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

GB/T 44693.2-2024

**Process stability of hazardous chemical enterprises - Part 2:
Technical specification for control loop performance evaluation
and optimization**

危险化学品企业工艺平稳性 第2部分：控制回路性能评估与优化

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Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part

1. Structure and drafting rules for standardization documents" Drafting. This document is Part 2 of GB/T 44693 "Process stability of hazardous chemical enterprises". GB/T 44693 has been published as follows part.

1. Management guidelines;

2. Technical specifications for control loop performance evaluation and optimization. Please note that some of the contents of this document may involve patents. The issuing

organization of this document does not assume the responsibility for identifying patents. This document was proposed and coordinated by the National Technical Committee for Standardization of Hazardous Chemicals Management (SAC/TC251). This document was drafted by: Sinopec Safety Engineering Research Institute Co., Ltd., Chemical Registration Center of the Ministry of Emergency Management, Sinopec National Petrochemical Project Risk Assessment Technology Center Co., Ltd., Sinopec Qingdao Refining and Chemical Co., Ltd., Sinopec Zhen Hailianhua Branch, Beijing University of Chemical Technology, Supcon Technology Co., Ltd., Tianjin Bohai Chemical Development Co., Ltd., Wanhua Chemical Group Co., Ltd. Co., Ltd., Sinochem Blue Sky Group Co., Ltd., Shandong Huaxia Shenzhou New Materials Co., Ltd., China Petroleum Engineering Construction Co., Ltd. North China Branch Company, Nantong Xingchen Synthetic Materials Co., Ltd., Chongqing Chuanyi Control Valve Co., Ltd., Anhui Jinhe Industrial Co., Ltd., Shandong Haihua Longxin Materials Co., Ltd., Shanghai Huayi Tianyuan Chemical Logistics Co., Ltd., Zhejiang Quzhou Guibao Chemical Co., Ltd., Ningbo Bohui Chemical Technology Co., Ltd., Dalian Qikai Pharmaceutical Technology Co., Ltd., Shandong Haiwang Chemical Co., Ltd., Shanxi Fuhengdi New Materials Co., Ltd. Company, Fujian Jianya Chemical Co., Ltd. The main drafters of this document are. Yang Zhe, Xu Wei, Gou Chengdong, Gao Xinjiang, He Yadong, Wang Chunli, Li Chuankun, Liu Gehong, Sun Bing, Du Yanhua, Zhang Zhe, Zhang Jiedong, Zhang Shuai, Chen Xin, Wang Feng, Li Rongqiang, Jiang Weiwei, Yang Yong, Wang Ting, Yang Zhanqiang, Geng Zhiqiang, Yuan Zhuang, Wu Chuanpeng, Lin Yang, Chen Guoxin, Tong Bufan, Tang Zaifeng, Jiang Jiande, Sun Chuanyi, Chen Qiang, Chen Wu, Zhou Zhongze, Wang Liang, Hu Chuan, Lu Rongbo, Liu Fa'an, Zhang Jian, Liu Xiaoqiang, Yang Le, Xu Jiade, Zhan Jiangqin, Li Chonghe, Jin Bihua, Zhang Hongxue, Sun Tongjiang, Chai Juncai, Zheng Hua.

Process stability is the basis for the sustainable development and innovation of hazardous chemical production enterprises. The status quo of process management in chemical production enterprises, the construction of GB/T 44693 "Process stability of hazardous chemicals enterprises" comprehensive management system, innovation and upgrading The first-level process management model builds a scientific, efficient and standardized process operation control mechanism to effectively prevent and resolve hazardous chemicals. To reduce major safety risks in manufacturing enterprises, it is of great significance to ensure the smooth and safe production process. GB/T 44693 "Process Stability of Hazardous Chemicals Enterprises" is planned to consist of 6 parts.

- 1.Management guidelines. The purpose is to determine the general principles and relevant requirements that need to be followed for process stability management.
- 2.Technical specification for control loop performance evaluation and optimization. The purpose is to provide control loop performance evaluation and optimization for process stability management. Provides actionable and verifiable methods for assessment and optimization.

