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CHEMICAL INDUSTRY STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

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Design code of instrument grounding (English Translation)

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1 General

1.0.1

This standard is formulated in order to unify the technical requirements for instrument system grounding design in the chemical industry, promote the standardization of instrument system grounding design, and achieve the goals of technological advancement, economic rationality, safety, and applicability.

1.0.2

This standard is applicable to the design of grounding systems for instrument and automatic control system engineering in the chemical industry.

1.0.3

In addition to complying with the requirements of this standard, the design of the instrument grounding system shall also comply with the relevant current national standards.

2 Terms

2.0.1

safety grounding

Grounding for the protection of instruments and personal safety, which is also called safe grounding.

2.0.2

working grounding

Grounding required for the normal operation of instrument and control systems.

2.0.3

shielding grounding

Grounding is adopted to avoid electromagnetic field interference on instruments and signals.

2.0.4

intrinsically safe grounding

Grounding required for proper operation of intrinsically safe instruments.

2.0.5

equipotential bonding

The connection by which the individual conductors are connected and equal to earth's potential.

2.0.6

connecting resistance

The sum of the resistance of the conductors and connection points from the grounding terminal of instruments and equipment to the grounding electrode.

3.1.1 The metal casing of electrical instruments and the normally non-energized metal

parts of automatic control equipment may carry dangerous voltage due to various reasons (such as insulation damage). The safety grounding shall be implemented for the following electrical instruments and automatic control equipment.

3.1.3 For field instruments, transmitters and local switches with a power supply lower

than 36 V, safety grounding is not required unless there are special needs.

3.1.4 Automatic control equipment that has safety grounding can be considered to have electrostatic grounding. When using an anti-static raised floor in the control room, electrostatic grounding shall be done. Electrostatic grounding shall share the grounding system with safety grounding.

3.2 Working grounding

3.2.1

Working grounding shall include signal loop grounding and shielding grounding.

3.3.1 For components of intrinsically safe instruments that need to be grounded for

safety functions, the intrinsically safe grounding shall be implemented according to the requirements of the instrument manufacturer.

3.3.2 The bus bar of the Zener safety barrier shall be connected to the common terminal of the DC power supply, and the bus bar (or guide rail) of the Zener safety barrier shall be intrinsically safe grounded.

3.3.3 The isolation safety barrier does not need to be grounded.

3.4.1 Control rooms, cabinet rooms, and process control computer rooms where

automatic control systems and other equipment are installed shall be grounded against static electricity. These indoor static conductive floors, anti-static raised floors, workbenches, etc. shall be anti-static grounded.

3.4.2 Instruments and equipment, for which the safety grounding and working

grounding are implemented, do not need to be grounded against static electricity.

4 Grounding system and grounding principles

4.0.1

The grounding system shall consist of two parts. bonding and earthing termination system.

4.0.3

All types of grounding in the instrument system shall be connected to the main grounding plate to achieve equipotential connection. They share the earthing termination system with

electrical devices and then are connected to the equipotential network.

5.1.1 For the safety grounding of field instrument cable troughs, instrument cable

protective tubes and instrument shells above 36 V, bonding wires shall be connected to nearby grounded metal components every 30 m, and the reliability and electrical continuity of the grounding shall be ensured. Metal equipment and pipelines for storing or transporting flammable media as well as related metal components shall not be used for grounding.

5.1.3 For field instruments that require or need to be grounded on site, they shall be grounded on the field side (see Figure 5.1.3).

5.2 Fieldbus instrument cable shielding grounding method

5.2.1

The signals of the fieldbus instrument system are transmitted by digital communication. The grounding of the shielding layer of the bus signal cable is different from that of the analog signal cable. Both ends of the shielding layer of the bus cable should be grounded (see Figure 5.2.1).

5.2.2

When it is not certain that there is a good equipotential grounding system between the control room and the field, it is advisable to directly ground the shielding layer at the field end of the bus signal cable shielding layer, and the other end of the cable shielding layer is connected to the grounding system through a capacitor. In places with explosive hazards, the capacitor connection grounding end of the cable shielding layer shall be set in a non-explosive safe place (see Figure 5.2.2).

5.2.3

The metal housings of all fieldbus instruments shall be connected to the equipotential grounding system.

5.2.4

For bonding of digital communication cable shields between systems, it is advisable to use a capacitor to connect to the grounding system at one end of the communication cable shielding layer, and the other end is directly grounded. The capacitor connection grounding end of the cable shielding layer shall be set up in a non- explosive safe place (see Figure 5.2.4).

Figure 5.2.4 -- Shielding grounding of communication cables between equipotential bonding control systems