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Industriell processtyrning – Profiler – Del 3-13: Fältbussar i system av betydelse för säkerheten – Kompletterande specifikationer för CPF 13 (Ethernet Powerlink)

*Industrial communication networks –
Profiles –
Part 3-13: Functional safety fieldbuses –
Additional specifications for CPF 13*

Som svensk standard gäller europastandarden EN 61784-3-13:2017. Den svenska standarden innehåller den officiella engelska språkversionen av EN 61784-3-13:2017.

Nationellt förord

Europastandarden EN 61784-3-13:2017

består av:

- **europastandardens ikraftsättningsdokument**, utarbetat inom CENELEC
- **IEC 61784-3-13, Second edition, 2016 - Industrial communication networks - Profiles - Part 3-13: Functional safety fieldbuses - Additional specifications for CPF 13**

utarbetad inom International Electrotechnical Commission, IEC.

Tidigare fastställd svensk standard SS-EN 61784-3-13, utgåva 1, 2010, gäller ej fr o m 2020-12-01.

ICS 25.040.40; 35.100.05

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EUROPEAN STANDARD

EN 61784-3-13

NORME EUROPÉENNE

EUROPÄISCHE NORM

December 2017

ICS 25.040.40; 35.100.05

Supersedes EN 61784-3-13:2010

English Version

**Industrial communication networks - Profiles - Part 3-13:
Functional safety fieldbuses - Additional specifications for CPF 13
(IEC 61784-3-13:2016)**

Réseaux de communication industriels - Profils - Partie 3-13: Bus de terrain de sécurité fonctionnelle - Spécifications complémentaires pour CPF 13 (IEC 61784-3-13:2016)

Industrielle Kommunikationsnetze - Profile - Teil 3-13: Funktional sichere Übertragung bei Feldbussen - Zusätzliche Festlegungen für die Kommunikationsprofilfamilie 13 (IEC 61784-3-13:2016)

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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European foreword

The text of document 65C/851/FDIS, future edition 2 of IEC 61784-3-13:2016, prepared by SC 65C "Industrial networks", of IEC/TC 65 "Industrial-process measurement, control and automation" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61784-3-13:2017.

The following dates are fixed:

- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2018-06-01
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2020-12-01

This document supersedes EN 61784-3-13:2010.

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In the official version, for Bibliography, the following notes have to be added for the standards indicated:

| | |
|-------------------------|--|
| IEC 60204-1 | NOTE Harmonized as EN 60204-1 |
| IEC 61000-6-7 | NOTE Harmonized as EN 61000-6-7 |
| IEC 61131-2 | NOTE Harmonized as EN 61131-2 |
| IEC 61131-6 | NOTE Harmonized as EN 61131-6 |
| IEC 61158 (all parts) | NOTE Harmonized as EN 61158 (all parts) |
| IEC 61326-3-1 | NOTE Harmonized as EN 61326-3-1 |
| IEC 61326-3-2 | NOTE Harmonized as EN 61326-3-2 |
| IEC 61496 (all parts) | NOTE Harmonized as EN 61496 (all parts) |
| IEC 61508-1:2010 | NOTE Harmonized as EN 61508-1:2010 (not modified). |
| IEC 61508-4:2010 | NOTE Harmonized as EN 61508-4:2010 (not modified). |
| IEC 61508-5:2010 | NOTE Harmonized as EN 61508-5:2010 (not modified). |
| IEC 61511 (all parts) | NOTE Harmonized as EN 61511 (all parts) |
| IEC 61784-1 | NOTE Harmonized as EN 61784-1 |
| IEC 61784-5 (all parts) | NOTE Harmonized as EN 61784-5 (all parts) |
| IEC 61800-5-2 | NOTE Harmonized as EN 61800-5-2 |
| IEC 62061 | NOTE Harmonized as EN 62061 |
| IEC 62443 (all parts) | NOTE Harmonized as prEN 62443 (all parts) |
| IEC/TR 62685 | NOTE Harmonized as CLC/TR 62685 |
| ISO 10218-1 | NOTE Harmonized as EN ISO 10218-1 |
| ISO 12100 | NOTE Harmonized as EN ISO 12100 |
| ISO 13849-1 | NOTE Harmonized as EN ISO 13849-1 |
| ISO 13849-2 | NOTE Harmonized as EN ISO 13849-2 |

