IEC 60364-4-44

Edition 2.1 2015-09
CONSOLIDATED VERSION

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

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

Installations électriques à basse tension –
Partie 4-44: Protection pour assurer la sécurité – Protection contre les perturbations de tension et les perturbations électromagnétiques

IEC 60364-4-44:2007-08+AMD1:2015-09 CSV(en-fr)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

LOW-VOLTAGE ELECTRICAL INSTALLATIONS –

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

FOREWORD

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This consolidated version of the official IEC Standard and its amendment has been prepared for user convenience.

IEC 60364-4-44 edition 2.1 contains the second edition (2007-08) [documents 64/1600/FDIS and 64/1609/RVD] and its amendment 1 (2015-09) [documents 64/2032/FDIS and 64/2073/RVD].

In this Redline version, a vertical line in the margin shows where the technical content is modified by amendment 1. Additions are in green text, deletions are in strikethrough red text. A separate Final version with all changes accepted is available in this publication.

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

The document 64/1600/FDIS, circulated to the National Committees as Amendment 3, led to the publication of the new edition.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all the parts in the IEC 60364 series, under the general title *Low-voltage electrical installations,* can be found on the IEC website.

Future standards in this series will carry the new general title as cited above. Titles of existing standards in this series will be updated at the time of the next edition.

The reader's attention is drawn to the fact that Annex C lists all of the “in-some-country” clauses on differing practices of a less permanent nature relating to the subject of this standard.

The committee has decided that the contents of the base publication and its amendment 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.

The contents of the corrigenda of May 2010 and October 2011 have been included in this copy.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

Part 4-44 of IEC 60364 covers the protection of electrical installations and measures against voltage disturbances and electromagnetic disturbances.

The requirements are arranged into four clauses as follows:

Clause 442	Protection of low-voltage installations against temporary overvoltages due to earth faults in the high-voltage system and due to faults in the low-voltage system
Clause 443	Protection against overvoltages of atmospheric origin or due to switching
Clause 444	Measures against electromagnetic influences
Clause 445	Protection against undervoltage

LOW-VOLTAGE ELECTRICAL INSTALLATIONS –

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

440.1 Scope

The rules of this Part of IEC 60364 are intended to provide requirements for the safety of electrical installations in the event of voltage disturbances and electromagnetic disturbances generated for different specified reasons.

The rules of this part are not intended to apply to systems for distribution of energy to the public, or power generation and transmission for such systems (see the scope of IEC 60364-1) although such disturbances may be conducted into or between electrical installations via these supply systems.

440.2 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~~ 2009, *IEC standard voltages*

IEC 60050-604:1987, *International Electrotechnical Vocabulary – Chapter 604: Generation, transmission and distribution of electricity – Operation*

IEC 60364-1, *Low-voltage electrical installations – Part 1: Fundamental principles, assessment of general characteristics, definitions*

IEC 60364-4-41:2005, *Electrical installations of buildings – Part 4-41: Protection for safety – Protection against electric shock*

IEC 60364-5-53:2001, *Electrical installations of buildings - Part 5-53: Selection and erection of electrical equipment - Isolation, switching and control*
IEC 60364-5-53:2001/AMD1:2002
IEC 60364-5-53:2001/AMD2:2015

IEC 60364-5-54:2002, *Electrical installations of buildings – Part 5-54: Selection and erection of electrical equipment – Earthing arrangements and protective bonding conductors* [1]

IEC 60479-1:2005, *Effects of current on human beings and livestock – Part 1: General aspects*

IEC 60664-1:2007, *Insulation co-ordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*

IEC 60950-1, *Information technology equipment – Safety – Part 1: General requirements*

IEC 61000-2-5:1995, *Electromagnetic compatibility (EMC) – Part 2: Environment – Section 5: Classification of electromagnetic environments – Basic EMC publication*

IEC 61000-6-1, *Electromagnetic compatibility (EMC) – Part 6-1: Generic standards – Immunity for residential, commercial and light-industrial environments*

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1 A third edition is currently in preparation.

