

# EMC Standards Alert

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## Timely Updates on Critical Standards

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### What happened when the latest edition of a standard replaces a previous edition?

We welcome back our Standards Alert readers for the 2011 series of Alerts. There has been limited activity in the EMC standards world since the holidays started with Thanksgiving of last year. One key CISPR immunity standard (CISPR 24) has now been picked up by the CENELEC which triggered our review of the progression from the previous edition and its amendments.

This issue continues our focus on “news you can use”- i.e., new and pending changes to EMC standards that will cost EMC laboratory owners and manager’s money, test time, and/or will impose new or altered testing and staff training procedures.

Key to this issue includes the latest updates to a key **EMC standard, including changes from the previous edition**. For this Standards Alert we compare the 1997 edition of CISPR 24 with the latest edition published in 2010. We focus on modifications that were added to arrive at **EN55024**, published this last November.

The title of this standard is:

**CISPR 24:Information technology equipment – Immunity characteristics – Limits and methods of measurement**

Before diving into the comparisons of the 1997 and the 2010 editions, a review of the 2010 edition of EN55024 shows only one common modification that is stated in its forward. Although the CISPR and CENELEC versions cite CISPR 22:2008 as a normative reference, the present EN “modification” for the use of CISPR 22:2008 still applies. The good news is that now the EN version of CISPR 24 (EN55024) is identical to CISPR 24:2010 even to the extent of attaching the published version of CISPR 24 as the EN.

### Changes incorporated in CISPR 24: 2010 (August 2010)

Definitions: The 2010 edition added definitions for “multifunctional equipment” (having two or more functions), telecommunication network port, and analog interface, acoustic interface, and associated equipment (to monitor or exercise equipment).

In each clause, there is a clear identification of the reference standard that forms the basis for the tests, noting that the date of the previous dated references have been made more current and hence it is imperative that the new editions of the IEC immunity standards cited as normative be used in making CISPR 24: 2010 tests.

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## Electro Static Discharge

The 2010 edition adds that the number of test points is EUT-dependent: clauses 8. 3. 1 and A5 of 61000-4-2 are used to determine the number of test points (not just 50 discharges (25 of each polarity) at 4 test points). There continues to be the requirement that all areas touched by the user shall be tested.

### Contact discharge to conductive surfaces and coupling planes

Interestingly, the maximum discharge rate of 1 per second has been removed. In addition the requirement to apply ESD discharges at lower levels, as defined in

Clause 5 of IEC 61000-4-2, is explicitly stated in the 2010 edition; there is no such allowance in the previous edition.

### Air discharge at apertures and insulating surfaces

The indication of applying discharges to “slots” is removed in the paragraph heading; presumably, “apertures” covers slots too. The new edition does not reference how to handle painted surfaces nor is the requirement to do at least 10 discharges for each selected test point. More importantly, connector pins do not require ESD testing.

## Electrical fast transients (EFT)

The 2010 edition includes the new requirement that the cable length between the EUT and the coupling device shall be as short as possible (in the range 0. 5 m to 3. 0 m. )

## Continuous radio frequency disturbances

### Continuous radio frequency disturbances--General

The option of starting the radiated test at a frequency lower than 80 MHz is removed and now radiated testing starts at 80 MHz; conducted testing is performed from 150 kHz – 80 MHz. The 2010 edition adds that unless required by an annex of the standard, clock and other sensitive frequencies do not need to be assessed separately.

### Continuous radiated disturbances

There is no longer the option of radiating separately modules of a system that is being tested. The frequency step size option of 4 percent of the fundamental frequency with a test level of twice the specification is not in the 2010 edition.

## Continuous conducted disturbances

No change

## Power frequency magnetic fields

No change

## Surges

No change

## Voltage dips and interruptions

No change

## Applicability

The 2010 edition has considerably expanded the verbiage in this section, with particular attention to multifunction equipment. Explanations include what to do when the EUT may be subject simultaneously to different clauses in CISPR 24. In this instance the EUT shall be tested with each function operated independently, if

this can be achieved without physically modifying the equipment internally and, of course, meet the individual functional requirements. If on the other hand, each function cannot be tested independently, or if the EUT primary function will not work or where the simultaneous operation of several functions would result in saving measurement time, the test should be performed with all functions operating and must meet the requirements for each function.

