

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



**Maritime navigation and radiocommunication equipment and systems – Bridge alert management –  
Part 1: Operational and performance requirements, methods of testing and required test results**

**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**



## THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2018 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

IEC Central Office  
3, rue de Varembe  
CH-1211 Geneva 20  
Switzerland

Tel.: +41 22 919 02 11  
[info@iec.ch](mailto:info@iec.ch)  
[www.iec.ch](http://www.iec.ch)

### About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

### About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

#### IEC Catalogue - [webstore.iec.ch/catalogue](http://webstore.iec.ch/catalogue)

The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

#### IEC publications search - [webstore.iec.ch/advsearchform](http://webstore.iec.ch/advsearchform)

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, replaced and withdrawn publications.

#### IEC Just Published - [webstore.iec.ch/justpublished](http://webstore.iec.ch/justpublished)

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and also once a month by email.

#### Electropedia - [www.electropedia.org](http://www.electropedia.org)

The world's leading online dictionary of electronic and electrical terms containing 21 000 terms and definitions in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

#### IEC Glossary - [std.iec.ch/glossary](http://std.iec.ch/glossary)

67 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

#### IEC Customer Service Centre - [webstore.iec.ch/csc](http://webstore.iec.ch/csc)

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: [sales@iec.ch](mailto:sales@iec.ch).

---

### A propos de l'IEC

La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

### A propos des publications IEC

Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

#### Catalogue IEC - [webstore.iec.ch/catalogue](http://webstore.iec.ch/catalogue)

Application autonome pour consulter tous les renseignements bibliographiques sur les Normes internationales, Spécifications techniques, Rapports techniques et autres documents de l'IEC. Disponible pour PC, Mac OS, tablettes Android et iPad.

#### Recherche de publications IEC - [webstore.iec.ch/advsearchform](http://webstore.iec.ch/advsearchform)

La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études,...). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

#### IEC Just Published - [webstore.iec.ch/justpublished](http://webstore.iec.ch/justpublished)

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et aussi une fois par mois par email.

#### Electropedia - [www.electropedia.org](http://www.electropedia.org)

Le premier dictionnaire en ligne de termes électroniques et électriques. Il contient 21 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans 16 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

#### Glossaire IEC - [std.iec.ch/glossary](http://std.iec.ch/glossary)

67 000 entrées terminologiques électrotechniques, en anglais et en français, extraites des articles Termes et Définitions des publications IEC parues depuis 2002. Plus certaines entrées antérieures extraites des publications des CE 37, 77, 86 et CISPR de l'IEC.

#### Service Clients - [webstore.iec.ch/csc](http://webstore.iec.ch/csc)

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: [sales@iec.ch](mailto:sales@iec.ch).

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



---

**Maritime navigation and radiocommunication equipment and systems – Bridge alert management –  
Part 1: Operational and performance requirements, methods of testing and required test results**

**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**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

COMMISSION  
ELECTROTECHNIQUE  
INTERNATIONALE

---

ICS 47.020.70

ISBN 978-2-8322-5993-1

**Warning! Make sure that you obtained this publication from an authorized distributor.  
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

## CONTENTS

FOREWORD.....	7
INTRODUCTION.....	9
1 Scope.....	10
2 Normative references .....	10
3 Terms, definitions and abbreviated terms .....	11
3.1 Terms and definitions.....	11
3.2 Abbreviated terms.....	16
4 Description .....	17
4.1 Purpose .....	17
4.2 EUT function types .....	17
4.3 Application .....	18
4.4 Implementation of BAM interfaces.....	18
4.5 Clusters .....	19
5 Test methods.....	20
5.1 Subject of tests .....	20
5.2 Test set-ups.....	20
5.3 General requirements .....	20
5.4 Configuration for testing.....	21
6 Module A – Presentation and handling of alerts on the bridge.....	21
6.1 General.....	21
6.1.1 Provisions.....	21
6.1.2 Number of alerts for one situation .....	21
6.1.3 Alert presentation at several locations .....	22
6.1.4 Central alert management HMI .....	22
6.2 Priorities classification and categories .....	23
6.2.1 Applicability .....	23
6.2.2 Requirement.....	23
6.2.3 Methods of test and required results .....	25
6.3 Presentation and state of alerts .....	25
6.3.1 Applicability .....	25
6.3.2 General .....	25
6.3.3 Emergency alarms.....	29
6.3.4 Alarms .....	29
6.3.5 Warnings .....	34
6.3.6 Cautions .....	39
6.3.7 Alert escalation.....	39
6.4 Presentation of alerts on the bridge .....	41
6.4.1 Applicability .....	41
6.4.2 General requirements .....	41
6.4.3 Aids for decision making.....	45
6.4.4 Audible annunciation .....	45
6.4.5 Display of icons .....	48
6.4.6 Functionality to help reduce the number of high-priority alerts .....	48
6.5 Systems failures, redundancies, back-up and fallback arrangements .....	49
6.5.1 Applicability .....	49
6.5.2 Requirement.....	49

