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Industrijska komunikacijska omrežja - Profili - 3. del: Funkcionalno varna procesna vodila - Splošna pravila in definicije profilov

Industrial communication networks - Profiles - Part 3: Functional safety fieldbuses - General rules and profile definitions

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Réseaux de communication industriels - Profils - Partie 3: Bus de terrain de sécurité fonctionnelle - Règles générales et définitions de profils

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OF INTEREST TO THE FOLLOWING COMMITTEES: SC 22G,TC 44,TC 57,SC 65A,TC 66	PROPOSED HORIZONTAL STANDARD: <input type="checkbox"/> Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.
FUNCTIONS CONCERNED: <input type="checkbox"/> EMC <input type="checkbox"/> ENVIRONMENT <input type="checkbox"/> QUALITY ASSURANCE <input type="checkbox"/> SAFETY	
<input checked="" type="checkbox"/> SUBMITTED FOR CENELEC PARALLEL VOTING Attention IEC-CENELEC parallel voting The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting. The CENELEC members are invited to vote through the CENELEC online voting system.	<input type="checkbox"/> NOT SUBMITTED FOR CENELEC PARALLEL VOTING

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TITLE:

Industrial communication networks - Profiles - Part 3: Functional safety fieldbuses - General rules and profile definitions

PROPOSED STABILITY DATE: 2024

NOTE FROM TC/SC OFFICERS:

In order to facilitate analysis by National Committees, changes with respect to the CDV have been highlighted in yellow in this document.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**INDUSTRIAL COMMUNICATION NETWORKS –
PROFILES –****Part 3: Functional safety fieldbuses –
General rules and profile definitions**

FOREWORD

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International Standard IEC 61784-3 has been prepared by subcommittee 65C: Industrial networks, of IEC technical committee 65: Industrial-process measurement, control and automation.

This fourth edition cancels and replaces the third edition published in 2016 and its Amendment 1 published in 2017. This edition constitutes a technical revision.

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

- Contents of previous Annex F were corrected based on feedback from peer review and subsequent analysis (in particular deletion of RP_U for data integrity, reduction of the Equation for RR_A , and clarifications on the values of RP_I and R_T).
- Additional assumptions for residual error rate calculations.

- 55 • After correction, contents of previous Annex F were exchanged with the contents of
56 previous subclause 5.8.
- 57 • Contents of subclause 5.9 on security replaced by a simple reference to IEC 62443 in
58 accordance with Guide 120.
- 59 • Changes in Annex B: Dependency of this Annex B with the BSC model has been
60 highlighted. First two paragraphs and figure in B.2 have been deleted because of little
61 relevance. The approximation Equation B.4 has been deleted due to obsolescence, based
62 on the observations that the CRC shall be anyway explicitly calculated in order to prove
63 properness, and that it may produce optimistic results. Guidance for calculation of R_{CRC} in
64 B.4.2 has been reviewed.
- 65 • Changes in Annex D: Formula D.1 was changed from an approximation to a proper
66 Equation, with some adjustments.
- 67 • New informative Annex H, providing additional guidance for the calculation of R_{CRC} .

68

69 The text of this International Standard is based on the following documents:

FDIS	Report on voting
65C/XX/FDIS	65C/XX/RVD

70

71 Full information on the voting for the approval of this International Standard can be found in
72 the report on voting indicated in the above table.

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

74 A list of all parts of the IEC 61784-3 series, published under the general title *Industrial*
75 *communication networks – Profiles – Functional safety fieldbuses*, can be found on the IEC
76 website.

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

- 80 • reconfirmed,
81 • withdrawn,
82 • replaced by a revised edition, or
83 • amended.

84

85 The National Committees are requested to note that for this document the stability date
86 is 2024.

87 THIS TEXT IS INCLUDED FOR THE INFORMATION OF THE NATIONAL COMMITTEES AND WILL BE
88 DELETED AT THE PUBLICATION STAGE.

89

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92 **Changes with respect to the second CD for this edition have been highlighted in yellow**
 93 **in this document. Note that the new draft Annex I introduced in the second CD and all**
 94 **corresponding references have been deleted from this document, instead Annex I**
 95 **contents will be further developed in a follow up Amendment. All references to**
 96 **IEC TR 62685:2010 (Assessment guideline for safety devices using IEC 61784-3FSCPs)**
 97 **have also been deleted, since the document is now withdrawn.**

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 99 **AT THE PUBLICATION STAGE.**