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

| <u>Publication</u> | <u>Year</u> | <u>Title</u> | <u>EN/HD</u> | <u>Year</u> |
|--------------------|-------------|--|---------------|-------------|
| IEC 61131-3 | - | Programmable controllers - Part 3: Programming languages | EN 61131-3 | - |
| IEC 61158-3-13 | - | Industrial communication networks - Fieldbus specifications - Part 3-13: Data link layer service definition - Type 13 elements | EN 61158-3-13 | - |
| IEC 61158-4-13 | - | Industrial communication networks - Fieldbus specifications - Part 4-13: Data-link layer protocol specification - Type 13 elements | EN 61158-4-13 | - |
| IEC 61158-5-13 | - | Industrial communication networks - Fieldbus specifications - Part 5-13: Application layer service definition - Type 13 elements | EN 61158-5-13 | - |
| IEC 61158-6-13 | - | Industrial communication networks - Fieldbus specifications - Part 6-13: Application layer protocol specification - Type 13 elements | EN 61158-6-13 | - |
| IEC 61508 | series | Functional safety of electrical/electronic/programmable electronic safety-related systems -- Part 1: General requirements | EN 61508 | series |
| IEC 61784-2 | - | Industrial communication networks - Profiles - Part 2: Additional fieldbus profiles for real-time networks based on ISO/IEC 8802-3 | EN 61784-2 | - |
| IEC 61784-3 | - | Industrial communication networks - Profiles - Part 3: Functional safety fieldbuses - General rules and profile definitions | EN 61784-3 | - |
| IEC 61784-5-13 | - | Industrial communication networks - Profiles -- Part 5-13: Installation of fieldbuses - Installation profiles for CPF 13 | EN 61784-5-13 | - |
| IEC 61918 | - | Industrial communication networks - Installation of communication networks in industrial premises | EN 61918 | - |
| ISO/IEC 19501 | - | Information technology - Open Distributed Processing - Unified Modeling Language (UML) Version 1.4.2 | - | - |

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**INDUSTRIAL COMMUNICATION NETWORKS –
PROFILES –****Part 3-13: Functional safety fieldbuses –
Additional specifications for CPF 13****FOREWORD**

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International Standard IEC 61784-3-13 has been prepared by subcommittee 65C: Industrial networks, of IEC technical committee 65: Industrial-process measurement, control and automation.

This second edition cancels and replaces the first edition published in 2010. This edition constitutes a technical revision. The main changes with respect to the previous edition are listed below:

- change of trade name to openSAFETY™;
- addition of Slim Safety PDU;
- addition of SOD CRC;
- addition of SSDO block transfer services;
- addition of connection valid bit to SPDO;
- addition of number of retries for reset guarding;

- addition of user parameters that are writeable at any time;
- corrections and editorial improvements.

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.

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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

