



BSI Standards Publication

Functional safety - Safety instrumented systems for the process industry sector

Part 4: Explanation and rationale for changes in IEC 61511-1 from Edition 1 to Edition 2

This is a preview of "PD CLC IEC/TR 61511-4:2020". [Click here to purchase the full version from the ANSI store.](#)

National foreword

This Published Document is the UK implementation of CLC IEC/TR 61511-4:2020. It is identical to IEC TR 61511-4:2020. It supersedes PD IEC TR 61511-4:2020, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee GEL/65/3, Industrial communications: process measurement and control, including fieldbus.

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

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© The British Standards Institution 2020
Published by BSI Standards Limited 2020

ISBN 978 0 539 15597 6

ICS 25.040.01; 13.110

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This Published Document was published under the authority of the Standards Policy and Strategy Committee on 31 March 2020.

Amendments/corrigenda issued since publication

| Date | Text affected |
|-----------------|---|
| 31 October 2020 | This corrigendum renumbers PD IEC TR 61511-4:2020 as PD CLC IEC/TR 61511-4:2020 |

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TECHNISCHER BERICHT

September 2020

ICS 13.110; 25.040.01

English Version

Functional safety - Safety instrumented systems for the process
industry sector - Part 4: Explanation and rationale for changes in
IEC 61511-1 from Edition 1 to Edition 2
(IEC/TR 61511-4:2020)

Sécurité fonctionnelle - Systèmes instrumentés de sécurité
pour le secteur des industries de transformation - Partie 4 :
Explication et justifications relatives aux modifications
apportées entre l'Édition 1 et l'Édition 2 de l'IEC 61511-1
(IEC/TR 61511-4:2020)

Funktionale Sicherheit - PLT-Sicherheitseinrichtungen für
die Prozessindustrie - Teil 4: Erläuterung und Gründe der
Änderungen in der IEC 61511-1 von Edition 1 zu Edition 2
(IEC/TR 61511-4:2020)

This Technical Report was approved by CENELEC on 2020-09-14.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, 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

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The text of document (65A/911/DTR), future edition 1 of IEC/TR 61511-4, 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 CLC IEC/TR 61511-4:2020.

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The text of the International Standard IEC/TR 61511-4:2020 was approved by CENELEC as a European Standard without any modification.

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(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 60050-192 | - | International electrotechnical vocabulary - Part 192:- Dependability | | - |
| IEC 61508-4 | 2010 | Functional safety of electrical/electronic/programmable electronic safety-related systems - Part 4: Definitions and abbreviations (see http://www.iec.ch/functionalsafety) | EN 61508-4 | 2010 |
| IEC 61511-1 | 2016 | Functional safety - Safety instrumented systems for the process industry sector - Part 1: Framework, definitions, system, hardware and application programming requirements | EN 61511-1 | 2017 |
| + A1 | 2017 | | + A1 | 2017 |
| ISO/IEC Guide 51 | 2014 | Safety aspects - Guidelines for their inclusion in standards | | - |

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

**Part 4: Explanation and rationale for changes in IEC 61511-1
from Edition 1 to Edition 2**

FOREWORD

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IEC TR 61511-4, which is a Technical Report, has been prepared by subcommittee 65A: Systems aspects, of IEC technical committee 65: Industrial-process measurement, control and automation.

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

| | |
|-------------|------------------|
| Draft TR | Report on voting |
| 65A/911/DTR | 65A/920A/RVDTR |

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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.

A list of all parts in the 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 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.

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INTRODUCTION

IEC 61511 (all parts) addresses safety instrumented systems (SIS) for the process industry sector. It is written to use terminology that is familiar within this sector and to define practical implementation requirements based on the sector-independent clauses presented in the IEC 61508 basic safety standard. IEC 61511-1 is recognized as a good engineering practice in many countries and a regulatory requirement in an increasing number of countries.

Nevertheless, standards evolve with the application experience in the affected sector. The second edition of IEC 61511-1 was edited based on a decade of international process sector experience in applying the requirements of the first edition of IEC 61511-1:2003. The changes from Edition 1 to Edition 2 were initiated by comments from National Committees representing a broad spectrum of users of the standard worldwide.

In Edition 1:2003 (Ed. 1)¹, the requirements addressing the avoidance and control of systematic errors that occur during design, engineering, operation, maintenance and modification were adapted primarily to support independent safety functions up to a SIL 3 performance target. In contrast, Edition 2:2016 (Ed. 2) needed to address a prevailing trend of sharing automation systems across multiple safety functions.

Ed. 2 also needed to address the common misinterpretations of the Ed. 1 requirements that became evident to the IEC 61511 maintenance team (MT 61511) over the intervening years. For example, Ed. 2 reinforced the necessity to design for functional safety management rather than a narrow focus on a calculation and to manage the actual performance of the SIS over time.

IEC TR 61511-4 was created to provide a brief introduction of the above issues to a general audience, with the more detailed content remaining in the main parts of the IEC 61511 series. IEC TR 61511-4 describes the underlying rationale of the primary clauses in IEC 61511-1, clarifies some common application misconceptions, provides a listing of the main differences between the first and second editions of IEC 61511-1, and gives a brief explanation of the typical process sector approaches to the application of each primary clause.

¹ For ease of reading, "Ed. 1" and "Ed. 2" will be used in this document.

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

Part 4: Explanation and rationale for changes in IEC 61511-1 from Edition 1 to Edition 2

1 Scope

This part of IEC 61511, which is a Technical Report,

- specifies the rationale behind all clauses and the relationship between them,
- raises awareness for the most common misconceptions and misinterpretations of the clauses and the changes related to them,
- explains the differences between Ed. 1 and Ed. 2 of IEC 61511-1 and the reasons behind the changes,
- presents high level summaries of how to fulfil the requirements of the clauses, and
- explains differences in terminology between IEC 61508-4:2010 and IEC 61511-1 Ed. 2.

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 60050-192, *International Electrotechnical Vocabulary (IEV) – Part 192: Dependability* (available at <http://www.electropedia.org>)

IEC 61508-4:2010, *Functional safety of electrical/electronic/programmable electronic safety-related systems – Part 4: Definitions and abbreviations*

IEC 61511-1:2016, *Functional safety – Safety instrumented systems for the process industry sector – Part 1: Framework, definitions, system, hardware and application programming requirements*
IEC 61511-1:2016/AMD1:2017

ISO/IEC Guide 51:2014, *Safety aspects – Guidelines for their inclusion in standards*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC Guide 51, IEC 60050-192, IEC 61508-4 and IEC 61511-1 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>