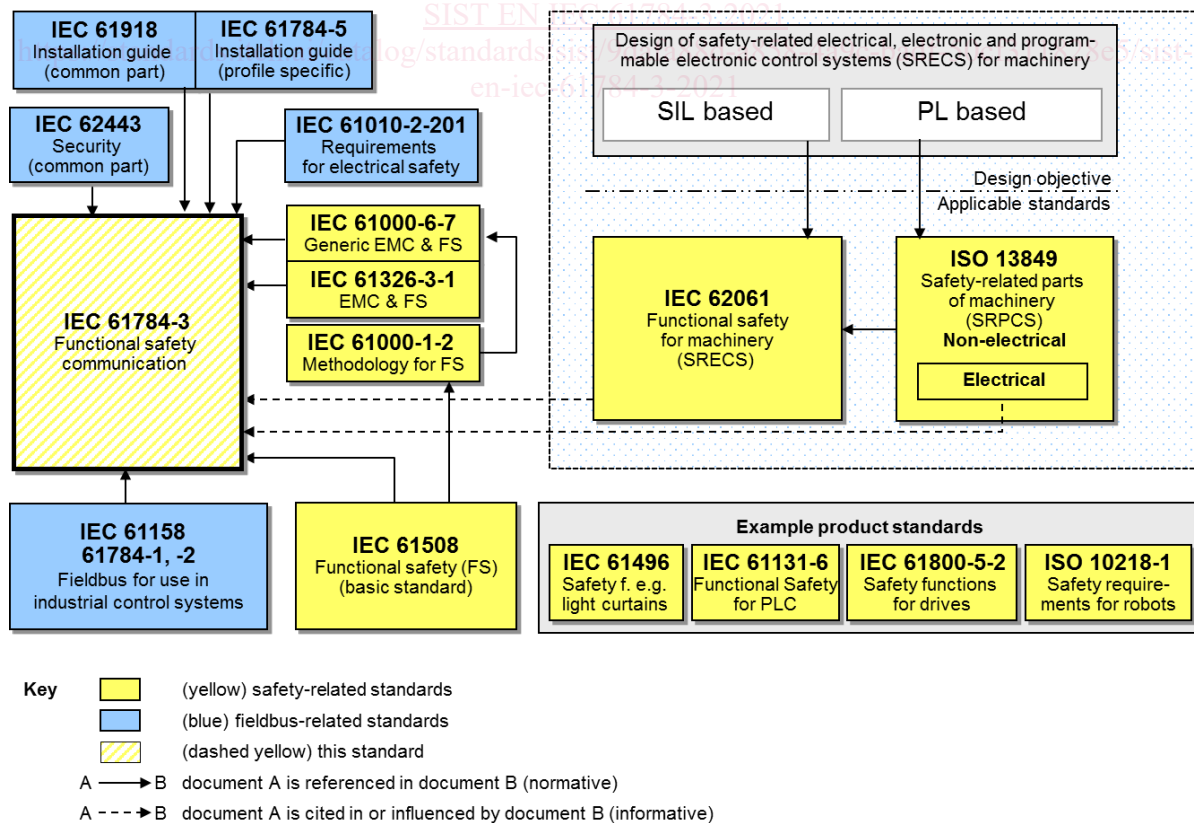
100 0 Introduction

101 0.1 General

102 The IEC 61158 (all parts) fieldbus standard together with its companion standards
 103 IEC 61784-1 and IEC 61784-2 defines a set of communication protocols that enable
 104 distributed control of automation applications. Fieldbus technology is now considered well
 105 accepted and well proven. Thus fieldbus enhancements continue to emerge, addressing
 106 applications for areas such as real time and safety-related applications.

107 IEC 61784-3 (all parts) explains the relevant principles for functional safety communications
 108 with reference to IEC 61508 (all parts) and specifies several safety communication layers
 109 (profiles and corresponding protocols) based on the communication profiles and protocol
 110 layers of IEC 61784-1, IEC 61784-2 and IEC 61158 (all parts). It does not cover electrical
 111 safety and intrinsic safety aspects. **It also does not cover security aspects nor does it provide**
 112 **any requirements for security.**

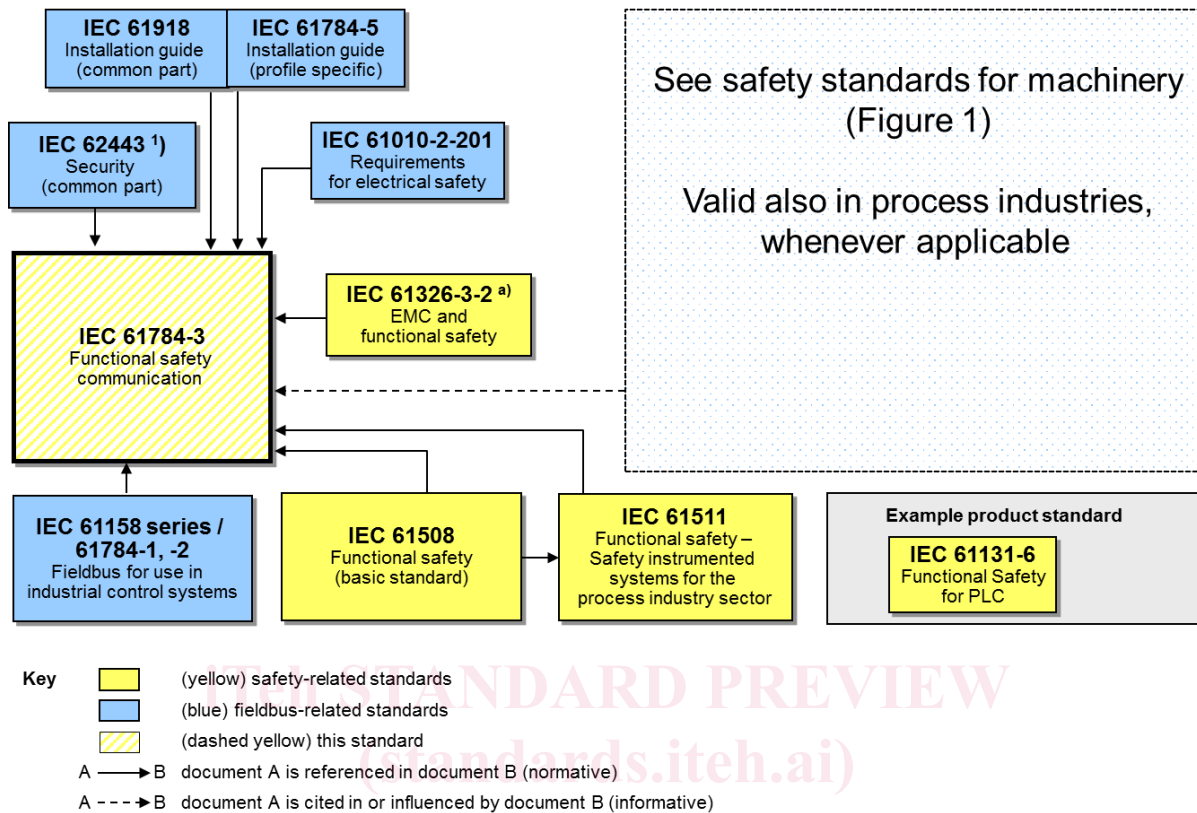
113 Figure 1 shows the relationships between IEC 61784-3 (all parts) and relevant safety and
 114 fieldbus standards in a machinery environment.



NOTE IEC 62061 specifies the relationship between PL (Category) and SIL.

Figure 1 – Relationships of IEC 61784-3 with other standards (machinery)

118 Figure 2 shows the relationships between IEC 61784-3 (all parts) and relevant safety and
119 fieldbus standards in a process environment.



120

121 ^a For specified electromagnetic environments; otherwise IEC 61326-3-1 or IEC 61000-6-7.

122 **Figure 2 – Relationships of IEC 61784-3 with other standards (process)**

123 Safety communication layers which are implemented as parts of safety-related systems
124 according to IEC 61508 (all parts) provide the necessary confidence in the transportation of
125 messages (information) between two or more participants on a fieldbus in a safety-related
126 system, or sufficient confidence of safe behaviour in the event of fieldbus errors or failures.

127 Safety communication layers specified in IEC 61784-3 (all parts) do this in such a way that a
128 fieldbus can be used for applications requiring functional safety up to the Safety Integrity
129 Level (SIL) specified by its corresponding functional safety communication profile.

130 The resulting SIL claim of a system depends on the implementation of the selected functional
131 safety communication profile (FSCP) within this system – implementation of a functional
132 safety communication profile in a standard device is not sufficient to qualify it as a safety
133 device.

134 IEC 61784-3 (all parts) describes:

- 135 • basic principles for implementing the requirements of IEC 61508 (all parts) for safety-
136 related data communications, including possible transmission faults, remedial measures
137 and considerations affecting data integrity;
- 138 • functional safety communication profiles for several communication profile families in
139 IEC 61784-1 and IEC 61784-2, including safety layer extensions to the communication
140 service and protocols sections of IEC 61158 (all parts).