The clause to include justification in the test report that certain tests are not needed or inappropriate is not in the 2010 edition.

## General Conditions during test

No change

## Particular conditions of EUT

No change

## General EUT performance criteria

No change

### Performance Criterion A

Added “during test” to the usual “after test” criterion that the product continues to operate without operator intervention. Additional emphasis was placed on describing the performance level where no degradation is allowed, that is, there should be a “minimum” performance level, not just “performance level” specified by the manufacturer.

### Performance Criterion B

No change

### Performance Criterion C

The 2010 description has been significantly changed (highlighted in red) to the following:

During and after testing, a temporary loss of function is allowed, provided the function is self recoverable, or can be restored by the operation of the controls or cycling of the power to the EUT by the user in accordance with the manufacturer’s instructions.

## Particular performance criteria

No change

## Product documentation

No change

## Measurement Uncertainty

MU is all new for the 2010 edition. The standard states that the test levels are not changed by MU.

## Immunity requirements

A new clause (Number 10) is introduced with tables of requirements. The previous edition had the requirements tables under “Product Documentation”.

For table 1 (Immunity, Enclosure Port) the 2010 edition removed the option of starting radiated immunity testing at 26 MHz; instead radiated testing starts at 80 MHz. The performance criteria for power frequency magnetic fields add “as appropriate” when citing performance criteria in Annex B.

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For table 2 (Immunity, signal ports and telecommunications ports), there are several changes in the 2010 edition. Notably,

- For RF continuous conducted immunity, there is no longer any reference to the demarcation between radiated and conducted being below 80 MHz.
- For surges, the reference standard is now IEC 61000-4-5 eliminating the ITU-T recommendation. In addition two more footnotes were added:
  - a. Test applied to all lines simultaneously to earth (ground).
  - b. Where the coupling network for the 10/700  $\mu$ s waveform affects the functioning of high speed data ports, the test shall be carried out using a 1,2/50 (8/20)  $\mu$ s waveform and appropriate coupling network.
- For electrical fast transients, there are two new footnotes as follows:
  - a. Test applied to all lines simultaneously to earth (ground).
  - b. For xDSL equipment, the repetition frequency for EFT testing shall be 100 kHz (See Annex H).

For table 3 (Immunity, input d.c. power port (excluding equipment marketed with an a.c./d.c. power converter)

- For RF continuous conducted immunity, there is no longer any reference to the demarcation between radiated and conducted being below 80 MHz.
- For surges—no change
- For electrical fast transients—no change

For table 4 (Immunity, input a.c. power ports (including equipment marketed with a separate a.c./d.c. power inverter)

- For RF continuous conducted immunity, there is no longer any reference to the demarcation between radiated and conducted being below 80 MHz.
- For voltage dips—no change
- For voltage interruptions—no change
- For surges, a clarification in the footnote is added to indicate where the test levels are reduced, i.e. test levels shall be reduced to 0.5 kV (line to line) and 1 kV (line to earth (ground)).

## Annex A: Telephony Terminal Equipment

This annex was renamed and completely rewritten. (The former title was Annex A: Telecommunications Terminal Equipment) Test labs that perform immunity measurements for TTE should review Annex A in its entirety. The scope has broadened and is now stated as follows:

Equipment which may provide audio or voice functionality over PSTN, ISDN, LAN or any other type of telecommunication network. Examples of telephony terminal equipment include, POTS (Plain Old Telephone Sets), conference telephones, small key telephone systems, video conference systems, facsimile machines. The requirements of other applicable annexes also apply.

The text has measurement methods for performance assessment,

levels to be met, and performance criteria established in tables and not indicated in text in the previous edition. There are also functional test set up diagrams to assist in performing the test and test setup. There is no facsimile machine test method.

## Annex B: Data Processing Equipment

This annex modifies the previous edition with some changes as follows.

### Read, write and storage of data

- The text on Performance Criteria have added the following: “During the test” (for Criterion A) and “During and after the test” (for Criterion B) at the start of the criterion definitions.
- For performance criteria C, the phrase “failure resulting in a system abort which can be recovered to normal operation by reset or reboot are permissible” is not in the 2010 edition.

