results

Methods of test and required test results are described in 6.3.2.3.

In case the EUT contains an alert HMI that is not a CAM-HMI, confirm by analytical evaluation that it is not possible to display alerts of other equipment in its list of active alerts.

6.1.4 Central alert management HMI

6.1.4.1 Provisions for CAM system

6.1.4.1.1 Applicability

EUT with functions of type Q "CAM functions".

6.1.4.1.2 Requirement

(MSC.302/5.4) *It shall be possible to provide the CAM-HMI at least on the workstation for navigating and manoeuvring, and if provided at the workstation for monitoring.*

The installation manual shall contain guidance to provide at least one CAM-HMI at the navigating and manoeuvring workstation.

NOTE IMO MSC/Circ.982 defines navigating and manoeuvring workstation.

6.1.4.1.3 Methods of test and required results

Confirm by inspection of the installation manual that guidance is given to install at least one CAM-HMI at the navigating and manoeuvring workstation.

If the EUT is not an INS, confirm by inspection of the manufacturer's documentation that the installation manual states that, for the case that an INS is installed, a separate CAM system is not permitted to be installed on board.

6.1.4.2 Provisions for INS

6.1.4.2.1 Applicability

EUT with functions of type T "INS functions".

6.1.4.2.2 Requirement

(MSC.302/5.5) *If an INS is installed on the bridge the functionality of the INS alert management HMI and the CAM-HMI shall be integrated.*

6.1.4.2.3 Methods of tests and required results

If the EUT is an INS, confirm by analytical evaluation that the INS alert management HMI and the CAM-HMI are integrated.

6.2 Priorities classification and categories

6.2.1 Applicability

EUT with functions of type P "all BAM compliant equipment functions".

See Annex E for guidance about assigning priorities and categories.

6.2.2 Requirement

6.2.2.1 Priorities

(MSC.302/6.1.1) *The BAM shall distinguish between the four priorities listed:*

- 1) *emergency alarms;*
- 2) *alarms;*
- 3) *warnings; and*
- 4) *cautions.*

(MSC.302/6.2.1) *Criteria for classification of emergency alarms:*

- 1) *alarms which indicate that immediate danger to human life or to the ship and its machinery exists and that immediate action shall be taken; and*

- 2) *emergency alarms are specified in the Code on Alerts and Indicators, 2009 (resolution A.1021(26)).*

(MSC.302/6.2.2) *Criteria for classification of alarms:*

- 1) *conditions requiring immediate attention and action by the bridge team to avoid any kind of hazardous situation and to maintain the safe operation of the ship; and*
- 2) *escalation required as alarm from not acknowledged warning.*

(MSC.302/6.2.3) *Criteria for classification of warnings: conditions or situations which require immediate attention for precautionary reasons, to make the bridge team aware of conditions which are not immediately hazardous, but may become so.*

(MSC.302/6.2.4) *Criteria for classification of cautions: awareness of a condition which still requires attention out of the ordinary consideration of the situation or of given information.*

6.2.2.2 Categories

(MSC.302/6.3) *Alerts shall be separated for the alert handling into three categories of alerts.*

- a) (MSC.302/6.3.1) *Category A alerts which are specified as alerts where information at a task station directly assigned to the function generating the alert is necessary, as decision support for the evaluation of the alert-related condition, e.g.:*

- 1) *danger of collision; and*
- 2) *danger of grounding.*

Where category A alerts cannot be acknowledged at a HMI, this fact shall be clearly indicated to the user. If an icon is used, it shall comply with Annex F.

NOTE 1 This condition is called "acknowledge not allowed".

When the EUT is an INS its alerts and their technical sources are part of the INS. In such case, depending on the selected operative mode, all multi-function displays of the INS may be capable of fulfilling the requirement to present the alerts together with the required graphical presentation for the evaluation of the alert related condition at the task station directly assigned to the function generating the alert. It is possible to acknowledge a category A alert if the selected operative mode provides the necessary graphical information, for example:

- the necessary graphical information for danger of collision is presentation of targets (i.e. tracked targets and active AIS targets) and presentation of background information (i.e. radar echoes and sleeping AIS targets) in Radar or ECDIS mode;
- the necessary graphical information for danger of grounding (i.e. safety contour) is presentation of chart information in ECDIS or Radar mode;
- the necessary graphical information for depth below keel alarm is presentation of histogram of the depth information.

