BSI Standards Publication

Functional safety - Safety instrumented systems for the process industry sector

Part 2: Guidelines for the application of IEC 61511-1 (IEC 61511-2:2016)

bsi.

National foreword

This British Standard is the UK implementation of EN 61511-2:2017. It is identical to IEC 61511-2:2016. It supersedes BS EN 61511-2:2004, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee GEL/65/1, System considerations.

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

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Published by BSI Standards Limited 2017

ISBN 978 0 580 79124 6

ICS 35.240.50; 13.110; 25.040.01

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 November 2017.

Amendments/corrigenda issued since publication

Date	Text affected

EUROPEAN STANDARD **EN 61511-2**

EUROPÄISCHE NORM

April 2017

ICS 13.110; 25.040.01

Supersedes EN 61511-2:2004

English Version

Functional safety - Safety instrumented systems for the process industry sector - Part 2: Guidelines for the application of IEC 61511-1 (IEC 61511-2:2016)

Sécurité fonctionnelle - Systèmes instrumentés de sécurité pour le secteur des industries de transformation - Partie 2: Lignes directives pour l'application de l'IEC 61511-1 (IEC 61511-2:2016)

Funktionale Sicherheit - PLT-Sicherheitseinrichtungen für die Prozessindustrie - Teil 2: Anleitungen zur Anwendung des Teils 1 (IEC 61511-2:2016)

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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.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Ref. No. EN 61511-2:2017 E

The text of document 65A/783/FDIS, future edition 2 of IEC 61511-2, prepared by SC 65A “System aspects” of IEC/TC 65 “Industrial process measurement, control and automation" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61511-2:2017.

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)	2017-10-21
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2020-04-21

This document supersedes EN 61511-2:2004.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

The text of the International Standard IEC 61511-2:2016 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 60880:2006	NOTE	Harmonized as EN 60880:2009.
IEC 61025:2006	NOTE	Harmonized as EN 61025:2007.
IEC 61078:2006	NOTE	Harmonized as EN 61078:2006.
IEC 61131-3:2013	NOTE	Harmonized as EN 61131-3:2013.
IEC 61165:2006	NOTE	Harmonized as EN 61165:2006.
IEC 61508-1:2010	NOTE	Harmonized as EN 61508-1:2010.
IEC 61508-2:2010	NOTE	Harmonized as EN 61508-2:2010.
IEC 61508-3:2010	NOTE	Harmonized as EN 61508-3:2010.
IEC 61508-6:2010	NOTE	Harmonized as EN 61508-6:2010.
IEC 61508-6:2010	NOTE	Harmonized as EN 61508-6:2010.
IEC 62061:2005	NOTE	Harmonized as EN 62061:2005.
IEC 62502:2010	NOTE	Harmonized as EN 62502:2010.
IEC 62551:2012	NOTE	Harmonized as EN 62551:2012.
ISO 9000:2015	NOTE	Harmonized as EN ISO 9000:2015.

ISO/TR 12489:2013	NOTE	Harmonized as CEN ISO/TR 12489:2016.
ISO 17776:2000	NOTE	Harmonized as EN ISO 17776:2002.

Annex ZA
(normative)
Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 When 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.

Publication	Year	Title	EN/HD	Year
IEC 61511-1	2016	Functional safety - Safety instrumented systems for the process industry sector - Normative (uon) -- Part 1: Framework, definitions, system, hardware and software requirements	EN 61511-1	2016

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FUNCTIONAL SAFETY – SAFETY INSTRUMENTED SYSTEMS FOR THE PROCESS INDUSTRY SECTOR –

Part 2: Guidelines for the application of IEC 61511-1:2016

FOREWORD

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International Standard IEC 61511-2 has been prepared by subcommittee 65A: System aspects, of IEC technical committee 65: Industrial-process measurement, control and automation.

This second edition cancels and replaces the first edition published in 2003. This edition constitutes a technical revision. This edition includes the following significant technical changes with respect to the previous edition:

- guidance examples based on all phases of the safety life cycle provided based on usage experience with IEC61511 1st edition;
- annexes replaced to address transition from software to application programming.

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

FDIS	Report on voting
65A/783/FDIS	65A/787/RVD

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

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

This International Standard is to be read in conjunction with IEC 61511-1. It is based on the second edition of that standard.

