

INTERNATIONAL STANDARD



Nuclear power plants – Instrumentation and control systems important for to safety – Software aspects for computer-based systems performing category B or C functions (<https://standards.iteh.ai>)

Document Preview

[IEC 62138:2018](#)

<https://standards.iteh.ai/catalog/standards/iec/263541ec-76b2-45ce-94a7-19943699fe39/iec-62138-2018>



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.

IEC Central Office
3, rue de Varembe
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.

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

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

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 It also gives information on projects, replaced and withdrawn publications.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 also once a month by email.

Electropedia - 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

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

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

[IEC 62138:2018](https://standards.iteh.ai/catalog/standards/iec/263541ec-76b2-45ce-94a7-19943699fe39/iec-62138-2018)

<https://standards.iteh.ai/catalog/standards/iec/263541ec-76b2-45ce-94a7-19943699fe39/iec-62138-2018>



IEC 62138

Edition 2.0 2018-07
REDLINE VERSION

INTERNATIONAL STANDARD



Nuclear power plants – Instrumentation and control systems important for to safety – Software aspects for computer-based systems performing category B or C functions

Document Preview

[IEC 62138:2018](#)

<https://standards.iteh.ai/catalog/standards/iec/263541ec-76b2-45ce-94a7-19943699fe39/iec-62138-2018>

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 27.120.20

ISBN 978-2-8322-5927-6

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

CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	9
2 Normative references.....	10
3 Terms and definitions and abbreviations	10
4 Symbols and abbreviated terms	19
5 Key concepts and assumptions	19
5.1 General.....	19
5.2 Types of software.....	19
5.3 Types of configuration data	21
5.4 Software and system safety lifecycles.....	21
5.5 Gradation principles	24
Requirements for the software of I&C systems performing category C functions.....	.....
 General requirements.....	.....
 Selection of pre-developed software .....	.....
 Software requirements specification .....	.....
 Software design .....	.....
 Implementation of new software .....	.....
 Software aspects of system integration.....	.....
 Software aspects of system validation .....	.....
 Installation of software on site .....	.....
 Anomaly reports.....	.....
 Software modification .....	.....
6 Requirements for the software of class 2 and class 3 I&C systems performing category B functions	37
6.1 Applicability of the requirements	37
6.2 General requirements.....	37
6.2.1 Software safety lifecycle – Software quality assurance.....	37
6.2.2 Verification	38
6.2.3 Configuration management.....	39
6.2.4 Selection and use of software tools	40
6.2.5 Selection of languages.....	41
Security.....	.....
6.3 Selection of pre-developed software	43
6.3.1 General	43
6.3.2 Documentation for safety.....	43
6.3.3 Evidence of correctness	44
6.3.4 Functional suitability	51
Selection and use of dedicated devices with embedded software .....	.....
6.3.5 Selection and use of digital devices of limited functionality.....	52
6.4 Software requirements specification	52
6.4.1 General	52
6.4.2 Objectives.....	52
6.4.3 Inputs	52
6.4.4 Contents	53
6.4.5 Properties	54

6.5	Software design	54
6.5.1	Objectives.....	54
6.5.2	Inputs	55
6.5.3	Contents	55
6.5.4	Properties	56
6.6	Implementation of software.....	57
6.6.1	General requirements.....	57
6.6.2	Configuration of software and of devices containing software.....	57
6.6.3	Implementation with application-oriented languages.....	57
6.6.4	Implementation with general-purpose languages.....	58
6.7	Software aspects of system integration	60
6.7.1	General	60
6.8	Software aspects of system validation	60
6.8.1	General	60
6.9	Installation of software on site	62
6.9.1	General	62
6.10	Anomaly reports.....	62
6.11	Software modification.....	63
6.11.1	General	63
6.12	Defences against common cause failure due to software.....	64
Annex A (informative)	Typical list of software documentation	66
Annex B (informative)	Correspondence between IEC 61513:2011 and this document	67
Annex C (informative)	Relations of this document with IEC 61508.....	68
C.1	General.....	68
C.2	Comparison of scope and concepts	68
C.3	Correspondence between this document and IEC 61508-3:2010	69
Bibliography	.....	70
<hr/>		
Figure – Process for providing evidence of correctness for pre-developed software of an I&C system of safety class 2.		
Figure 1	– Typical software parts in a computer-based I&C system	20
Figure 2	– Activities of the system safety lifecycle (as defined by IEC 61513:2011)	21
Figure 3	– Software related activities in the system safety lifecycle	22
Figure 4	– Development activities of the IEC 62138 software safety lifecycle.....	23
Figure 5	– Overview of the typical qualification process for pre-developed complete operational system software.....	46
Figure 6	– Overview of the typical qualification process for pre-developed software components	47
<hr/>		
Table A.1	– Typical list of software documentation.....	66
Table B.1	– Correspondence between IEC 61513:2011 and this document.....	67
Table C.1	– Correspondence between this document and IEC 61508-3:2010	69

