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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 37157-2018

Safety of machinery -- Evaluation of fault masking serial connection of interlocking devices with potential free contacts

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Foreword

This standard was drafted in accordance with the rules given in GB/T 1.1-2009.

This standard uses the translation method equivalent to ISO /T R24119.2015 "Mechanical safety and protection devices combined with potential-free contacts

Evaluation of fault masking of series interlocking devices.

The documents of our country that have a consistent correspondence with the international documents referenced in this standard are as follows.

---GB/T 15706-2012 Mechanical Safety Design General Risk Assessment and Risk Reduction (ISO 12100.2010, IDT);

--- GB/T 16855.1-2018 Safety related parts of machinery safety control systems - Part 1. General rules

(ISO 13849-1.2015, IDT).

This standard has made the following editorial changes.

--- Change the standard name to "Evaluation of fault masking of non-potential contact interlocks in mechanical safety series";

--- Change MTTFd to MTTFD;

--- Change B10d to B10D.

This standard was proposed by the Jiangsu Provincial Bureau of Quality and Technical Supervision.

This standard is under the jurisdiction of the National Machinery Safety Standardization Technical Committee (SAC/TC208).

This standard was drafted. Nanjing Light Machine Packaging Machinery Co., Ltd., Chengdu Aerospace Kate Electromechanical Technology Co., Ltd., Anhui Ruishi Optoelectronic Technology

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Nanjing University of Science and Technology, China Machine Productivity Promotion Center, Nan'an Quality Measurement and Inspection Institute, Jinjiu Technology Co., Ltd., Guangdong Kejie Machinery Automation

Co., Ltd., Dongguan Machinery Industry Management Association, Xiamen Kunjin Electronic Technology Co., Ltd., Lihong Safety Equipment Engineering (Shanghai) Co., Ltd.

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1 Scope

This standard gives and explains that fault masking is interlocked with multiple series potential-free contacts connected to a logic unit (K) performing diagnostics.

The principle of the device (B1 ~ Bn) (see Figure 1 ~ Figure 7). This standard further gives an estimate of how to estimate the probability of fault masking and the associated

A guide to the maximum DC value of the lock device. This standard only applies to interlocking devices in which both channels are physically connected in series.

This standard has two purposes.

--- Provide users with a guide to estimate the maximum DC value;

--- As a guide to SRP/CS design.

Note 1. Interlocking devices with integrated self-monitoring function are outside the scope of this standard.

Note 2. The diagnostic methods used by the logic unit also impose limitations.

Note 3. This standard is not limited to mechanically actuated position sensors.

2 Normative references

The following documents are indispensable for the application of this document. For dated references, only the dated version applies to this article.

Pieces. For undated references, the latest edition (including all amendments) applies to this document.

GB/T 18831-2017 Principles for the design and selection of interlocks for mechanical safety and protection devices (ISO 14119.

2013, IDT)

ISO 12100 Mechanical Safety Design General Risk Assessment and Risk Reduction (Safetyofmachinery-Generalprinciplesfor

design-Riskassessmentandriskreduction)

ISO 13849-1.2006 Safety-related components for safety control systems - Part 1. General rules for design (Safetyofmachin-

ery-Safety-relatedpartsofcontrolsystems-Part 1.Generalprinciplesfordesign)

3 Terms and definitions

The following terms and definitions defined by ISO 13849-1, GB/T 18831 and ISO 12100 apply to this document.

3.1

Fault masking

Unexpected reset of the fault or failure of the SRP/CS through the operation of the fault-free component in the SRP/CS is not detected.

3.2

Series device seriesconnecteddevices

A plurality of series of potential-free contact (dry contact) devices (B1~Bn) connected to a logic unit (K) performing diagnostics.

3.3

Signal evaluation of redundant channels of the same polarity signalevaluationofredundantchannelswithsamepolarity

A method in which a logic unit for a safety function evaluates a redundant signal having the same supply voltage.

3.4

Signal evaluation of opposite polarity redundant channels signalevaluationofredundantchannelswithinversepolarity

A method in which a logic unit for a safety function evaluates a redundant signal whose ground polarity is a second channel.