

# INTERNATIONAL STANDARD



**Industrial communication networks – Profiles –  
Part 3-12: Functional safety fieldbuses – Additional specifications for CPF 12**

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IEC 61784-3-12

Edition 1.1 2019-11  
CONSOLIDATED VERSION

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INTERNATIONAL  
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COMMISSION

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ICS 25.040.40; 35.100.05

ISBN 978-2-8322-7603-7

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### INDUSTRIAL COMMUNICATION NETWORKS – PROFILES –

#### Part 3-12: Functional safety fieldbuses – Additional specifications for CPF 12

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**This consolidated version of the official IEC Standard and its amendment has been prepared for user convenience.**

**IEC 61784-3-12 edition 1.1 contains the first edition (2010-06) [documents 65C/591A/FDIS and 65C/603/RVD] and its amendment 1 (2019-11) [documents 65C/960/CDV and 65C/980/RVC].**

**In this Redline version, a vertical line in the margin shows where the technical content is modified by amendment 1. Additions are in green text, deletions are in strikethrough red text. A separate Final version with all changes accepted is available in this publication.**

International Standard IEC 61784-3-12 has been prepared by subcommittee 65C: Industrial networks, of IEC technical committee 65: Industrial process measurement, control and automation.

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 the base publication and its amendment 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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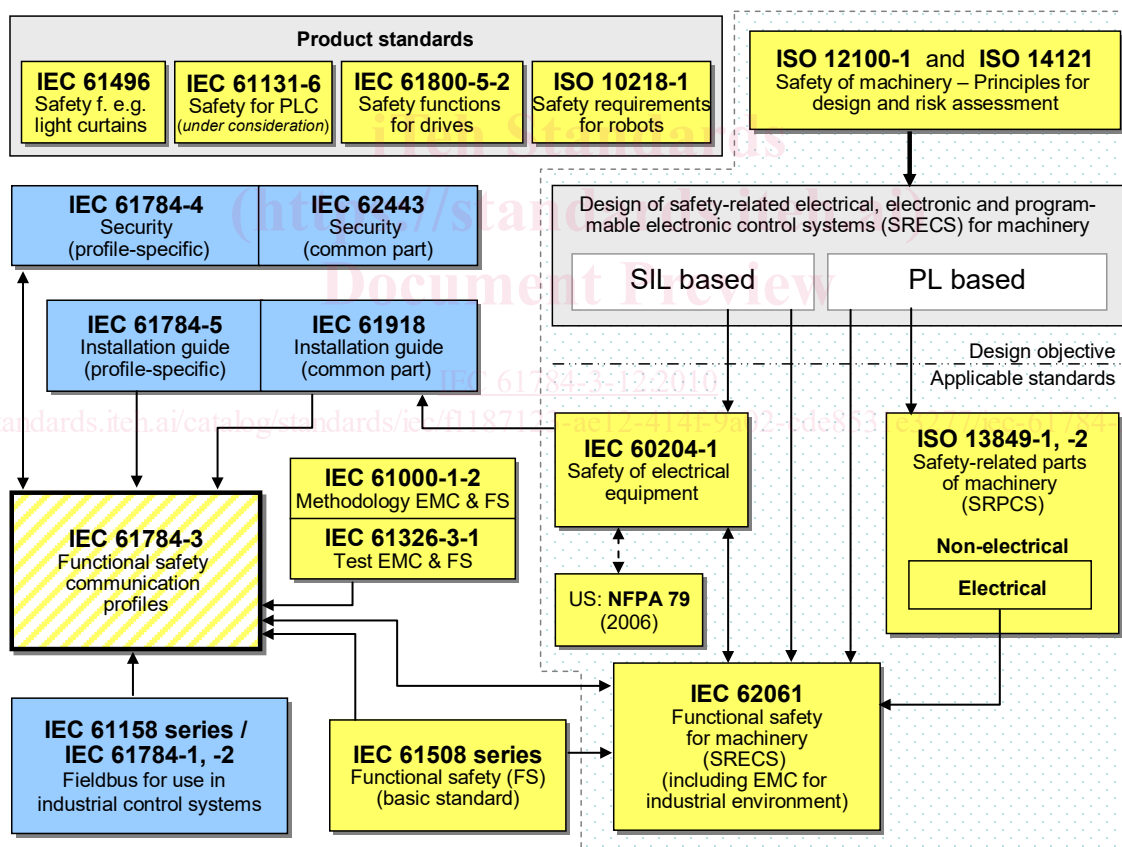
## 0 Introduction

### 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 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.



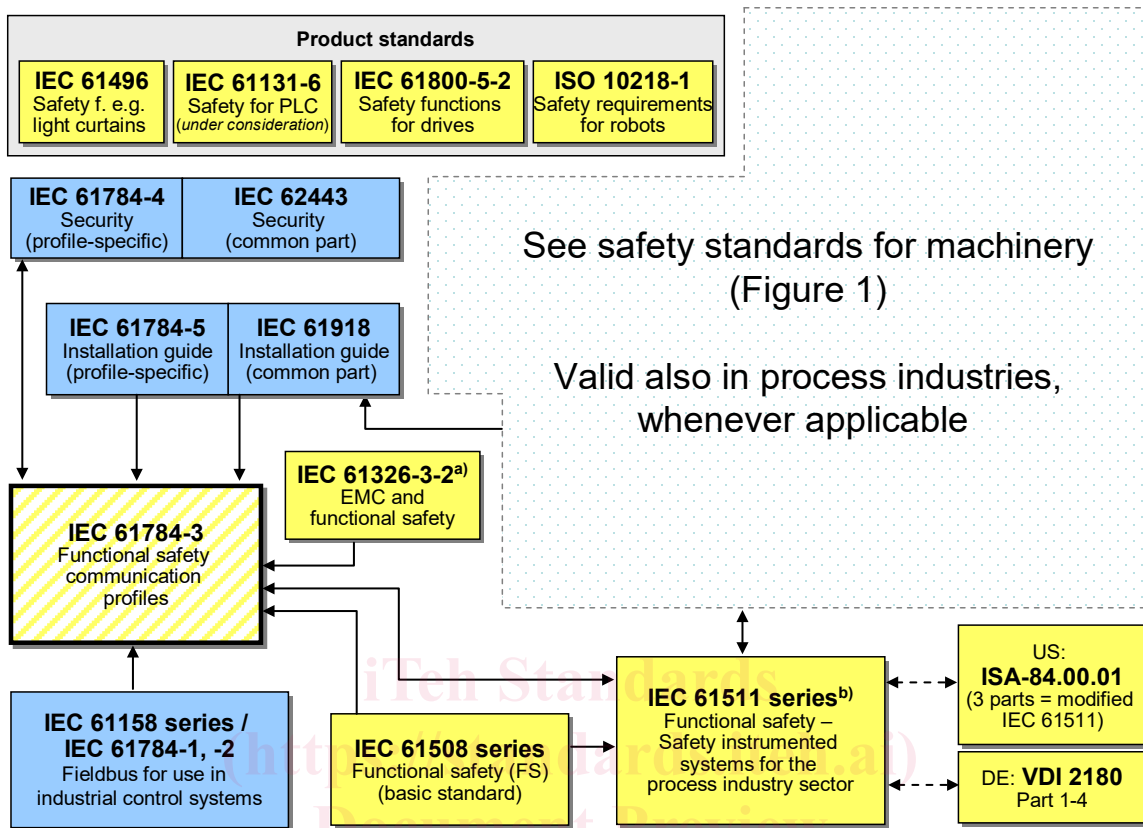
#### Key

- (yellow) safety-related standards
- (blue) fieldbus-related standards
- (dashed yellow) this standard

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.



**Key**

- (yellow) safety-related standards
- (blue) fieldbus-related standards
- (dashed yellow) this standard

<sup>a</sup> For specified electromagnetic environments; otherwise IEC 61326-3-1.

<sup>b</sup> 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 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.

## 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 12 as follows, where the [xx] notation indicates the holder of the patent right:

DE 10 2004 044 764.0 [BE] Datenübertragungsverfahren und Automatisierungssystem zum Einsatz eines solchen Datenübertragungsverfahrens

EP 05 733 921.0 [BE] Sicherheitssteuerung

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## INTRODUCTION to Amendment 1

This Amendment 1 corrects technical errors in state tables for the FSoE Slave.

- Correct invalid value for the “bNew” parameter of SendFrame in transitions RESET\_OK (Reset state), SESSION\_STAY2 (Session state), CONN\_RESET2 (Connection state), PARA\_RESET2 (Parameter state), and DATA\_RESET2 (Data state). This parameter shall only be set to “FALSE” in all back-to-reset-transitions when all values are set to their defaults.
- Add missing action in Transition SESSION\_FAIL5 (Session state).
- Correct invalid value for the address parameter of STORE\_DATA in transition CONN\_STAY1 (Connection state).