### Data display

Performance criteria A

- The 2010 edition clarifies that the use of a microscope to determine the extent of display jitter is used only in the case where displays with pixels having continuous luminance distributions
- There is further information provided in the 2010 edition which that for any display type, a special display-measuring device may be used. This device shall determine, on a scan by-scan basis, the relative location of a character or test object. If a device is used that determines movement along the horizontal and vertical axes only, the extent of the jitter shall be defined as the square root of the sum of the squares of the maximum horizontal and vertical differences.
- Observations now shall extend for periods of at least 4 seconds; there was no explicit timing in the 1997 edition

Performance criteria B

- The 2010 edition adds the phrase “if they self-recover after removal of the external disturbance” for when screen disturbances are permissible.

Performance criteria C

- The 2010 edition again adds the phrase “during the test” when identifying failures.

### Data input

- Again “during the test” is used at the start of each performance criteria
- For performance criteria C, the phrase “failure resulting in a system abort which can be recovered to normal operation by reset or reboot are permissible” is not in the 2010 edition.

### Data printing

- Again “during the test” is used at the start of each performance criteria
- For the 2010 edition this is added for performance criterion B: a paper feed failure is allowed if after removal of the jammed sheets the job is automatically recovered and there is no loss of printed information

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## Data processing

- “During the test” is used at the start of performance criteria A and B and in the text for criterion C
- Criteria are the same except for Criterion C where the words “after testing” is inserted after the words “operator intervention”.

## **Annex C: Local Area Networks**

This annex modifies the previous edition with some changes as follows.

- Again “during the test” is used in the wording of B and C, although the text in the 1997 edition implies the application during the test.
- Rest of information is the same between the two editions.

## **Annex D: Printers and Plotters**

The 2010 edition explicitly adds “plotters” to the title of the annex. The introductory text in the 1997 edition though does call out application to both printers and plotters.

- The 2010 edition adds another degradation category to performance criteria B: a paper feed failure is allowed if after removal of the jammed sheets, the job automatically recovers and there is no loss of printed information.
- The rest of information is the same between the two editions

## **Annex E: Copying Machines**

- Interestingly, in performance criteria A, the word “or loss of function” is added to “performance degradation”.
- In performance criteria B, there is an additional exception to meeting this criterion: “A paper feed failure is allowed only if, after removal of the feeding error sheets the job is automatically recovered and no damage occurs to the original documents”.
- Performance criterion C has been revised to read: “Degradation of the performance as described in criteria A and B is permitted provided that the normal operation of the EUT is self-recoverable to the condition immediately before the application of the test or can be restored after the test by the operator. The exception to this criterion has not changed and is that no unintended start of copying from stand-by mode is allowed. Another exception in the 1997 was eliminated in the 2010 edition. That removed exception was that output/input failures are only allowed if normal operation can be restored by reset or reboot.

## **Annex F: Automatic Teller Machines**

- As in Annex E, in performance criteria A, the word “or loss of function” is added to “performance degradation”.
- All performance criteria are identical in both the 1997 and 2010 editions.

## **Annex G: Point of Sale Terminals**

- As in Annex E, in performance criteria A, the word “or loss of function” is added to “performance degradation”.
- For the 2010 edition the following is added to performance criteria B: “After the disturbance is removed, normal operation of the EUT shall be recoverable to the condition immediately before the application of the test.”

## **Annex H: xDSL Terminal equipment**

For the 2010 edition this annex is totally new as it was not in the 1997 edition. xDSL includes ADSL, VDSL and SDSL which all use a single wire pair and HDSL which can use up to 3 wire pairs. “DSL” stands for “Digital Subscriber Line”

“x” equals:

“A” for “Asymmetrical digital subscriber line (ADSL)”

“H” for “High bit rate Digital Subscriber Line (HDSL)”

“V” for “Very high speed digital subscriber line 2 (VDSL2)”

“S” for “Single-pair high-speed digital subscriber line (SHDSL)”

Those test labs that perform immunity measurements for xDSL equipment should review Annex H in its entirety.

*The information contained in this newsletter is current based on sources as of the date of electronic publication, is the sole opinion of its editor, Don Heirman. ACIL is not responsible for its content.*

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