

ICS 25.040
CCS N 10



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 34040-2017

**Industrial communication networks -- Functional safety fieldbus
profiles -- General rules and profile definitions**

工业通信网络 功能安全现场总线行规 通用规则和行规定义

(English Translation)

Issued on: July 31, 2017

Implemented on: February 1, 2018

**Issued by: General Administration of Quality Supervision, Inspection and
Quarantine of the People's Republic of China, Standardization
Administration of the People's Republic of China**

Table of Contents

Foreword	
Introduction	
1 Scope	
2 Normative references	
3 Terms, definitions, symbols, abbreviations and conventions	
3.1 Terms and definitions	
3.2 Symbols and Abbreviations	
4 Consistency	
5 Basis for safety-related fieldbus systems	
5.1 Safety Function Decomposition	
5.2 Communication System	
5.3 Communication Error	
5.4 Certain Remedies	
5.5 Typical Relationship Between Errors and Safety Measures	
5.6 Communication Phase	
5.7 FSCP Implementation	
5.8 Data Integrity Considerations	
5.9 Functional Safety and Information Security	
5.10 Boundary conditions and restrictions	
5.11 Installation Guide	
5.12 Safety Manual	
5.13 Security Policy	
6 Communications Line Regulation 1 (FOUNDATION TM Fieldbus) Functional Safety Profile	
7 Communication Line Family 2 (CIPT TM) and Communication Line Family 16 (SERCOS) Functional Safety Line	
8 Communications Line Regulation 3 (PROFIBUS TM and PROFINET TM) Functional Safety Profiles	
9 Communications Line 6 (INTERBUS) Functional Safety Line	
10 Communications Line Regulation 8 (CC-Link TM) Functional Safety Regulation	
10.1 Functional Safety Communications Line Regulations 8/1	
10.2 Functional Safety Communications Regulations 8/2	
11 Communications Lineage 12 (EtherCAT TM) Functional Safety Practices	

12	Communication Line Family 13 (EthernetPOWERLINK™) Functional Safety Profile
13	Communications Line Regulation 14 (EPA) Functional Safety Practices
14	Communication Routine 17 (RAPIEnet™) Functional Safety Practices
15	Communication Line Regulation 18 (SafetyNETp™ Fieldbus) Functional Safety Regulation
	Appendix A (informative) Functional safety communication model example
	Appendix B (Normative) Secure Communication Channel Model Based on CRC Error Detection
	Appendix C (Informative) Structure of Specific Parts of Technology
	Appendix D (Informative) Evaluation Guide
	Appendix E (Informative) Explicit FSCP and Implicit FSCP Security Examples
	Appendix F (informative) Expanded model for assessing the total residual error rate
	References

Foreword

This standard was drafted in accordance with the rules given in GB/T 1.1-2009.

This standard uses the translation method identical with IEC 61784-3:2016 (3rd Edition) "Industrial Communication Network Regulations Part 3. Functional Safety all fieldbus generic rules and regulations defined. " this standard made the following editorial changes.

--- Modify the standard name;

--- Removed the English standard on the field bus various types of trademark footnote.

This standard is proposed by the China Machinery Industry Federation.

This standard by the National Institute of Industrial Process Control and Automation Standardization Technical Committee (SAC/TC124) centralized.

This standard was drafted unit. Mechanical Industry Instrumentation Technology and Economy Institute, Shenyang Branch Ke Micro-Technology Co., Ltd., Beijing Machinery Industry Automation Institute.

Introduction

0 Introduction

0.1 Overview

The IEC 61158 fieldbus standard and its companion standards IEC 61784-1 and IEC 61784-2 define a common set of communication protocols Achieve automated application

of distributed control. Fieldbus technology is now generally accepted and proved viable. Therefore, the fieldbus technology is not Rising, involving real-time, functional safety-related and information security-related applications.

This standard and other parts of IEC 61784-3- x standards defined in line with GB/T 20438 series of standards related to functional safety communications Principle, a number of standardized safety communication layer (line rules and the corresponding agreement), but does not include electrical safety and intrinsic safety aspects. These safe pass the signaling layer is based on the protocol layers of the IEC 61784-1, IEC 61784-2 communication regulations and the IEC 61158 series of standards.

Figure 1 shows the standard and other IEC 61784-3- x standards and the various parts of the mechanical environment and the field bus between the safety standards relationship.

Note 6: 7.6.4 (High Complexity) and 6.7.8.1.6 (Low Complexity) in IEC 62061 define the relationship between PL (category) and SIL.

Figure 1 This standard and other IEC 61784-3- x each part of the standard and other standards (machinery) relationship

Figure 2 shows the standard and other IEC 61784-3- x standards and the various parts of the process environment and the field bus between the safety standards relationship.

a For a defined electromagnetic environment, otherwise IEC 61326-3-1.

Figure 2 This standard and other IEC 61784-3- x each part of the standard and other standards (process) relationship

According to GB/T 20438 series of standards to achieve safety communication layer as part of safety-related systems for safety-related systems the transmission of messages (messages) between two or more participants in a fieldbus provides the necessary level of confidence or error or loss in the fieldbus in the case of security to provide sufficient credibility.

This standard and other IEC 61784-3- x standards for each part of the safety communication layer, the field bus can be used to require functional safety of up to to Safety Integrity Level (SIL), which is specified by its corresponding Functional Safety Communications Profile.

The final SIL declaration for a system depends on the implementation of the FSCP for the selected function within the system -Prepared to achieve functional safety communications regulations is not sufficient to prove that the device is a safety device.

IEC 61784-3 is a series of standards, each part of the standard number and content are as

follows.

--- IEC 61784-3 (this standard) as a common part of the definition of the realization of GB/T 20438 series of standards on safety-related data communications the basic principles required, including possible transmission failures, remedial measures and considerations affecting data integrity;

--- IEC 61784-3- x Each part of the standard technology-related part of the IEC 61784-1 and IEC 61784-2 in the various communications line regulation Respectively, defines the functional safety communication line regulation (where x is the communication line family number), including the IEC 61158 series of standards pass Security services layer extensions to the messaging services and protocols section.

Therefore, "this standard" in this document refers only to the general part of the IEC 61784-3 series of standards.

0.2 IEC 61784-3 3rd edition Evaluation method for version 2 extensions

This standard corresponds to the general part of the IEC 61784-3 (3rd edition) series of standards, contains a number of additional extensions. After that will make Use these models to evaluate the total residual error rate of a FSCP. Its value can be used to determine if the FSCP meets the functional safety of a given SIL Full application requirements. Appendix E and Appendix F describe these extended models for qualitative and quantitative safety determination methods in detail.

In addition, due to the typical duration of the evaluation process, only FSCPs released prior to or simultaneously with the generic part of this new version (version 3) Use the previous version (version 2) of the method of assessment, that is based on the standard 5.8 data integrity considerations.

The Validity Framework in Figure 3 gives the extended method from the original Evaluation Method Version 2 (specified in 5.8) to the Version 3 Extension Method (currently in Appendix F in the provisions of the transition method). Under this framework, a new assessment of FSCP is not conducted in accordance with Annex F until IEC 61784-3 (4th edition) Replace 5.8 with the current Appendix F.

Note: However, a specific FSCP may complete the evaluation earlier and issue an appropriate fix.

Description.

DI --- Data Integrity (DataIntegrity);

TADI --- Timeliness, Authenticity, Data Integrity;

IS --- International Standard (InternationalStandard);

CD --- Committee Draft (CommitteeDraft);