

IEC TR 62998-2

Edition 1.0 2020-04

TECHNICAL REPORT



Safety of machinery – Part 2: Examples of application





THIS PUBLICATION IS COPYRIGHT PROTECTED Copyright © 2020 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.

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

Tel.: +41 22 919 02 11 info@iec.ch

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.

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

IEC publications search - 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 It also gives information on projects, replaced and withdrawn publications.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
Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - 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.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 000 terminological entries 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

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 TR 62998-2

Edition 1.0 2020-04

TECHNICAL REPORT



Safety of machinery –
Part 2: Examples of application

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ICS 13.110; 21.020 ISBN 978-2-8322-7975-5

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FΟ	REWORD		4
INT	RODUCTIO	DN	6
1	Scope		7
2	Normative	e references	7
3	Terms, de	efinitions and abbreviated terms	7
		ns and definitions	
		reviated terms	
4		ons for mobile robots	
	4.1 General		
	_	SS on mail transport mobile robot	_
	4.2.1	Intended use	
	4.2.2	SRSS performance class determination	
	4.2.3	SRS limits of use and SRSS function	
	4.2.4	Safety-related requirements	
	4.2.5	Object classes and physical properties	
	4.2.6	Sensing zones	
	4.2.7	Dependability under environmental influences	
	4.2.8	Safety-related information	
	4.2.9	Verification and validation	
	4.2.10	Information for use of the SRSS	
	4.3 SRSS on cleaning mobile robot		19
	4.3.1	Intended use	19
	4.3.2	SRSS performance class determination	
	4.3.3	SRS limits of use and SRSS function	
	4.3.4	Safety-related requirements	21
	4.3.5	Object classes and physical properties	22
	4.3.6	Sensing zones	23
	4.3.7	Dependability under environmental influences	24
	4.3.8	Safety-related information	24
	4.3.9	Verification and validation	25
	4.3.10	Information for use of the SRSS	26
5	Applicatio	n for container handling equipment for harbour logistics	27
	5.1 Gen	eral	27
	5.2 SRS	SS for CHE	28
	5.2.1	Intended use	28
	5.2.2	SRS limits of use and SRSS function	29
	5.2.3	SRSS performance class determination	30
	5.2.4	Safety-related requirements	31
	5.2.5	Object classes and physical properties	31
	5.2.6	Sensing zones	32
	5.2.7	Dependability under environmental influences	34
	5.2.8	Safety-related information	34
	5.2.9	SRSS performance class after fusion	34
	5.2.10	Verification and validation	34
	5.2.11	Information for use of the SRSS	
Bib	liography		37

