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**The technical requirements and test methods of overvoltages
and overcurrents resistibility for wire telecommunication
terminal equipment**

有线电信终端设备 防雷技术要求及试验方法

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The technical requirements and test methods of overvoltages and overcurrents resistibility for wire telecommunication terminal equipment

1 Scope

This standard specifies the technical requirements and test methods for lightning protection and safety protection of wired telecommunications terminal equipment.

This standard applies to the protection performance inspection of wired telecommunications terminal products (including indoor and outdoor types), which are connected to communication networks and public power grids.

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 17626.5-2008 Electromagnetic compatibility - Testing and measurement techniques - Surge immunity test

YD/T 1540-2014 Over-voltage and over-current telecommunications equipment resistance test methods

3 Terms, definitions, abbreviations

3.1 Terms and definitions

The following terms and definitions apply to this document.

3.1.1

Telecommunication terminal equipment, TTE

Telecommunication equipment which is connected to the end of the public telecommunication network, to provide users with the function of sending and

- "On" and "off" of the power switch;
 - Ringing;
 - Audio and video playback status, etc.
- c) Auxiliary equipment such as LI, LT, NT, CPE, power supply, simulator or passive terminal can be connected to the tested and non-tested ports. If the auxiliary equipment is not needed to verify the effect of the test voltage on the equipment, the auxiliary equipment can be omitted in the test. Attention shall be paid to the use of decoupling components to protect the auxiliary equipment or terminals from surge damage.
- d) The external port to ground test includes two parts of the test: the external port to ground test in which all non-tested ports are not coupled to ground, the external port to ground test in which each type of internal port is coupled to ground in turn.
- e) The external port to external port test shall be applied to each type of external port, including ports of the same type, coupled to ground in turn.
- f) For floating-ground equipment, longitudinal tests are not required except for DC power ports.
- g) If the product can only function when installed on other equipment, the test shall be carried out according to the grounding condition of the equipment after installation.
- h) The lightning test shall switch polarity between two consecutive surge signals. The time interval between two consecutive tests on the same port shall not be less than 1 min. If necessary, the time interval can be longer.
- i) When the transverse test is applied to two terminals, one terminal shall be connected to the signal generator and the other terminal shall be grounded. After the test, the terminals shall be swapped and the test shall be repeated.
- j) For card or plug-in card devices, the test can be performed on only one slot. When it is necessary to confirm whether a specific qualification criterion is met, the board can be tested on one or more slots.
- k) If a card has two or more identical ports, only one port shall be tested in a single-port test.
- l) When testing on a card or port, adjacent boards shall not be affected in any way.

6.3.2.1 Lightning voltage

The lightning voltage test is to check whether the port of the equipment reaches the required level of resistance to overvoltage. The test is performed on the core wire. The equipment under test is installed according to the actual application. For example, there are other components between the port and the surge protector. These components are not allowed to be removed during the surge test.

Only transverse tests are performed.

6.3.2.2 Lightning current

The lightning current test is to check whether the inherent resistance reaches the required level when only high-current protection components are installed in the equipment without primary protection. This test also checks the overall coordination of the high-current protector with the equipment connector, printed circuit, etc.

Only longitudinal tests are performed.

6.3.2.3 Shield lightning current

The shield lightning current test is to check whether the shielded cable connected to the equipment ground/frame can fully conduct the surge current level, that may be suffered in the current scenario.

The test is performed on the shielded cable.

6.3.3 Dedicated power supply port

6.3.3.1 Lightning voltage

The lightning voltage test is to check whether the port of the equipment meets the required level of overvoltage resistance.

Both transverse and longitudinal tests shall be performed.

6.3.3.2 Lightning current

The lightning current test is to check whether the inherent resistance meets the required level, when only high current protection components are installed in the equipment without primary protection.

Only longitudinal tests are performed.

6.3.4 External AC power port

The lightning voltage test is to check whether the port of the equipment meets the required level of overvoltage resistance.

Both transverse and longitudinal tests shall be performed.

6.3.5 Internal port

The lightning voltage test is to check whether the port of the equipment meets the required level of overvoltage resistance.

Only vertical tests are performed for unshielded wires, shielded wires, floating DC inputs and grounded DC inputs.

6.3.6 DC power port

The lightning voltage test is to check whether the port of the equipment meets the required level of overvoltage resistance.

Only longitudinal tests are performed.

6.4 Power induction

6.4.1 External symmetrical pair ports

The power induction test is to verify whether the equipment port meets the required level of resistance to interference from adjacent power lines or electrified railway systems.

When the equipment has a large current-carrying protection element, primary protection may not be required. The following shall be implemented:

- If the component is removable, remove it and replace it with a special test protector when performing the protection coordination test.
- If the component is not removable, all tests shall be performed with the protection provided; the manufacturer shall provide a test report that can prove that the protection coordination test was performed using a special test protector during the design phase test.

The test method is shown in 10.1 and Appendix B of YD/T 1540 2014.

Both transverse and longitudinal tests shall be performed.

6.4.2 Dedicated feeder port

The power induction test is to verify whether the equipment port meets the required level of resistance to interference from adjacent power lines or electrified railway systems.

Both transverse and longitudinal tests shall be performed.

6.5 Mains power contact test

6.5.1 External symmetrical pair ports

The power line contact test is to verify that the equipment ports meet the required level of resistance to direct contact with the power line.

Primary protection may not be required when the equipment has a large current-carrying protective element. The following shall be implemented:

- a) Test with the protective element provided by the manufacturer, to ensure that the protective element operates during the test, which may require the selection of a linear protective element with a relatively low starting voltage. It is not necessary to ensure that the protective element operates when one or more of the following conditions occur.
 - 1) The product manufacturer selects the protection element start time when designing the product, so that the protection element does not operate when mains power contact occurs.
 - 2) At the input of the equipment, the input resistance of the equipment prevents the mains power contact voltage from exceeding the minimum starting voltage specified for the protection element.
- b) If the protective element can be removed, it shall be removed and replaced with a special test protector to repeat the test.
- c) If the protective element cannot be removed, the manufacturer shall provide a report, to prove that the manufacturer repeated all tests using a protective element with a starting voltage equal to the specified minimum impulse operating voltage when designing the product.

The test method is shown in 10.1 and Appendix B of YD/T 1540-2014.

Only longitudinal test is performed.

6.5.2 Dedicated feeder port

The power line contact test is to verify whether the equipment port meets the required level of resistance to direct contact with the power line. Only longitudinal test is performed.

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