6.5.3	Methods of test and required results .....	50
6.6	Documentation.....	51
6.6.1	Applicability .....	51
6.6.2	Requirement.....	52
6.6.3	Methods of test and required results .....	52
6.7	Functional alert grouping .....	52
6.7.1	Applicability .....	52
6.7.2	Functional alert group source .....	52
6.7.3	Functional alert group display.....	55
6.8	Alert aggregation .....	57
6.8.1	Applicability .....	57
6.8.2	Alert aggregation source.....	57
6.8.3	Aggregation display .....	59
6.9	Responsibility transfer .....	61
6.9.1	EUT performing reevaluation .....	61
6.9.2	EUT as source of alerts .....	62
7	Module B – Central alert management system functionality .....	63
7.1	Applicability .....	63
7.2	Central alert management human machine interface (CAM-HMI) .....	63
7.2.1	General requirements .....	63
7.2.2	Aggregated header alerts .....	67
7.2.3	Alert history .....	68
7.3	Functional aspects of a CAM .....	70
7.3.1	Requirement.....	70
7.3.2	Methods of test and required results .....	70
7.4	Back-up and redundancies.....	71
7.4.1	Requirement.....	71
7.4.2	Methods of test and required results .....	71
7.5	System failures and fallback arrangements .....	71
7.5.1	Requirement.....	71
7.5.2	Methods of test and required results .....	72
8	Module C – Interfacing .....	73
8.1	Interfacing requirements for alert-related communication .....	73
8.1.1	Communication protocol .....	73
8.1.2	Alert priority, state and text.....	74
8.1.3	Time of last change .....	75
8.1.4	Acknowledgement and silence.....	75
8.1.5	Aggregation.....	76
8.1.6	Reconnection .....	77
8.2	Connection to the ship's power supply .....	77
8.2.1	Applicability .....	77
8.2.2	Requirement.....	77
8.2.3	Methods of test and required results .....	77
8.3	Function not in operational use .....	77
8.3.1	Applicability .....	77
8.3.2	Requirement.....	78
8.3.3	Methods of test and required results .....	78
9	Module D – System and equipment documentation for CAM system .....	78
9.1	Applicability .....	78

9.2	Manuals .....	78
9.2.1	Requirement .....	78
9.2.2	Methods of test and required results .....	78
9.3	Information regarding system configuration for surveyor .....	78
9.3.1	Requirement .....	78
9.3.2	Methods of tests and required results .....	79
9.4	Failure analysis .....	79
9.4.1	Requirement .....	79
9.4.2	Methods of test and required results .....	79
9.5	Guidance to equipment manufacturers for the provision of on-board familiarization material .....	79
9.5.1	Requirement .....	79
9.5.2	Methods of test and required results .....	79
Annex A (informative)	Test set-ups .....	80
A.1	Applicability .....	80
A.2	Purpose .....	80
A.3	Generic representation .....	80
A.4	Test set-up 1 .....	82
A.5	Test set-up 2 .....	82
A.6	Test set-up 3 .....	83
A.7	Test set-up 4 .....	84
Annex B (informative)	Guidance to equipment manufacturers for the provision of on-board familiarization material (Appendix 2 of IMO Resolution MSC.302(87)) .....	86
B.1	Applicability .....	86
B.2	General .....	86
B.3	On-board familiarization .....	86
B.4	Familiarization training framework .....	87
B.4.1	General description .....	87
B.4.2	Detailed operation .....	87
Annex C (normative)	Logical interfaces for alert communication .....	88
C.1	Applicability .....	88
C.2	Logical interfaces .....	88
C.3	Alert sentences for exchanging alert information .....	89
C.4	Alert communication in case of successful revaluation and priority reduction .....	91
C.5	Alert communication in case of unsuccessful revaluation .....	92
C.6	Additional requirements for use of BAM sentences on IEC 61162-450 .....	93
C.6.1	Use of ALF .....	93
C.6.2	Use of ALC .....	93
C.6.3	Use of ACN .....	94
C.6.4	Use of ARC .....	94
C.6.5	Use of AGL .....	94
C.7	Alert communication in case of inconsistent content of ALF messages .....	94
Annex D (informative)	Properties of aggregation and functional grouping .....	95
Annex E (informative)	Guidance on alert management .....	96
E.1	Applicability .....	96
E.2	Alert management strategic changes .....	96
E.3	Alert management tactics .....	96
E.4	Alert management means and methods .....	97
E.4.1	Overview .....	97