of SRSS		
Figure 4 – Mounting positions and sensing zones of the SRS and safety-related zones of SRSS	Figure 2 – Mobile robot with 2 distinctive safety-related zones	10
14 Figure 5 – Mounting positions and sensing zones of the SRS and safety-related zones of SRSS	Figure 3 – Combination of three SRSs into an SRSS and SRSS functions	11
14 Figure 6 – Examples of measurement data for evaluation of coverage interval	Figure 4 – Mounting positions and sensing zones of the SRS and safety-related zones of SRSS	14
Figure 7 – Test setup	Figure 5 – Mounting positions and sensing zones of the SRS and safety-related zones of SRSS	14
Figure 8 – CHE application 28 Figure 9 – Operation areas of CHE 29 Figure 10 – SRSS structure and safety-related functions 30 Figure 11 – Safety-related zones of SRSS 32 Figure 12 – Mounting positions and sensing zones of the SRS, and safety-related zones of the SRSS 33 Table 1 – Safety-related requirements 12 Table 2 – Example of confidence information for SRS 17 Table 3 – Information for use of the SRSS 19 Table 4 – Safety-related requirements 22 Table 5 – Information for use of the SRSS 27 Table 6 – Safety-related requirements 31 Table 7 – Environmental limits of SRSS 34 Table 8 – Information for use of the SRSS 36	Figure 6 – Examples of measurement data for evaluation of coverage interval	17
Figure 9 – Operation areas of CHE	Figure 7 – Test setup	18
Figure 10 – SRSS structure and safety-related functions	Figure 8 – CHE application	28
Figure 11 – Safety-related zones of SRSS	Figure 9 – Operation areas of CHE	29
Figure 12 – Mounting positions and sensing zones of the SRS, and safety-related zones of the SRSS	Figure 10 – SRSS structure and safety-related functions	30
Table 1 – Safety-related requirements	Figure 11 – Safety-related zones of SRSS	32
Table 1 – Safety-related requirements12Table 2 – Example of confidence information for SRS17Table 3 – Information for use of the SRSS19Table 4 – Safety-related requirements22Table 5 – Information for use of the SRSS27Table 6 – Safety-related requirements31Table 7 – Environmental limits of SRSS34Table 8 – Information for use of the SRSS36	Figure 12 – Mounting positions and sensing zones of the SRS, and safety-related	
Table 2 – Example of confidence information for SRS17Table 3 – Information for use of the SRSS19Table 4 – Safety-related requirements22Table 5 – Information for use of the SRSS27Table 6 – Safety-related requirements31Table 7 – Environmental limits of SRSS34Table 8 – Information for use of the SRSS36	zones of the SRSS	33
Table 3 – Information for use of the SRSS19Γable 4 – Safety-related requirements22Γable 5 – Information for use of the SRSS27Γable 6 – Safety-related requirements31Γable 7 – Environmental limits of SRSS34Γable 8 – Information for use of the SRSS36	Table 1 – Safety-related requirements	12
Table 4 – Safety-related requirements22Table 5 – Information for use of the SRSS27Table 6 – Safety-related requirements31Table 7 – Environmental limits of SRSS34Table 8 – Information for use of the SRSS36	Table 2 – Example of confidence information for SRS	17
Table 5 – Information for use of the SRSS27Table 6 – Safety-related requirements31Table 7 – Environmental limits of SRSS34Table 8 – Information for use of the SRSS36	Table 3 – Information for use of the SRSS	19
Table 6 – Safety-related requirements	Table 4 – Safety-related requirements	22
Table 7 – Environmental limits of SRSS	Table 5 – Information for use of the SRSS	27
Table 7 – Environmental limits of SRSS	Table 6 – Safety-related requirements	31
	Table 7 – Environmental limits of SRSS	34
	Table 8 – Information for use of the SRSS	36

INTERNATIONAL ELECTROTECHNICAL COMMISSION

SAFETY OF MACHINERY -

Part 2: Examples of application

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.

The main task of IEC technical committees is to prepare International Standards. However, a technical committee may propose the publication of a technical report when it has collected data of a different kind from that which is normally published as an International Standard, for example "state of the art".

IEC TR 62998-2, which is a Technical Report, has been prepared by IEC technical committee TC 44: Safety of machinery – Electrotechnical aspects.

The text of this Technical Report is based on the following documents:

Enquiry draft	Report on voting
44/849/DTR	44/865A/RVDTR

Full information on the voting for the approval of this technical report 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.

This document is to be used in conjunction with IEC TS 62998-1:2019.

A list of all parts in the IEC 62998 series, published under the general title *Safety of machinery*, 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 ACTION OF THE STATE OF THE STAT of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

Safety-related sensors are applied to machinery presenting a risk of personal injury. They provide protection by causing the machine to revert to a safe condition before a person can be placed in a hazardous situation.

IEC TS 62998-1:2019 is intended for use by safety-related sensor manufacturers and integrators of safety-related sensors for the design of safety-related sensor systems used for the protection of persons.

s guida

Marie de la contraction de la contracti This document gives guidance for manufacturers and integrators on the application of IEC TS 62998-1:2019.

SAFETY OF MACHINERY -

Part 2: Examples of application

1 Scope

This document establishes guidance for the application of IEC TS 62998-1:2019.

It provides examples of:

- application for which SRS/SRSS are relevant,
- use of SRS/SRSS information from an application point of view,
- fusion of SRS into SRSS for given applications, and
- appropriate information for use for given applications.

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 TS 62998-1:2019, Safety of machinery – Safety-related sensors used for protection of persons

3 Terms, definitions and abbreviated terms

For the purposes of this document, the following terms and definitions 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

mobile robot

robot able to travel under its own control

[SOURCE: ISO 8373:2012, 2.13, modified - The note has been omitted.]

3.1.2

robot

actuated mechanism programmable in two or more axes with a degree of autonomy, moving within its environment, to perform intended tasks

[SOURCE: ISO 8373:2012, 2.6, modified – Notes 1 and 2 have been omitted.]