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GB/T 46568.1-2025

Intelligent instruments reliability - Part 1: Reliability test and evaluation methods

智能仪器仪表可靠性 第1部分：可靠性试验与评估方法

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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 1 of GB/T 46568 "Reliability of Intelligent Instruments". GB/T 46568 has already published the following parts.

1.Reliability Testing and Evaluation Methods;

2.Test methods for enhancing the reliability of electrical systems. 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 Institute of Comprehensive Technology and Economics of Instrumentation and Meter of the Machinery Industry, Southwest University, Sinopec Safety Engineering Research Institute, and Chongqing. Science and Technology Testing Center, Beijing Satellite Environmental Engineering Research Institute, Chongqing Saibao Industrial Technology Research Institute Co., Ltd., and Guangdian Measurement and Testing Group Co., Ltd. Limited Liability Company, Shenzhen Wanxun Automation Co., Ltd., Harbin University of Science and Technology, University of Electronic Science and Technology of China, China Electric Power Research Institute Co., Ltd. The company, Mianyang Weibao Electronics Co., Ltd., China Jiliang University, Hangzhou Wolai Intelligent Technology Co., Ltd., and Zhejiang Wansheng Intelligent Technology Co., Ltd. Technology Co., Ltd., Chongqing Industrial Automation Instrumentation Research Institute Co., Ltd., Zhejiang Provincial Academy of Quality Sciences, Hefei Jinxing Intelligent Control Technology Co., Ltd. Technology Co., Ltd., Huizhong Instrument Co., Ltd., Shenzhen Tean Electronics Co., Ltd., Jinka Smart Group Co., Ltd., Tianxin Instrument Group Co., Ltd., Metzel Instrument (Changzhou) Co., Ltd., Yantai Oriental Weston Electric Co., Ltd., Beijing Shouke Shihua Automation Equipment Co., Ltd., Wuxi Yadi Fluid Control Technology Co., Ltd., Guangdong Kejian Testing Engineering Technology Co., Ltd., Huace Testing & Certification Group Group Co., Ltd., Shanghai Mingkong Sensing Technology Co., Ltd., Shengli Oilfield Dongqiang Electromechanical Equipment Manufacturing Co., Ltd., Shandong Huaruida Industrial Co., Ltd. Equipment Co., Ltd., Chengdu Jiujin Technology Co., Ltd., MicroSensor Co., Ltd., Xi'an Aohua Electronic Instruments Co., Ltd. Qingdao Huiying Technology Co., Ltd., Pulimo Intelligent Technology (Shanghai) Co., Ltd., Yangzhou Power Equipment Repair and Manufacturing Plant Co., Ltd., Beijing Jieyite Technology Development Co., Ltd., Xiamen Yudian Automation Technology Co., Ltd., Xinjiang Jinniu Energy Internet of Things Technology Co., Ltd., Kenzo Control Equipment (Shanghai) Co., Ltd., Tegaan (Shanghai) Technology Co., Ltd., Kaifeng University, Kaifeng Songyi Measurement Technology Development Co., Ltd. The main drafters of this document are. Wang Chengcheng, Wang Chunxi, Cao Deshun, Qin Taichun, Zhou Xuelian, Yan Jiangbao, Liu Feng, Yuan Fei, Li Qiang, and Zhao Kelun. Qi Jia, Wei Kunlun, Liu Yu, Li Dong, Hong Tao, Guo Bin, Hu Xiaofeng, Chen Yan, Li Na, Dai Siyang, Xu Changhong, Huang Chengjun, Sun Yongquan, Xiahou Tangfan Peng Zhenghong, Pan Congyuan, Chen Hui, Yan Han, Lin Mingxing, Tao Chaojian, Liu Xiao, Tu Binbin, Yang Di, Wang Dongchang, Pan Dipin, Zhu Rongting, Fang Zimin, Chen Qianyong Chen Qingrong, Gao Jingwei, Liu Naiyu, Yuan Shengli, Gui Yongbo,

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High stability, high reliability, and high intelligence are the main trends in the development of modern instrumentation. Through reliability testing and evaluation, the intelligence level can be clearly defined. The reliability level of instruments and meters reveals weaknesses and hidden dangers in the design of intelligent instruments and meters, providing direction for decision-making and improvement. The "Reliability of Intelligent Instruments" series of standards provides unified objectives and standardized testing methods for reliability testing and evaluation of intelligent instruments. The evaluation procedures and specific operational methods ensure the scientific rigor, completeness, and operability of the testing and evaluation process. Because there are many types of reliability tests for intelligent instruments and meters, and the methods vary greatly, GB/T 46568 "Intelligent Instruments and Meters" is used as the standard. The "Reliability" standard specifies the testing and evaluation methods for different types of intelligent reliability. It is proposed to consist of four parts.

1.Reliability Testing and Evaluation Methods. The purpose is to specify general reliability testing and evaluation methods for intelligent instruments. method.

2.Reliability Enhancement Test Methods for Electrical Systems. The purpose is to introduce newly introduced reliability enhancement test methods. Detailed regulations and requirements shall be provided.

3.System Reliability Assessment Methods. The aim is to provide systematic reliability assessments for relatively complex intelligent instruments. The evaluation methodology is specified.

4.Fault Diagnosis and Health Management Methods. The purpose is to specify fault diagnosis and health management methods for intelligent instruments and meters. This method aims to improve the quality and reliability of instruments throughout their entire lifecycle. GB/T 46568 is formulated specifically for the characteristics, basic functions, and technical performance of intelligent instruments and meters. For similar intelligent non-instrumental instruments... For the table, the relevant parts of GB/T 46568 can be used for reliability testing and evaluation. Reliability of intelligent instruments and meters Part

1 Scope

GB/T 46568.1-2025 is the Chinese national standard covering establishing how reliable an instrument is - the test plans and the acceleration factors, the failure definitions and the classification of what counts as a relevant failure, and the statistical evaluation that turns a handful of failures into an MTBF anyone should believe. At 20,000 words. Part 1 of the series, with the enhancement test method in Part 2. First edition, in force from 1 May 2026. Issued on 31 October 2025, it has been in force since 1 May 2026.

This document specifies the reliability indicators and target values, and fault criteria for reliability testing and evaluation of intelligent instruments and meters. It also describes the reliability testing... Test methods, reliability test implementation and evaluation methods. This document applies to the reliability testing and evaluation of intelligent instruments and meters.

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 2900.99-2016 Reliability of Electrical Engineering Terminology

GB/T 3358-2009 (All Parts) Statistical Terminology and Symbols

GB/T 5080.4-1985 Point and Interval Estimation Methods for Reliability Testing of Equipment (Exponential Distribution)

GB/T 18271.1-2017 General performance evaluation methods and procedures for process measurement and control devices - Part

3 Terms and Definitions

The terms and definitions defined in GB/T 2900.99-2016 and GB/T 3358-2009 (all parts) as well as the following terms and definitions apply to this document.

3.1 Designed based on a microprocessor or microcomputer, it has functions such as data acquisition, processing, configuration, diagnosis, control and/or communication. A digital instrument capable of operating.

3.2 Based on the product's own test data, the values of reliability parameters are estimated using statistical numerical estimation theory.

3.3 A quantitative measure of product reliability; parameters that describe the reliability characteristics of a product.

3.4 reliability indexes Quantitative requirements for reliability characteristics of a product under specified conditions.