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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 17626.11-2023

Electromagnetic compatibility - Testing and measurement techniques - Part 11: Voltage dips, short interruptions and voltage variations immunity tests for equipment with input current up to 16 A per phase

电磁兼容 试验和测量技术 第11部分：对每相输入电流小于或等于16 A设备的电压暂降、短时中断和电压变化抗扰度试验

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1 Scope

GB/T 17626.11-2023 is Part 11 of the Chinese EMC testing series, and covers immunity to voltage dips, short interruptions and voltage variations for equipment drawing up to 16 A per phase. Dips are the commonest disturbance on any supply - a fault clears somewhere on the network and the voltage collapses for a few cycles - and equipment that resets, loses its configuration or trips when it happens is a recurring nuisance rather than a rare failure. Testing them well is harder than it looks, because the generator must produce the transition with a defined fall time and still supply the inrush current the equipment draws on recovery. The standard sets the test levels for dips, short interruptions and voltage variations, the test instrumentation covering the generator and the power source, the test setup and the test procedures, with an annex on the rationale for the rapid fall times. It took effect on 1 June 2024.

This document defines the immunity test methods and range of preferred test levels for electrical and electronic equipment connected to low-voltage power supply networks for voltage dips, short interruptions, and voltage variations. This document applies to electrical and electronic equipment having a rated input current not exceeding 16 A per phase, for connection to

50 Hz AC networks. It does not apply to electrical and electronic equipment for connection to 400 Hz AC networks. Tests for these networks will be covered by future IEC documents. The object of this document is to establish a common reference for evaluating the immunity of electrical and electronic equipment when subjected to voltage dips, short interruptions and voltage variations. Note

1.Voltage fluctuation immunity tests are covered by IEC 61000-4-14. The test method documented in this document of GB/T 17626 describes a consistent method to assess the immunity of equipment or a system against a defined phenomenon. Note

2.As described in IEC Guide 107, this is a basic EMC publication for use by product committees of the IEC. As also stated in Guide 107, the IEC product committees are responsible for determining whether this immunity test standard should be applied or not, and, if applied, they are responsible for defining the appropriate test levels. Technical committee 77 and its sub- committees are prepared to co-operate with product committees in the evaluation of the value of particular immunity tests for their products.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1 immunity (to a disturbance) ability of a device, equipment or system to perform without degradation in the presence of an electromagnetic disturbance

3.2 voltage dip sudden reduction of the voltage at a particular point of an electricity supply system below a specified dip threshold followed by its recovery after a brief interval

3.3 short interruption sudden reduction of the voltage on all phases at a particular point of an electric supply system below a specified interruption threshold followed by its restoration after a brief interval

Note. Short interruptions are typically associated with switchgear operations related to the occurrence and termination of short circuits on the system or on installations connected to

it.

3.4 residual voltage (of voltage dip) minimum value of RMS voltage recorded during a voltage dip or short interruption

3.5 malfunction breakdown of the ability of equipment to carry out intended functions or the execution of unintended functions by the equipment

3.6 calibration method to prove that the measurement equipment is in compliance with its specifications

3.7 verification set of operations which are used to check the test equipment system (e.g., the test generator and the interconnecting cables) to demonstrate that the test system is functioning within the specifications given in Clause 6

4 General

Electrical and electronic equipment can be affected by voltage dips, short interruptions or voltage variations of the power supply. Voltage dips and short interruptions occur due to faults in a (public or non-public) network or in installations by sudden changes of large loads. In certain cases, two or more consecutive dips or interruptions can occur. Voltage variations are caused by continuously varying loads connected to the network.

5 Test levels

5.1 General The voltages in this document use the rated voltage for the equipment (UT) as a basis for the voltage test level specification. Where the equipment has a rated voltage range the following shall apply.

5.2 Voltage dips and short interruptions The change between UT and the changed voltage is abrupt. The step can start and stop at any phase angle on the mains voltage. The following test voltage levels (in %UT) are used. 0%, 40%, 70% and 80%, corresponding to dips with residual voltages of 0%, 40%, 70% and 80%. The rise and fall time are detailed in Figure 3. The preferred test levels and durations given in Table 1 and Table 2 take into account the information given in IEC TR 61000-2-8. The preferred test levels in Table 1 are reasonably severe, and are representative of many real world dips, but are not intended to guarantee immunity to all voltage dips. More severe dips, for example 0% for 1 s and balanced three-phase dips, may be considered by product committees. The generator specification for voltage rise time, tr, and voltage fall time, tf, during abrupt changes is indicated in Table 4.

5.3 Voltage variations This test considers a defined transition between the rated voltage UT and the changed voltage.

6.1 Test generator

6.1.1 General The following features are common to the generator for voltage dips, short interruptions and voltage variations, except as indicated. Examples of generators are given in Annex C.

6.1.2 Performance and characteristics of the generator UT (RMS) See Table 4 for technical specifications for the performance and characteristics of the generator.

6.1.3 Verification of the characteristics of the voltage dips, short interruptions generators For output voltages of 70% and 40% of the nominal value, the above requirements need only be verified for a maximum of 3 s duration. For output voltages of 40% of the nominal value it is acceptable to verify the load regulation requirements either at 200 V ~ 240 V nominal voltage or at 100 V ~ 120 V nominal voltage.. The 100 Omega resistive load used to test the generator should not have additional inductivity. Rise and fall time, as well as overshoot and undershoot, shall be verified for switching at both 90° and 270°, from 0% to 100%, 100% to 80%, 100% to 70%, 100% to 40%, and 100% to 0%. Phase angle accuracy shall be verified for switching from 0% to 100% and 100% to 0%, at nine phase angles from 0° to 360° in 45° increments. It shall also be verified for switching from 100% to 80% and 80% to 100%, 100% to 70% and 70% to 100%, as well as from 100% to 40% and 40% to 100%, at 90° and 180°. The voltage generators shall, preferably, be recalibrated at defined time periods in accordance with a recognized quality assurance system.

6.2 Power source The frequency of the test voltage shall be within ±2% of rated frequency.

7 Test set-up

The test shall be performed with the EUT connected to the test generator with the shortest power supply cable as specified by the EUT manufacturer. If no cable length is specified, it shall be the shortest possible length suitable to the application of the EUT. The test set-ups are defined for the three types of phenomena described in this document. Figure C.1a) shows a schematic for the generation of voltage dips, short interruptions and voltage variations with gradual transition between rated and changed voltage using a generator with internal switching. In Figure C.1b) a generator and a power amplifier are used.

8 Test procedures

8.1 General Before starting the test of a given EUT, a test plan shall be prepared. The test plan should be representative of the way the system is actually used. Systems can require a precise pre-analysis to define which system configurations shall be tested to reproduce field situations. Test cases shall be explained and indicated in the test report. It is recommended that the test plan include the following items. If the actual operating signal sources are not available to the EUT, they can be simulated. For each test, any degradation