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**NUCLEAR POWER PLANTS – INSTRUMENTATION
AND CONTROL SYSTEMS IMPORTANT ~~FOR~~ TO SAFETY –
SOFTWARE ASPECTS FOR COMPUTER-BASED SYSTEMS
PERFORMING CATEGORY B OR C FUNCTIONS**

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.

This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

International Standard IEC 62138 has been prepared by subcommittee 45A: Instrumentation, control and electrical power systems of nuclear facilities, of IEC technical committee 45: Nuclear instrumentation.

This second edition cancels and replaces the first edition published in 2004. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) align the standard with standards published or revised since the first edition, in particular IEC 61513, IEC 60880, IEC 62645 and IEC 62671;
- b) merge Clause 5 and Clause 6 of the first edition into a single clause in order to avoid the repetition of the vast majority of the text which proves to be extremely difficult to maintain in consistency;
- c) revise clause on the selection of pre-developed software based on experiences from the application of the first edition of the standard on industrial projects. More precise criteria are proposed for the evidence of correctness of pre-developed software;
- d) introduce requirements on traceability in consistency with IEC 61513;
- e) introduce an Annex A that gives a typical list of software documentation;
- f) introduce an Annex B that establishes relationship between IEC 61513 and this document;
- g) introduce an Annex C that establishes relationship between IEC 61508 and this document.

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

FDIS	Report on voting
45A/1201/FDIS	45A/1209/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.

In this document, the following print types are used:

- *Requirements and recommendations applicable specifically to class 2 or to class 3 systems appear in italics in Clause 6.*

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 publication using a colour printer.

INTRODUCTION

~~Structure of the SC 45A standard series – Relationships with other IEC, IAEA and ISO documents~~

~~The entry point of the SC 45A standard series is IEC 61513. This standard deals with general requirements for instrumentation and control systems and equipment (I&C systems) that are used to perform functions important to safety in nuclear power plants (NPPs), and structures the SC45A standard series.~~

~~IEC 61513 refers directly to other SC 45A standards for general topics related to categorization of functions and classification of systems, qualification, separation of systems, software aspects of computer-based systems, hardware aspect of computer-based systems, control rooms design and multiplexing. The standards referenced directly have to be considered together with IEC 61513 as a consistent document set.~~

~~The other SC 45A standards not directly referenced by IEC 61513 are standards related to particular equipment, technical methods or specific activities. Usually, those low level documents, which refer to the documents of the higher levels previously described for the general topics, can be used on their own.~~

~~IEC 61513 has adopted a presentation format similar to basic safety publication IEC 61508, with an overall safety lifecycle frame and a system safety lifecycle frame, and provides an interpretation of the general requirements of IEC 61508, parts 1, 2 and 4, for the nuclear application sector. Compliance with IEC 61513 will facilitate consistency with the requirements of IEC 61508 as they have been interpreted for the nuclear industry. In that frame, IEC 60880 and IEC 62138 correspond to IEC 61508, part 3 for the nuclear application sector.~~

~~IEC 61513 refers to ISO as well as to IAEA 50-C-QA (now replaced by IAEA 50-C/SG-Q) for topics related to quality assurance.~~

~~The SC 45A standards series implements consistently and in detail the principles and basic safety aspects given in the IAEA Code on the safety of nuclear power plants and in the IAEA safety series, in particular the Requirements NS-R-1, “Safety of Nuclear Power Plants: Design” and the Safety Guide NS-G-1.3, “Instrumentation and Control Systems Important to Safety in Nuclear Power Plants”. The terminology and definitions used by the SC 45A standards are consistent with that used by the IAEA.~~

a) Technical background, main issues and organisation of this document

This International Standard provides requirements on the software aspects for computer-based instrumentation and control (I&C) systems performing category B or C functions as defined by IEC 61226. It complements IEC 60880 which provides requirements for the software of computer-based I&C systems performing category A functions.

It is consistent with, and complementary to, IEC 61513:2011. Activities that are mainly system level activities (for example, integration, validation and installation) are not addressed exhaustively by this document: requirements that are not specific to software are deferred to IEC 61513:2011.