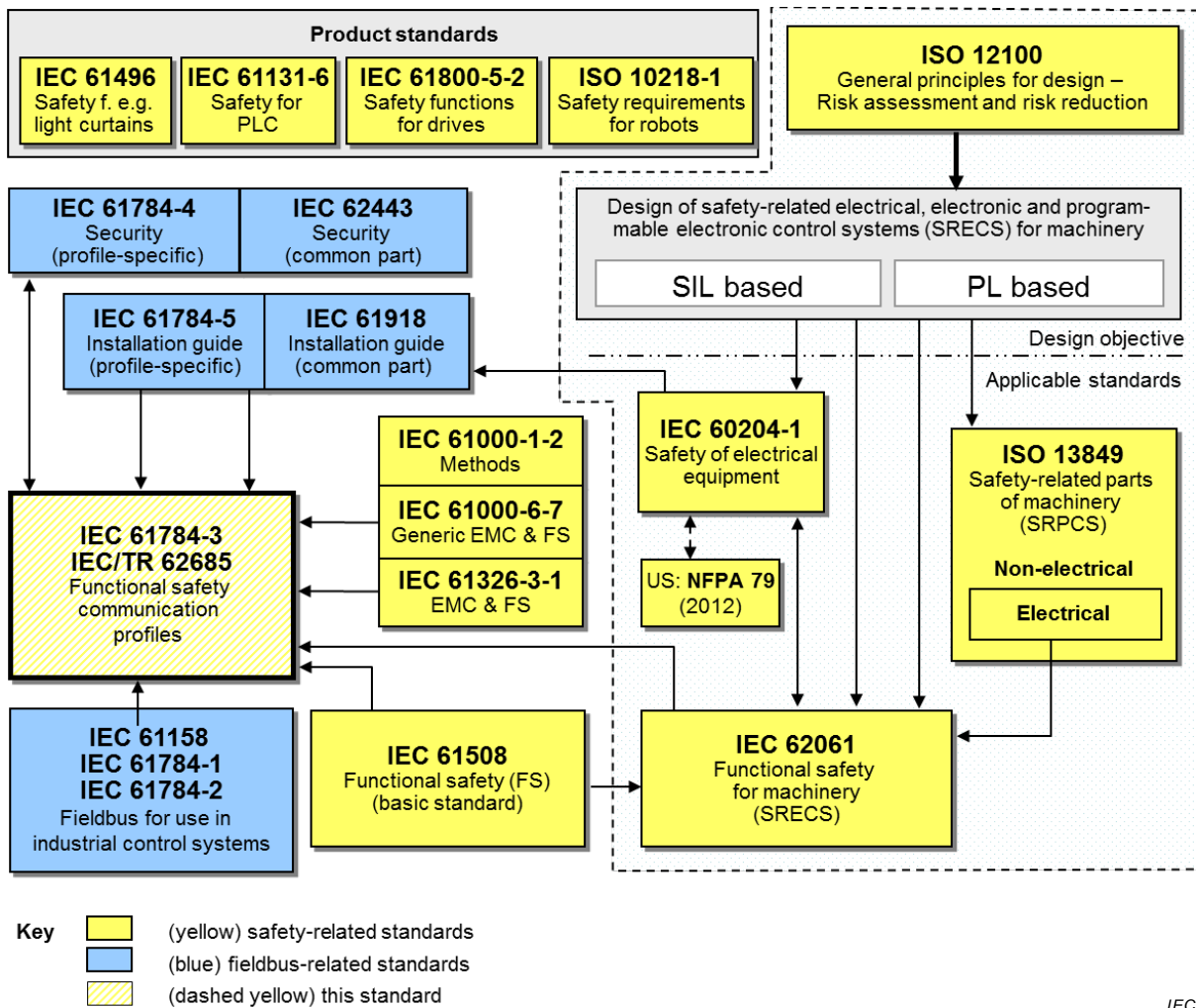
0 Introduction

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 61784-1, IEC 61784-2 and the IEC 61158 series. It does not cover electrical safety and intrinsic safety aspects.

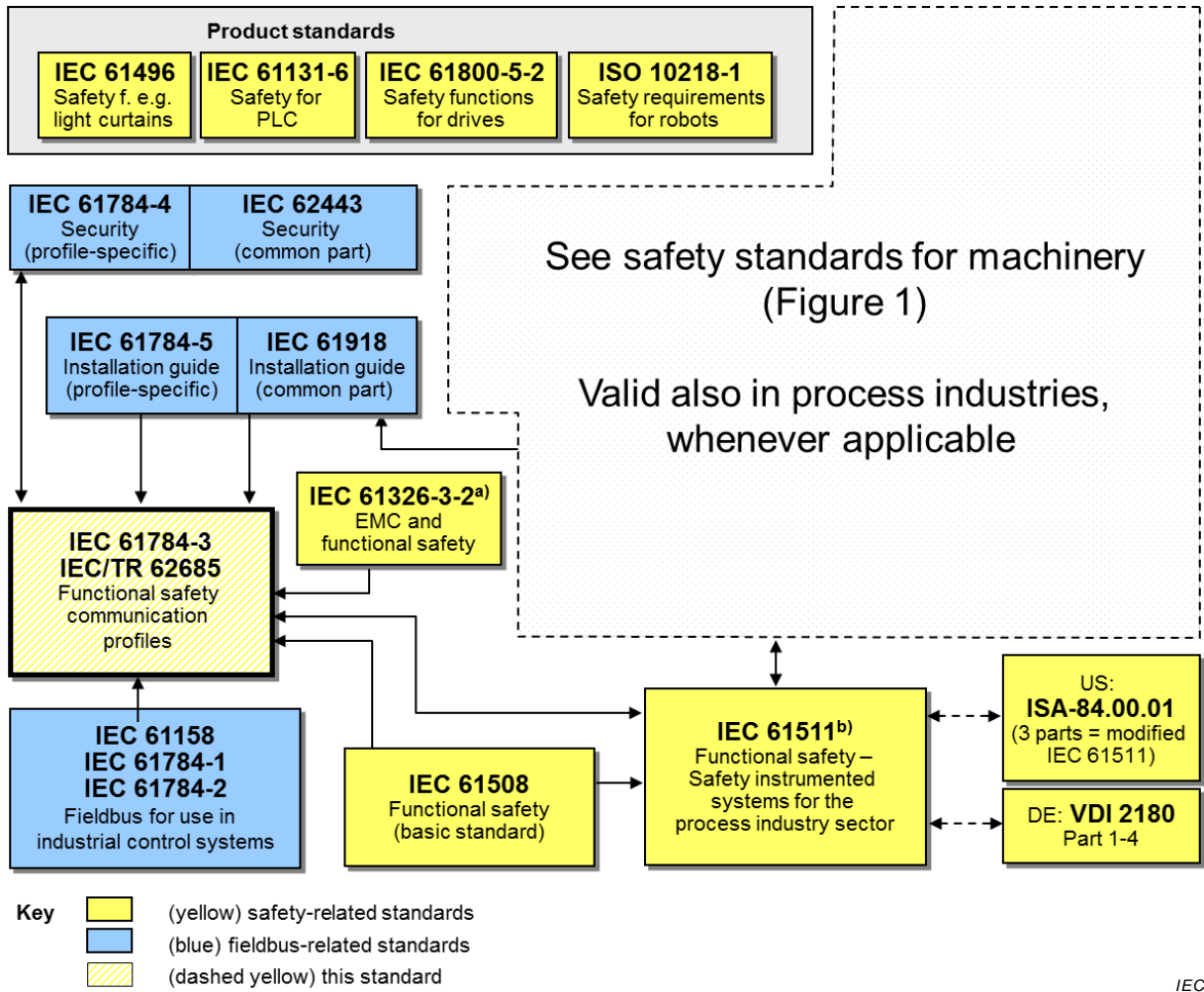
Figure 1 shows the relationships between this standard and relevant safety and fieldbus standards in a machinery environment.



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)

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 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 (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.

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 13 as follows, where the [xx] notation indicates the holder of the patent rights:

| | | |
|-------------------|------|---|
| AT 504739 | [BR] | Anordnung und ein Verfahren zur sicheren Datenkommunikation über ein nicht sicheres Netzwerk |
| DE 102005032877.6 | [BR] | Verfahren zur Zeitsynchronisation von Teilnehmern eines Netzwerkes |
| DE 102004055685.7 | [BR] | Verfahren zur Abgrenzung eines sicheren Netzwerkes |
| DE 102004055684.9 | [BR] | Verfahren zur Absicherung des Datentransfers in einem sicheren Netzwerk mit CRC's variabler Länge |
| EP 08150038.1 | [BR] | Anordnung und ein Verfahren zur sicheren Datenkommunikation über ein nicht sicheres Netzwerk |

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

The holder of these patent rights has assured the IEC that he/she is willing to negotiate licences either free of charge or under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the holder of these patent rights is registered with IEC.

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

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

INDUSTRIAL COMMUNICATION NETWORKS – PROFILES –

Part 3-13: Functional safety fieldbuses – Additional specifications for CPF 13

1 Scope

This part of the IEC 61784-3 series specifies a safety communication layer (services and protocol) based on CPF 13 of IEC 61784-2 and IEC 61158 Type 13. 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 relates to hazards such as electrical shock. Intrinsic safety relates to hazards associated with potentially explosive atmospheres.

This part¹ 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 series² 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 the 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 to qualify it 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 61131-3, *Programmable controllers – Part 3: Programming languages*

IEC 61158-3-13, *Industrial communication networks – Fieldbus specifications – Part 3-13: Data-link layer service definition – Type 13 elements*

IEC 61158-4-13, *Industrial communication networks – Fieldbus specifications – Part 4-13: Data-link layer protocol specification – Type 13 elements*

IEC 61158-5-13, *Industrial communication networks – Fieldbus specifications – Part 5-13: Application layer service definition – Type 13 elements*

IEC 61158-6-13, *Industrial communication networks – Fieldbus specifications – Part 6-13: Application layer protocol specification – Type 13 elements*

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”.

IEC 61508 (all parts), *Functional safety of electrical/electronic/programmable electronic safety-related systems*

IEC 61784-2, *Industrial communication networks – Profiles – Part 2: Additional fieldbus profiles for real-time networks based on ISO/IEC 8802-3*

IEC 61784-3:³, *Industrial communication networks – Profiles – Part 3: Functional safety fieldbuses – General rules and profile definitions*

IEC 61784-5-13, *Industrial communication networks – Profiles – Part 5-13: Installation of fieldbuses – Installation profiles for CPF 13*

IEC 61918, *Industrial communication networks – Installation of communication networks in industrial premises*

ISO/IEC 19501, *Information technology – Open Distributed Processing – Unified Modeling Language (UML) Version 1.4.2*

³ To be published