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Varnost strojev - Funkcijska varnost nadzornih sistemov, povezanih z varnostjo

Safety of machinery - Functional safety of safety-related control systems

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TITLE:

Safety of machinery – Functional safety of safety-related control systems

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**SAFETY OF MACHINERY –
FUNCTIONAL SAFETY OF SAFETY-RELATED CONTROL SYSTEMS**
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International Standard IEC 62061 has been prepared by IEC technical committee 44: Safety of machinery – Electrotechnical aspects.

This second edition cancels and replaces the previous edition. This edition constitutes a technical revision and it includes the following significant technical changes:

1. structure has been changed and contents have been updated to reflect the design process of the safety function
2. standard extended to non-electrical technologies
3. standard extended to low demand mode for specific applications (Annex D)
4. definitions updated to be aligned with IEC 61508
5. functional safety plan introduced and configuration management updated (Section 4)
6. requirements on parametrization expanded (Section 6)
7. reference to requirements on security added (Section 6.8)
8. requirements on periodic testing added (Section 6.9)
9. various improvements and clarification on architectures and reliability calculations (Sections 6 and 7)
10. shift from SILCL to maximum SIL of a subsystem (Section 7)
11. use cases for software described including requirements (Section 8)

- 60 12. requirements on independence for software verification (Section 8) and validation
61 activities (Sections 9) added
62 13. new informative annex with examples (Annex I)
63 14. new informative annexes on typical $MTTF_D$ values, diagnostics and calculation
64 methods for the architectures (Annexes C, E and K)

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

FDIS	Report on voting
XX/XX/FDIS	XX/XX/RVD

66
67 Full information on the voting for the approval of this standard can be found in the report on
68 voting indicated in the above table.

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

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

- 74 • reconfirmed,
- 75 • withdrawn,
- 76 • replaced by a revised edition, or
- 77 • amended.

78

79 The National Committees are requested to note that for this publication the stability date
80 is 20XX.

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

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84

INTRODUCTION

85 As a result of automation, demand for increased production and reduced operator physical
86 effort, Safety-related Control Systems (referred to as SCS) of machines play an increasing
87 role in the achievement of overall machine safety. Furthermore, the SCS themselves
88 increasingly employ complex electronic technology.

89 IEC 62061 and ISO 13849-1 specify requirements for the design and implementation of
90 safety-related control systems of machinery. This standard is machine sector specific within
91 the framework of IEC 61508.

92 This International Standard is intended for use by machinery designers, control system
93 manufacturers and integrators, and others involved in the specification, design and validation
94 of an SCS. It sets out an approach and provides requirements to achieve the necessary
95 performance.

96 It is intended to facilitate the specification of the safety functions intended to achieve the risk
97 reduction of machine when it is intended to be achieved by safety-related control systems.

98 This standard provides a machine sector specific framework for functional safety of a SCS of
99 machines. It only covers those aspects of the safety lifecycle that are related to safety
100 requirements allocation through to safety validation. Requirements are provided for
101 information for safe use of SCS of machines that can also be relevant to later phases of the
102 lifecycle of a SCS.

103 There are many situations on machines where SCS are employed as part of safety measures
104 that have been provided to achieve risk reduction. A typical case is the use of an interlocking
105 guard that, when it is opened to allow access to the danger zone, signals the machine control
106 system to stop hazardous machine operation. Also in automation, the machine control system
107 that is used to achieve correct operation of the machine process often contributes to safety by
108 mitigating risks associated with hazards arising directly from control system failures. This
109 standard gives a methodology and requirements to

- 110 • assign the required safety integrity for each safety function to be implemented by SCS;
- 111 • enable the design of the SCS appropriate to the assigned safety (control) function(s);
- 112 • integrate safety-related subsystems designed in accordance with other applicable
113 functional safety-related standards (see 6.2.4);
- 114 • validate the SCS.

115 This standard is intended to be used within the framework of systematic risk reduction, in
116 conjunction with risk assessment described in ISO 12100. Suggested methodologies for a
117 safety integrity assignment are given in informative Annex A.

118 **SAFETY OF MACHINERY –**
 119 **FUNCTIONAL SAFETY OF SAFETY-RELATED CONTROL SYSTEMS**
 120
 121

122 **1 Scope**

123 This International Standard specifies requirements and makes recommendations for the
 124 design, integration and validation of safety-related control systems (SCS) for machines. It is
 125 applicable to control systems used, either singly or in combination, to carry out safety
 126 functions on machines that are not portable by hand while working, including a group of
 127 machines working together in a co-ordinated manner.

128 This standard is machinery sector specific standard within the framework of the IEC 61508
 129 series.

130 The design of complex programmable electronic subsystems or subsystem elements is not in
 131 the scope of this standard. This is in the scope of IEC 61508 or standards linked to it, see
 132 Figure 1.

133 The main body of this sector standard specifies general requirements for the design, and
 134 verification of a safety-related control system intended to be used in high/continuous demand
 135 mode.

136 Specific requirements for design, and verification of a safety-related control system intended
 137 to be used in low demand mode are given in normative Annex D.

138 NOTE 1 It's recognized that a subsystem can be shared by high and low demand functions.

139 This standard:

- 140 – is concerned only with functional safety requirements intended to reduce the risk of injury
 141 or damage to the health of persons in the immediate vicinity of the machine and those
 142 directly involved in the use of the machine;
- 143 – is restricted to risks arising directly from the hazards of the machine itself or from a group
 144 of machines working together in a co-ordinated manner;

145 NOTE 2 Requirements to mitigate risks arising from other hazards are provided in relevant sector standards.
 146 For example, where a machine(s) is part of a process activity, additional information is available in IEC 61511.

147 This document does not cover

- 148 – electrical hazards arising from the electrical control equipment itself (e.g. electric shock –
 149 see IEC 60204–1);
- 150 – other safety requirements necessary at the machine level such as safeguarding;
- 151 – specific measures for security aspects – see IEC TR 63074.

152 This document is not intended to limit or inhibit technological advancement.

153 Figure 1 shows the relationship of this standard to other relevant standards.