IEC 61000-6-2, *Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity for industrial environments*

IEC 61000-6-3, *Electromagnetic compatibility (EMC) – Part 6-3: Generic standards – Emission standard for residential, commercial and light-industrial environments*

IEC 61000-6-4, *Electromagnetic compatibility (EMC) – Part 6-4: Generic standards – Emission standard for industrial environments*

IEC 61558-2-1, *Safety of power transformers, power supplies, reactors and similar products – Part 2-1: Particular requirements for tests for separating transformers and power supplies incorporating separating transformers for general applications*

IEC 61558-2-4, *Safety of power transformers, power supply units and similar – Part 2-4: Particular requirements for isolating transformers for general use*

IEC 61558-2-6, *Safety of power transformers, power supply units and similar – Part 2-6: Particular requirements for safety isolating transformers for general use*

IEC 61558-2-15, *Safety of power transformers, power supply units and similar – Part 2-15: Particular requirements for isolating transformers for the supply of medical locations*

IEC 61643 (all parts), *Low-voltage surge protective devices*

IEC 61643-11:2011, *Low-voltage surge protective devices – Part 11: Surge protective devices connected to low-voltage power systems – Requirements and test methods*

IEC 61643-22, *Low-voltage surge protective devices – Part 22: Surge protective devices connected to telecommunications and signalling networks – Selection and application principles*

IEC 61936-1, *Power installations exceeding 1 kV a.c. – Part 1: Common rules*

IEC 62305 (all parts), *Protection against lightning*

IEC 62305-1, *Protection against lightning – Part 1: General principles*

IEC 62305-3, *Protection against lightning – Part 3: Physical damage to structures and life hazard*

IEC 62305-4, *Protection against lightning – Part 4: Electrical and electronic systems within structures*

441 (Vacant)

442 Protection of low-voltage installations against temporary overvoltages due to earth faults in the high-voltage system and due to faults in the low-voltage system

442.1 Field of application

The rules of this clause provide requirements for the safety of low-voltage installation in the event of

– a fault between the high-voltage system and earth in the transformer substation that supplies the low-voltage installation,

– a loss of the supply neutral in the low-voltage system,

– a short-circuit between a line conductor and neutral,

– an accidental earthing of a line conductor of a low-voltage IT-system.

The requirements for the earthing arrangement at the transformer substation are given in IEC 61936-1.

442.1.1 General requirements

As Clause 442 covers faults between a high-voltage line and the earth in the HV/LV substation, it gives rules for the designer and installer of the substation. It is necessary to have the following information concerning the high-voltage system:

– quality of the system earthing;

– maximum level of earth fault current;

– resistance of the earthing arrangement.

The following subclauses consider four situations as proposed in 442.1, which generally cause the most severe temporary overvoltages such as defined in IEC 60050-604:

– fault between the high-voltage system(s) and earth (see 442.2);

– loss of the neutral in a low-voltage system (see 442.3);

– accidental earthing of a low-voltage IT system (see 442.4);

– short-circuit in the low-voltage installation (see 442.5).

442.1.2 Symbols

In Clause 442 the following symbols are used (see Figure 44.A1):

I_E part of the earth fault current in the high-voltage system that flows through the earthing arrangement of the transformer substation.

R_E resistance of the earthing arrangement of the transformer substation.

R_A resistance of the earthing arrangement of the exposed-conductive-parts of the equipment of the low-voltage installation.

R_B resistance of the earthing arrangement of the low-voltage system neutral, for low-voltage systems in which the earthing arrangements of the transformer substation and of the low-voltage system neutral are electrically independent.

U_o in TN- and TT-systems: nominal a.c. r.m.s. line voltage to earth

in IT-systems: nominal a.c. voltage between line conductor and neutral conductor or mid point conductor, as appropriate

U_f power-frequency fault voltage that appears in the low-voltage system between exposed-conductive-parts and earth for the duration of the fault.

U_1 power-frequency stress voltage between the line conductor and the exposed-conductive-parts of the low-voltage equipment of the transformer substation during the fault.

U_2 power-frequency stress voltage between the line conductor and the exposed-conductive-parts of the low-voltage equipment of the low-voltage installation during the fault.

NOTE 1 The power-frequency stress voltage (U_1 and U_2) is the voltage that appears across the insulation of low-voltage equipment and across surge protective devices connected to the low-voltage system.