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

GB/T 18499-2025

**Residual current-operated protective devices (RCD) for
household and similar use - Electromagnetic compatibility**

剩余电流动作保护电器包括：

(English Translation)

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1 Scope

This document specifies the emission and immunity requirements, testing, and performance criteria for residual current-operated protective devices (RCDs) for household and similar uses with a rated voltage not exceeding 440 V.

The electromagnetic environment for household and similar uses is referenced to the electromagnetic environment for residential, commercial and light industrial applications in the basic standard IEC 61000-6-1.

This document is primarily intended as a reference for RCD product standards, but is not intended to be used as an independent document.

Residual current-operated protective devices include.

- Residual current-operated circuit breakers without integral overcurrent protection for household and similar uses (RCCBs) covered by IEC 61008 (all parts) and IEC 62423;
- Residual current-operated circuit breakers with integral overcurrent protection for household and similar uses (RCBOs) covered by IEC 61009 (all parts) and IEC 62423;
- Residual current devices with or without overcurrent protection for socket- outlets for household and similar uses (SRCDS) as specified in IEC 62640;
- Portable residual current devices without overcurrent protection for household and similar uses (PRCDs) as specified in IEC 61540;
- Electrical appliances with RCD function for household and similar uses that comply with

the general safety requirements for RCD in IEC 60755.

This document applies to dated references in relevant product standards.

This document can also serve as a guide for developing EMC requirements and tests for other product standards in the field of household circuit breakers and similar equipment. This document also specifies general performance criteria, which are expected to be translated into specific performance criteria in relevant product standards.

NOTE: Examples of other product standards in the field of household circuit breakers and similar equipment are as follows.

- IEC 62020-1 Electrical accessories - Residual current monitors (RCMs) - Part 1.RCMs for household and similar uses;
- IEC 62606 General requirements for arc fault detection and protection devices (AFDDs);
- IEC 63024 Requirements for automatic reclosing devices (ARDs) for circuit-breakers, RCBOs and RCCBs for household and similar uses;
- IEC 63052 Power frequency overvoltage protection devices (POPs) for household and similar applications;
- IEC 62752 In-cable control and protection device (IC-CPD) for mode 2 charging of electric road vehicles;
- IEC 62955 Residual direct current detecting device (RDC-DD) to be used for mode 3 charging of electric vehicles.

2 Normative references

The provisions of the following documents constitute the essential clauses of this document through normative references in this text. Among them, for any dated reference, only the version corresponding to that date applies to this document; for any undated reference, the latest version (including all amendments) applies to this document.

IEC 61000-4-2 Electromagnetic compatibility (EMC) - Part 4-2.Testing and measurement techniques - Electrostatic discharge immunity test

NOTE: GB/T 17626.2-2018 Electromagnetic compatibility - Testing and measurement techniques
- Electrostatic discharge immunity test (IEC 61000-4-2.2008, IDT)

IEC 61000-4-3 Electromagnetic compatibility (EMC) - Part 4-3.Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test

NOTE: GB/T 17626.3-2023 Electromagnetic compatibility - Testing and measurement techniques
- Part 3.Radiated, radio-frequency, electromagnetic field immunity test (IEC 61000-4-3.2020, IDT)

IEC 61000-4-4 Electromagnetic compatibility (EMC) - Part 4-4. Testing and measurement techniques - Electrical fast transient/burst immunity test

NOTE: GB/T 17626.4-2018 Electromagnetic compatibility - Testing and measurement techniques - Electrical fast transient/burst immunity test (IEC 61000-4-4:2012, IDT)

CISPR 14-1 Electromagnetic compatibility - Requirements for appliances, electric tools and similar household apparatus - Part 1. Emission

NOTE: GB 4343.1-2024 Electromagnetic compatibility requirements for household appliances, electric tools and similar apparatus - Part 1. Emission (CISPR 14-1:2020, IDT)

3 Terms and definitions

This document does not contain any terms or definitions that need to be defined.

The terminology databases of IEC and ISO can be accessed at the following URL.

4 Electromagnetic emission of RCD

Only RCDs containing a continuous-operating oscillator require an emission test. The test shall be conducted according to CISPR 14-1.

Except for RCDs containing continuous-operating oscillators, RCDs typically do not generate continuous or transient disturbances except during their switching operations.

The frequencies, levels, and effects of emission during switching can be considered part of the normal electromagnetic environment of low-voltage equipment.

5.1 Overview

Unless otherwise specified, the test shall be performed at the rated voltage and without load. For RCDs with functional ground (FE), FE is connected to the power supply neutral point.

5.2 RCD performance judgment criteria

For safety reasons, some testing levels and specifications are selected at a level higher than the basic standard requirements. Performance judgment criteria A, B, and C are as follows.

A. During the test, according to the performance judgment criteria in this clause, the RCD shall remain closed when a residual current of $0.3I_{\Delta n}$ is continuously applied, and The test shall be performed on the power cord of the electrical appliance under test in accordance with IEC 61000-4-11.

For voltage sags, the sudden change in power supply voltage is applied at the zero-crossing point and at phase angles of 45°, 90°, and 135°. A phase angle is randomly selected on each phase for testing.

For short-term interruptions, the test shall be conducted at a 0° phase angle in one of the phases.

5.3.3 Conducted disturbance induced by radio-frequency fields (T3)

The test shall be conducted in accordance with IEC 61000-4-6, and the specific test conditions are as follows.

- 0.15 MHz~80 MHz;
- 150 ohm;
- 3 V;
- 80% AM (1 kHz).

When verifying that the 0.3Ideltan current does not trip, the scan shall be performed within the specified frequency range.

When performing tripping verification according to performance judgment criterion A, each test specimen is tested 5 times, and the selected frequency points for each test specimen are as follows.

- Test specimen 1.0.15 MHz, 0.8 MHz, 3.2 MHz, 13.56 MHz, 48 MHz;
- Test specimen 2.0.30 MHz, 1.2 MHz, 6.78 MHz, 20 MHz, 65 MHz;
- Test specimen 3.0.50 MHz, 2.0 MHz, 8.0 MHz, 27.12 MHz, 80 MHz.

NOTE: 13.56 MHz, 6.78 MHz and 27.12 MHz are commonly used values for Radio frequency identification (RFID).

5.3.4 Electrical fast transient/burst (T4)

The test shall be conducted in accordance with IEC 61000-4-4, and the specific test conditions are as follows.

The test specimen shall be installed on a flat, insulating support 10 cm away from the ground plane, as if it were in normal use.

- For RCCB and RCBO, test level 4.4 kV (peak value).

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