E.4.2	Functional alerts .....	98
E.4.3	Tools .....	100
E.4.4	Clusters .....	102
E.4.5	Technical and structural approach .....	104
Annex F (normative)	Icons for alert management .....	105
Annex G (normative)	Alert state diagrams .....	108
Annex H (normative)	Legacy alert handling .....	111
H.1	Applicability .....	111
H.2	Introduction to legacy alert sources .....	111
H.3	Conversion of legacy alerts .....	112
H.3.1	Requirement .....	112
H.3.2	Methods of test and required results .....	112
Annex I (normative)	Alert group list (AGL) message for functional grouping .....	114
I.1	Applicability .....	114
I.2	General .....	114
I.3	AGL – Alert group list .....	114
Annex J (normative)	TAG block for cluster identification .....	115
J.1	Applicability .....	115
J.2	General .....	115
J.3	Destination cluster identification "x" .....	115
J.4	Source cluster identification "z" .....	115
Annex K (informative)	Additional talker identifiers for alert sources .....	116
Bibliography	.....	117
Figure 1	– Interfacing legacy alert sources with BAM compliant equipment .....	19
Figure 2	– Example of cluster-dependent alert management limitations .....	20
Figure 3	– Multiple alerts with audible annunciation existing simultaneously .....	46
Figure 4	– Occurrence of alerts during a temporary silence period .....	46
Figure 5	– Escalation of a warning as warning during a temporary silence period .....	47
Figure 6	– Occurrence of multiple warnings .....	47
Figure A.1	– BAM concept .....	81
Figure A.2	– Test set-up 1: no reevaluation of input data .....	82
Figure A.3	– Test set-up 2: with reevaluation of input data .....	83
Figure A.4	– Test set-up 3: BAM compliant CAM system .....	84
Figure A.5	– Test set-up 4: BAM/CAM system compliant INS .....	85
Figure C.1	– Logical interfaces .....	88
Figure C.2	– Alert communication showing priority reduction, alert condition rectified .....	92
Figure C.3	– Alert communication in case of no priority reduction, with user acknowledgement .....	93
Figure E.1	– Alert management decision flow .....	97
Figure E.2	– Clusters and their functional relations .....	103
Figure G.1	– State diagram of an alert of priority emergency alarm .....	108
Figure G.2	– State diagram of an alert of priority alarm .....	109
Figure G.3	– State diagram of an alert of priority warning .....	110
Figure G.4	– State diagram of an alert of priority caution .....	110

Figure H.1 – Division of functional blocks of alert management when BAM compliant alert source is interfaced to CAM ..... 111

Figure H.2 – Division of functional blocks of alert management when legacy alert source is interfaced to CAM ..... 111

  

Table 1 – Alert states and related conditions ..... 26

Table 2 – Alert state and presentation for emergency alarms ..... 26

Table 3 – Alert state and presentation for alarms ..... 27

Table 4 – Alert state and presentation for warnings ..... 28

Table 5 – Alert state and presentation for cautions ..... 28

Table C.1 – IEC 61162-1 sentences received by BAM compliant equipment ..... 90

Table C.2 – IEC 61162-1 sentences transmitted by BAM compliant equipment ..... 91

Table D.1 – Properties of aggregation and functional grouping ..... 95

Table F.1 – Alert management icons – basic..... 105

Table F.2 – Alert management icons – additional qualifiers..... 107

Table F.3 – Alert management icons – selected display status..... 107

Table K.1 – Talker identifiers for automation equipment..... 116

## 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.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

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*