This document takes into account the current practices for the development of software for I&C systems, in particular:

- the use of pre-developed software, equipment and equipment families that were not necessarily designed to nuclear industry sector standards;
- the use of application-oriented languages.

b) Situation of the current document in the structure of the IEC SC 45A standard series

IEC 61513 is a first level IEC SC 45A document and gives guidance applicable to I&C at system level.

IEC 62138 is a second level IEC SC 45A document that supplements IEC 61513 concerning software development of computer-based I&C systems performing category B or C functions.

For more details on the structure of the IEC SC 45A standard series, see item d) of this introduction.

c) Recommendations and limitations regarding the application of this document

This document is not intended to be used as a general-purpose software engineering guide. It applies to the software of I&C systems performing category B or C functions for new nuclear power plants as well as to I&C upgrading or back-fitting of existing plants.

For existing plants, only a subset of requirements is applicable and this subset has to be identified at the beginning of any project.

The purpose of the guidance provided by this document is to reduce, as far as possible, the potential for latent software faults to cause system failures, either due to single software failures or multiple software failures (i.e. Common Cause Failures due to software).

This document does not explicitly address how to protect software against those threats arising from malicious attacks, i.e. cybersecurity, for computer-based systems. IEC 62645 provides requirements for security programmes for computer-based systems.

To ensure that this document will continue to be relevant in future years, the emphasis has been placed on issues of principle, rather than specific technologies.

d) Description of the structure of the IEC SC 45A standard series and relationships with other IEC documents and other bodies documents (IAEA, ISO)

The top-level documents of the IEC SC 45A standard series are IEC 61513 and IEC 63046. IEC 61513 provides general requirements for I&C systems and equipment that are used to perform functions important to safety in nuclear power plants (NPPs). IEC 63046 provides general requirements for electrical power systems of NPPs; it covers power supply systems including the supply systems of the I&C systems. IEC 61513 and IEC 63046 are to be considered in conjunction and at the same level. IEC 61513 and IEC 63046 structure the IEC SC 45A standard series and shape a complete framework establishing general requirements for instrumentation, control and electrical systems for nuclear power plants.

IEC 61513 and IEC 63046 refer directly to other IEC SC 45A standards for general topics related to categorization of functions and classification of systems, qualification, separation, defence against common cause failure, control room design, electromagnetic compatibility, cybersecurity, software and hardware aspects for programmable digital systems, coordination of safety and security requirements and management of ageing. The standards referenced directly at this second level should be considered together with IEC 61513 and IEC 63046 as a consistent document set.

At a third level, IEC SC 45A standards not directly referenced by IEC 61513 or by IEC 63046 are standards related to specific equipment, technical methods, or specific activities. Usually these documents, which make reference to second-level documents for general topics, can be used on their own.

A fourth level extending the IEC SC 45A standard series, corresponds to the Technical Reports which are not normative.

The IEC SC 45A standards series consistently implements and details the safety and security principles and basic aspects provided in the relevant IAEA safety standards and in the relevant documents of the IAEA nuclear security series (NSS). In particular this includes the IAEA requirements SSR-2/1, establishing safety requirements related to the design of nuclear power plants (NPPs), the IAEA safety guide SSG-30 dealing with the safety classification of structures, systems and components in NPPs, the IAEA safety guide SSG-39 dealing with the design of instrumentation and control systems for NPPs, the IAEA safety guide SSG-34 dealing with the design of electrical power systems for NPPs and the implementing guide NSS17 for computer security at nuclear facilities. The safety and security terminology and definitions used by SC 45A standards are consistent with those used by the IAEA.

IEC 61513 and IEC 63046 have adopted a presentation format similar to the basic safety publication IEC 61508 with an overall life-cycle framework and a system life-cycle framework. Regarding nuclear safety, IEC 61513 and IEC 63046 provide the interpretation of the general requirements of IEC 61508-1, IEC 61508-2 and IEC 61508-4, for the nuclear application sector. In this framework IEC 60880, IEC 62138 and IEC 62566 correspond to IEC 61508-3 for the nuclear application sector. IEC 61513 and IEC 63046 refer to ISO as well as to IAEA GS-R-3 and IAEA GS-G-3.1 and IAEA GS-G-3.5 for topics related to quality assurance. At level 2, regarding nuclear security, IEC 62645 is the entry document for the IEC SC 45A security standards. It builds upon the valid high level principles and main concepts of the generic security standards, in particular ISO/IEC 27001 and ISO/IEC 27002; it adapts them and completes them to fit the nuclear context and coordinates with the IEC 62443 series. At level 2, regarding control rooms, IEC 60964 is the entry document for the IEC SC 45A control rooms standards and IEC 62342 is the entry document for the IEC SC 45A ageing management standards.