A list of all parts in the IEC 61511 series, published under the general title *Functional safety – Safety instrumented systems for the process industry sector*, can be found on the IEC website.

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

Safety instrumented systems (SISs) have been used for many years to perform safety instrumented functions (SIFs) in the process industries. If instrumentation is to be effectively used for SIFs, it is essential that this instrumentation achieves certain minimum standards.

The IEC 61511 series addresses the application of SISs for the process industries. It also deals with the interface between SISs and other safety systems in requiring that a process H&RA be carried out. The SIS includes sensors, logic solvers and final elements.

The IEC 61511 series has two concepts, which are fundamental to its application; SIS safety life-cycle and the safety integrity level (SIL). The SIS safety life-cycle forms the central framework which links together most of the concepts in this International Standard.

The SIS logic solvers addressed include Electrical (E)/Electronic (E)/ and Programmable Electronic (PE) technology. Where other technologies are used for logic solvers, the basic principles of this standard can be applied to ensure the functional safety requirements were met. The IEC 61511 series also addresses the SIS sensors and final elements regardless of the technology used. The IEC 61511 series has been developed as a process sector implementation of the IEC 61508 series. The IEC 61511 series is process industry specific within the framework of the IEC 61508 series.

The IEC 61511 series sets out an approach for SIS safety life-cycle activities to achieve these minimum standards. This approach has been adopted in order that a rational and consistent technical policy is used. The objective of this part of IEC 61511 is to provide guidance on how to comply with IEC 61511-1:2016.

To facilitate use of IEC 61511-1:2016, the clause numbers provided in Annex A (informative) are identical to the corresponding normative text in IEC 61511-1:2016 except for the “A” notation.

In most situations, safety is best achieved by an inherently safe process design whenever practicable, combined, if necessary, with a number of protective systems which rely on different technologies (e.g., chemical, mechanical, hydraulic, pneumatic, electrical, electronic, thermodynamic (e.g., flame arrestors), programmable electronic) which manage any residual identified risk. Any safety strategy considers each individual SIS in the context of the other protective systems. To facilitate this approach, IEC 61511-1:2016:

- requires that a H&RA is carried out to identify the overall safety requirements;
- requires that an allocation of the safety requirements to the safety functions and related safety systems, such as the SIS(s), is carried out;
- works within a framework which is applicable to all instrumented methods of achieving functional safety;
- details the use of certain activities, such as safety management, which may be applicable to all methods of achieving functional safety.
- addresses relevant SIS safety life-cycle stages from initial concept, through design, implementation, operation and maintenance and decommissioning;
- enables existing or new country specific process industry standards to be harmonized with this standard.

The IEC 61511 series is intended to lead to a high level of consistency (e.g., of underlying principles, terminology, information) within the process industries. This should have both safety and economic benefits.

Figure 1 below shows the overall framework of the IEC 61511 series.

