SLOVENSKI STANDARD
SIST R064-004:2000

01-februar-2000

Električne inštalacije zgradb – Zaščita pred elektromagnetnimi motnjami v inštalacijah zgradb (IEC 60364-4-444:1996, spremenjen)

Electrical installations of buildings - Protection against electromagnetic interferences (EMI) in installations of buildings (IEC 60364-4-444:1996, modified)

Elektrische Anlagen von Gebäuden - Schutz gegen elektromagnetische Störungen (EMI) in Anlagen von Gebäuden

Installations électriques des bâtiments - Protection contre les interférences électromagnétiques (IEM) dans les installations des bâtiments

Ta slovenski standard je istoveten z: **R064-004:1999**

ICS:

33.100.20	Imunost	Immunity
91.140.50	Sistemi za oskrbo z elektriko	Electricity supply systems

SIST R064-004:2000 **en**

CENELEC

R064-004

REPORT

February 1999

English version

Electrical installations of buildings Protection against electromagnetic interferences (EMI) in installations of buildings

Installations électriques des bâtiments Protection contre les interférences électromagnétiques (IEM) dans les installations des bâtiments

Elektrische Anlagen von Gebäuden Schutz gegen elektromagnetische Störungen (EMI) in Anlagen von Gebäuden

This CENELEC Report has been prepared by SC 64B, Protection against thermal effects, of Technical Committee CENELEC TC 64, Electrical installations of buildings. It was approved by the Technical Committee on 1997-11-26 and endorsed by the CENELEC Technical Board on 1998-04-01.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

Ref. No. R064-004:1999 E

Foreword

This CENELEC Report has been prepared by SC 64B, Protection against thermal effects, of Technical Committee CENELEC TC 64, Electrical installations of buildings.

During its meeting on 25th and 26th November 1997 in Brussels, SC 64B decided to publish a CENELEC Report based on the International Standard IEC 60364-4-444 with common modifications. This decision was endorsed by the CENELEC Technical Board on 1998-04-01.

The text of the Report was finalized by SC 64B during its meeting on 24th and 25th November 1998 in London.

INTRODUCTION

Electromagnetic interferences (EMI) can disturb or damage information technology systems or equipment, equipment with electronic components or circuits.

Currents due to lightning, switching operations, short circuits and other electromagnetic phenomena can cause overvoltages and electromagnetic interference.

These effects appear:

- where large metal loops exist[1]; and
- where different electrical wiring systems are installed on different routes, e.g. for power supply and for signalling information technology equipment within a building.

The value of the induced voltage depends on the rate of rise (di/dt) of the interference current, and on the size of the loop.

Power cables carrying large currents with a high rate of rise of current (di/dt) (e.g. the starting current of lifts or currents controlled by rectifiers) can induce overvoltages in cables of information technology systems, which can influence or damage information technology or similar electrical equipment.

In or near rooms for medical use, electric or magnetic fields of electrical installations can interfere with medical electrical equipment.

[1] Equipotential bonding systems, structural metalwork or pipe systems for non-electrical supplies, e.g. for water, gas, heating or air conditioning, can create such induction loops.

ELECTRICAL INSTALLATIONS OF BUILDINGS –

R064-004: Protection against electromagnetic interferences (EMI) in installations of buildings

444.1 Scope

This section of IEC 364-4 provides information for architects of buildings and for designers and installers of electrical installations of buildings on some installation concepts which can limit electromagnetic interference (EMI). Basic considerations are given here to mitigate these disturbances. Further requirements are given in other chapters or sections of IEC 364, e.g. IEC 364-5-548 or in other IEC Standards, e.g. IEC 1000-2, future IEC 1000-5, IEC 1024-1 and IEC 1312-1. These considerations are in line with the above-mentioned standards (see figure 5).

