IEC 60364-5-54

Edition 3.0 2021-04

INTERNATIONAL STANDARD

NORME INTERNATIONALE

AMENDMENT 1
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Low-voltage electrical installations – Part 5-54: Selection and erection of electrical equipment – Earthing arrangements and protective conductors

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

IEC 60364-5-54:2011-03/AMD1:2021-04(en-fr)

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LOW-VOLTAGE ELECTRICAL INSTALLATIONS –

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

AMENDMENT 1

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Amendment 1 to IEC 60364-5-54:2011 has been prepared by IEC technical committee 64: Electrical installations and protection against electric shock.

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

Draft	Report on voting
64/2479/FDIS	64/2481/RVD

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

The language used for the development of this Amendment is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications/.

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- withdrawn,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

INTRODUCTION to Amendment 1

The main changes provided in this Amendment 1 are:

- clarification and necessary modifications to define a clear borderline between functional earthing and protective earthing (see INTRODUCTION);
- introduction of additional requirements for functional earthing and functional-equipotential-bonding for information technology systems and communication equipment (ICT).

INTRODUCTION

Add the following new text at the end of the existing paragraph:

To define a clear borderline between functional earthing and protective earthing the following explanations are given:

Functional earthing

- Functional earthing

  If any connection of the functional earthing is interrupted, it does not impair any kind of protection or any kind of protective measure or protective provision provided for electrical safety. Therefore, its application mainly relates to:

  – communication,

  – measurement, and

  – EMC as regards radiated disturbances and conducted high frequency disturbances.

- Protective earthing

  If any connection of the protective earthing is interrupted, it impairs the protection or the function of a protective measure or protective provision provided for electrical safety.

  Requirement for protective earthing are given in:

  – IEC 60364-4-41 for protection against electric shock;
  – IEC 60364-4-42 for protection against thermal effects;
  – IEC 60364-4-44 for protection against conducted disturbances.

541.1 Scope

Add the following new text at the end of the existing paragraph:

This document also includes requirements regarding earthing and equipotential bonding for information and communication technology (ICT) with the aim of:

– reducing the risk of electrical hazards for correct operation of these devices and the information and communication technology wiring;
– providing the telecommunication systems with a reliable signal reference plane that can improve resistance to electromagnetic interference (EMI) by reference to ISO/IEC 30129.

NOTE Examples of information and communication technology (ICT) include:

– DC supply networks (and systems) for supplying power to ICT equipment within a building;
– star-shaped private automatic branch exchanges (PABX) or their equipment;
– local area (communication) networks (LANs);
– fire and intruder alarms communication systems;
– building automation systems, e.g. direct digital control systems;
– systems for computer-aided manufacturing (CAM) and other computer-aided services;
– broadcast and communication technology.

541.2 Normative references

Add the following new references:

IEC 60445, *Basic and safety principles for man-machine interface, marking and identification – Identification of equipment terminals, conductor terminations and conductors*

IEC 60417, *Graphical symbols for use on equipment* (available at http://www.graphical-symbols.info/equipment)

Replace the existing reference to IEC 62305-3:2006 with the following new reference:

IEC 62305-3:2010, *Protection against lightning – Part 3: Physical damage to structures and life hazard*

541.3 Terms and definitions

Add the following new definitions:

541.3.13
functional earthing conductor
conductor provided for functional earthing

[SOURCE: IEC 60050-826:2004, 826-13-28, modified – In the definition, "earthing conductor" replaced with "conductor".]

541.3.14
main functional earthing terminal
main functional earthing busbar
MFET
terminal or busbar, which is part of the functional earthing arrangement of an electrical installation, enabling the electric connection of a number of conductors for functional earthing purposes

541.3.15
functional-equipotential-bonding
equipotential bonding for reasons other than electrical safety

[SOURCE: IEC 60050-826:2004, 826-13-21, modified – "operational reasons other than safety" replaced with "reasons other than electrical safety".]

541.3.16
protective-equipotential-bonding
equipotential bonding for the purposes of electrical safety

[SOURCE: IEC 60050-826:2004, 826-13-20, modified – "electrical" added.]

541.3.17
equipotential bonding
provision of electric connections between conductive parts, intended to achieve equipotentiality

[SOURCE: IEC 60050-826:2004, 826-13-19]

541.3.18
protective earthing
earthing for purposes of electrical safety

[SOURCE: IEC 60050-826:2004, 826-13-09, modified – "a point or points in a system or in an installation or in equipment" deleted.]

541.3.19
functional bonding conductor
conductor provided for functional-equipotential-bonding

[SOURCE: IEC 60050-826:2004, 826-13-29]

542 Earthing arrangements

542.1 General requirements

542.1.2

Delete the note.

542.2 Earth electrodes

542.2.1

Replace, after NOTE 2, the sentence:

"If a lightning protection system is required, 5.4 of IEC 62305-3:2006 applies."

with the following new sentence:

"Where a lightning protection system is required, IEC 62305-3:2010, 5.4 also applies."