The same principles apply for multi-function displays (MFD). For example, when the EUT comprises the combination of Radar and ECDIS functionality in one MFD, when the technical source of alerts is this MFD, and when above listed conditions given for INS are fulfilled, then it is possible to acknowledge ECDIS related alerts in Radar mode and Radar related alerts in ECDIS mode on this MFD.

Every MFD which is capable of accepting acknowledgement of a category A alert shall perform visual presentation and audible annunciation of the alert as an indication that the MFD can accept acknowledgement of the alert.

- b) (MSC.302/6.3.2) *Category B alerts are specified as alerts where no additional information for decision support is necessary besides the information which can be presented at the CAM-HMI.*

- c) (MSC.302/6.3.3) *Category C alerts which are specified as alerts that cannot be acknowledged on the bridge but for which information is required about the status and treatment of the alerts, e.g., certain alerts from the engine.*

NOTE 2 Because category C alerts can be silenced, and because category A alerts need an audible signal to distinguish which HMI has additional information for decision support and thus can be used to handle the alert, categories C and A alerts have situations in which they cause an audible signal. As cautions never cause an audible signal, they always belong to category B.

6.2.2.3 Additional alerts

(MSC.302/6.1.2) *Alerts additional to the alerts required by the IMO shall be assigned to a priority level using the criteria for classification.*

The manufacturer shall provide a list of the alerts of the EUT indicating at least the priority and category and the application of the criteria used for classification. See Annex E for guidance about assigning priorities and categories.

6.2.3 Methods of test and required results

Confirm by inspection that the manufacturer's documentation lists the alerts of the EUT indicating at least the priority, category and the criteria used for classification (see 6.3.2.3 for further tests).

Identify if category A alerts can be displayed on an HMI even if these alerts cannot be acknowledged on that HMI. If such alerts can be displayed, simulate an alert of category A and confirm by observation that:

- the alert cannot be acknowledged on the HMI;
- there is an indication on the HMI that acknowledgement will not be accepted; and
- if an icon is used, it complies with Annex F.

For INS or MFD (see 6.2.2.2), confirm by analytic evaluation that all locations in which it is possible to acknowledge a category A alert are displaying necessary graphical information and perform audible annunciation according to Table 2, Table 3, Table 4 and Table 5 when they allow acknowledgement of the category A alert.

6.3 Presentation and state of alerts

6.3.1 Applicability

EUT with functions of type P "all BAM compliant equipment functions".

6.3.2 General

6.3.2.1 Statement

(MSC.302/7.1.1) *The presentation of alarms and warnings is defined in the Performance standards for presentation of navigation-related information on shipborne navigational displays (resolution MSC.191(79) and the related standard IEC 62288).*

6.3.2.2 Requirement

(MSC.302/7.1.2) *The state of an alert shall be consistently distributed and presented for the BAM compliant equipment and all associated displays.*

Alert states and related conditions are described in Table 1.

Table 1 – Alert states and related conditions

Alert state	Condition
"active – unacknowledged"	Alert condition still present, alert not acknowledged
"active – silenced"	Alert condition still present, alert not acknowledged but audible signals have been silenced by the operator
"active – acknowledged"	Alert condition still present, alert acknowledged by the operator
"active – responsibility transferred"	Alert condition still present, a function of the BAM compliant equipment with additional system knowledge has taken over
"rectified – unacknowledged"	Alert condition rectified, alert still unacknowledged
"active"	Alert condition present
"normal"	No alert condition present
NOTE 1 "Responsibility transferred" is the process used to inform functions, sensors and/or sources that after reevaluation, BAM compliant equipment, with its system knowledge, has taken the responsibility in order to reduce number of high-priority alerts. NOTE 2 For each alert priority a separate state diagram has been defined (see Annex G). The state diagrams each apply a selection of states listed in this table, as detailed in Table 2 to Table 5.	

Alert states and their presentation are described in Table 2, Table 3, Table 4 and Table 5. Visual presentation of alert title and/or alert description text, if provided, is required. Optionally icons can be presented together with the alert title and/or alert description text, according to 6.4.5.

Table 2 – Alert state and presentation for emergency alarms

Alert state	Visual presentation ^a	Audible annunciation
"active"	Red flashing	CAM-HMI: silent Source: according to A.1021(26)
"normal"	None	CAM-HMI: silent Source: according to A.1021(26)
Audible signals are not required from the CAM-HMI as the audible signals given in IMO resolution A.1021(26) are presented on the bridge by other equipment. If the user is required to read alarm text, a marker symbol shall flash rather than the text (IEC 60945:2002, 6.1.5). For example an icon could be used. In this document "alarm text" is for example the alert title and/or alert description text, including associated textual and numeric information like time and state. ^a Optional icons for alert management are given in Annex F, the requirements and tests for display of icons are given in 6.4.5.		

Table 3 – Alert state and presentation for alarms

Alert state	Visual presentation ^a	Audible annunciation ^b
"active – unacknowledged"	Red flashing	3 short audible signals that shall be repeated every 7 s to 10 s ^c Speech output optional ^c
"active – silenced"	Red flashing	No audible signal and no speech output
"active – acknowledged"	Red steady, but distinguishable from other states	No audible signal and no speech output
"active – responsibility transferred"	Red steady, but distinguishable from other states	No audible signal and no speech output
"rectified – unacknowledged"	Red flashing, but distinguishable from other states	No audible signal and no speech output
"normal"	None	No audible signal and no speech output

"Rectified – unacknowledged" state is not applicable to all alarms. In which case, when such an alarm condition is rectified, the alert state becomes "normal" immediately without acknowledgement (the alert is "terminated") – see Figure G.2.

If the user is required to read alarm text, a marker symbol shall flash rather than the text (IEC 60945:2002, 6.1.5). For example an icon could be used. In this document "alarm text" is for example the alert title and/or alert description text, including associated textual and numeric information like time and state.

"distinguishable from other states". The manufacturer can specify a method or use the icons in accordance with 6.4.5.

When colour coding is used, it should be used in combination with other symbol attributes, such as size, shape and orientation (MSC.191, 5.5.3). This can be used as guidance for distinguishable visual presentation of each alert state.

See 6.3.5 for requirements on audible annunciation in situations with multiple alerts and for alerts occurring during a silence period.

^a Optional icons for alert management are given in Annex F, the requirements and tests for display of icons are given in 6.4.5.

^b HMIs displaying an alert shall remain silent if the alert cannot be handled on that HMI (i.e. alternative control position). Such HMI shall have a permanent indication that "Alert handling is disabled".

^c HMIs displaying an alert of category A shall remain silent if the alert cannot be acknowledged on that HMI (see 6.2.2.2).

Table 4 – Alert state and presentation for warnings

Alert state	Visual presentation ^a	Audible annunciation ^b
"active – unacknowledged"	Yellowish orange flashing	2 short audible signals and not to be repeated unless escalated in accordance with 6.3.7 ^c . Speech output optional and not to be repeated unless escalated in accordance with 6.3.7 ^c .
"active – silenced"	Yellowish orange flashing	No audible signal and no speech output
"active – acknowledged"	Yellowish orange steady, but distinguishable from other states	No audible signal and no speech output
"active – responsibility transferred"	Yellowish orange steady, but distinguishable from other states	No audible signal and no speech output
"rectified – unacknowledged"	Yellowish orange flashing, but distinguishable from other states	No audible signal and no speech output
"normal"	None	No audible signal and no speech output
"Rectified – unacknowledged" State is not applicable to all warnings. In which case, when such a warning condition is rectified, the alert state becomes "normal" immediately without acknowledgement (the alert is "terminated") – see Figure G.2. If the user is required to read alarm text, a marker symbol shall flash rather than the text (IEC 60945:2002, 6.1.5). For example an icon could be used. In this document "alarm text" is for example the alert title and/or alert description text, including associated textual and numeric information like time and state. "distinguishable from other states". The manufacturer can specify an own method or use the icons in accordance with 6.4.5. When colour coding is used, it should be used in combination with other symbol attributes, such as size, shape and orientation (MSC.191, 5.5.3). This can be used as guidance for distinguishable visual presentation of each alert state. See 6.4.4 for requirement on audible annunciation in situations with multiple alerts and for alerts occurring during a silence period. ^a Optional icons for alert management are given in Annex F, the requirements and tests for display of icons are given in 6.4.5. ^b HMIs displaying an alert shall remain silent if the alert cannot be handled on that HMI (i.e. alternative control position). Such HMI shall have a permanent indication that "Alert handling is disabled". ^c HMIs displaying an alert of category A shall remain silent if the alert cannot be acknowledged on that HMI (see 6.2.2.2).		

Table 5 – Alert state and presentation for cautions

Alert state	Visual presentation ^a	Audible annunciation
"active"	Yellow	No audible signal and no speech output
"normal"	None	No audible signal and no speech output
^a Optional icons for alert management are given in Annex F, the requirements and tests for display of icons are given in 6.4.5.		