444.2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this section of IEC 364-4. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this section of IEC 364-4 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 364-4-41: 1992, *Electrical installations of buildings – Part 4: Protection for safety – Chapter 41: Protection against electric shock*

IEC 364-5-54: 1980, *Electrical installations of buildings – Part 5: Selection and erection of electrical equipment – Chapter 54: Earthing arrangements and protective conductors*

IEC 742: 1983, *Isolating transformers and safety isolating transformers – Requirements*

IEC 1000-2-5: 1995, *Electromagnetic compatibility (EMC) – Part 2: Environment – Section 5: Classification of electromagnetic environments*

IEC 1024-1: 1990, *Protection of structures against lightning – Part 1: General principles*

IEC 1312-1: 1995, *Protection against lightning electromagnetic impulse – Part 1: General principles*

IEC 364-5-548: 1996, *Electrical installations of buildings – Part 5: Selection and erection of electrical equipment – Chapter 54: Earthing arrangements and protective conductors – Section 548: Earthing arrangements and equipotential bonding for information technology equipment*

444.3 Measures

Measures to be taken against electric and magnetic influences on electrical equipment:

All electrical equipment shall meet the appropriate electromagnetic compatibility (EMC) requirements, and shall be in accordance with the relevant EMC standards.

Reference is also made to IEC 364-3: 321.10, Electromagnetic, electrostatic or ionizing influence; and Amendment 1 to IEC 364-5-51; 515.3, Electromagnetic compatibility (EMC); 515.3.1, Choice of the immunity and emission levels.

Furthermore, reference is made to IEC 364-5-548.

Consideration shall be given by the planner and designer of the electrical installations to the following (see also figure 4) for reducing the effect of induced overvoltages and EMI:

444.3.1 Location of potential sources of interference relative to sensitive equipment.

444.3.2 Location of sensitive equipment relative to high electrical current such as in busbars or in equipment, e.g. lifts.

444.3.3 Provision of filters and/or surge protective devices in the circuits feeding sensitive electrical equipment.

444.3.4 Selection of protective devices with appropriate time delay characteristics to avoid unwanted tripping on transients.

444.3.5 Bonding of metal enclosures and screening.

444.3.6 Adequate separation (distance or screening) of power and signal cables, and cross-overs at right angles.

444.3.7 Adequate separation (distance or screening) of power and signal cables from down conductors of LPS (see IEC 1024-1 and figure 5).

444.3.8 Avoidance of inductive loops by selection of a common route for the wiring of different systems (see also 444.4.4).

444.3.9 Use of screened and/or twisted pair signal cables.

444.3.10 Bonding connections to be made as short as possible.

444.3.11 Wiring systems with single-core conductors to be enclosed in bonded metallic enclosures or equivalent.

444.3.12 Avoidance of TN-C system in installations with sensitive equipment (see figure 1 as well as clause 548.4 of IEC 364-5-548). For buildings which have, or are likely to have, significant information technology equipment installed, consideration shall be given to the use of separate protective conductors (PE) and neutral conductors (N) beyond the incoming supply point, in order to minimize the possibility of electromagnetic problems due to the diversion of neutral current through signal cables causing damage or interference.

444.3.13 For TN-C-S systems within the building, there are two possibilities, depending on the arrangement for interconnection of equipment and extraneous conductive parts:

- change of the TN-C section of the TN-C-S system into a TN-S section for distribution within the building (see figures 1a, 1b and 2);
- avoidance of excessive loops between different TN-S sections of the TN-C-S system within the building (see figure 1b).

444.3.14 Metal pipes (e.g. for water, gas or heating), and cables *for supply of the building* should enter the building at the same place. Metal sheets, screens, metal pipes and connections of these parts shall be bonded and connected to the main equipotential bonding (MEB) of the building (see figure 3) with low impedance conductors.

444.3.15 In the case of different areas which have separated equipotential bonding systems, the use of metal-free fibre optic cable or other non-conducting systems should be used between these different areas.

NOTE – The problem of earth differential voltages on large telecommunication networks is the responsibility of the network operator, who may employ other methods.

444.4 Measures for signal connections

In buildings which include a PEN conductor, or where there is EMI on signal cables due to inadequate provisions in the electrical installations (see clause 548.5 of IEC 364-5-548), the following methods may be considered to avoid or minimize the problem.

444.4.1 Use of fibre optic links for signal connections.

444.4.2 Use of Class II equipment.

444.4.3 Use of local transformers with separate windings (double-wound transformers) for the supply of the information technology equipment, taking into account the requirements of 312.2.3 and 413.1.5 for IT systems (local IT systems), or of clause 413.5 of IEC 364-4-41, for protection by electrical separation (e.g. transformers according to IEC 742).

444.4.4 Use of suitable wiring (cabling) routing in order to minimize the enclosed area of common loops formed by the supply cables and signal cables.

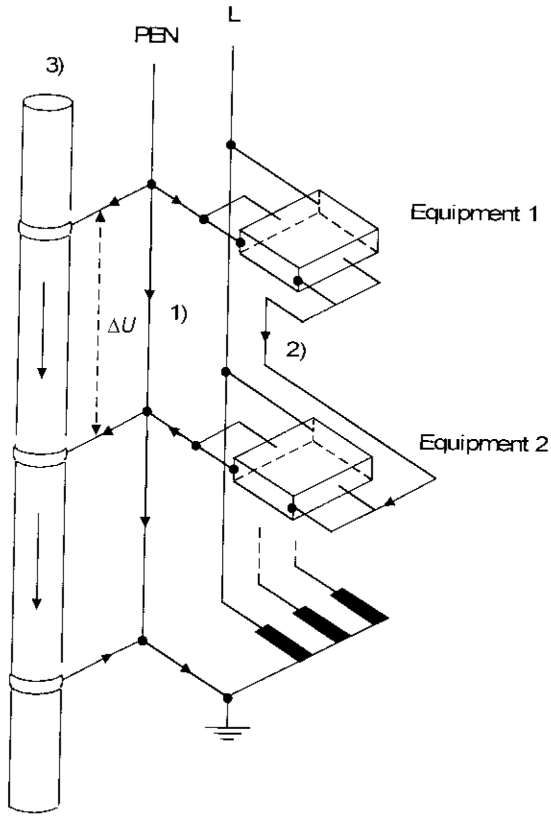

Figure 1a – TN-C system

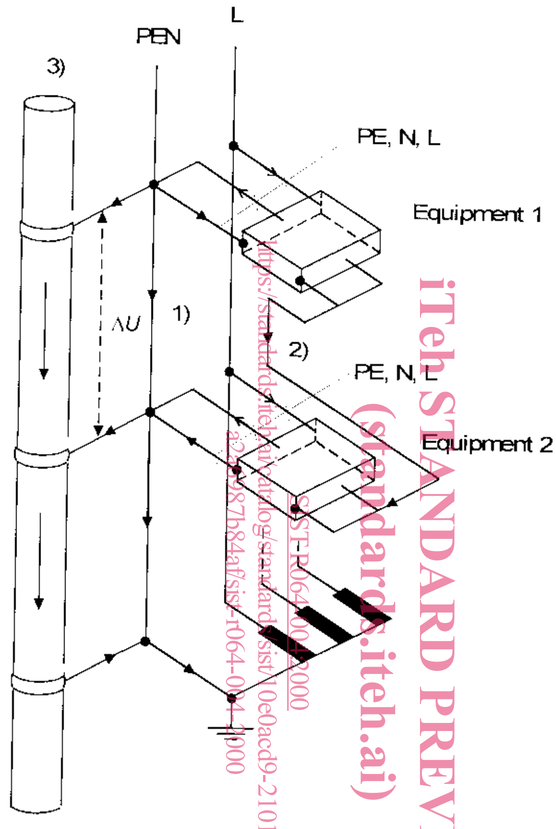

Figure 1b – TN-C-S system

1) Voltage drop ΔU along PEN
2) Loop of limited area
3) Extraneous conductive part

NOTE – In a TN-C system, the current which in a TN-S system would flow only through the neutral conductor, flows also through the screens or reference conductors of signal cables, exposed conductive parts, and extraneous conductive parts such as structural metalwork.

Figure 1 – TN-C and TN-C-S systems in a building