

INTERNATIONAL STANDARD

AMENDMENT 2

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

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IEC Secretariat
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

AMENDMENT 2

FOREWORD

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Amendment 2 to IEC 62061:2021 has been prepared by IEC technical committee 44: Safety of machinery – Electrotechnical aspects.

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

| Draft | Report on voting |
|--------------|------------------|
| 44/1074/FDIS | 44/1081/RVD |

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

The language used for the development of this Amendment is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications/.

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- reconfirmed,
- withdrawn, or
- revised.

5.2.4 Estimation of demand mode of operation

Add, after the first paragraph, the following new note:

NOTE IEC TS 63394:2023, Annex J, provides guidance on the use of subsystems in different modes of operation.

7.4.1 General

Replace, in the second paragraph, in the first sentence, "Table 4" with "Table 6".

Table 6 – Architectural constraints on a subsystem: maximum SIL that can be claimed for an SCS using the subsystem

Replace NOTE 3, as modified by Amendment 1, with the following new text:

NOTE 3 See 7.5.3, where subsystems which have a safe failure fraction of less than 60 % and zero hardware fault tolerance that use well-tried components, or subsystems where fault exclusions have been applied to faults that could lead to a dangerous failure, can be considered to achieve SIL 1.

7.4.3.1 General

Replace the existing text with the following new text.

The detection of a dangerous failure by automatic diagnostic functions in any subsystem of the SCS having a hardware fault tolerance of more than zero shall result in a specified fault reaction function to maintain or to reach a safe state before a dangerous situation can occur. Restoring normal operation (e.g. re-starting the machine process) shall not be possible until the fault has been repaired or rectified.

Where a diagnostic function is necessary to achieve the required safe failure fraction and the subsystem has a hardware fault tolerance of zero, then

- the ratio of the diagnostic test rate to the demand rate shall equal or exceed 100, or
- testing occurs immediately upon demand of the safety function,

and the sum of the time to detect a fault and to perform the specified fault reaction shall be short enough to maintain or reach a safe state before a dangerous situation can occur. Restoring normal operation (e.g. re-starting the machine process) shall not be possible until the fault has been repaired or rectified.

NOTE The specified fault reaction function is given in 5.2.3. For most safety functions the safe state can be reached by de-energizing.

7.4.3.2 Fault reaction function

Replace the title and text with the following new title and text:

7.4.3.2 Isolation of a faulty channel of a subsystem

For certain machines, it is not recommended or can even be dangerous to stop the production process immediately if a dangerous fault is detected.

In this case the specification can allow isolation of the faulty channel of subsystems having HFT = 1 or higher, while the machine is operating, up to an estimated maximum isolation time. If the faulty part is not repaired within an estimated maximum time, then a fault reaction function shall be performed to achieve immediately a safe state. Restoring normal operation (e.g. re-starting the machine process) shall not be possible until the fault has been repaired or rectified.

Upon isolation of the faulty channel of the subsystem, the required risk reduction shall be ensured.

NOTE 1 This can be achieved for example by:

- reducing the speed of the dangerous parts;
- reducing the risk and consequently the required safety performance;
- blocking the dangerous area while the faulty part is being repaired;
- design the single channel capable to reach the target SIL.

This document does not provide further details on the development and validation of such subsystems.

NOTE 2 See also the IEC 61508 series for further information.

7.4.4 Realization of diagnostic functions

Replace, in the third paragraph, the first sentence with the following new text:

"Diagnostic functions shall satisfy the requirements of systematic safety integrity (see 7.3.2) including the following:"

Replace the fifth paragraph with the following new text:

To apply the simplified approach of this document for the estimation of *PFH* of subsystems, the following shall be considered: