ICS 25.040.40, 35.100.05 SLOVENSKÁ TECHNICKÁ NORMA September 2021

STN	**Priemyselné komunikačné siete Profily Časť 3-8: Funkčná bezpečnosť prevádzkových zberníc Doplnkové špecifikácie pre CPF 8**	**STN EN IEC 61784-3-8** 18 4020

Industrial communication networks - Profiles - Part 3-8: Functional safety fieldbuses - Additional specifications for CPF8

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 08/21

Obsahuje: EN IEC 61784-3-8:2021, IEC 61784-3-8:2021

Oznámením tejto normy sa od 23.06.2024 ruší
STN EN 61784-3-8 (18 4020) z augusta 2018

133366

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 61784-3-8

June 2021

ICS 25.040.40; 35.100.05

Supersedes EN 61784-3-8:2017 and all of its amendments and corrigenda (if any)

English Version

Industrial communication networks - Profiles - Part 3-8: Functional safety fieldbuses - Additional specifications for CPF8 (IEC 61784-3-8:2021)

Réseaux de communication industriels - Profils - Partie 3-8: Bus de terrain de sécurité fonctionnelle - Spécifications supplémentaires pour CPF 8 (IEC 61784-3-8:2021)

Industrielle Kommunikationsnetze - Profile - Teil 3-8: Funktional sichere Übertragung bei Feldbussen - Zusätzliche Festlegungen für die Kommunikationsprofilfamilie 8 (IEC 61784-3-8:2021)

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European foreword

The text of document 65C/1083/FDIS, future edition 3 of IEC 61784-3-8, 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 IEC 61784-3-8:2021.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2022-03-23
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2024-06-23

This document supersedes EN 61784-3-8:2017 and all of its amendments and corrigenda (if any).

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

Endorsement notice

The text of the International Standard IEC 61784-3-8:2021 was approved by CENELEC as a European Standard without any modification.

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

IEC 61000-1-2	NOTE	Harmonized as EN 61000-1-2
IEC 61000-6-7	NOTE	Harmonized as EN 61000-6-7
IEC 61010-2-201	NOTE	Harmonized as EN IEC 61010-2-201
IEC 61131-6	NOTE	Harmonized as EN 61131-6
IEC 61158-1	NOTE	Harmonized as EN IEC 61158-1
IEC 61158-5 (series)	NOTE	Harmonized as EN 61158-5 (series)
IEC 61496 (series)	NOTE	Harmonized as EN IEC 61496 (series)
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 61784-3 (series)	NOTE	Harmonized as EN 61784-3 (series)
IEC 61784-5 (series)	NOTE	Harmonized as EN IEC 61784-5 (series)
IEC 61800-5-2	NOTE	Harmonized as EN 61800-5-2
IEC 61918:2018	NOTE	Harmonized as EN IEC 61918:2018 (not modified)
IEC 62443 (series)	NOTE	Harmonized as EN IEC 62443 (series)
ISO 10218-1	NOTE	Harmonized as EN ISO 10218-1
ISO 13849 (series)	NOTE	Harmonized as EN ISO 13849 (series)
ISO 13849-1:2015	NOTE	Harmonized as EN ISO 13849-1:2015 (not modified)
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 Where 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.

Publication	Year	Title	EN/HD	Year
IEC 61131-2	-	Industrial-process measurement and control - Programmable controllers - Part 2: Equipment requirements and tests	-	-
IEC 61158	series	Industrial communication networks - Fieldbus specifications	EN IEC 61158	series
IEC 61158-2	-	Industrial communication networks - Fieldbus specifications - Part 2: Physical layer specification and service definition	EN 61158-2	-
IEC 61158-3-18	-	Industrial communication networks - Fieldbus specifications - Part 3-18: Data-link layer service definition - Type 18 elements	EN 61158-3-18	-
IEC 61158-4-18	-	Industrial communication networks - Fieldbus specifications - Part 4-18: Data-link layer protocol specification - Type 18 elements	EN 61158-4-18	-
IEC 61158-5-18	-	Industrial communication networks - Fieldbus specifications - Part 5-18: Application layer service definition - Type 18 elements	EN 61158-5-18	-
IEC 61158-5-23	-	Industrial communication networks - Fieldbus specifications - Part 5-23: Application layer service definition - Type 23 elements	EN IEC 61158-5-23	-
IEC 61158-6-18	-	Industrial communication networks - Fieldbus specifications - Part 6-18: Application layer protocol specification - Type 18 elements	EN 61158-6-18	-
IEC 61158-6-23	-	Industrial communication networks - Fieldbus specifications - Part 6-23: Application layer protocol specification - Type 23 elements	EN IEC 61158-6-23	-

EN IEC 61784-3-8:2021 (E)

Publication	Year	Title	EN/HD	Year
IEC 61326-3-1	-	Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 3-1: Immunity requirements for safety-related systems and for equipment intended to perform safety-related functions (functional safety) - General industrial applications	EN 61326-3-1	-
IEC 61326-3-2	-	Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 3-2: Immunity requirements for safety-related systems and for equipment intended to perform safety-related functions (functional safety) - Industrial applications with specified electromagnetic environment	EN IEC 61326-3-2	-
IEC 61508	series	Functional safety of electrical/electronic/programmable electronic safety-related systems	EN 61508	series
IEC 61511	series	Functional safety - Safety instrumented systems for the process industry sector -	EN 61511	series
IEC 61784-1	-	Industrial communication networks - Profiles Part 1: Fieldbus profiles	EN IEC 61784-1	-
IEC 61784-2	-	Industrial communication networks - Profiles - Part 2: Additional fieldbus profiles for real-time networks based on ISO/IEC/IEEE 8802-3	EN IEC 61784-2	-
IEC 61784-3	2021	Industrial communication networks - Profiles - Part 3: Functional safety fieldbuses - General rules and profile definitions	EN IEC 61784-3	2021
IEC 62061	-	Safety of machinery - Functional safety of safety-related control systems	EN IEC 62061	-
ISO/IEC/IEEE 8802-3	-	Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks - Specific requirements - Part 3: Standard for Ethernet	-	-

IEC 61784-3-8

Edition 3.0 2021-05

INTERNATIONAL STANDARD

NORME INTERNATIONALE

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Industrial communication networks – Profiles – Part 3-8: Functional safety fieldbuses – Additional specifications for CPF 8

Réseaux de communication industriels – Profils – Partie 3-8: Bus de terrain de sécurité fonctionnelle – Spécifications supplémentaires pour CPF 8

IEC 61784-3-8:2021-05(en-fr)

IEC 61784-3-8

Edition 3.0 2021-05

INTERNATIONAL STANDARD

NORME INTERNATIONALE

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Industrial communication networks – Profiles – Part 3-8: Functional safety fieldbuses – Additional specifications for CPF 8

Réseaux de communication industriels – Profils – Partie 3-8: Bus de terrain de sécurité fonctionnelle – Spécifications supplémentaires pour CPF 8

INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

ICS 25.040.40; 35.100.05

ISBN 978-2-8322-9751-3

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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INDUSTRIAL COMMUNICATION NETWORKS – PROFILES –

Part 3-8: Functional safety fieldbuses – Additional specifications for CPF 8

FOREWORD

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IEC 61784-3-8 has been prepared by subcommittee 65C: Industrial networks, of IEC technical committee 65: Industrial-process measurement, control and automation. It is an International Standard.

This third edition cancels and replaces the second edition published in 2016. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- structured for compliance with IEC 61784-3 Ed.4;
- general editorial changes and clarifications;
- safety measures (11.5.3);

- safety application service elements (11.6.2);
- safety PDU format (11.7.1);
- constraints for calculations of system characteristics (11.9.5);
- safety measures (12.5.3);
- safety PDU format (12.7.1);
- behaviour (12.7.2);
- constraints for calculations of system characteristics (12.9.5);
- hash function calculations (Annex A).

The text of this International Standard is based on the following documents:

FDIS	Report on voting
65C/1083/FDIS	65C/1087/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 International Standard 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/standardsdev/publications.

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 document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document 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.

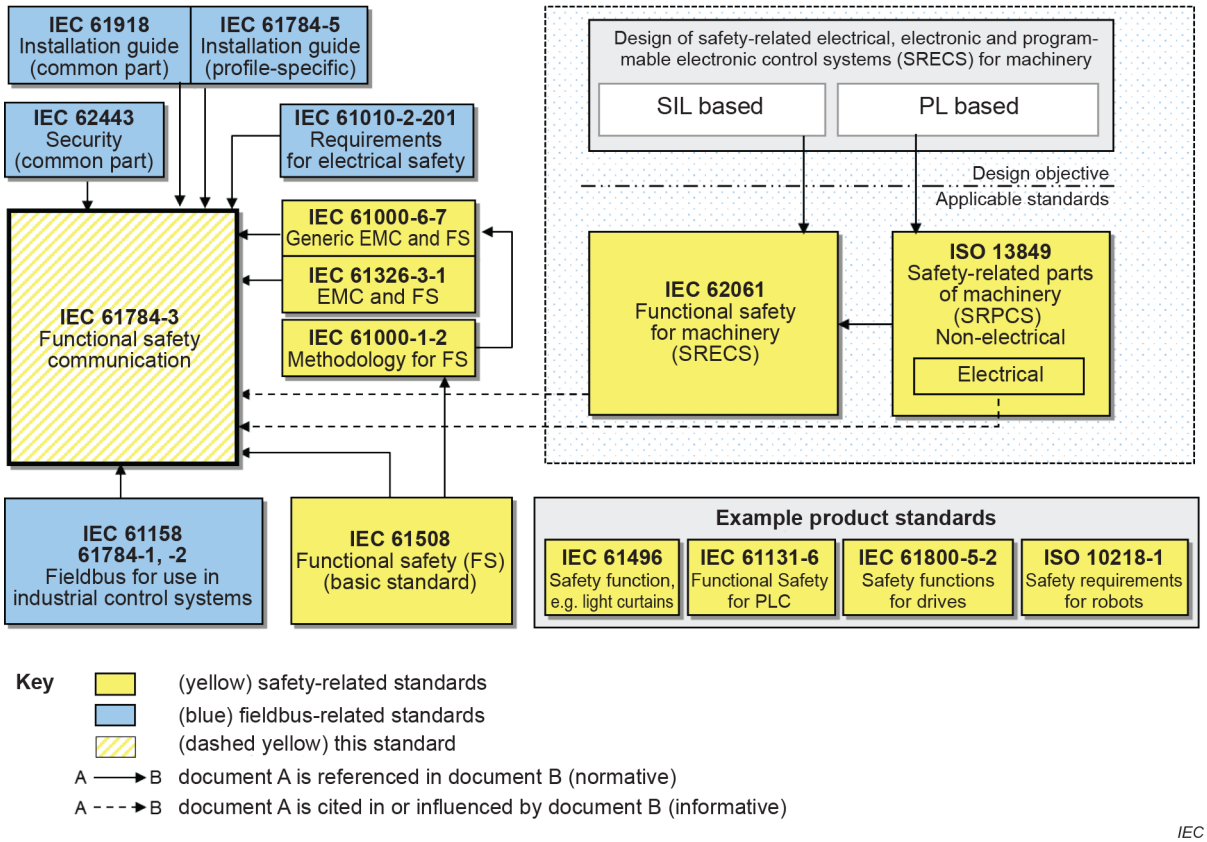
0 Introduction

0.1 General

The IEC 61158 (all parts) 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 and safety-related applications.

IEC 61784-3 (all parts) explains the relevant principles for functional safety communications with reference to IEC 61508 (all parts) 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 IEC 61158 (all parts). It does not cover electrical safety and intrinsic safety aspects. It also does not cover security aspects, nor does it provide any requirements for security.

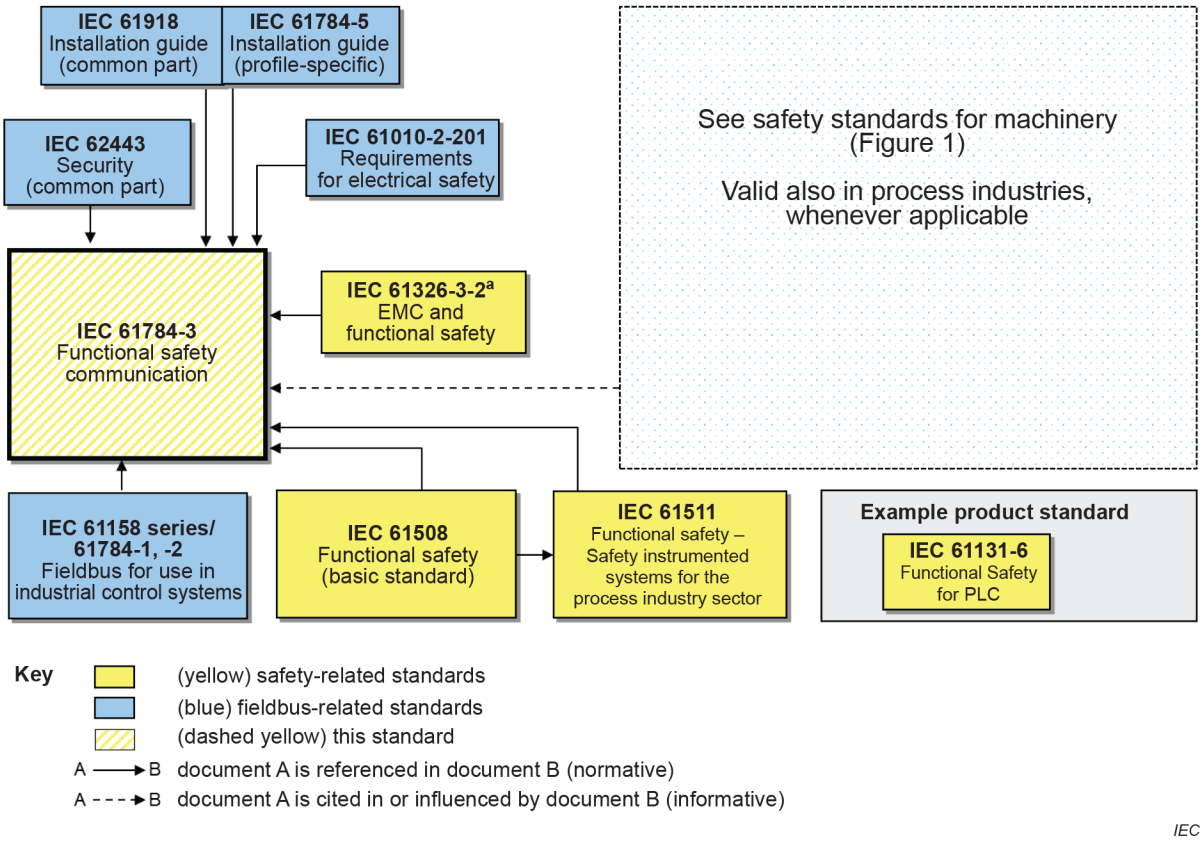
Figure 1 shows the relationships between IEC 61784-3 (all parts) and relevant safety and fieldbus standards in a machinery environment.



NOTE IEC 62061 specifies the relationship between PL (Category) and SIL.

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

Figure 2 shows the relationships between IEC 61784-3 (all parts) 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.

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 (all parts) 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 IEC 61784-3 (all parts) 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.

IEC 61784-3 (all parts) describes:

- basic principles for implementing the requirements of IEC 61508 (all parts) 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 IEC 61158 (all parts).

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 a patent concerning the functional safety communication profiles for family 8. IEC takes no position concerning the evidence, validity, and scope of this patent right.

The holder of this patent right has assured IEC that s/he is willing to negotiate licences under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the holder of this patent right is registered with IEC. Information may be obtained from the patent database available at http://patents.iec.ch.

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

INDUSTRIAL COMMUNICATION NETWORKS – PROFILES –

Part 3-8: Functional safety fieldbuses – Additional specifications for CPF 8

1 Scope

This part of IEC 61784-3 (all parts) specifies a safety communication layer (services and protocol) based on CPF 8 of IEC 61784-1, IEC 61784-2 and IEC 61158 Type 18 and Type 23. 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 document 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 (all parts)[1] for functional safety. These mechanisms may be used in various industrial applications such as process control, manufacturing automation and machinery.

This document 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 document in a standard device is not sufficient to qualify it as a safety device.

2 Normative references

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.

IEC 61131-2, *Industrial-process measurement and control – Programmable controllers – Part 2: Equipment requirements and tests*

IEC 61158 (all parts), *Industrial communication networks – Fieldbus specifications*

IEC 61158-2, *Industrial communication networks – Fieldbus specifications – Part 2: Physical layer specification and service definition*

IEC 61158-3-18, *Industrial communication networks – Fieldbus specifications – Part 3-18: Data-link layer service definition – Type 18 elements*

IEC 61158-4-18, *Industrial communication networks – Fieldbus specifications – Part 4-18: Data-link layer protocol specification – Type 18 elements*

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1 In the following pages of this document, "IEC 61508" will be used for "IEC 61508 (all parts)".

IEC 61158-5-18, *Industrial communication networks – Fieldbus specifications – Part 5-18: Application layer service definition – Type 18 elements*

IEC 61158-5-23, *Industrial communication networks – Fieldbus specifications – Part 5-23: Application layer service definition – Type 23 elements*

IEC 61158-6-18, *Industrial communication networks – Fieldbus specifications – Part 6-18: Application layer protocol specification – Type 18 elements*

IEC 61158-6-23, *Industrial communication networks – Fieldbus specifications – Part 6-23: Application layer protocol specification – Type 23 elements*

IEC 61326-3-1, *Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 3-1: Immunity requirements for safety-related systems and for equipment intended to perform safety-related functions (functional safety) – General industrial applications*

IEC 61326-3-2, *Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 3-2: Immunity requirements for safety-related systems and for equipment intended to perform safety-related functions (functional safety) – Industrial applications with specified electromagnetic environment*

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

IEC 61511 (all parts), *Functional safety – Safety instrumented systems for the process industry sector*

IEC 61784-1, *Industrial communication networks – Profiles – Part 1: Fieldbus profiles*

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

IEC 61784-3:2021, *Industrial communication networks – Profiles – Part 3: Functional safety fieldbuses – General rules and profile definitions*

IEC 62061, *Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic control systems*

ISO/IEC/IEEE 8802-3, *Information technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Specific requirements –*