3. Standard operating procedures preparation and use specifications. The purpose is to clarify the standard operating procedures in process stability management (Work Instructions) Principles and requirements that need to be followed in writing and using.

4. Start-up process management specifications. The purpose is to determine the requirements for the start-up management of the device in process stability management. basic principles and working norms.

5. Technical specification for process alarm optimization. The purpose is to provide operational A proven method.

6. Technical specifications for key performance indicators. The purpose is to provide operational, Verifiable indicators and calculation methods. As a key component of the basic process control system of hazardous chemical production enterprises, the control loop integrates sensors, actuators, According to the specific needs of the actual production equipment, multiple control loops can be flexibly combined to build a variety of These control loops continuously monitor process parameters and implement precise adjustments. Control effectively reduces the interference of parameter fluctuations on the production process, reduces the intervention of manual operation, ensures the stability of production, and improves product quality and production efficiency, providing a solid guarantee for production safety and helping enterprises achieve the goal of energy conservation and emission reduction. As the operating cycle lengthens and the operating conditions change, the performance of the control loop tends to gradually decline. Therefore, in order to ensure the control system To ensure long-term efficient and stable operation, continuous performance evaluation and optimization of the control loop is particularly important, which is to maintain a smooth, safe and environmentally friendly production process. Necessary measures to ensure efficient operation. This document effectively regulates the performance evaluation and optimization technology of control loops in hazardous chemical production enterprises and defines the control loop The terminology and models for performance evaluation and optimization are established, and the recommended technical methods for effectively evaluating and optimizing control loop systems are established, which can effectively guide The company promptly discovered control loops with performance problems, and diagnosed and optimized the causes of poor performance, improving the control loops of the device. Performance ensures safe and efficient operation of the production process. Process stability of hazardous chemical enterprises Part

2. Technical specifications for control loop performance evaluation and optimization

1 Scope

GB/T 44693.2-2024 is Part 2 of the Chinese series on process stability in hazardous chemical plants, and covers the performance of the regulatory control loops. It rests on an observation that anyone who has looked at a DCS knows: a large fraction of loops in a running plant are in manual, oscillating, or detuned to the point of doing nothing, and an

unstable plant is an unsafe one, because operators intervene more often, alarms lose meaning and the process spends more time near its limits. Part 2 sets the general requirements and the management of the basic loop information, then the performance evaluation - its scope, the data collection and processing, the assessment of the single loop and the comprehensive assessment across the unit - the performance diagnosis that identifies the cause, whether valve, tuning, interaction or disturbance, and the optimisation, covering the preparation, the execution including maintenance and repair and retuning, and the verification of the result. It takes effect on 1 April 2025.

This document specifies the overall requirements for control loop performance evaluation and optimization technology for hazardous chemical production enterprises, as well as basic information management, Requirements for performance evaluation, performance diagnosis and performance optimization describe the verification methods. This document is applicable to the control loop performance evaluation and optimization of basic process control systems of hazardous chemical production enterprises.

Note. In order to avoid confusion, the "hazardous chemical production enterprises" in this document are hereinafter referred to as "enterprises".

2 Normative references

The contents of the following documents constitute essential clauses of this document through normative references in this document. For referenced documents without a date, only the version corresponding to that date applies to this document; for referenced documents without a date, the latest version (including all amendments) applies to This document.

GB/T 31497 Information technology security technology Information security management Monitoring, measurement, analysis and evaluation

GB/T 44693.1 Process stability in hazardous chemical enterprises Part

3.1 Terms and Definitions The terms and definitions defined in

GB/T 44693.1 and the following apply to this document.

3.1.1 control loop In an automatic control system, the basic control unit consists of sensors, actuators, controllers and signal processors.

Note. The controller automatically adjusts the controller input by comparing the difference between the measured value of the controlled variable from the sensor and the expected value of the system, so that the controlled variable approaches Expected value.

3.1.2 The ability to quickly, accurately, and stably control the controlled variables to follow the expected values when faced with changes in internal system parameters or external disturbances.