# IEC 61784-3-17

Edition 1.0 2016-07

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

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## Industrial communication networks – Profiles – Part 3-17: Functional safety fieldbuses – Additional specifications for CPF 17

## Réseaux de communication industriels – Profils – Partie 3-17: Bus de terrain de sécurité fonctionnelle – Spécifications supplémentaires pour CPF 17

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IEC 61784-3-17:2016 (en-fr)

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# INDUSTRIAL COMMUNICATION NETWORKS – PROFILES –

## Part 3-17: Functional safety fieldbuses – Additional specifications for CPF 17

## FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 61784-3-17 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/851/FDIS | 65C/854/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.

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

The committee has decided that the contents of this publication will remain unchanged until the stability 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

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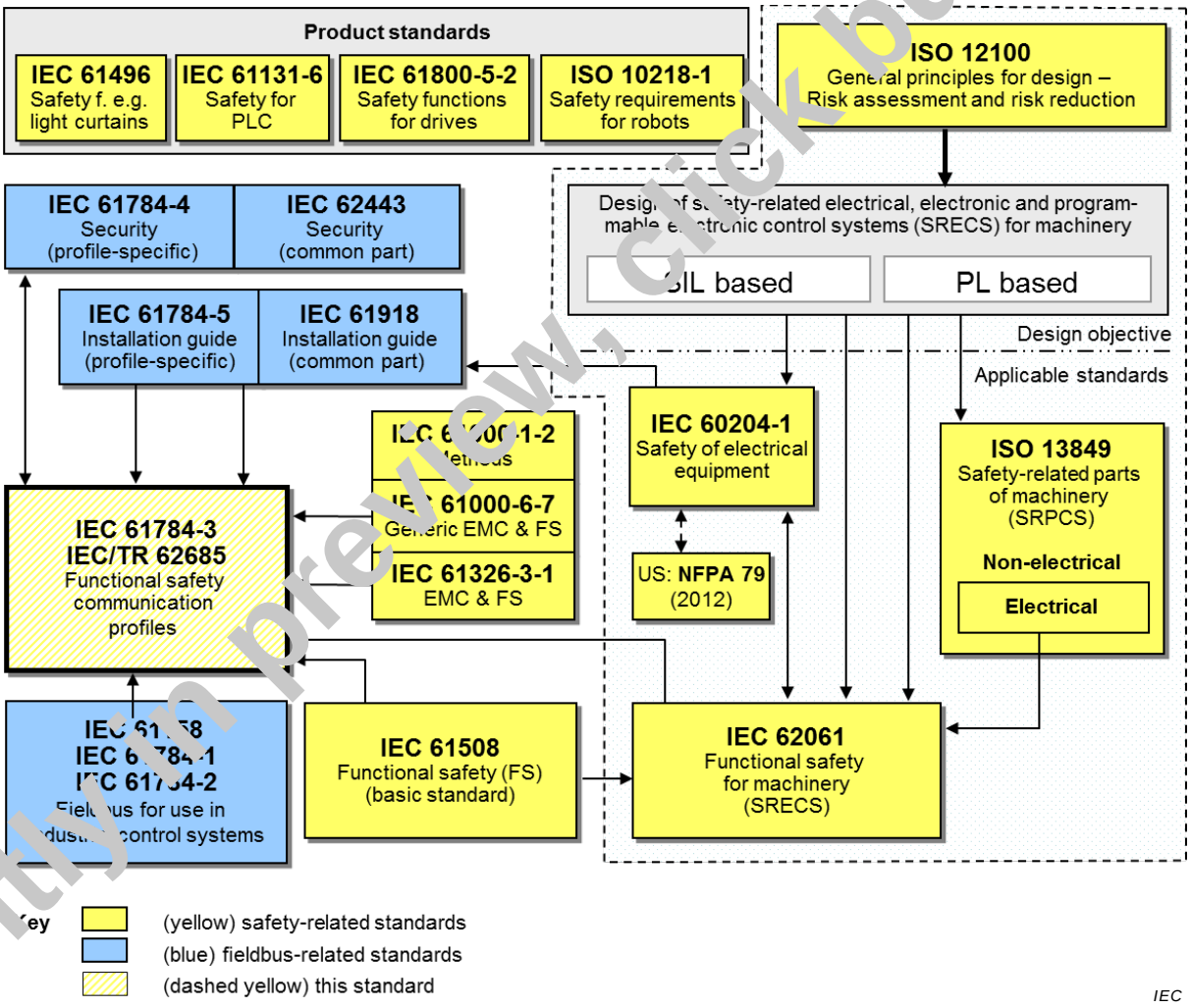
# 0 Introduction

