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**Low-voltage switchgear and controlgear - Guidance for the
development of embedded software**

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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 of Standardization Documents" drafted.

This document is equivalent to IEC TR63201.2019 "Guidelines for the Development of Embedded Software for Low-Voltage Switchgear and Control Equipment". file class

The type is adjusted from the IEC technical report to my country's national standardization guiding technical document.

This document has undergone minimal editorial changes.

- Substitute GB/T 8566-2007 for the informative reference IEC 12207.2008;
- Replace the informative reference IEC 61508 (all parts) with GB/T 20438 (all parts);
- Replace the IEC 61511-1.2016 cited for information with GB/T 21109.1-2007;
- Replace the IEC 62061 cited for information with GB 28526;
- Replace the IEC Guide 116.2018 for informative references with GB/T 34924-2017.

Please note that some content of this document may be patented. The issuing agency of this document assumes no responsibility for identifying patents.

Introduction

At present, more and more programmable electronic products are integrated in switchgear and control device. For example, soft starters, electronic overloads

Relays, circuit breakers with electronic trip units, proximity switches with built-in microcontrollers and accessories such as expansion modules and control panels, etc.

Programmable electronics with embedded software (commonly referred to as firmware) are

used. This embedded software usually supports the main functions provided by the device functions, such as overcurrent protection and other important functions (such as alarm detection for monitoring equipment).

The integration of embedded software in switchgear and control devices should not degrade the integrity of their primary functions compared to purely electromechanical devices.

Therefore, this document provides the minimum standard requirements for embedded software.

This document refers to the existing best practice standard GB/T 20438.3-2017 for developing embedded software automation security functions. Function

Safety methods are mainly used in machinery, automotive, automation and process automation, where the safety function is implemented by multiple components, these

Components should match consistently and ensure a level of integrity when combined. In other fields, such as power distribution and power control systems, overcurrent tripping, residual

Critical functions such as current tripping, load monitoring, etc. are subject to installation regulations and coordination rules related to system safety and reliability. Therefore, this paper

It can be considered as good practice according to GB/T 20438.3-2017.

This document will also provide an updated approach to Annex SE of UL489.2016.

This document is intended to provide guidance on.

- aspects of risk assessment related to embedded software;
- Embedded software evaluation methods;
- Software Architecture;
- Basic coding rules;
- Measures to control software errors;
- Software verification and its relationship to equipment or system verification.

In this document, the term "software" is used as a broad term for embedded software.

Low-voltage switchgear and controlgear

Embedded Software Development Guide

1 Scope

This document presents information and recommended minimum requirements for embedded software that supports switchgear and control

The realization of the main function of the equipment in the whole life cycle. This document also includes parametric requirements and basic requirements for secure coding standards.

If the content of this document is not covered in the product standard, this document can be used as a supplementary requirement of the product standard.

This document applies to new product developments or significant improvements to existing products.

This document does not cover GB 28526, GB/T 16855.1 and GB/T 20438 (all parts) in the mechanical or automatic control system

Functional safety requirements, nor do they include cybersecurity risk requirements in ISO 27005 and IEC 62443 (all parts). This document is only for

Some examples of safe coding rules are given.

NOTE. IEC TS63208.2020 has been published, which specifies networks in switchgear and controlgear based on ISO 27005 and IEC 62443 (all parts)

safety measures.

2 Normative references

The contents of the following documents constitute essential provisions of this document through normative references in the text. Among them, dated citations

documents, only the version corresponding to that date applies to this document; for undated references, the latest edition (including all amendments) applies to

this document.

GB/T 5271.1-2000 Information Technology Vocabulary Part 1. Basic Terminology (eqvISO /IEC 2382-1.1993)

Note. There is no technical difference between the quoted content of GB/T 5271.1-2000 and ISO /IEC 2382-1.1993.

3 Terms and Definitions

The terms and definitions defined in GB/T 5271.1-2000 and the following apply to this document.

The IEC and ISO terminology databases can be accessed at.

3.1

embeddedsoftwareembeddedsoftware

The software provided by the manufacturer is an integral part of the product and may be partially modified.

Note 1.Both firmware and system software are examples of embedded software.

Note 2.Embedded software can be upgraded through whole or partial updates.

3.2

Based on computer technology, it is generally composed of hardware, software and its input and (or) output units.

Example. The following are programmable electronic devices.

---microprocessor;

--- Microcontroller;