SLOVENSKI STANDARD
SIST EN 61000-2-9:1997

01-marec-1997

Electromagnetic compatibility (EMC) - Part 2: Environment - Section 9: Description of HEMP environment - Ratiated disturbance - Basic publication (IEC 1000-2-9:1996)

Electromagnetic compatibility (EMC) -- Part 2: Environment -- Section 9: Description of HEMP environment - Radiated disturbance

Elektromagnetische Verträglichkeit (EMV) -- Teil 2: Umgebungsbedingungen -- Hauptabschnitt 9: Beschreibung der HEMP-Umgebung-Störstrahlung

Compatibilité électromagnétique (CEM) -- Partie 2: Environnement -- Section 9: Description de l'environnement IEMN-HA -- Perturbations rayonnées

Ta slovenski standard je istoveten z: **EN 61000-2-9:1996**

ICS:

33.100.01	Elektromagnetna združljivost na splošno	Electromagnetic compatibility in general

SIST EN 61000-2-9:1997 **en**

EUROPEAN STANDARD

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EN 61000-2-9

May 1996

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Descriptors: Environments, pulses, electromagnetism, explosions, nuclear reactions, nuclear energy, electromagnetic compatibility, electromagnetic waves, wave forms, description

English version

Electromagnetic compatibility (EMC)
Part 2: Environment
Section 9: Description of HEMP environment - Radiated disturbance
Basic EMC publication
(IEC 1000-2-9:1996)

Compatibilité électromagnétique (CEM)
Partie 2: Environnement
Section 9: Description de l'environnement IEMN-HA Perturbations rayonnées
Publication fondamentale en CEM
(CEI 1000-2-9:1996)

Elektromagnetische Verträglichkeit (EMV)
Teil 2: Umgebungsbedingungen
Hauptabschnitt 9: Beschreibung der HEMP-Umgebung-Störstrahlung
EMV-Grundnorm
(IEC 1000-2-9:1996)

This European Standard was approved by CENELEC on 1996-03-05. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of document 77C/27/FDIS, future edition 1 of IEC 1000-2-9, prepared by SC 77C, Immunity to high altitude nuclear electromagnetic pulse (HEMP), of IEC TC 77, Electromagnetic compatibility, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61000-2-9 on 1996-03-05.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 1996-12-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 1996-12-01

Annexes designated "normative" are part of the body of the standard.
In this standard, annex ZA is normative.
Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 1000-2-9:1996 was approved by CENELEC as a European Standard without any modification.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

NOTE: When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
IEC 50(161)	1990	International Electrotechnical Vocabulary (IEV) Chapter 161: Electromagnetic compatibility	-	-

NORME INTERNATIONALE
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Compatibilité électromagnétique (CEM) –

Partie 2:
Environnement –
Section 9: Description de l'environnement
IEMN-HA – Perturbations rayonnées
Publication fondamentale en CEM

Electromagnetic compatibility (EMC) –

Part 2:
Environment –
Section 9: Description of HEMP environment – Radiated disturbance
Basic EMC publication

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FOREWORD

1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international cooperation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.

2) The formal decisions or agreements of the IEC on technical matters, prepared by technical committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.

3) They have the form of recommendations for international use published in the form of standards, technical reports or guides and they are accepted by the National Committees in that sense.

4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.

International Standard IEC 1000-2-9 has been prepared by sub-committee 77C: Immunity to high altitude nuclear electromagnetic pulse (HEMP), of IEC technical committee 77: Electromagnetic compatibility.

It has the status of a Basic EMC publication in accordance with IEC Guide 107.

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

DIS	Report on voting
77C/27/FDIS	77C/34/RVD

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

IEC 1000 consists of the following parts, under the general title *Electromagnetic compatibility:*

Part 1: General
Part 2: Environment
Part 3: Limits
Part 4: Testing and measurement techniques
Part 5: Installation and mitigation guidelines
Part 6: Generic standards
Part 9: Miscellaneous

ELECTROMAGNETIC COMPATIBILITY (EMC) –

Part 2: Environment – Section 9: Description of HEMP environment – Radiated disturbance – Basic EMC publication

1 Scope and object

This section of IEC 1000-2 defines the high-altitude electromagnetic pulse (HEMP) environment that is one of the consequences of a high-altitude nuclear explosion.

Those dealing with this subject consider two cases:

- high-altitude nuclear explosions;
- low-altitude nuclear explosions.

For civil systems, the most important case is the high-altitude nuclear explosion. In this case, the other effects of the nuclear explosion: blast, ground shock, thermal and nuclear ionizing radiation are not present at the ground level. However the electromagnetic pulse associated with the explosion may cause disruption of, and damage to, communication, electronic and electric power systems thereby upsetting the stability of modern society.

The object of this standard is to establish a common reference for the HEMP environment in order to select realistic stresses to apply to victim equipment for evaluating their performance.

2 Normative reference

The following normative document contains provisions which, through reference in this text, constitute provisions of this section of IEC 1000-2. At the time of publication, the edition indicated was valid. All normative documents are subject to revision, and parties to agreements based on this section of IEC 1000-2 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 50(161): 1990, *International Electrotechnical Vocabulary – Chapter 161: Electromagnetic compatibility*

3 General

A high-altitude (above 30 km) nuclear burst produces three types of electromagnetic pulses which are observed on the earth's surface:

- early-time HEMP (fast);
- intermediate-time HEMP (medium);
- late-time HEMP (slow):

Historically, most interest has been focused on the early-time HEMP which was previously referred to as simply "HEMP". Here we will use the term high-altitude "EMP" or "HEMP" to include all three types. The term NEMP[1] covers many categories of nuclear EMP's including those produced by surface bursts (SREMP)[2] or created on space systems (SGEMP)[3].