NOTE 1 It is assumed that for the design of I&C systems in NPPs that implement conventional safety functions (e.g. to address worker safety, asset protection, chemical hazards, process energy hazards) international or national standards would be applied.

NOTE 2 IEC SC 45A domain was extended in 2013 to cover electrical systems. In 2014 and 2015 discussions were held in IEC SC 45A to decide how and where general requirement for the design of electrical systems were to be considered. IEC SC 45A experts recommended that an independent standard be developed at the same level as IEC 61513 to establish general requirements for electrical systems. Project IEC 63046 is now launched to cover this objective. When IEC 63046 is published, this NOTE 2 of the introduction will be suppressed.

iTeh Standards (<https://standards.iteh.ai>) Document Preview

[IEC 62138:2018](#)

<https://standards.iteh.ai/catalog/standards/iec/263541ec-76b2-45ce-94a7-19943699fe39/iec-62138-2018>

NUCLEAR POWER PLANTS – INSTRUMENTATION AND CONTROL SYSTEMS IMPORTANT FOR TO SAFETY – SOFTWARE ASPECTS FOR COMPUTER-BASED SYSTEMS PERFORMING CATEGORY B OR C FUNCTIONS

1 Scope

This document ~~provides~~ specifies requirements for the software of computer-based instrumentation and control (I&C) systems performing functions of safety category B or C as defined by IEC 61226. It complements IEC 60880 ~~and IEC 60880-2~~, which provides requirements for the software of computer-based I&C systems performing functions of safety category A.

It is ~~also~~ consistent with, and complementary to, IEC 61513. Activities that are mainly system level activities (for example, integration, validation and installation) are not addressed exhaustively by this document: requirements that are not specific to software are deferred to IEC 61513.

~~IEC 61513 defines the safety classes of I&C systems important to safety as follows:~~

- ~~• I&C systems of safety class 1 are basically intended to perform functions of safety category A, but may also perform functions of safety category B and/or C, and non safety-classified functions;~~
- ~~• I&C systems of safety class 2 are basically intended to perform functions of safety category B, but may also perform functions of safety category C, and non safety-classified functions;~~
- ~~• I&C systems of safety class 3 are basically intended to perform functions of safety category C, but may also perform non safety-classified functions.~~

The link between functions categories and system classes is given in IEC 61513. Since a given safety-classified I&C system may perform functions of different safety categories and even non safety-classified functions, the requirements of this document are attached to the safety class of the I&C system (class 2 or class 3).

~~This standard takes into account the current practices for the development of software for I&C systems, in particular:~~

- ~~• the use of pre-developed software, equipment and equipment families that were not necessarily designed to nuclear industry sector standards;~~
- ~~• the use of dedicated “black box” devices with embedded software;~~
- ~~• the use of application-oriented languages.~~

This document is not intended to be used as a general-purpose software engineering guide. It ~~provides requirements that~~ applies to the software of I&C systems of safety classes 2 or 3 ~~must meet to achieve system nuclear safety objectives~~ for new nuclear power plants as well as to I&C upgrading or back-fitting of existing plants.

For existing plants, only a subset of requirements is applicable and this subset has to be identified at the beginning of any project.

The purpose of the guidance provided by this document is to reduce, as far as possible, the potential for latent software faults to cause system failures, either due to single software failures or multiple software failures (i.e. Common Cause Failures due to software).

This document does not explicitly address how to protect software against those threats arising from malicious attacks, i.e. cybersecurity, for computer-based systems. IEC 62645 provides requirements for security programmes for computer-based systems.

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 60880:2006, *Nuclear power plants – Instrumentation and control systems important to safety – Software aspects for computer-based systems performing category A functions*

IEC 61226, *Nuclear power plants – Instrumentation and control ~~systems~~ important ~~for~~ to safety – Classification of instrumentation and control functions*

IEC 61513:~~2004~~ 2011, *Nuclear power plants – Instrumentation and control ~~for systems~~ important to safety – General requirements for systems*

IEC 62671:2013, *Nuclear power plants – Instrumentation and control important to safety – Selection and use of industrial digital devices of limited functionality*

3 Terms and definitions ~~and abbreviations~~

For the purposes of this document, the following terms and definitions ~~and abbreviations~~ 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 animation

process by which the behaviour defined by a specification is displayed with actual values derived from the stated behaviour expressions and from some input values

[SOURCE: IEC 60880-~~2~~:2006, 3.1]

3.2 application function

function of an I&C system that performs a task related to the process being controlled rather than to the functioning of the system itself

[SOURCE: IEC 61513:2011, 3.1]

3.3 application software

part of the software of an I&C system that implements the application functions

~~NOTE – See also System software, Operational system software.~~

Note 1 to entry: Application software contrasts with system software.

