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GB/T 46933.4-2025

Safety and security integration of smart factories - Part 4: System evaluation requirements

智能工厂安全一体化 第4部分：系统评测要求

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Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part

1.Structure and Drafting Rules of Standardization Documents". Drafting. This document is Part 4 of GB/T 46933 "Integrated Safety in Smart Factories". GB/T 46933 has already published the following parts.

1.General Requirements;

2.Risk Assessment Requirements;

3.System Co-design Requirements;

4.System Evaluation Requirements. Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents. This document was proposed by the China Machinery Industry Federation. This document is under the jurisdiction of the National Technical Committee on

Standardization of Industrial Process Measurement, Control and Automation (SAC/TC124). This document was drafted by: the Mechanical Industry Instrumentation Comprehensive Technology and Economic Research Institute, Supcon Technology Co., Ltd., and Shaanxi Yanchang Petroleum. Yulin Kekegai Coal Industry Co., Ltd., Oil and Gas Control Center of China Oil & Gas Pipeline Network Corporation, Shanghai Energy Construction Engineering Design Institute Research Institute Co., Ltd., China Unicom (Shaanxi) Industrial Internet Co., Ltd., Dongfang Electric Group Digital Technology Co., Ltd., Ningbo Hollysys Information Security Research Institute Co., Ltd. The main drafters of this document are. Liu Yao, Zhu Minglu, Liu Quanhu, Shuai Bing, Lü Feng, Mei Ke, Shi Xueling, Zhu Jie, Huang He, Xiong Wenze, and Sun Yongkang. Wu Haifeng, Wu Lei, Hao Xin, Ren Zhigang, Wang Xiaopeng, Liu Lisan, Huang Liang, Li Chengpeng, Fan Yongfeng, Yang Liu, Zhou Youzheng, Zhao Yanling, Ma Xinxin, Zhou Li Nie Zhongwen, Zhang Jinbin, Qiu Kun, Wang Qingcang, Li Shouqing, Liu Ying, Zhang Yabin, Guo Miao.

Traditional factories generally adopt GB/T 20438 (all parts) "Functional Safety of Electrical/Electronic/Programmable Electronic Safety Related Systems" and Application field standards [such as GB/T 21109 (all parts) "Functional Safety of Safety Instrumented Systems in Process Industries", GB/T 16855 (the relevant standard)] (Some parts) "Safety-Related Components of Mechanical Safety Control Systems", GB 28526 "Electrical Safety of Machinery - Safety-Related Electrical, Electronic and Programmable Components" Functional safety is achieved by adhering to GB/T 35673 "Industrial Communication Network and System Security" to ensure the functional safety of electronic control systems. Industrial control system information security is achieved through standards such as "System Security Requirements and Security Levels". Technically, relatively independent electrical and electronic programmable logic controllers (PLCs) are generally used. Electronic or mechanical protection systems are generally isolated or have limited connections between different systems. Functional safety systems and information security protection also... Relatively independent settings. With the development of smart factories, more and more intelligent and information technologies are being applied to industrial control systems, and various aspects of smart factories are becoming increasingly important. Deeper interconnectivity has been achieved between and within the same hierarchical structure of devices/systems. This has improved the efficiency of industrial operators and reduced costs. However, this also increases system complexity and brings new challenges to traditional production operation risk control. On the one hand, traditional functional safety technologies... Applications such as safety instrumented systems face more complex application environments (e.g., information security threats such as hacker attacks and malware, and artificial intelligence AI). (such as the risk of loss of control), its original risk reduction ability is weakened; on the other hand, the increase in external influencing factors and the enhanced correlation between various units make the original risk reduction ability weakened. The applicability of risk protection theories decreases; finally, the interaction and integration among different security protection

measures intensifies potential conflicts and contradictions. Therefore, smart factories need to adopt an integrated safety approach to achieve comprehensive safety protection throughout the entire lifecycle. GB/T 46933, "Integrated Safety in Smart Factories," aims to guide smart factories in establishing an integrated safety lifecycle and to address risk assessment. The requirements for estimation, collaborative design, and evaluation and verification are proposed and consist of four parts.

1.General Requirements. The purpose is to outline the overall requirements for the integrated security lifecycle, and to achieve integrated security. Basic principles.

2.Risk Assessment Requirements. The purpose is to outline the procedures and requirements for conducting integrated safety risk assessments.

3.System Collaborative Design Requirements. The aim is to address the manufacturing execution layer, process monitoring layer, and field control layer of a smart factory. The system requires collaborative design with the field equipment layer.

4.System Evaluation Requirements. The purpose is to propose methods and requirements for conducting integrated security capability evaluations. This document clarifies the objects, objectives, stages, personnel, and activity requirements for integrated safety assessment of smart factories, and provides the assessment steps. Evaluation metrics and methods can guide relevant parties in understanding the interplay between functional safety and information security in smart factories, as well as conflict mitigation/coordination. We will conduct assessments on the same level of protection in order to achieve a high level of safety in smart factories and provide safety guarantees for high-quality development in various production fields. Smart factory safety integration Part

1 Scope

GB/T 46933.4-2025 is the Chinese national standard covering evaluating a smart factory's combined safety and security - what evidence is examined, the tests performed on the integrated system, and the criteria for judging whether the safety functions survive the security threats and the security controls do not defeat the safety functions. Part 4 of the series, first edition, 22,500 words, with Part 2 on risk assessment. It was issued on 31 December 2025 and has been in force since 1 July 2026, as a first edition. The document is under the responsibility of the China Machinery Industry Federation. This page is published from the official record of the 2025 edition; the clause text of a standard this recent is not yet in circulation, and the figures, limits and tables it contains are those of the document itself, delivered in full with the English translation.

This document specifies the general requirements for the evaluation of integrated security systems, the implementation requirements for system evaluation, and the requirements for system evaluation reports. This document is applicable to users, evaluation and certification bodies, and other independent or non-independent organizations assessing the level of

integrated security collaboration in smart factories. Related system evaluation activities.

2 Normative references

The contents of the following documents, through normative references within the text, constitute essential provisions of this document. Dated citations are not included. For references to documents, only the version corresponding to that date applies to this document; for undated references, the latest version (including all amendments) applies. This document.

GB/T 20438.4 Functional safety of electrical/electronic/programmable electronic safety-related systems - Part

3 Terms and Definitions

The terms and definitions defined in GB/T 46933.1, GB/T 20438.4, and GB/T 21109.1, as well as the following terms and definitions, apply to this document.

3.1 Risk reduction factor (RRF) The safety function requirement is the reciprocal of the probability of hazardous failure (PFD), which is a measure of the risk reduction capability provided by the safety function.

4.Abbreviations The following abbreviations apply to this document. DoS. Denial of Service SL. Security Level

4 Definitions and abbreviations

GB/T 21109.1 Functional safety of safety instrumented systems for process industries - Part

1.Framework, definitions, systems, hardware and applications Programming requirements

GB/T 46933.1 Smart Factory Safety Integration - Part