Industrial communications subsystem based on ISO 11898 (CAN) forc ontroller-device interfaces - Part 5: Functional safety communication based on EN 50325-4

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NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN 50325-5:2010 sisaldab Euroopa standardi EN 50325-5:2010 ingliskeelset teksti.	This Estonian standard EVS-EN 50325-5:2010 consists of the English text of the European standard EN 50325-5:2010.
Standard on kinnitatud Eesti Standardikeskuse 31.10.2010 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas.	This standard is ratified with the order of Estonian Centre for Standardisation dated 31.10.2010 and is endorsed with the notification published in the official bulletin of the Estonian national standardisation organisation.
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English version

Industrial communications subsystem based on ISO 11898 (CAN) for controller-device interfaces - Part 5: Functional safety communication based on EN 50325-4

Sous-système de communications industriel basé sur l'ISO 11898 (CAN) pour les interfaces des dispositifs de commande - Partie 5: Communication de sécurité fonctionnelle basée sur EN 50325-4

Industrielles Kommunikationssubsystem basierend auf ISO 11898 (CAN) - Teil 5: Funktional sichere Kommunikation basierend auf EN 50325-4

CENELEC

European Committee for Electrotechnical Standardization
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Management Centre: Avenue Marnix 17, B - 1000 Brussels

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Foreword

This European Standard was prepared by the Technical Committee CENELEC TC 65CX, Fieldbus.

It was submitted to the formal vote and was approved by CENELEC as EN 50535-5 on 2010-07-01.

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

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2011-07-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2013-07-01

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Introduction

The EN 50325-4 fieldbus standard defines a communication protocol that enables distributed control of automated 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 European Standard specifies a safety communication layer (profile and corresponding protocols) based on the communication profile and protocol layer of EN 50325-4. The relevant principles for functional safety communication with reference to EN 61508 series are explained in EN 61784–3. Differently to EN 61784–3 this standard uses a white channel approach. It does not cover electrical safety and intrinsic safety aspects. Figure 1 shows the safety-related definitions in this standard. In implementing this standard additional measures to ensure integrity with the requirements of EN 61508 series shall be taken care (marked blue and dashed-blue in Figure 1).

