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Edition 1.0 2007-12

INTERNATIONAL STANDARD

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INDUSTRIAL COMMUNICATION NETWORKS – PROFILES

Part 3-3: Functional safety fieldbuses – Additional specifications for CPF 3

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EP1267270-A2	[SI]	Verfahren zur Datenübertragung in einem Rechnersystem
WO00/045562-A1	[SI]	Method and device for determining the reliability of data carriers
WO99/049373-A1	[SI]	Shortened data message of an automation system

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

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

FDIS	Report on voting
65C/470/FDIS	65C/481/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.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site 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- withdrawn,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.

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

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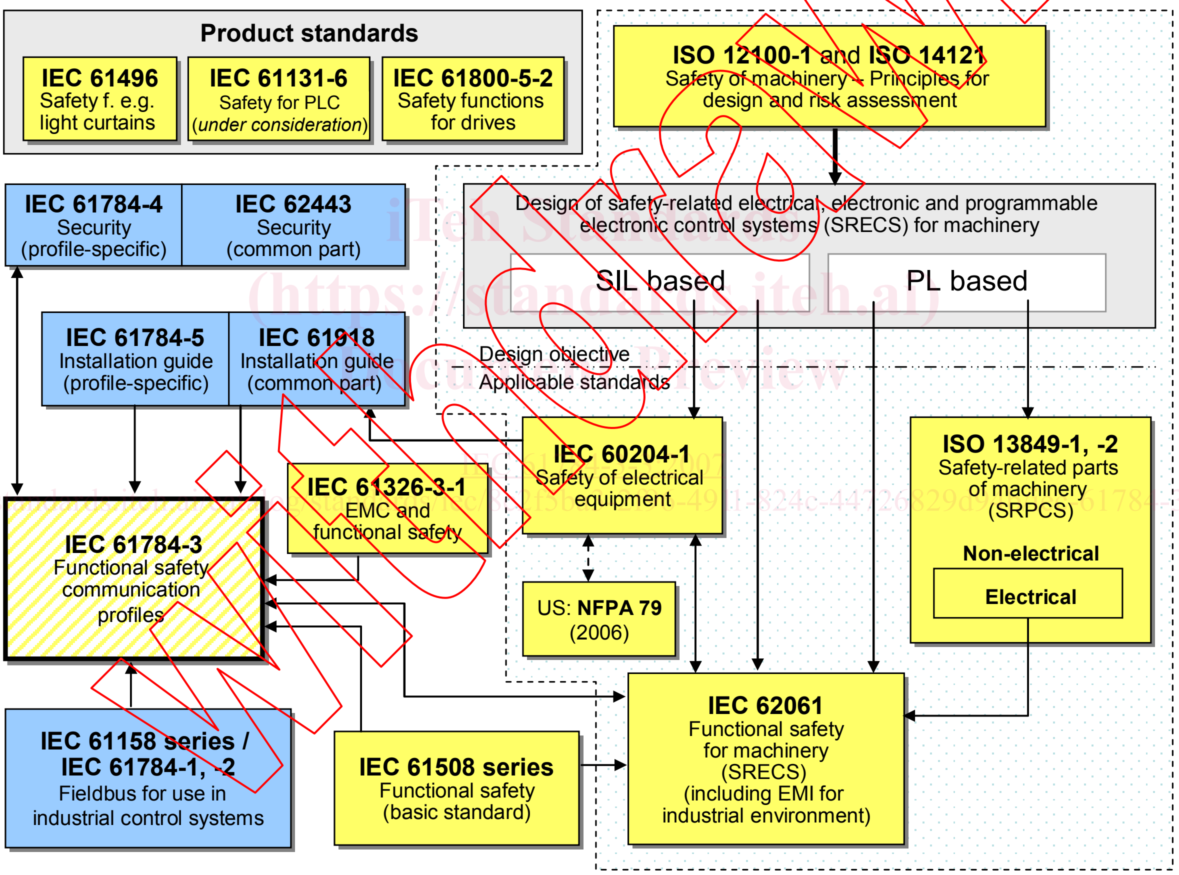
INTRODUCTION

The IEC 61158 fieldbus standard together with its companion standards IEC 61784-1 and IEC 61784-2 defines a set of communication protocols that enable distributed control of automation applications. Fieldbus technology is now considered well accepted and well proven. Thus many fieldbus enhancements are emerging, addressing not yet standardized areas such as real time, safety-related and security-related applications.

This standard explains the relevant principles for functional safety communications with reference to IEC 61508 series and specifies several safety communication layers (profiles and corresponding protocols) based on the communication profiles and protocol layers of IEC 61784-1, IEC 61784-2 and the IEC 61158 series. It does not cover electrical safety and intrinsic safety aspects.

Figure 1 shows the relationships between this standard and relevant safety and fieldbus standards in a machinery environment.


Product standards
IEC 61496
Safety f. e.g. light curtains
IEC 61131-6
Safety for PLC
(under consideration)
IEC 61800-5-2
Safety functions for drives
ISO 12100-1 and ISO 14121
Safety of machinery – Principles for design and risk assessment
IEC 61784-4
Security (profile-specific)
IEC 62443
Security (common part)
Design of safety-related electrical, electronic and programmable electronic control systems (SRECS) for machinery
SIL based
PL based
IEC 61784-5
Installation guide (profile-specific)
IEC 61918
Installation guide (common part)
Design objective
Applicable standards
IEC 60204-1
Safety of electrical equipment
ISO 13849-1, -2
Safety-related parts of machinery (SRPCS)
Non-electrical
Electrical
IEC 61326-3-1
EMC and functional safety
IEC 61784-3
Functional safety communication profiles
US: NFPA 79 (2006)
IEC 62061
Functional safety for machinery (SRECS) (including EMI for industrial environment)
IEC 61158 series / IEC 61784-1, -2
Fieldbus for use in industrial control systems
IEC 61508 series
Functional safety (basic standard)