## 0.1 General

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 fieldbus enhancements continue to emerge, addressing applications for 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 61784-2 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.




NOTE Subclauses 6.7.6.4 (high complexity) and 6.7.8.1.6 (low complexity) of IEC 62061 specify the relationship between PL (Category) and SIL.

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

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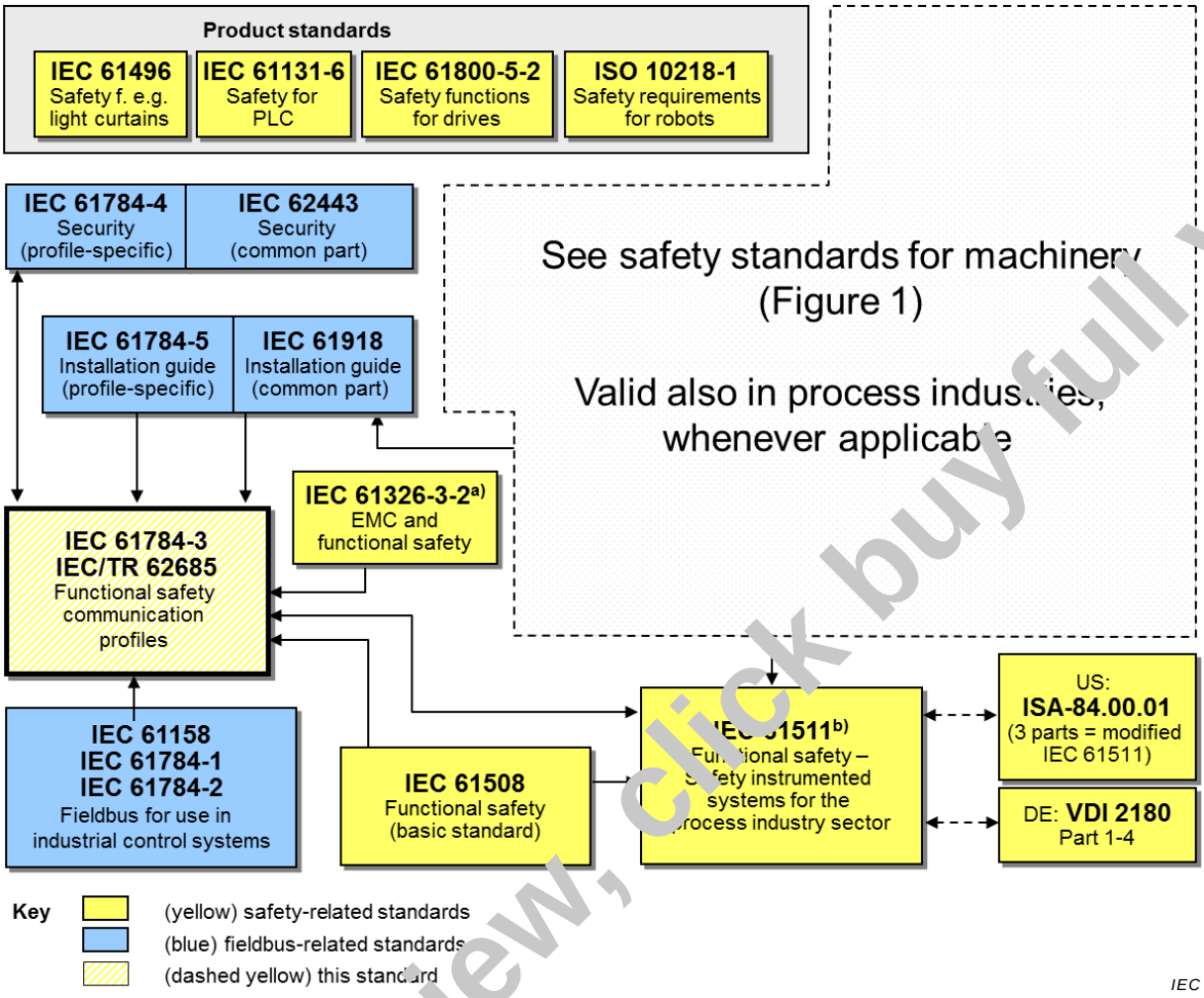
Figure 2 shows the relationships between this standard and relevant safety and fieldbus standards in a process environment.