Note 2 to entry: Application software is plant specific, so it is not to be considered pre-developed software.

[SOURCE: IEC 61513:2011, 3.2 modified (modified notes to entry)]

3.4

application-oriented language

computer language specifically designed to address a certain type of application and to be used by persons who are specialists of this type of application

Note 1 to entry: Equipment families usually feature application-oriented languages so as to provide easy to use capability for adjusting the equipment to specific requirements.

Note 2 to entry: Application-oriented languages may be used to specify the functional requirements of an I&C system, and/or to specify or design application software. They may be based on texts, on graphics, or on both.

Note 3 to entry: Examples: function block diagram languages, languages defined by IEC 61131-3.

Note 4 to entry: See also general-purpose language.

[SOURCE: IEC 60880:2006, 3.3 modified (addition of note 4 to entry)]

3.5

category of an I&C function

~~one of three possible safety assignments (A, B, C) of I&C functions resulting from considerations of the importance to safety of the functions to be performed. An unclassified assignment may be made if the function is not significant to safety~~

~~(IEC 61513)~~

~~NOTE See also Class of an I&C system.~~

3.6

class of an I&C system

~~one of three possible assignments (1, 2, 3) of I&C systems important to safety resulting from consideration of their requirement to implement I&C functions of differing importance to safety. An unclassified assignment is made if the I&C system does not implement functions important to safety~~

~~(IEC 61513)~~

~~NOTE See also Category of an I&C function.~~

3.5

common cause failure

CCF

failure of two or more structures, systems or components due to a single specific event or cause

Note 1 to entry: Common causes may be internal or external to an I&C system.

[SOURCE: IAEA Safety Glossary, 2016 edition]

3.6

complexity

degree to which a system or component has a design, implementation or behaviour that is difficult to understand and verify

[SOURCE: IEC 61513:2011, 3.9]

3.7

computer program

set of ordered instructions and data that specify operations in a form suitable for execution by a computer

Note 1 to entry: This includes traditional programs written in general-purpose languages. This also includes programs written in application-oriented languages.

[SOURCE: IEC 60880:2006, 3.10, modified (addition of note 1 to entry)]

**3.8
computer-based item**

item that relies on software instructions running on microprocessors or microcontrollers

Note 1 to entry: In this term and its definition, the term item can be replaced by the terms: system or equipment or device.

Note 2 to entry: A computer-based item is a kind of programmable digital item.

Note 3 to entry: This term is equivalent to software-based item.

**3.9
configuration management**

~~discipline applying technical and administrative direction and surveillance to identify and document the functional and physical characteristics of a configuration item, control modifications to those characteristics, record and report changes in status, and verify compliance with specified requirements~~

~~(IEC 61513)~~

process of identifying and documenting the characteristics of a facility's structures, systems and components (including computer systems and software), and of ensuring that changes to these characteristics are properly developed, assessed, approved, issued, implemented, verified, recorded and incorporated into the facility documentation

[SOURCE: IAEA Safety Glossary, 2016 edition]

**3.10
cybersecurity**

set of activities and measures whose objective is to prevent, detect, and react to digital attacks that have the intent to cause:

- disclosures that could be used to perform malicious acts which could lead to an accident, an unsafe situation or plant performance degradation (confidentiality),
- malicious modifications of functions that may compromise the delivery or integrity of the required service by I&C CB&HPD systems (including loss of control) which could lead to an accident, an unsafe situation or plant performance degradation (integrity),
- malicious withholding or prevention of access to or communication of information, data or resources (including loss of view) that could compromise the delivery of the required service by I&C systems which could lead to an accident, an unsafe situation or plant performance degradation (availability).

Note 1 to entry: This definition is tailored with respect to the IEC 62645 scope, focusing on the prevention of, detection of and reaction to malicious acts by digital means on I&C CB&HPD systems. It is recognized that the term "cybersecurity" has a broader meaning in other standards and guidance, often including non-malevolent threats, human errors and protection against natural disasters, which are all out of the scope of IEC 62645.

[SOURCE: IEC 62645:2014, 3.6 modified (removal of note 2 to entry)]

**3.11
dedicated functionality**

property of devices that have been designed to accomplish only one clearly defined function or only a very narrow range of functions, such as, for example, capture and signal the value of a process parameter, or invert an alternating current power source to direct current. This function (or narrow range of functions) is inherent in the device, and not the product of programmability by the user