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

GB/T 20936.3-2017

**Gas detectors for explosive atmospheres -- Part 3: Guidance on
functional safety of fixed gas detection systems**

爆炸性环境用气体探测器 第3部分：固定式气体探测系统功能安全指南

(English Translation)

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Foreword

GB/T 20936 "explosive gas detector" is divided into several parts.

- Part 1. Flammable gas detector performance requirements;
- Part 2. Selection, installation, use and maintenance of combustible gases and oxygen detectors;
- Part 3. Fixed gas detection system Functional Safety Guide;

--- Part 4. Open path combustible gas detector performance requirements;

This section GB/T 20936 Part 3.

This section drafted in accordance with GB/T 1.1-2009 given rules.

This section uses the redrafted law Amendment uses IEC 60079-29-3:2014 "Explosive Environment Part 29-3. Gas detector solid Fixed gas detection system Functional Safety Guide. " this section and the main technical differences IEC 60079-29-3:2014 are as follows.

--- On the normative references, this section made a technical difference with the adjustment to the application of China's technical conditions, adjust the situation Concentration reflected in the second chapter "Normative references", the specific adjustments are as follows.

- GB/T 20438 (all parts) instead of IEC 61508 (all parts), the two parts of the standard consistency between the procedures Degree is as follows.

- Functional safety of electrical/electronic/programmable electronic safety-related systems GB/T 20438.1-2017 Part 1.

General requirements (IEC 61508-1:2010, IDT);

- Functional safety of electrical/electronic/programmable electronic safety-related systems GB/T 20438.2-2017 Part 2.

Requirements for electrical/electronic/programmable electronic safety-related systems (IEC 61508-2:2010, IDT);

- Functional safety of electrical/electronic/programmable electronic safety-related systems GB/T 20438.3-2017 Part 3.

Software Requirements (IEC 61508-3:2010, IDT);

- GB/T 20438.4-2017 Functional safety of electrical/electronic/programmable electronic safety-related systems - Part 4.

Definitions and Abbreviations (IEC 61508-4:2010, IDT);

- Functional safety of electrical and electronic/programmable electronic safety-related systems GB/T 20438.5-2017 Part 5.

Examples of methods for determining safety integrity levels (IEC 61508-5:2010, IDT);

- Functional safety of electrical/electronic/programmable electronic safety-related systems GB/T 20438.6-2017 Part 6.

Guidelines for the application of GB/T 20438.2 and GB/T 20438.3 (IEC 61508-6:2010, IDT);

- Functional safety of electrical/electronic/programmable electronic safety-related systems

GB/T 20438.7-2017 Part 7.

Overview of technologies and measures (IEC 61508-7:2010, IDT).

- GB/T 20936.1-2017 instead of IEC 60079-29-1, GB/T 20936.2-2017 instead of IEC 60079-29-2:2007, with GB/T 20936.4-2017 instead of IEC 60079-29-4, with GB/T 20438.1 instead IEC 61508-1, IEC 61508-2 with GB/T 20438.2 and IEC 61508-3 with GB/T 20438.3.

- Increased reference to GB/T 21109 (all parts) and GB/T 18268.1.

This section made the following editorial changes.

--- Modify the standard name.

This part is proposed by China Electrical Equipment Industry Association.

This part of the National Standardization Technical Committee explosion-proof electrical equipment (SAC/TC9) centralized.

This part of the drafting unit. Shanghai Industrial Automation Instrumentation Research Institute, Nanyang Institute of Explosion Electric Co., Ltd., CNOOC (China) Limited Company Shanghai Branch, Shenzhen Te An Electronics Co., Ltd., Han Wei Technology Group Co., Ltd., Wuxi Green Link Security Equipment Co., Ltd.

Division, British Sen Electric Systems (Shanghai) Co., Ltd., Huarui Scientific Instruments (Shanghai) Co., Ltd., Shanghai Instrumentation Automatic Control System Testing Institute.

Introduction

Fixed gas detection systems have been used for many years to perform safety instrumented functions. Like other instrumentation systems, fixed gas detection system A system typically contains single or multiple gas detector inputs, a control unit and one or more terminal components or outputs. Fixed gas exploration the measurement system may also include some additional peripherals, such as a gas sampling system or a gas conditioning system. If a fixed gas exploration Measuring Systems and Peripherals To achieve effective safety instrumented functions, the entire system must meet specific minimum standards and performance levels.

Safety Integrity Level (SIL) or SIL capability required for individual functional units, number of sensing points, mounting position, redundancy Degree, Routine Maintenance Management, Especially Response Check, Calibration, and Other Gas Detection Features (Such as Sampling System Design)

Table system integrity has a greater impact. However, independent functional integrity of each meter safety function should also be considered.

This section presents fixed, electronic/electrical/programmable electronic systems for risk

reduction or as an additional safety protection system Gas detection system minimum standards and performance levels.

This section does not apply to portable gas detectors or not for the purpose of reducing the risk of fixed gas detection system. But this section can be as best practice literature for such devices or systems.

This section refers to the "gas detection system", not only applies to the internal multi-level alarm and switch output independent gas detection it is also suitable for complex, stand-alone gas detection systems (see Appendix A Typical Applications).

This section considers the supply chain complexity that gas detector manufacturers, suppliers, and system integrators may encounter, including but not limited to.

--- Fixed gas detection equipment manufacturers, suppliers, system integrators will use a separate gas detector, and integrated into the overall safety System (or similar).

--- Fixed gas detector manufacturers, suppliers, system integrators to design and use of fixed gas detection subsystem, including the association and/or peripheral gas detection equipment and integrated into the overall safety system (or similar).

--- Design and use of a complete fixed gas detection system, including associated and/or peripheral gas detection equipment, and as a whole safety System-wide.

Note 1: GB/T 20438 Part 1, Part 2 and Part 3 specify the design of independent gas detectors, control units and terminal components. This section regulations Set the design guidelines for peripherals.

Before applying this section, you should first understand the application and classification of fixed gas detection system. There are three main types of applications.

--- As a precautionary system, the entire system or individual instrumentation control loop has safety features and clearly defined safety integrity.

--- As a mitigation system. The entire system or individual instrumentation control loop with safety features and clearly defined safety integrity.

--- As an additional safety protection system. Including and instrumentation safety systems parallel (standby) fixed gas detection system or independent the meter control loop needs to be operational only if the primary safety instrumented system fails or when another protective system fails.

In any case, the use of gas detection additional safety protection system should not be included in the hardware safety fault tolerance of the instrument safety system (HFT).

The fixed gas detection system shown in Figure 1 may be operated several times per year depending on the application and should therefore be specified according to safety requirements Rate (low demand mode), (eg, reference > 1 time/year, < 10 times/year).