

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

AMENDMENT 1  
AMENDEMENT 1

**Electromagnetic compatibility (EMC)**  
**Part 4-25: Testing and measurement techniques – HEMP immunity test methods for equipment and systems**

**Compatibilité électromagnétique (CEM)**  
**Partie 4-25: Techniques d'essai et de mesure – Méthodes d'essai d'immunité à l'IEMN-HA des appareils et des systèmes**



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IEC Central Office  
3, rue de Varembe  
CH-1211 Geneva 20  
Switzerland

Tel.: +41 22 919 02 11  
Fax: +41 22 919 03 00  
[info@iec.ch](mailto:info@iec.ch)  
[www.iec.ch](http://www.iec.ch)

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## FOREWORD

This amendment has been prepared by subcommittee 77C: High power transient phenomena, of IEC technical committee 77: Electromagnetic compatibility.

The text of this amendment is based on the following documents:

FDIS	Report on voting
77C/216/FDIS	77C/218/RVD

Full information on the voting for the approval of this amendment can be found in the report on voting indicated in the above table.

The committee has decided that the contents of this amendment and the base publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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## 2 Normative references

*Replace the existing reference IEC 61000-2-10 by the following:*

IEC 61000-2-10:1998, *Electromagnetic compatibility (EMC) – Part 2-10: Environment – Description of HEMP environment – Conducted disturbance*

*Delete from the existing list the following standards:*

IEC 61000-4-12, *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 12: Oscillatory waves immunity test*

ISO 7137, *Aircraft – Environmental conditions and test procedures for airborne equipment*

*Add in the existing list the following new references:*

IEC 61000-4-18, *Electromagnetic compatibility (EMC) – Part 4-18: Testing and measurement techniques – Damped oscillatory wave immunity test*

IEC 61000-4-33, *Electromagnetic compatibility (EMC) – Part 4-33: Testing and measurement techniques – Measurement methods for high-power transient parameters*

*Delete the existing footnote <sup>1</sup> at the end of reference to IEC 61000-4-20.*

**Table 2 – Early time conducted immunity test levels**

Replace the existing Table 2 by the following new Table 2:

Immunity test level	$V_{oc}$ V	$I_{sc}$ A	Waveform	Basic standard	Severity level in the basic standard
EC1	100	2	Damped sinusoids <sup>a</sup>	IEC 61000-4-18	X
EC2	250	5	Damped sinusoids <sup>a</sup>	IEC 61000-4-18	X
EC3	500	10	Damped sinusoids <sup>a</sup>	IEC 61000-4-18	1
EC4	1 000	20	Damped sinusoids <sup>a</sup>	IEC 61000-4-18	2
EC5	2 000	40	Damped sinusoids <sup>a</sup>	IEC 61000-4-18	3
EC6	4 000	80	Damped sinusoids <sup>a</sup>	IEC 61000-4-18	4
EC7	4 000	80	5/50 ns	IEC 61000-4-4	4
EC8	8 000	160	5/50 ns	IEC 61000-4-4	X
EC9	16 000	320	5/50 ns	IEC 61000-4-4	X
EC10	25 000	500	25/500 ns	This standard	EC10
EC11	160 kV	3 200	10/100 ns	This standard	EC11
ECX	Special	Special	Fast transient	This standard	ECX

NOTE 1 Voltage and current levels shown in the table are for common mode values.

NOTE 2 EC10 consists of four sublevels in addition to 25 kV: 1 kV, 4 kV, 8 kV and 16 kV.

NOTE 3 For immunity test levels EC8 and EC9, it is sufficient to test with a single pulse.

NOTE 4 EC11 consists of four sublevels in addition to 160 kV: 20 kV, 40 kV, 80 kV and 120 kV. This immunity test level category is intended for testing equipment directly connected to long MV distribution power lines protected against lightning. If lightning protection is not used, increase  $V_{oc}$  to 1,6 MV and  $I_{sc}$  to 4 000 A (see Annex A).

a Each immunity test level consists of at least three frequencies: 3 MHz, 10 MHz and 30 MHz. The damping parameter  $Q$  of the damped oscillatory wave test, as defined by equation (D.1) in IEC 61000-2-10:1998, ranges from 5 to 20.

### 5.5.2 Conducted immunity test specifications

Replace, in the third sentence of the first paragraph, the reference “IEC 61000-4-12” by “IEC 61000-4-18”.

Replace, in the last sentence of the existing first paragraph, the word “shall” by “should”.

Add, at the end of the first paragraph, the following sentence:

Instrumentation and measurement guidance for the special tests defined by this standard is available in IEC 61000-4-33.

**Table 6 – Conducted HEMP immunity test specifications**

Replace, in the second row “Early-time EC1 – EC6”, in the second column, the existing reference “ISO 7137” by “IEC 61000-4-18”.

Delete, in the second row “Early-time EC1 – EC6”, in the fourth column, the existing sentence “See Annex D”.

Add, in the fourth and fifth rows “Early-time EC10” and “Early-time EC11”, in the fourth column, the following sentence:

IEC 61000-4-33 is applicable.

*Add, in the seventh and eighth rows “Late-time LC1 – LC2” and “Late-time LC3 – LC4”, in the fourth column, the following sentence:*

IEC 61000-4-33 is applicable.

### 6.1.2 Instrumentation

*Add, after the second sentence of the first paragraph, the following sentence:*

The instrumentation and measurement techniques described in IEC 61000-4-33 are applicable to the radiated field tests in this standard.

*Replace, in the first sentence of the second paragraph, the word “shall” by “should”.*

*Replace, in the second sentence of the third paragraph, the word “must” by “should”.*

### 6.2.2 Instrumentation

*Replace the second sentence of the existing text by the two following new sentences:*

For the special tests defined by this standard, the instrumentation and measurement techniques described in IEC 61000-4-33 are applicable. The required overall measurement system accuracy should be within  $\pm 3,0$  dB over a frequency range of  $f_{\min}$  to  $f_{\max}$  where  $f_{\min} = 0,025/(\text{pulse width})$  and  $f_{\max} = 1,25/(\text{pulse rise time})$ .

*Replace, in the penultimate sentence, the word “must” by “should”.*

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## 7.2 Conducted disturbance test

*Replace, in the last sentence of the second paragraph, the word “must” by “should”.*

## 8.2 Immunity test level and test exposures

*Replace the second sentence of the first paragraph by the two following new sentences:*

Thus, each immunity test should consist of three actual test amplitudes, the immunity test level in the table, and 50 %, and 25 % of the level. The test should start at the lowest level, which is assumed to be below the voltage protection level provided by the SPD and the arcing threshold.

*The change in the penultimate sentence of the last paragraph, applies to the French text only.*

*Add, in the second sentence of the second paragraph, the new parenthesis “(6 exposures)” between “three test amplitudes” and “for each orientation”.*

*Replace, in the first sentence of the third paragraph, the word “shall” by “should”.*

*Replace the last sentence of the third paragraph by the two following new sentences:*

At least two test exposures should be performed at each of the six test amplitudes (three positive and three negative pulses). This results in a total of 12 exposures for each major operational mode of the test object.

### 8.3.2 Radiated test procedure

*Replace the entire existing text of the third paragraph by the following new text:*

Each immunity test at a specified immunity test level consists of exposures at three test amplitudes: the specified immunity test level, and 50 %, and 25 % of the level. A minimum of two pulses of the field illumination shall be performed for each of the three exposure levels.

### 8.4 Conducted disturbance immunity test procedure

*Replace the existing text of the third paragraph by the following new text:*

Each immunity test at a specified immunity test level consists of exposures at three exposure levels: the specified immunity test level, and 50 %, and 25 % of the level. A minimum of two positive pulses and two negative pulses shall be performed for each of the three exposure levels.

## Annex D

*Replace, under “Annex D”, the word “(normative)” by “(informative)”.*

*Replace the last two sentences of the first paragraph by the following new text:*

This standard uses IEC 61000-4-18 for the damped oscillatory wave test. This annex describes other pulse injection tests that have been used for HEMP immunity testing. An ISO test as well as a German and a US/NATO standard are presented below for informative purposes.

[IEC 61000-4-25:2001/AMD1:2012](https://standards.iteh.ai/catalog/standards/sist/73999f99-0f6b-4c78-bf5e-65f4841398ac/iec-61000-4-25-2001-amd1-2012)

#### D.1 ISO 7137

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*Replace the first sentence of this clause by the following:*

The test procedure in ISO 7137 for a damped oscillatory wave is test method 3.8 used for lightning induced transient susceptibility.

*Add, at the end of the first paragraph, the following sentence:*

See reference [1] in Clause D.4 for a description of this test.

#### D.2 VG 96-903, Part 70

*Replace the second sentence of Clause D.2 by the following:*

The test method and injection generator are described in references [2] and [3] in Clause D.4.

#### D.3 MIL-STD-461-E, conducted susceptibility (CS116)

*Replace the last sentence of Clause D.3 by the following:*

This standard is described in reference [4] of Clause D.4.

#### **D.4 Reference documents**

*Add the following new reference [1] to the existing list and renumber the list accordingly.*

- [1] ISO 7137:1995, *Aircraft – Environmental conditions and test procedures for airborne equipment*
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