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Oil and gas pipeline control systems - Electrical protection requirements for I/O interfaces

油气管道控制系统 I/O接口电气防护应用要求

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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. 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: University of Electronic Science and Technology of China, China Pipeline Network Corporation Western Pipeline Co., Ltd., and Machinery Industry Instrumentation Technology Co., Ltd. Technical Economics Research Institute, South China Branch of China Oil & Gas Pipeline Network Corporation, Oil & Gas of China Oil & Gas Pipeline Network Corporation Control Center, Gansu Branch of China Oil & Gas Pipeline Network Corporation, Storage & Transportation Technology Development Co., Ltd. of China Pipeline Network Corporation, Electronic Advanced Research Institute of Shenzhen University of Science and Technology, Chengdu University of Information Technology, Beijing Ankong Oil & Gas Technology Co., Ltd., and Supcon Technology Co., Ltd. The company, Hangzhou Hollysys Automation Co., Ltd., China Electronics Intelligent Technology Co., Ltd., CGN Digital Technology Co., Ltd., Chengdu Youyida Technology Co., Ltd. Limited Liability Company. The main drafters of this document are. Bai Libing, Huang Zhongsheng, Wang Min, Zhang Ping, Wang Qingliang, Wang Chengcheng, Zhang Xinyong, Liao Xingwan, Lü Feng, Zhou Quan, and Li Jiafu. Liu Xiaokai, Li Guoming, Zhang Wei, Ma Yanbao, Zhang Jie, Yang Wen, Zhang Maomao, Gu Ziqiang, Tian Lulu, Liu Gongyin, Kang Bo, Chen Cong, Xiahou Shiji, Ai Jiangshan Ding Jianhui, Wang Hui, Sun Tieliang, Guan Rui, Tan Xing, Wang Zicong, Liu Chao, Zhang Haining, Cao Yongle, Wang Wenming, Lin Bin, Sun Xiangdong, Hu Xiao, Wang Guowei Li Jian, Liu Chenxu, Zhang Hongliang, Zheng Yali, Lin Zhenchang, Zhang Li, Guo Feng, Hu Fabin.

Oil and gas pipelines include pipeline routes, oil (gas) transportation stations, valve chambers, and ancillary facilities. The oil and gas pipeline control system consists of station control systems and central control systems. The system consists of measurement and control equipment and a communication network, and is divided into a process monitoring layer, a field control layer, and a field equipment layer. Current documents standardize the field... The electrical protection requirements for the control layer and field device layers do not specify the electrical protection requirements for the I/O interfaces connecting the two. Excessive electrical protection can frequently lead to I/O interface failures or malfunctions. This document includes the relevant technical requirements for the electrical protection of I/O interfaces. This provides a basis for online detection and diagnosis of I/O interface faults or failures. Oil and gas pipeline control system I/O interface electrical protection application requirements

1 Scope

GB/T 46890-2025 is the Chinese national standard covering protecting the input and output cards of a pipeline control system - the surges from lightning and from the induced voltage

a pipeline picks up running for hundreds of kilometres beside power lines, and the isolation and arrestors that keep them out of the controller. First edition. 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 principles for I/O interfaces of oil and gas pipeline control systems, electrical protection design requirements, performance requirements, and management requirements, and describes... The corresponding testing methods were developed. This document applies to the design, manufacture, use, and maintenance of electrical protection for I/O interfaces in oil and gas pipeline control systems.

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 16935.1-2023 Insulation Coordination of Equipment in Low-Voltage Power Supply Systems - Part

3 Terms and Definitions

The terms and definitions defined in GB/T 35068-2018, GB/T 50892-2013, and SY/T 7031-2016, as well as the following terms and definitions, apply to this. document.

3.1 electrical stress When an electric current passes through a conductor, the Joule heating effect or electromagnetic force generates heat inside the conductor, leading to material fatigue, aging, and even... The stress that caused the failure.

3.2 A system consisting of station control system, central control system, measurement and control equipment, and communication network.

4 General Principles

The input/output interfaces (hereinafter referred to as "I/O interfaces") of the oil and gas pipeline control system are mainly located between the field control layer and the field equipment layer. The input interface is used to receive status parameters measured by instruments or sensors, and the output interface is used to send control commands to actuators and oil/gas pipes. The schematic diagram of the road control system structure is

shown in Figure 1.