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

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**Guide for computer-based control for hydroelectric power plant
automation**

水力发电厂自动化计算机控制导则
(English Translation)

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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 for standardization documents" Drafting.

This document is modified to adopt IEC 62270:2013 "Guidelines for computer control of automation in hydroelectric power plants".

This document has made the following structural adjustments compared to IEC 62270:2013.

--- Added Chapter 2 "Normative References" and the subsequent chapter numbers are postponed;

---3.1 corresponds to Chapter 2 of IEC 62270:2013;

---5.2.1, 5.3.1, 6.4.1, 6.7.1, 8.1.1, 8.2.1, 8.2.2.1, 8.2.5.1, 9.3.1, 9.6.2.1, 13.2.1 and 13.3.1 correspond respectively IEC 62270:2013, 4.2, 4.3, 5.4, 5.7, 7.1, 7.2, 7.2.1, 7.2.4, 8.3, 8.6.2,

12.2 and 12.3 suspension sections, Make the subsequent item numbers at the same level be postponed;

--- The three items in 7.2.7.2.2 correspond to the three paragraphs in 6.2.7.2.2 of IEC 62270:2013;

--- Appendix A corresponds to Appendix B of IEC 62270:2013;

--- Added "References" and incorporated the contents of Appendix A "References" of IEC 62270:2013.

The technical differences between this document and IEC 62270:2013 and their reasons are as follows.

--- According to the requirements of GB/T 1.1-2020, the overview of Chapter 1 of IEC 62270:2013 is incorporated into the introduction of this document;

Chapter 1 is applicable to large hydropower plants, small hydropower plants (unit capacity of 5MVA or less) are implemented by reference, and adjusted to apply it shall be implemented as a reference for large and medium-sized hydropower plants, cascade hydropower plants and small hydropower plants, and shall be consistent with relevant standards of my country.

--- Deleted the description of IEEE Std 610.12 and IEC 60050-351 in the introduction of the chapter "Terms and Definitions".

It has no practical significance in this document and is in line with the actual situation.

--- Change "Data link. Communication between main system elements should adopt serial communication connection" to "Data link. Main system elements Communication between the two can be done by Ethernet link or serial communication connection" (see 7.2.5), which is in line with the current technological development Condition.

--- Added 3.2 "Abbreviations" to facilitate the conciseness of the language of this document.

---In a digital control system, the data of the monitored equipment is transmitted to the data acquisition and control system through a communication link (or link) in digital control systems, the data of monitored equipment is transmitted through hard wiring and communication links (or links).

Transmitted to the data acquisition and control system node" (see 7.2.6.1), in line with the actual situation of current technological development.

---Speech synthesis is sometimes used to provide speech-based audible messages to operators, but is not currently widely used in power plant applications.

"used for" is changed to "speech synthesis is used to provide voice information to the operator" (see 8.1.3), which is in line with the actual situation of current technological development.

---The security requirements of future systems are changing rapidly, and this topic is considered a national security issue in various countries.

Users should refer to the latest versions of their respective national regulations and standards for further assistance and information" is changed to "System design should be full Meet the requirements of the latest versions of my country's network and automation system security regulations and standards, such as GB/T 38318-2019 (see 8.3), in line with my country's network and automation system requirements and actual conditions.

--- There is no universal standard for the operating time of the automation system after the loss of factory AC power, but the operating time is usually between 0.5~ 8 hours. "Change to "The operating time of the automation system after losing the factory AC power supply shall be implemented according to the relevant standards, and the operating time shall be "It is usually operated at full load for not less than 2 hours" (see 11.4), which is in line with the actual situation of current technological development.

The following editorial changes have been made to this document.

--- GB/T 17626.3-2023 replaces the informative reference IEC 61000-4-3;

--- Deleted the informative Appendix C "IEEE Participant List".

Introduction

The data recording, monitoring automation and automatic control functions of hydropower plants reduce the labor intensity of power plant operators and allow operators to More time to focus on other tasks. In most cases, automation can significantly reduce the operating costs of a power plant (primarily by reducing the number of employees).

quantity), while the reliability of the power plant can continue to be maintained or improved.

Automatic control systems for hydroelectric generators based on relay logic have been in common use for many years.

In recent decades, microprocessor controllers have been developed and widely used in power plant environments.

Computer systems have been used for data recording, alarm monitoring, and control of units and power plants. Advantages of computer-based automatic control the key points include the application of graphical user interface technology, integrating event sequence recording and trending, dynamic archiving and reporting functions into the control system, and Application of artificial intelligence and expert system functions.

This document addresses the application, design concepts, and implementation of computer-based automation controls for hydropower plants.

Guidelines for computer control of hydroelectric power plant automation

1 Scope

This document specifies the functional/performance requirements, interface requirements, hardware configuration and operation of computer-based hydropower plant automation control.

This document does not apply to generators and boosters.

Transformer relay protection device system.

This document is applicable to large and medium-sized hydropower plants, cascade hydropower plants and small hydropower plants for reference implementation.

2 Normative references

This document has no normative references.

3.1 Terms and Definitions

The following terms and definitions apply to this document.

3.1.1

analog-to-digital conversion; A/D Convert analog signals into digital signals, and the value of the digital output signal is proportional to the analog signal input.

3.1.2

automatic control

Providing switching and/or control of equipment in a specific sequence and under predetermined conditions without operator intervention.

3.1.3

The control function adjusts the output active power of the controlled units according to the total output of the power plant, the interconnection line flow and the power system frequency.

3.1.4

The specific power system voltage is adjusted by adjusting the unit excitation within the machine terminal voltage limit and the automatic voltage regulator (AVR) capability.

Press function.

3.1.5

availability

The ratio of the system's available uptime to the sum of the system's available uptime and