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

b EN ratified.

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

Safety communication layers which are implemented as parts of safety-related systems according to IEC 6150[illegible] 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 (FSCP) within this system – implementation of a functional safety communication profile in a standard device is not sufficient to qualify it as a safety device.

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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;
- functional safety communication profiles for several communication profile families in IEC 61784-1 and IEC 61784-2, including safety layer extensions to the communication service and protocols sections of the IEC 61158 series.

### 0.2 Patent declaration

The International Electrotechnical Commission (IEC) draws attention to the fact that it is claimed that compliance with this document may involve the use of patents concerning the functional safety communication profiles for family 17 as follows, where the [xx] notation indicates the holder of the patent right:

| | | |
|---|---|---|
| PCT/KR2012/008651 | [LSIS] | Communication apparatus and Communication method |
| PCT/KR2012/008653 | [LSIS] | Communication apparatus and Communication method |
| PCT/KR2012/008654 | [LSIS] | Communication apparatus and Communication method |
| PCT/KR2012/008655 | [LSIS] | Communication apparatus and Communication method |
| KR 10-1389604 | [LSIS] | Communication Device and communication method |
| KR 10-1442963 | [LSIS] | Communication Device and communication method |
| KR 10-1389646 | [LSIS] | Communication Device and communication method |

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# INDUSTRIAL COMMUNICATION NETWORKS – PROFILES –

# Part 3-17: Functional safety fieldbuses – Additional specifications for CPF 17

## 1 Scope

This part of the IEC 61784-3 series specifies a safety communication layer (services and protocol) based on CPF 17 of IEC 61784-2 (CP 17/1) and IEC 61158 Type 21. It identifies the principles for functional safety communications defined in IEC 61784-3 that are relevant for this safety communication layer. This safety communication layer is intended for implementation in safety devices only.

NOTE 1 It does not cover electrical safety and intrinsic safety aspects. Electrical safety is related to hazards such as electrical shock. Intrinsic safety is related to hazards associated with potentially explosive atmospheres.

This part[1] defines mechanisms for the transmission of safety-relevant messages among participants within a distributed network using fieldbus technology in accordance with the requirements of IEC 61508 series[2] for functional safety. These mechanisms may be used in various industrial applications such as process control, manufacturing automation, and machinery.

This part provides guidelines for both developers and assessors of compliant devices and systems.

NOTE 2 The resulting SIL claim of a system depends on implementation of the selected functional safety communication profile within this system; implementation of a functional safety communication profile according to this part in a standard device is not sufficient for it to qualify as a safety device.

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61000-6-2, *Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity for industrial environments*

IEC 61131-2, *Programmable controllers – Part 2: Equipment requirements and tests*

IEC 61158-3-21:2010, *Industrial communication networks – Fieldbus specifications – Part 3-21: Data-link layer service definition – Type 21 elements*

IEC 61158-4-21:2010, *Industrial communication networks – Fieldbus specifications – Part 4-21: Data-link layer protocol specification – Type 21 elements*

IEC 61158-5-21:2010, *Industrial communication networks – Fieldbus specifications – Part 5-21: Application layer service definition –Type 21 elements*

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1 In the following pages of this standard, “this part” will be used for “this part of the IEC 61784-3 series.”

2 In the following pages of this standard, “IEC 61508” will be used for “IEC 61508 series.”