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Key

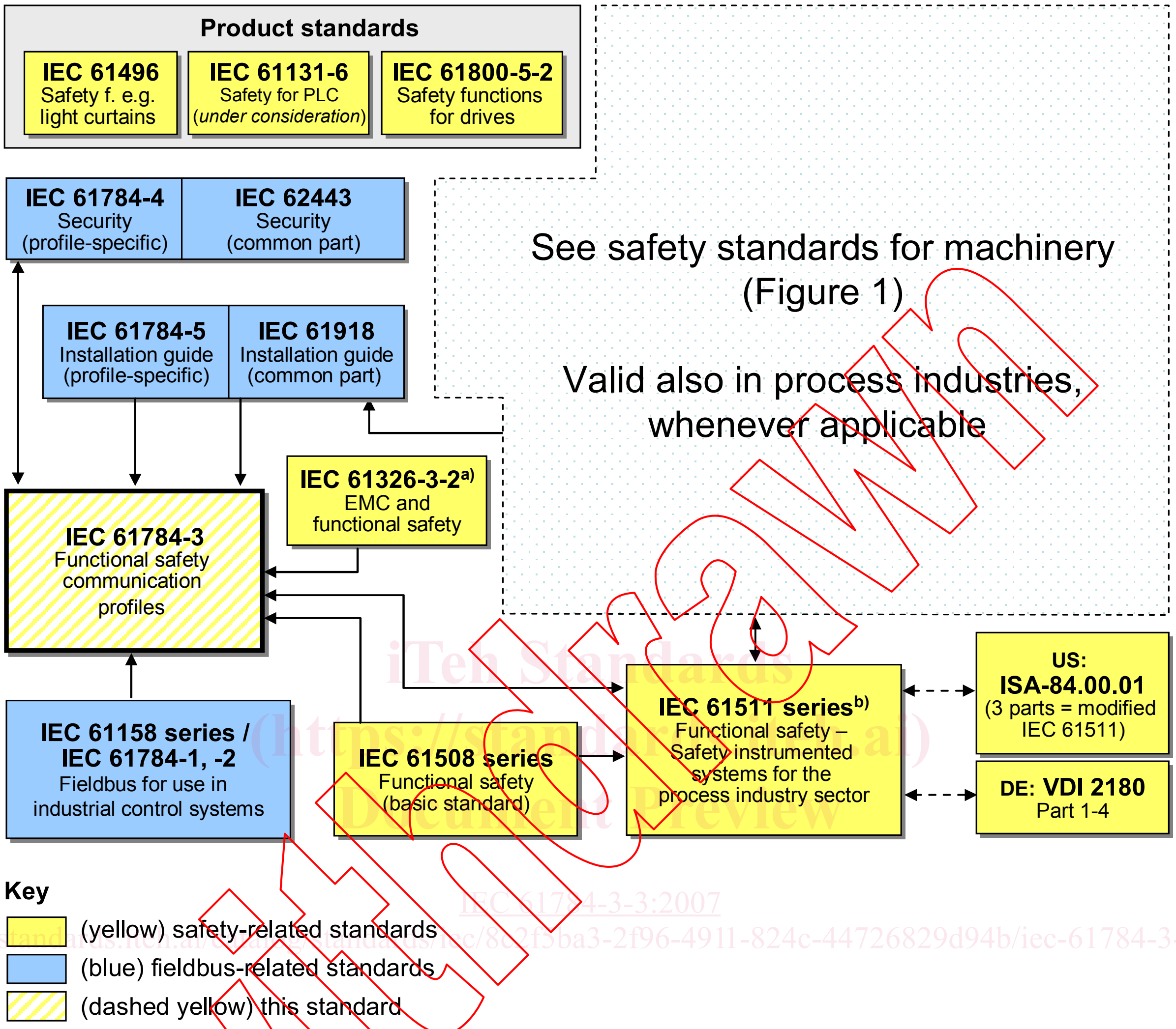
🟨 (yellow) safety-related standards

🟦 (blue) fieldbus-related standards

▨ (dashed yellow) this standard

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

Figure 2 shows the relationships between this standard and relevant safety and fieldbus standards in a process environment.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IEC 61496
Safety f. e.g. light curtains
IEC 61131-6
Safety for PLC
(under consideration)
IEC 61800-5-2
Safety functions for drives
IEC 61784-4
Security
(profile-specific)
IEC 62443
Security
(common part)
See safety standards for machinery (Figure 1)
Valid also in process industries, whenever applicable
IEC 61784-5
Installation guide
(profile-specific)
IEC 61918
Installation guide
(common part)
IEC 61326-3-2a)
EMC and functional safety
IEC 61784-3
Functional safety communication profiles
IEC 61158 series / IEC 61784-1, -2
Fieldbus for use in industrial control systems
IEC 61508 series
Functional safety
(basic standard)
IEC 61511 seriesb)
Functional safety – Safety instrumented systems for the process industry sector
US:
ISA-84.00.01
(3 parts = modified IEC 61511)
DE: VDI 2180
Part 1-4
Key
(yellow) safety-related standards
(blue) fieldbus-related standards
(dashed yellow) this standard

[a] For specified electromagnetic environments; otherwise IEC 61326-3-1.

[b] EN ratified.

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

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

Safety communication layers specified in this standard do this in such a way that a fieldbus can be used for applications requiring functional safety up to the Safety Integrity Level (SIL) specified by its corresponding functional safety communication profile.

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

This standard describes

- basic principles for implementing the requirements of IEC 61508 series for safety-related data communications, including possible transmission faults, remedial measures and considerations affecting data integrity;
- individual description of functional safety profiles for several communication profile families in IEC 61784-1 and IEC 61784-2;
- safety layer extensions to the communication service and protocols sections of the IEC 61158 series.

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