Because the HEMP is produced by a high-altitude detonation, we do not observe other nuclear weapon environments such as gamma rays, heat and shock waves at the earth's surface. HEMP was reported from high-altitude U.S. nuclear tests in the South Pacific during the early 1960's, producing effects on electronic equipment far from the burst location.

4 Definitions

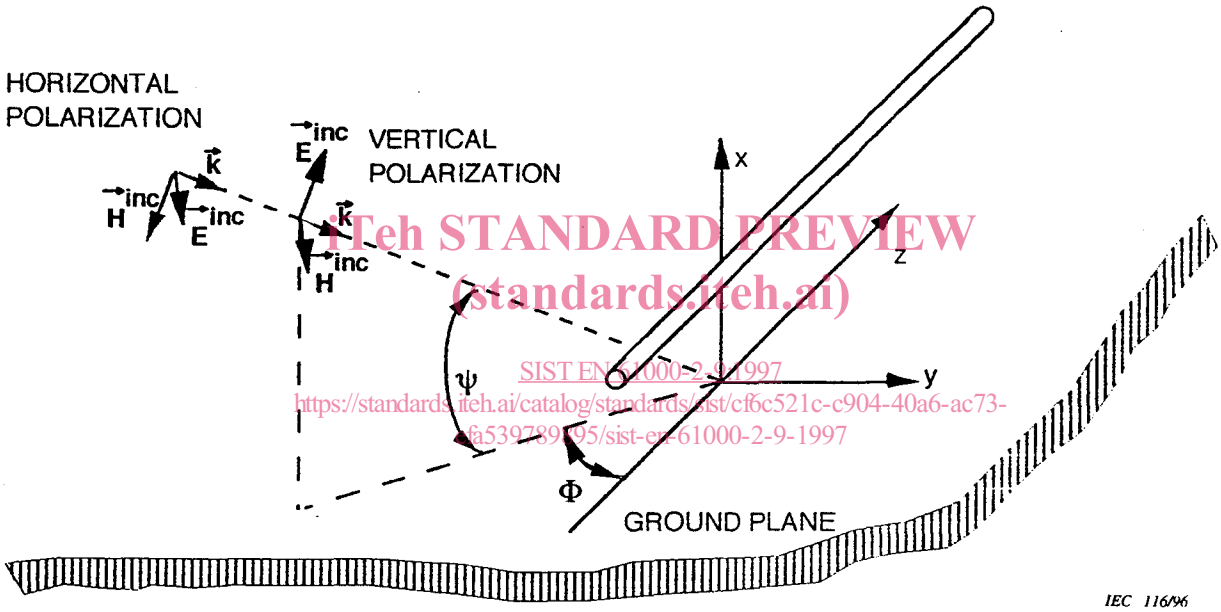

Figure 1 – Geometry for the definition of polarization and of the angles of elevation ψ and azimuth ϕ

4.1 angle of elevation in the vertical plane Ψ: Angle ψ measured in the vertical plane between a flat horizontal surface such as the ground and the propagation vector (see figure 1).

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1) NEMP: Nuclear ElectroMagnetic Pulse.

2) SREMP: Source Region EMP.

3) SGEMP: System Generated EMP.

4.2 azimuth angle, ϕ: Angle between the projection of the propagation vector on the ground plane and the principal axis of the victim object (z axis for the transmission line of figure 1).

4.3 composite waveform: Waveform which maximizes the important features of a group of waveforms.

4.4 coupling: Interaction of the HEMP field with a system to produce currents and voltages on system surfaces and cables. Voltages result from the induced charges and are only defined at low frequencies with wavelengths larger than the surface or gap dimensions.

4.5 direction of propagation of the electromagnetic wave: Direction of the propagation vector $\vec{k}$, perpendicular to the plane containing the vectors of the electric and the magnetic fields (see figure 2).

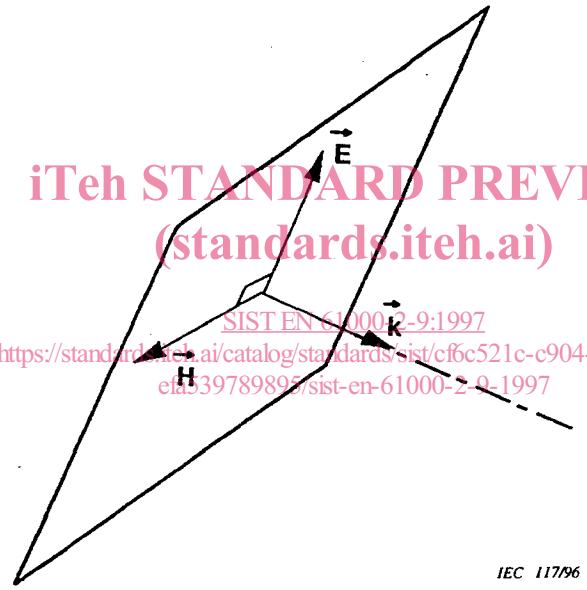

Figure 2 – Geometry for the definition of the plane wave

4.6 E_1, E_2, E_3: Terminology for the early, intermediate and late-time HEMP electric fields.

4.7 EMP: Any electromagnetic pulse, general description.

4.8 energy fluence: Integral of the Poynting vector over time; presented in units of J/m^2.