542.2.2

Replace the second sentence starting with "One or more earth electrodes..." with the following new sentence:

"Earth electrode(s) shall be selected according to the soil conditions and the required value of resistance to earth."

543 Protective conductors

543.2 Types of protective conductors

543.2.3

Replace the first sentence starting with "The following metal parts..." with the following new sentence:

"The following metal parts shall not be used as protective conductors:"

Renumber the existing NOTE 1 as NOTE and delete NOTE 2.

543.3 Electrical continuity of protective conductors

543.3.2

Replace the text:

"Joints in protective conductors shall be accessible for inspection and testing except for"

with the following new text:

"Joints in protective conductors shall be accessible except for"

Replace the second dashed item:

"– encapsulated joints,"

with the following:

"– connections within enclosures which can be opened only by destruction,"

Replace the fourth dashed item with the following:

"– joints forming part of equipment, complying with the relevant standards, for example low-voltage switchgear and controlgear assemblies according to 543.2.2,"

Add, at the end of Clause 544, the following new Clause 545

545 Functional earthing and functional-equipotential-bonding for Information and communication technology equipment and systems (ICT)

545.1 Functional-equipotential-bonding for ICT

545.1.1 General

A functional-equipotential-bonding system may comprise

– functional earthing conductor(s),
– functional bonding conductor(s),
– a main functional earthing terminal.

Where the functional-equipotential-bonding system is not locally connected to the protective-equipotential-bonding system, the functional bonding conductors shall be

– insulated, and
– installed separately from the protective conductor, and
– connected to the main earthing terminal only once.

NOTE The functional-bonding-conductors are insulated because those conductors could under certain circumstances achieve a dangerous potential.

If there are multiple functional bonding conductors present in the electrical installation, a separate main functional earthing terminal (MFET) shall be installed for ease of connection for these conductors. The main functional earthing terminal shall be connected to the main earthing terminal only once.

The cross-sectional area of every functional bonding conductor or functional earthing conductor shall be capable of withstanding all mechanical and thermal stresses caused by the expected operational current. This current shall be determined in accordance with the manufacturer's instructions or by measurement taking into account the ICT equipment or system.

545.1.2 Minimum cross-sectional area

In the absence of requirements, for example stated by the equipment manufacturer, the following minimum cross-sectional area shall be applied for functional earthing conductors and functional bonding conductors:

– 2,5 mm^2 Cu or 16 mm^2 Al, if protection against mechanical damage is provided,
– 4 mm^2 Cu or 16 mm^2 Al, if protection against mechanical damage is not provided.

NOTE Larger cross-sectional areas can be specified for EMC reasons.

545.1.3 Identification

A functional earthing conductor shall be identified according to IEC 60445 by:

– the alphanumeric notation FE, or
– by the colour PINK at least applied at the terminations and points of connection, or
– by the symbol  (graphical symbol IEC 60417-5018:2011-07).

A functional bonding conductor shall be identified by:

– the alphanumeric notation FB, or
– by the symbol  (graphical symbol IEC 60417-5020:2002-10).

NOTE The alphanumeric notation and the colour marking are in accordance with IEC 60445.

The bi-colour combination GREEN-AND-YELLOW shall not be used to identify functional bonding conductors.

545.1.4 Electrical continuity of functional bonding conductors

The requirements of 543.3, except for 543.3.5, also apply for functional bonding.

If part of an item of equipment can be removed, the functional bonding conductor for the remaining part of the electrical installation shall not be disconnected.

545.1.5 Combined protective and functional bonding conductors

Where a combined protective and functional bonding conductor is used, it shall fulfil all requirements for a protective bonding conductor. The combined protective and functional bonding conductor shall be identified by the bi-colour combination GREEN-AND-YELLOW.

545.2 Main functional earthing terminal (MFET)

The following conductors shall be connected to the main functional earthing terminal (MFET), if any:

– functional earthing conductors;
– functional bonding conductors.

The main functional earthing terminal (MFET) and the main earthing terminal (MET) may be combined, as stated in 542.4.

545.3 Equipotential bonding ring conductors

The main earthing terminal (MET according to 542.4 and/or MFET according to 548.2) may be provided as a ring (closed loop) conductor to enable systems of information technology and communications equipment (ICT) to be incorporated into the equipotential bonding system using the shortest connection.

The equipotential bonding ring conductor shall be easily accessible wherever connections may be required.

The cross-sectional area of equipotential bonding ring conductors shall comply either with Clause 544 when used also for protective bonding, or:

– be at least 50 mm^2 hot-dip galvanized steel strip, or
– be at least 16 mm^2 copper, or
– be a cross-sectional area in another material, which provides at least a conductivity equivalent to 16 mm^2 copper.

Annex B

Figure B.54.1

Replace the existing figure including the key to the figure with the following new Figure B.54.1 and key: