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PEOPLE'S REPUBLIC OF CHINA**

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Guidelines for building a safety culture in electrical plants

电气场所的安全生态构建指南

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1 Scope

China's national guidelines for building a safety culture in electrical plants. It specifies the terms and definitions and the framework. Safety culture is the term for what an organisation does about risk when nobody is watching, and it has become a formal subject in high-hazard industries because the alternative explanation for accidents ran out. An accident investigation that ends at the individual who made the error explains nothing

useful, because the same error will be made again by someone else; the questions that matter are why the error was available to make, why nobody had noticed the condition that allowed it, and why the people who did notice said nothing. Those are cultural rather than technical, and they are what a guideline of this kind addresses: reporting without blame, learning from near misses, leadership behaviour, and the willingness of a junior person to stop a job. Electrical work makes it acute, since its hazards are invisible and its errors immediately fatal.

This document provides guidelines for the construction of the safety ecology in electrical places, including the general principles of the safety ecology in electrical places; the safety coordination of the influencing factors (such as electrical equipment and systems, the environment, and the personnel) of safety ecology in electrical places; as well as the role and management of the safety ecology in electrical places. This document applies to the safety ecology construction in electrical places where electrical equipment and systems operate with an AC rated voltage of 1000 V and a DC rated voltage of 1500 V and below.

2 Normative references

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) is applicable to this standard.

GB/T 4776-2017 Electrical safety terminology

GB/T 17045 Protection against electric shock -- Common aspects for installations and equipment

GB 19517-2009 National safety technical code for electric equipment

GB/T 24612.1-2009 Requirements for electrical safety in the workplace -- Part 1: General rules

GB/T 24612.2-2009 Requirements for electrical safety in the workplace -- Part 2: Safety measure of operation on power off

GB/T 40431-2021 Guidelines for personal safety restraint in electrical operation place

3 Terms and Definitions

The terms and definitions defined in GB/T 4776-2017, GB 19517-2009 and the following apply to this document.

3.1 Electrical place A closed and/or open place where the electrical equipment and systems operate and only professionals or persons with electrical training can enter.

3.2 Safety ecological in electrical place An electrical place where multiple electrical

equipment and systems are installed (or connected), the electrical equipment (systems), the environment, and personnel form a unified whole, and within a certain period, its functions maintain safe and reliable as expected in a dynamic balance state.

3.3 Interface of electrical place A specific area in which two different types (for example, different functions or different safety level requirements) of electrical places are adjacent.

4.1 Factors to be considered for the safety ecology in electrical places

4.1.1 The safety ecology in electrical places is affected by the following factors:

- Safety of electrical equipment and systems; the content specified in GB 19517- 2009 is applicable to all electrical equipment and systems with the voltage range of AC voltage 1000 V and below, as well as DC voltage 1500 V and below;
- Environmental safety in electrical places;
- Safety of personnel in electrical places;
- Interaction between electrical equipment (systems), environment, and personnel.

4.1.2 The following should be considered for the safety ecology in electrical places:

- The influencing factors in 4.1.1;
- The functional objectives of the safety ecology, which are determined based on the functions of electrical equipment and systems;
- The electrical safety objectives of the safety ecology for ensuring personal and

5 Safety coordination of electrical equipment and systems

5.1 Classification of electrical equipment Usually, electrical equipment is classified according to the measures of protection against electric shock. According to the provisions of GB/T 17045, electrical equipment can be divided into Class-0 electrical equipment, Class-I electrical equipment, Class-II electrical equipment, and Class-III electrical equipment.

- Class-0 electrical equipment: The basic insulation is used as the basic protective measure, and there are no fault protection measures;
- Class-I electrical equipment: The basic insulation is used as the basic protective measure, and the protective bonding is used as a fault protection measure;
- Class-II electrical equipment: The basic insulation is used as the basic protective measure, and the supplementary insulation is used as a fault protection measure; or reinforced insulation is adopted for basic protection and fault protection functions;
- Class III electrical equipment: The protection against electric shock depends on the

power supply of safety extra-low voltage (SELV), and the electrical equipment does not generate a voltage that is higher than the extra-low voltage. In addition, the requirements for safety levels will be different due to some differences, such as the different use of the electrical equipment, whether the electrical equipment is mobile or not, and the different operation methods of the electrical equipment; those should be considered when building a safety ecology. According to the use, electrical equipment can be divided into:

- Production equipment;
- Monitoring equipment;
- Control equipment;
- Protection equipment, etc. According to whether it is mobile or not, electrical equipment can be divided into:
 - Fixed electrical equipment (also including stationary electrical equipment);
 - Mobile electrical equipment, which can include electrical equipment that moves by autonomous power and handheld electrical equipment.
- Dry tropics;
- Rain (it should be considered for the outdoor electrical equipment and systems), etc.

6.3 Safety factors of the operating environment The safety factors of the operating environment shall be considered according to the different classifications of electrical places. The classification of electrical places may include: