Electrical installations of buildings –

Part 4-44:
Protection for safety –
Protection against voltage disturbances and electromagnetic disturbances

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Electrical installations of buildings –

Part 4-44:
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FOREWORD

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International Standard IEC 60364-4-44 has been prepared by IEC technical committee 64: Electrical installations and protection against electric shock.

This consolidated version of IEC 60364-4-44 is based on the first edition (2001) and its amendment 1 (2003) [documents 64/1303/FDIS and 64/1329/RVD].

It bears the edition number 1.1.

A vertical line in the margin shows where the base publication has been modified by amendment 1.
The IEC 60364 series (parts 1 to 6) is currently being restructured, without any technical changes, into a more simple form (see annex C).

According to a unanimous decision by the Committee of Action (CA/1720/RV (2000-03-21)), the restructured parts of IEC 60364 have not been submitted to National Committees for approval.

Annexes A, B and C are for information only.

Annex D forms an integral part of this standard.

The committee has decided that the contents of the base publication and its amendment 1 will remain unchanged until 2005. At this date, the publication will be

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- withdrawn;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

Part 4-44 of IEC 60364 provides rules for the protection against the effects of conducted and radiated disturbances on electrical installations.

The rules of this standard do not apply to systems which are wholly or partly under control of public power supply companies (see scope of IEC 60364-1).

The fault-current flowing in the earth electrode of the exposed-conductive-parts of the sub-station causes a significant rise of the potential of the exposed-conductive-parts of the sub-station to the general mass of the earth, i.e. a fault-voltage, whose magnitude is governed by

- the fault-current magnitude, and
- the resistance of the earth electrode of the exposed-conductive-parts of the sub-station.

The fault-current may cause

- a general rise of the potential of the low-voltage system with respect to earth, i.e. stress-voltages which may cause a breakdown of the insulation in low-voltage equipment,
- a general rise of the potential of the exposed-conductive-parts of the low-voltage system with respect to earth, which may give rise to fault-voltage and touch voltages.

NOTE In this standard, the expression "high-voltage" (HV) refers to voltages exceeding the upper limit of voltage band II. The expression "low-voltage" (LV) refers to voltages not exceeding the upper limit of voltage band II.

Clause 443 is intended to describe the means by which transient voltages can be limited to reduce the risk to an acceptable level of failure in the installation and in electrical equipment connected to it. This approach is in line with the principles of insulation co-ordination contained in IEC 60664-1. IEC 60664-1 requires technical committees to specify an appropriate impulse withstand category (overvoltage category) for their equipment; that means a minimum impulse withstand voltage for the equipment, according to its application and the related impulse withstand categories.

NOTE In accordance with 2.2.2.1.1 of IEC 60664-1, technical committees should specify the relevant information. It is recommended to indicate the rated impulse withstand voltage applicable to the equipment and the way this is provided.

In clause 444, basic recommendations are described to mitigate electromagnetic disturbances. Actually 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 exist1); 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.

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

Power cables carrying large currents with a high rate of rise of current (\(\frac{di}{dt}\)) (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.

Clause 445 deals with the precautions to be taken in the case of undervoltages.
440.1 (442.1.1) Scope

The rules of this part of IEC 60364 are intended to provide for the safety of persons and equipment in a LV system in the event of a fault between the HV system and earth in the HV part of transformer stations which supply low-voltage systems.

440.2 (442.1.4) Normative references

The following referenced documents are indispensable for the application 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.

IEC 60038:1983, *IEC standard voltages*


IEC 60364-4-41:2001, *Electrical installations of buildings – Part 4-41: Protection for safety – Protection against electric shock*


IEC 60364-5-54, *Electrical installations of buildings – Part 5-54: Selection and erection of electrical equipment – Earthing arrangements and protective conductors and equipotential bonding 1)*


1) To be published.
IEC 60664-1:1992, *Insulation co-ordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*


IEC 61643 (all parts), *Surge protective devices connected to low-voltage power distribution systems*

IEC 61662:1995, *Assessment of the risk of damage due to lightning Amendment 1 (1996)*

441 (Number available)

NOTE This has been introduced to enable the later text to retain the original number.

442 Protection of low-voltage installations against temporary overvoltages and faults between high-voltage systems and earth

442.1 General requirements

NOTE The following clauses consider only four situations which generally cause the most severe temporary overvoltages such as defined in IEV 60050(604), definition 604-03-12:

- fault between the high-voltage system(s) and earth. The corresponding subclauses should be read in conjunction with annex A;
- loss of the neutral in a low-voltage TN and TT system (see 442.6);
- accidental earthing of a low-voltage IT system (see 442.7);
- short-circuit in the low-voltage installation (see 442.8).

442.1.2 Fault-voltage

The magnitude and the duration of the fault-voltage or the touch voltage due to an earth-fault in the high-voltage system shall not exceed the values given by curve F and T respectively of figure 44A.

442.1.3 Stress-voltage

The magnitude and the duration of the power-frequency stress voltage of the LV equipment in the consumer's installation due to an earth fault in the high voltage system shall not exceed the values of table 44A.

NOTE 1 The power-frequency stress voltage is the voltage which appears across the insulation.

NOTE 2 A higher stress voltage is permitted for the low-voltage equipment of the sub-station if the insulation level of the equipment is compatible and under the conditions of 442.3.