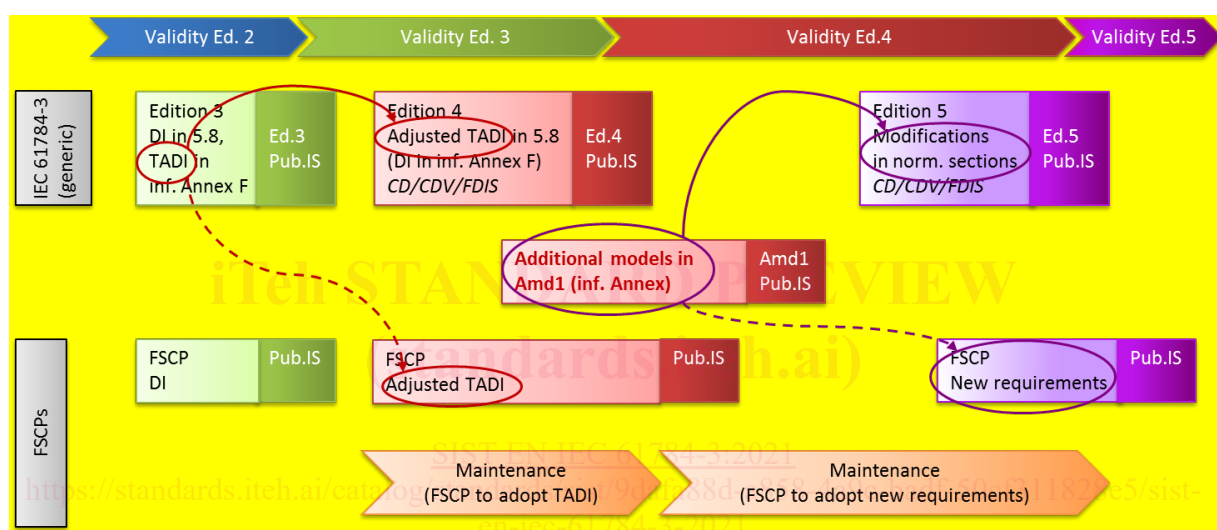
141

142 0.2 Use of extended assessment methods in Edition 4

143 This edition of the generic part of IEC 61784-3 (all parts) includes extended models for use
 144 when estimating the total residual error rate for an FSCP. This value can be used to
 145 determine if the FSCP meets the requirements of functional safety applications up to a given
 146 SIL. These extended models for qualitative and quantitative safety determination methods are
 147 detailed in Annex E and 5.8.

148 Upon publication of this new edition of the generic part, FSCPs shall be assessed using the
 149 methods from this Edition 4, based on the extended models specified in 5.8 (derived from a
 150 modified version of Annex F of Edition 3). The informative Annex F contains the legacy
 151 models for reference purpose only.

152 Figure 3 shows the transitions from original assessment methods of Edition 2 to extended
 153 assessment methods in this Edition 4 and the future Edition 5.



154

155 Key

156 DI Data Integrity

157 TADI Timeliness, Authenticity, Data Integrity

158 **Figure 3 – Transitions from Edition 2 to Edition 4 and future Edition 5 assessment**
 159 **methods**

160 0.3 Patent declaration

161 The International Electrotechnical Commission (IEC) draws attention to the fact that it is
 162 claimed that compliance with this document may involve the use of patents concerning
 163 functional safety communication profiles for families 1, 2, 3, 6, 8, 12, 13, 14, 17 and 18 given
 164 in IEC 61784-3-1, IEC 61784-3-2, IEC 61784-3-3, IEC 61784-3-6, IEC 61784-3-8,
 165 IEC 61784-3-12, IEC 61784-3-13, IEC 61784-3-14, IEC 61784-3-17 and IEC 61784-3-18.

166 IEC takes no position concerning the evidence, validity and scope of these patent rights.

167 The holders of these patent rights have assured the IEC that they are willing to negotiate
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 169 conditions with applicants throughout the world. In this respect, the statements of the holders
 170 of these patent rights are registered with IEC.

171 NOTE Patent details and corresponding contact information are provided in IEC 61784-3-1, IEC 61784-3-2,
 172 IEC 61784-3-3, IEC 61784-3-6, IEC 61784-3-8, IEC 61784-3-12, IEC 61784-3-13, IEC 61784-3-14, IEC 61784-3-17
 173 and IEC 61784-3-18.

174 Attention is drawn to the possibility that some of the elements of this document may be the
175 subject of patent rights other than those identified above. IEC shall not be held responsible for
176 identifying any or all such patent rights.

177 ISO (www.iso.org/patents) and IEC (<http://patents.iec.ch>) maintain on-line data bases of
178 patents relevant to their standards. Users are encouraged to consult the data bases for the
179 most up to date information concerning patents.

180

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