# IEC 60364-5-54

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# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

BASIC SAFETY PUBLICATION

PUBLICATION FONDAMENTALE DE SÉCURITÉ

## Low-voltage electrical installations – Part 5-54: Selection and erection of electrical equipment – Earthing arrangements and protective conductors

## Installations électriques basse-tension – Partie 5-54: Choix et mise en œuvre des matériels électriques – Installations de mise à la terre et conducteurs de protection



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

# LOW-VOLTAGE ELECTRICAL INSTALLATIONS –

## Part 5-54: Selection and erection of electrical equipment – Earthing arrangements and protective conductors

## FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). 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. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 60364-5-54 has been prepared by IEC technical committee 64: Electrical installations and protection against electric shock.

This third edition cancels and replaces the second edition, published in 2002, and constitutes a technical revision.

The main changes with respect to the previous edition are listed below:

– clarification of the definition of protective conductor;
– improved specification of mechanical characteristics of the earth electrode;
– introduction of earth electrode for protection against electric shock and lighting protection;
– annexes describing concrete-embedded foundation earth electrodes and soil-embedded earth electrode.

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

| FDIS | Report on voting |
|---|---|
| 64/1755/FDIS | 64/1766/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.

It has the status of a basic safety publication in accordance with IEC Guide 104.

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

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

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

The committee has decided that the contents of this 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.

# INTRODUCTION

Clause numbering is sequential, preceded by the number of this Part. Numbering of figures and tables takes the number of this part followed by a sequential number, i.e. Table 54.1, 54.2, etc. Numbering of figures and tables in annexes takes the letter of the annex, followed by the number of the part, followed by a sequential number, e.g. A.54.1, A.54.2, etc.

# LOW-VOLTAGE ELECTRICAL INSTALLATIONS –

# Part 5-54: Selection and erection of electrical equipment – Earthing arrangements and protective conductors

## 541 General

### 541.1 Scope

This part of IEC 60364 addresses the earthing arrangements and protective conductors including protective bonding conductors in order to satisfy the safety of the electrical installation.

### 541.2 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 60364-4-41:2005*, Low-voltage electrical installations – Part 4-41: Protection for safety – Protection against electric shock*

IEC 60364-4-44:2007, *Low-voltage electrical installations – Part 4-44: Protection for safety – Protection against voltage disturbances and electromagnetic disturbances*

IEC 60364-5-51:2005, *Electrical installations of buildings – Part 5-51: Selection and erection of electrical equipment – Common rules*

IEC 60439-2, *Low-voltage switchgear and controlgear assemblies – Part 2: Particular requirements for busbar trunking systems (busways)*

IEC 61439-1, *Low-voltage switchgear and controlgear assemblies – Part 1: General rules*

IEC 61439-2, *Low-voltage switchgear and controlgear assemblies – Part 2: Power switchgear and controlgear assemblies*

IEC 60724*, Short-circuit temperature limits of electric cables with rated voltages of 1 kV ($U_m$ = 1,2 kV) and 3 kV ($U_m$ = 3,6 kV)*

IEC 60909-0*, Short-circuit currents in three-phase a.c. systems – Part 0: Calculation of currents*

IEC 60949, *Calculation of thermally permissible short-circuit currents, taking into account non-adiabatic heating effects*

IEC 61140:2001, *Protection against electric shock – Common aspects for installation and equipment*

IEC 61534-1, *Powertrack systems – Part 1: General requirements*

IEC 62305 (all parts) *Protection against lightning*

IEC 62305-3:2006, *Protection against lightning – Part 3: Physical damage to structures and life hazard*

### 541.3 Terms and definitions

For the purposes of this document, the terms and definitions of IEC 61140, together with the following definitions, apply.

Definitions used for earthing arrangements, protective conductors and protective bonding conductors are illustrated in Annex B and listed below:

**541.3.1**
**exposed-conductive-part**
conductive part of equipment which can be touched and which is not normally live, but which can become live when basic insulation fails

[IEC 60050-826:2004, 826-12-10]

**541.3.2**
**extraneous-conductive-part**
conductive part not forming part of the electrical installation and liable to introduce an electric potential, generally the electric potential of a local earth

[IEC 60050-825:2004, IEV 826-12-11]

**541.3.3**
**earth electrode**
conductive part, which may be embedded in the soil or in a specific conductive medium, e.g. concrete, in electrical contact with Earth

[IEC 60050-826:2004, 826-13-05, modified]

**541.3.4**
**concrete-embedded foundation earth electrode**
earth electrode embedded in concrete of a building foundation, generally in the form of a closed loop

[IEC 60050-826:2004, 826-13-08, modified]

**541.3.5**
**soil-embedded foundation earth electrode**
earth electrode buried in the soil under a building foundation, generally in the form of a closed loop

[IEC 60050-826:2004, 826-13-08, modified]

**541.3.6**
**protective conductor**
conductor provided for purposes of safety, for example protection against electric shock

[IEC 60050-826:2004, 826-13-22]

NOTE Examples of a protective conductor include a protective bonding conductor, a protective earthing conductor and an earthing conductor when used for protection against electric shock.