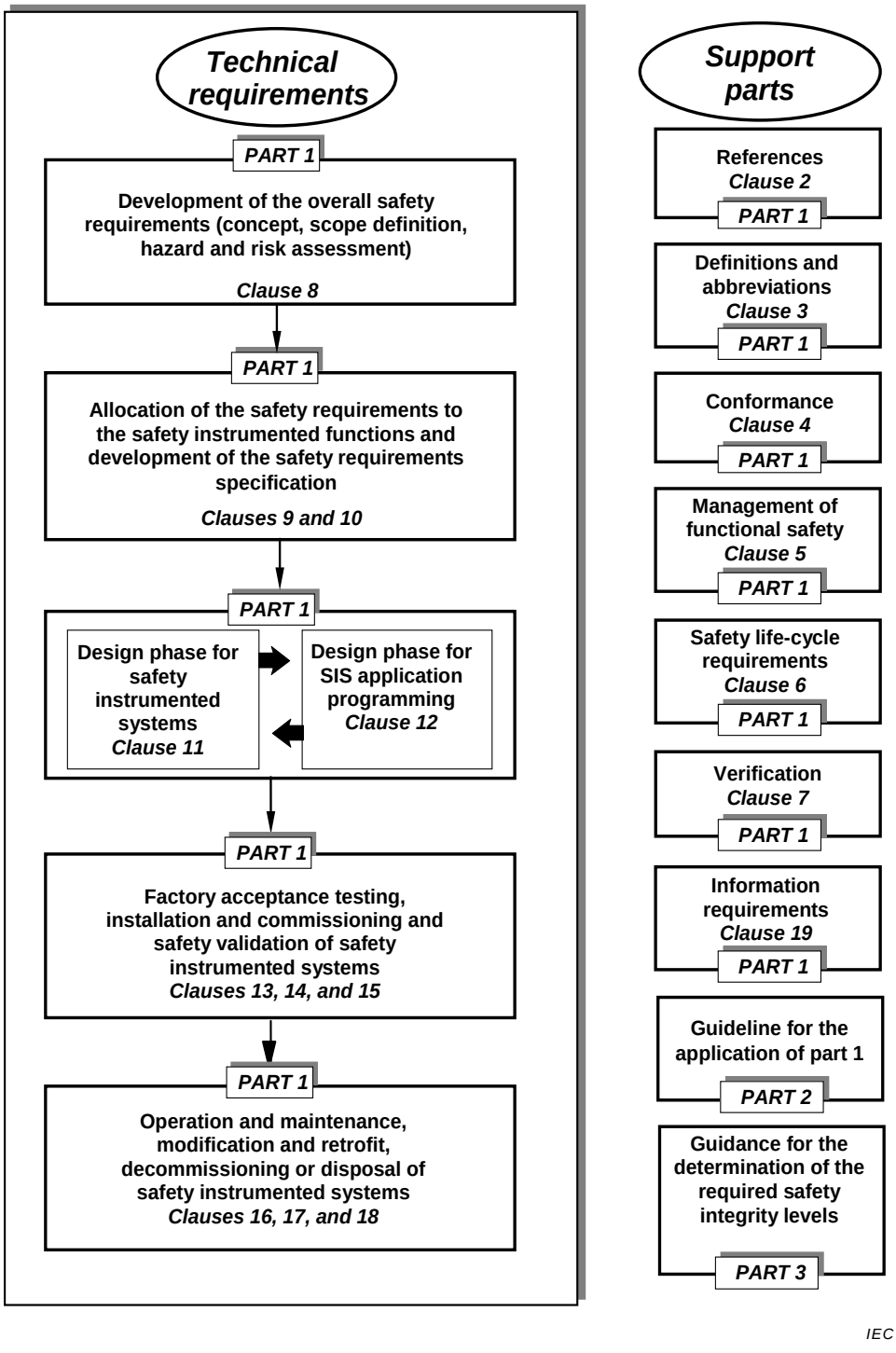

Figure 1 – Overall framework of IEC 61511 series

FUNCTIONAL SAFETY – SAFETY INSTRUMENTED SYSTEMS FOR THE PROCESS INDUSTRY SECTOR –

Part 2: Guidelines for the application of IEC 61511-1:2016

1 Scope

This part of IEC 61511 provides guidance on the specification, design, installation, operation and maintenance of SIFs and related SIS as defined in IEC 61511-1:2016.

NOTE 1 Annex A (informative) has been organized so that each clause and subclause number therein addresses the corresponding clause and subclause number in IEC 61511-1:2016 except for being preceded by “A”.

NOTE 2 Annex A now contains material previously in the body of the first edition. These changes are required for compliance with IEC rules which prohibit a standard being wholly informative.

NOTE 3 To achieve maximum use of this guideline;

– review the section guidance as well as the specific clause guidance. (e.g., when looking for guidance on 5.2.6.1.3, consider guidance in 5.2.6);

– when specific clause guidance is not provided (e.g.; no further guidance provided), consider reviewing the section guidance as well, as it can be applicable).

NOTE 4 Examples given in the Annexes of this Standard are intended only as case specific examples of implementing IEC 61511 requirements in a specific instance, and the user should satisfy themselves that the chosen methods and techniques are appropriate to their situation.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61511-1:2016, *Functional safety – Safety instrumented systems for the process industry sector – Part 1: Framework, definitions, system, hardware and application programming requirements*

3 Terms, definitions, and abbreviations

For the purposes of this document, the terms, definitions, and abbreviations given in IEC 61511-1:–, Clause 3 apply.