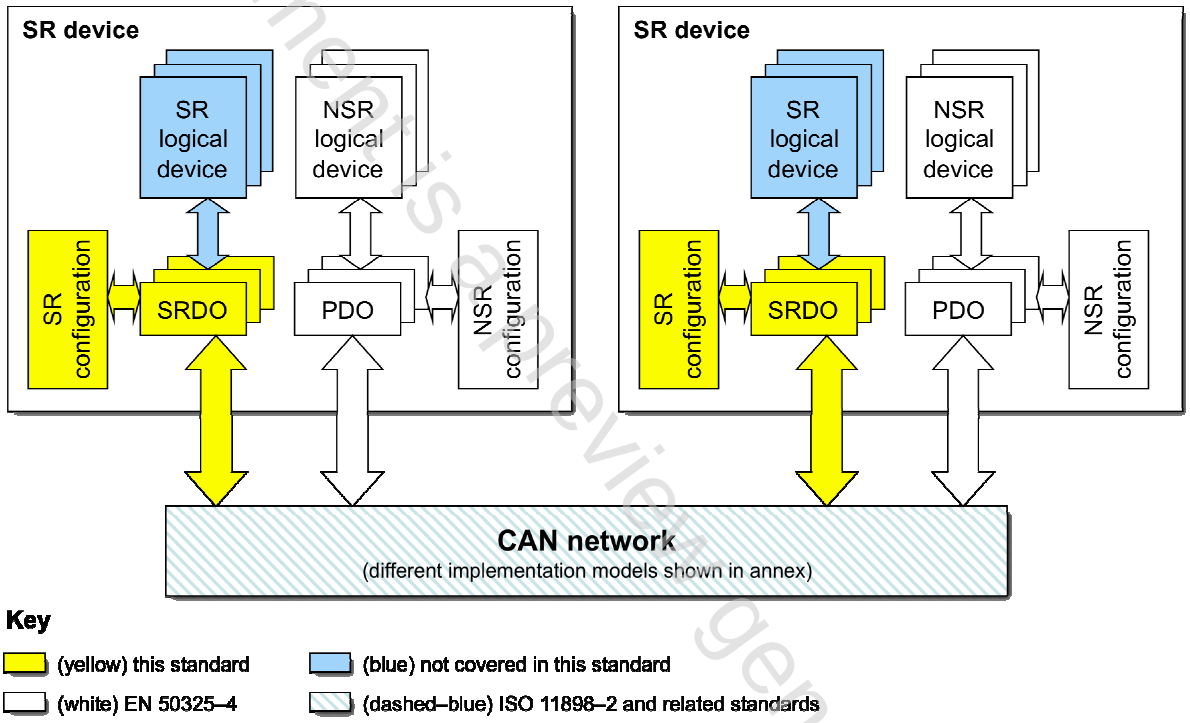
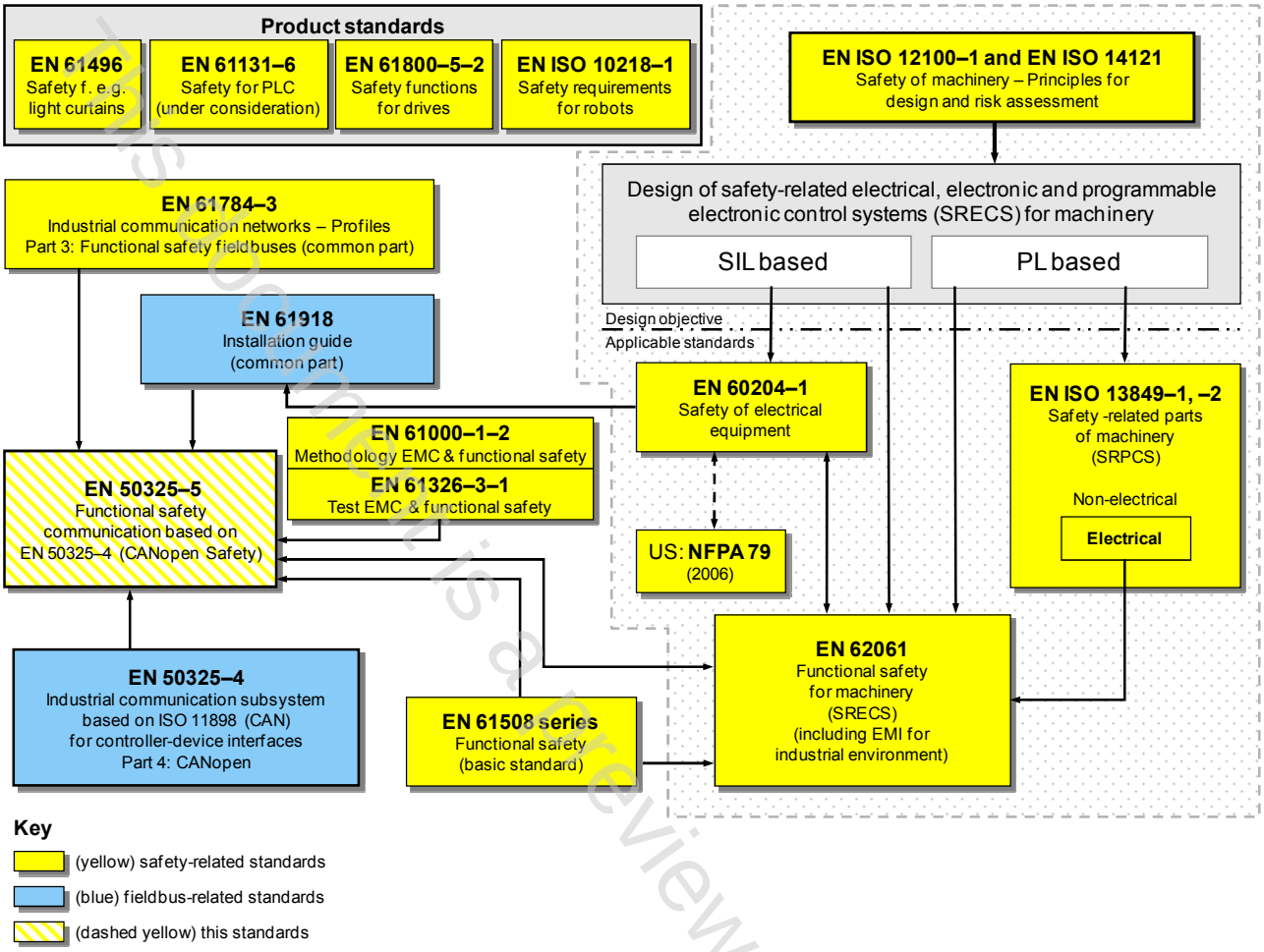


Figure 1 — Safety-related definitions in this standard

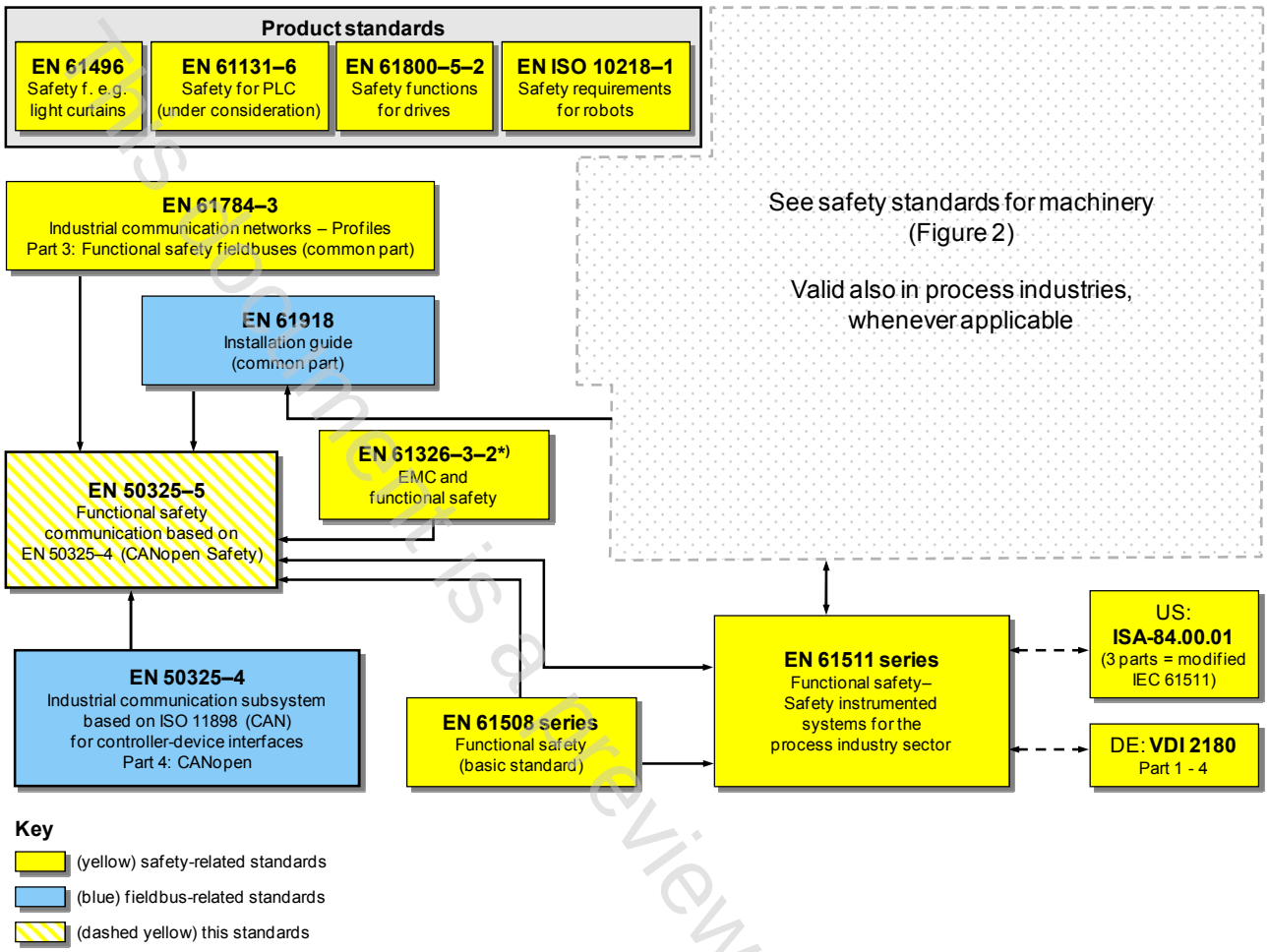
Figure 2 shows the relationships between this standard and relevant safety and fieldbus standards in a machinery environment.



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

Figure 2 — Relationships of EN 50325–5 with other standards (machinery)

Figure 3 shows the relationships between this standard and relevant safety and fieldbus standards in a process environment.



* For specified electromagnetic environments; otherwise EN 61326-3-1.

Figure 3 — Relationships of EN 50325–5 with other standards (process)

In other environments than machinery and process control, like for example medical devices or railway systems, other standards instead may apply. The user of this standard has to take care that all related standards for the corresponding environment are considered.

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

The safety communication layer 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 safety communication profile.

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

This European Standard covers:

— individual description of the functional safety profile for the communication profile defined in EN 50325-4;

— safety layer extensions to the communication object and object dictionary sections in EN 50325-4.

1 Scope

This European Standard specifies a safety-related communication layer (services and protocol) based on EN 50325-4.

This European Standard applies to networks based on EN 50325-4 providing safety-related communication capabilities between devices in a safety-related system in accordance with the requirements of EN 61508 series for functional safety. The services and protocols defined in this standard are intended to extend those defined in EN 50325-4. These services and protocols may be used in various applications such as manufacturing, machinery, medical, mobile machinery and process control.

NOTE 1 This European Standard does not cover the procedures for the safety-related configuration and for the safety-related setup of safety-related systems. The definition and implementation of such procedures depends on the kind of the safety-related system. For example flexible safety-related systems like operating theatres as found in medical systems require different procedures than for fixed safety-related systems like cranes in the mobile machinery. This European Standard does not cover electrical safety, intrinsic safety and security aspects. Electrical safety relates to hazards such as electrical shock. Intrinsic safety relates to hazards associated with potentially explosive atmospheres. Security relates to enforcing policies to prevent changes in the safety-related system by unauthorized personnel.

NOTE 2 The resulting safety integrity level claim of a system depends on the implementation of the services and protocols within the devices and the system. The implementation of the services and protocols defined in this European Standard in a device is not sufficient to qualify the device as a safety-related device.

2 Normative references

EN 50325-4, *Industrial communications subsystem based on ISO 11898 (CAN) for controller-device interfaces - Part 4: CANopen*

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

EN 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 61326-3-1)

EN 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 61326-3-2)

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

EN 61784–3:2008, *Industrial communication networks - Profiles – Part 3: Functional safety fieldbuses - General rules and profile definitions* (IEC 61784-3:2007)

EN 61918, *Industrial communication networks - Installation of communication networks in industrial premises* (IEC 61918)

EN ISO 13849-1, *Safety of machinery – Safety-related parts of control systems – Part 1: General principles for design*

ISO 11898-1, *Road vehicles - Controller area network (CAN) – Part 1: Data link layer and physical signalling*

3 Terms, definitions, symbols, abbreviated terms and conventions

For the purposes of this document, the following terms and definitions apply.

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 61784–3, EN 50325-4 and the following apply.

3.1.1
logical device
representation of a program in terms of its objects from one device profile segment (see EN 50325-4) and behaviour as viewed through a network

3.1.2
SR application object
application object in accordance with EN 50325-4 that includes all necessary measures to ensure its integrity with the requirements of EN 61508 series

3.1.3
SR communication profile and protocols
communication profile and protocols that include all the necessary measures to ensure safe transmission of data and the necessary measures to ensure safe configuration with the requirements of EN 61508 series

3.1.4
SR device
composition of regular communication profile and protocols as defined in EN 50325-4, SR communication profile and protocols, regular logical devices and SR logical devices

3.1.5
SR logical device
logical device that includes all necessary measures to ensure safe operation with the requirements of EN 61508 series

3.2 Symbols and abbreviated terms

For the purposes of this document, the following abbreviations apply.

3.2.1 Common symbols

CAN	Controller Area Network	[ISO 11898-1]
CAN-ID	CAN Identifier	[ISO 11898-1]
COB	Communication Object	[EN 50325-4]
COB-ID	COB Identifier	[EN 50325-4]
CRC	Cyclic Redundancy Check	
DLL	Data Link Layer	[ISO/IEC 7498-1]
E/E/PE	Electrical/Electronic/Programmable Electronic	[EN 61508-4]
EMC	Electromagnetic Compatibility	
EUC	Equipment Under Control	[EN 61508-4]
FAL	Fieldbus Application Layer	[EN 61784–3]
FCS	Frame Check Sequence	
FSCP	Functional Safety Communication Profile	[EN 61784–3]