6.3.2.3 Methods of test and required results

Refer to the manufacturer's documentation. Identify all displays associated with the EUT that may present alerts.

Cause at least one alert of each priority and each state, if applicable, at the EUT.

Confirm by observation that, disregarding colour coding (see Table 3 and Table 4), the different alert priorities and states can be distinguished.

Confirm by observation that an HMI presenting alerts while that HMI is not in control has a permanent indication that "Alert handling is disabled". Confirm by observation that, in this mode, any HMI of the EUT which is not in control does not provide audible annunciation.

Additional methods of test and required results are described in 6.3.3, 6.3.4, 6.3.5, 6.3.6 and 6.4.5. For all these tests, in addition to the test itself, confirm by observation that the state of the alerts is consistently presented on all associated displays.

6.3.3 Emergency alarms

6.3.3.1 Statement

(MSC.302/7.2) *The handling of emergency alarms is specified in the Code on Alerts and Indicators, 2009 (resolution A.1021(26)).*

6.3.3.2 Requirement

Emergency alarms shall be presented on the CAM-HMI in accordance with Table 2 and, if icons are used, Annex F.

6.3.3.3 Methods of test and required results

Refer to the manufacturer's documentation. As applicable generate an emergency alarm and/or simulate at the input an ALF message representing an emergency alarm, and confirm by observation that the presentation is in all states in compliance with Table 2 and, if icons are used, Annex F.

6.3.4 Alarms

6.3.4.1 Different alert states

6.3.4.1.1 Requirement

(MSC.302/7.3.1) *The BAM shall distinguish between different alarm states:*

- 1) *unacknowledged alarm; and*
- 2) *acknowledged alarm.*

(See Table 1 and Table 3)

6.3.4.1.2 Methods of test and required results

Methods of test and required results are described in 6.3.4.2.2 and 6.3.4.6.2.

6.3.4.2 Unacknowledged alarm

6.3.4.2.1 Requirement

(MSC.302/7.3.2) *When an alarm condition is detected, it shall be indicated as unacknowledged alarm:*

- 1) *initiate an audible signal, accompanied by the visual alarm announcement;*

NOTE 1 IEC 60945:2002, 4.2.2.2, contains generic requirements for sound pressure level.

- 2) *provide a message of sufficient detail to enable the bridge team to identify and address the alarm condition; and*

- 3) *may be accompanied by speech output presented at least in English, using harmonized alert voice messages according to the regulations of the IMO. The visual announcement and audible signal shall occur simultaneously. If provided, speech output shall be generated directly following the audible signal.*

NOTE 2 IEC 60945:2002, 4.2.1.6, contains generic requirements for speech announcements.

The alert title and if provided, the alert description text shall, where possible, use the terminology defined in IEC 62288 (for guidance see Annex E).

If provided, speech output shall, as far as practicable, match the alert title and/or the alert description text and use, where applicable, the terminology defined in IEC 62288. The volume of speech output shall be adjustable to extinction without affecting the sound pressure level of the audible signal. Failure of speech output shall not degrade operation of the visual presentation or operation of the audible signal.

(MSC.302/7.3.3) *An unacknowledged alarm shall be clearly distinguishable from those existing and already acknowledged. Unacknowledged alarms shall be indicated flashing and by an audible signal (see Table 3).*

NOTE 3 The audible signal stops when the state is "rectified – unacknowledged".

(MSC.302/7.3.4) *The characteristics of the audible alarm signal, whether used singly or in combination with speech, shall be such that there is no possibility of mistaking it for the audible signal used for a warning (see Table 4).*

6.3.4.2.2 Methods of test and required results

Refer to the manufacturer's documentation to identify three category A, three category B and three category C alarms, if provided, for which the alert state will not change after revaluation. Generate these alarms individually and confirm by observation that:

- each alarm is visually presented as "active – unacknowledged" alarm in compliance with Table 3, together with its associated alert title and/or alert description text, at least on the HMI(s) directly assigned to the alert source and together with its associated alert title and, if provided, alert description text on the CAM-HMI(s) if provided in the EUT;
- the alert title and if provided the alert description text, where possible, uses the terminology defined in IEC 62288;
- an audible signal in compliance with Table 3 and 6.4.4 occurs for:
 - category A alarms only at the HMI of task stations providing the necessary graphical information for decision support of the alert related condition (see 6.2.2.2);
 - category B and C alarms at all the HMIs.

If speech output is provided, confirm by observation that:

- the audible signal as defined in Table 3 occurs before speech output;
- the same speech output is repeated as long as the alarm is "active – unacknowledged";
- only one speech output is announced at any given time by the EUT;
- speech output, as far as practicable, matches the alert title and/or the alert description text and uses, where applicable, the terminology defined in IEC 62288;
- it is possible to adjust the speech volume to extinction without affecting the audible signal.

If speech output is provided, cause a failure of speech output. Confirm by observation that the visual presentation and the audible signal remain as defined in Table 3.

6.3.4.3 Silencing of alarms categories A and B

6.3.4.3.1 Requirement

(MSC.302/7.3.5) *Means may be provided at an HMI to temporarily silence audible alarm signals, if the alert identification is provided at the HMI. If an alarm, which can be acknowledged on the bridge (categories A and B), is not acknowledged within 30 s the audible signal shall start again or as specified in the equipment performance standards.*

When the EUT is not a CAM (for CAM, see 7.2.1.9), if a silence function is provided in an HMI to silence alerts raised by the EUT, that function applies to all the "active – unacknowledged" alerts of the EUT, that were displayed at the HMI where the silence function was operated, regardless of priority and category. Operation of that silence function shall cause the EUT to change the state of these alerts from "active – unacknowledged" to "active – silenced" (see also 6.3.4.4 and 6.3.5.3), unless this is not permitted by the individual equipment standard.

When the EUT within a cluster (see 4.5) receives a silence command from a CAM in the same cluster, this command shall cause the EUT to change the state of the referenced category A and B alert(s) of which it is the source from "active – unacknowledged" to "active – silenced", unless this is not permitted by the individual equipment standard. A silence command from a CAM in another cluster shall be ignored.

A prolonged activation of temporary silence command shall not prevent reactivation of the audible signal and speech output, if applicable, of an alert after 30 s (due to state transition from "active – silenced" to "active – unacknowledged") unless otherwise specified in the equipment performance standards.

A repeated activation of the temporary silence command during a temporary silence period shall not prevent reactivation of the audible signal and speech output of an alert at the end of the original temporary silence period.

Activation of temporary silence shall not prevent the audible signal and speech output, if applicable, of new alerts.

6.3.4.3.2 Methods of test and required results

Refer to the manufacturer's documentation to identify all methods of temporary silencing of all alerts. Use the same category A and B alarms as in 6.3.4.2.2 and activate them all in parallel. Confirm by observation for all available methods of temporary silence that:

- the audible signal and speech output, if applicable, for all alerts displayed at the device where the silence command was given stops when the temporary silence is activated;
- if the EUT is not a CAM, if the temporary silence command was received from its own HMI, the audible signal and speech output, if applicable, stops for all alerts of the EUT of all categories and priorities presented at the alert HMI of the EUT where the silence function was initiated and the state of alerts with state "active – unacknowledged" changes to "active – silenced", except for those alerts where individual performance standards do not permit such function for which the audible signals and speech output, if provided, continue and their alert states remain unchanged;
- the visual presentation of alerts in state "active – silenced" is in accordance with Table 3;
- if an alert source receives a silence command from a CAM, the referenced alerts of the EUT in the applicable cluster, unless otherwise stated by individual equipment standards, stop audible signals and, if provided, speech output. The state of the relevant alerts of all categories and priorities of "active – unacknowledged" changes to "active – silenced" (see also 6.3.4.4 and 6.3.5.4);
- the audible signal and speech output, if applicable, start again after 30 s (or as specified in performance standards) if the alarm condition is not rectified and the alarm is not acknowledged;

- a prolonged activation of the temporary silence command for longer than 30 s does not prevent the start of the audible signal and speech output, if applicable, after 30 s from initial activation of the temporary silence;
- a repeated activation of the temporary silence command does not prevent the start of the audible signal and speech output, if applicable, after 30 s from initial activation of the temporary silence;
- by activating a new alarm, activation of the temporary silence command does not prevent the start of the audible signal and speech output, if applicable, for this new alarm.

6.3.4.4 Silencing of alarms category C

6.3.4.4.1 Requirement

(MSC.302/7.3.6) *It shall be possible to temporarily silence category C alarms. The alarm shall be retriggered after a specified period of time consistent with the Code on alerts and indicators (i.e. a configuration setting, depending on the size of the ship but not exceeding 5 min) when the alarm is not acknowledged and not rectified at the specified workplace (e.g., engine-room).*

When the EUT is not a CAM (for CAM see 7.2.1.9), the silence function provided in the HMI to silence alerts raised by the EUT applies to all the "active – unacknowledged" alerts of the EUT that were displayed at the HMI where the silence function was operated, regardless of priority and category. Operation of that silence function shall cause the EUT to change the state of these alerts from "active – unacknowledged" to "active – silenced" (see also 6.3.4.3 and 6.3.5.3), unless this is not permitted by the individual equipment standard.

When the EUT receives a silence command from a CAM in the cluster to which it has reported category C alerts (see 4.5), this command shall cause the EUT to change the state of only those category C alerts of which it is the source from "active – unacknowledged" to "active – silenced", unless this is not permitted by the individual equipment standard.

A prolonged activation of the temporary silence command shall not prevent reactivation of the audible signal and speech output, if applicable, of an alert after a period not exceeding 5 min (due to state transition from "active – silenced" to "active – unacknowledged").

A repeated activation of the temporary silence command during a temporary silence period shall not prevent reactivation of the audible signal and speech output of an alert at the end of the original temporary silence period.

Activation of temporary silence shall not prevent the audible signal and speech output, if applicable, of new alerts.

6.3.4.4.2 Methods of test and required results

Refer to the manufacturer's documentation and apply this test if the EUT provides category C alerts or if it encompasses a CAM. Repeat the tests of 6.3.4.3.2 but using alarms of category C and using a configurable time which can be set to, but not exceed, 5 min. Refer to the manufacturer's documentation to identify the methods by which this time is determined.

6.3.4.5 Continuation of alarms

6.3.4.5.1 Requirement

(MSC.302/7.3.7) *The visual indication (presentation) for an unacknowledged alarm shall continue until the alarm is acknowledged, unless specified otherwise in the equipment performance standards, e.g., for CPA/TCPA alerts where the visual signal (presentation) can be ceased when the alarm condition is rectified.*

(MSC.302/7.3.8) *The audible indication (signal), if not temporarily silenced, for an unacknowledged alarm shall continue until the alarm is acknowledged or the alarm condition is rectified. The audible signal of an unacknowledged alarm shall be ceased when the alarm condition is rectified.*

If a function is no longer in use due to it being disengaged intentionally by the user, the alert source shall set the states of its related alerts back to "normal".

NOTE As an example, reset of "off heading alert" if the heading control is switched off.

When an alert generating function is deactivated while the alert reporting part of the function remains operational, the alert states associated with the active function and reported in ALF and ALC messages shall be set to "normal".

In case the EUT presents alerts received from an alert source via ALC/ALF messages, and in that case the ALC messages are no longer available to the EUT, the EUT shall stop presenting the alerts received from that alert source and it shall generate and present a new alert indicating failure of the interface with this alert source (see 7.5.1).

6.3.4.5.2 Methods of test and required results

Use same alarms as in 6.3.4.2.2. Generate the alarms, do not acknowledge them and rectify the alarm condition. Confirm by observation that after the alarm condition is rectified:

- the audible signal stops;
- the EUT reports the changed alert states by means of ALF and ALC messages and that afterwards the EUT reports by continuous sending of ALC messages;
- if provided, the speech announcement stops;
- the flashing visual presentation is in compliance with Table 3.

Refer to the manufacturer's documentation. If available, generate 3 alarms for which an equipment performance standard allows removal of the alarm after the alarm condition is rectified. Generate the alarms, do not acknowledge them and rectify the alarm condition. Confirm by observation that:

- the alarms, including visual presentation and audible signals, disappear after the alarm condition is rectified;
- the EUT reports the changed alert state "normal" by means of ALF and ALC messages and that afterwards the EUT continues to send ALC (empty list) messages;
- if provided, speech announcement stops after the alarm condition is rectified.

Refer to the manufacturer's documentation to identify whether or not there are functions that can be deactivated while the associated alert reporting function remains operational. If that is the case, execute the following steps:

- generate 3 alerts of that function, if applicable;
- confirm by observation that the EUT presents the alerts and reports the alerts by means of ALF and ALC messages;
- deactivate the function;
- confirm by observation that the EUT reports the changed alert state "normal" by means of ALF and ALC messages and removes the alert presentation.

Compliance with the requirement for missing ALC messages is verified by tests in 7.5.2.