

Application of equipotential bonding and earthing in buildings with information technology equipment

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Summary of pages

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Application of equipotential bonding and earthing in buildings with information technology equipment

Application de liaison équipotentielle et de la mise à la terre dans les locaux avec équipement de technologie de l'information

Anwendung von Maßnahmen für Potentialausgleich und Erdung in Gebäuden mit Einrichtungen der Informationstechnik

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Foreword

This European Standard has been prepared by CENELEC/TC 215/WG 4, which is composed of experts of both CENELEC/TC 215 and ETSI/TC EE/WG EE 2 (former ETSI/STC EE 2). The work started in Technical Committee Environmental Engineering (TC EE) of the European Telecommunications Standards Institute (ETSI) as sub-contracted work on behalf of Technical Committee CENELEC/TC 215 under mode 3, as agreed on the CENELEC-ETSI work repartition meeting held in 1992 and as approved by the ETSI/TA and CENELEC/BT at that time.

The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50310 on 2000-08-1.

The following dates were fixed.

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2001-08-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2003-08-01

Annexes designated “normative” are part of the body of the standard. Annexes designated “informative” are given for information only.

In this standard, annex A is normative; Annexes B and C are informative.

This standard has been produced within the framework of the following considerations:

- a) With the ongoing growth of the liberalized telecommunication market, the increasing advent of private telecommunication network operators, and the flourishing use of networking computers, the amount of Information Technology equipment installed in buildings and the complexity of these Information Technology installations are permanently growing.
- b) Information Technology equipment is generally installed either as stand alone equipment (e.g. personal or network computers, small PBXs), or held in racks, cabinets or other mechanical structures (e.g. switching systems, transmission systems, mobile base stations).
- c) The existing ITU-T and ITU-R recommendations in such matters do not ensure the required standardization at the equipment level.
- d) CENELEC/SC 64B, *Electrical installations of buildings: Protection against thermal effects*, has decided during their meeting in November 1997 not to harmonize IEC 60364-5-548:1996, *Electrical installations of buildings – Part 5: Selection and erection of electrical equipment – Section 548: Earthing arrangements and equipotential bonding for information technology installations*.
- e) This European Standard shall give guidance to Network operators, equipment providers and building owners to agree on a standardized bonding configuration that facilitates:
 - compliance of the Information Technology Equipment installation with functional requirements including Electromagnetic Compatibility (EMC) aspects of emission and immunity;
 - compatible building installation and equipment provisions;
 - installation of new equipment in buildings as well as expansion or replacement of installations in existing buildings with equipment coming from different suppliers;
 - a structured installation practice;
 - simple maintenance rules;
 - contracting on a common basis;
 - harmonization in development, manufacturing, installation and operation.

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Introduction

This standard addresses earthing and bonding of information technology equipment in buildings in relation to safety, functional and electromagnetic performance, taking into account that the draft does not specify another earthing and bonding system but selects out of the existing ones (specified in HD 384 series together with IEC 60364-5-548) the best suitable system to information technology needs (CBN, MESH-BN, TN-S system).

Information regarding the general principles on earthing for (small) telecommunication installations in buildings has been published in Recommendation ITU-T K.31.

Depending on the degree of complexity and the size of the information technology installation, different levels of earthing and bonding are required. Starting from basic requirements on earthing and bonding this standard defines the refinements necessary to operate information technology equipment. The underlined concepts of this standard are in harmony with ETS 300 253. Therefore large information technology installations in buildings, which may require special care to avoid damage or upset from electromagnetic sources can make use of the bonding configurations and earthing techniques of ETS 300 253.

The specifications of EN 50310 are intended to provide optimum earthing and bonding conditions for buildings, where information technology installations are to be operated. EN 50310 should be applied at least in the case of newly constructed buildings and whenever possible in existing buildings (e.g. on the occasion of refurbishment). EN 50174-2 details the considerations for satisfactory installation and operation of information technology cabling within the environment of a building operating a low-voltage electricity distribution system (up to AC 1 000 V rms). For the relationship of EN 50310 and European Standards on information technology cabling and their usage see Table 1.

Table 1 - Relationship between EN 50310 and European Standards dealing with information technology cabling

Building design phase	Cabling design phase	Planning phase	Implementation phase	Operation phase
EN 50310 5.2: Common bonding network (CBN) within a building 6.3: AC distribution system and bonding of the protective conductor (TN-S)	EN 50173 or (and) EN 50098-1 or (and) EN 50098-2 or (and) Other application standards	EN 50174-1 4: Specification considerations 5: Quality assurance 7: Cabling administration and EN 50174-2 4: Safety requirements 5: General installation practices for metallic and optical fibre cabling 6: Additional installation practice for metallic cabling 7: Additional installation practice for optical fibre cabling and EN 50174-3 and (for equipotential bonding) EN 50310 5.2: Common bonding network (CBN) within a building 6.3: AC distribution system and bonding of the protective conductor (TN-S)	EN 50174-1 6: Documentation 7: Cabling administration and EN 50174-2 4: Safety requirements 5: General installation practices for metallic and optical fibre cabling 6: Additional installation practice for metallic cabling 7: Additional installation practice for optical fibre cabling and EN 50174-3 and (for equipotential bonding) EN 50310 5.2: Common bonding network (CBN) within a building 6.3: AC distribution system and bonding of the protective conductor (TN-S)	EN 50174-1 5: Quality assurance 7: Cabling administration 8: Repair and maintenance

1 Scope

This European Standard applies to the equipotential bonding inside buildings in which information technology equipment is going to be installed. It contributes to the standardization of information technology equipment and co-ordinates with the pre-requirements of the generic installation conditions as outlined in IEC 60364-5-548 to achieve the following targets:

- a) safety from electrical hazards;
- b) reliable signal reference within the entire information technology installation;
- c) satisfactory electromagnetic performance of the entire information technology installation.

A defined bonding configuration down to the equipment level – independent of the equipment supplier – is intended to facilitate:

- the installation, operation and maintenance of information technology installations in buildings;
- the interworking between different information technology equipment (interconnected by metallic links).

The specification of information technology equipment and of the pre-requirements of installation are subject to agreement of the parties (e.g. the equipment supplier and the purchaser or building owner).

This standard applies to buildings with information technology equipment or in which the installation of information technology equipment is intended. It does not apply to buildings which may be subject to a harsh electromagnetic environment, or rooms containing the generation, transmission or termination of voltages over AC 1 000 V. This standard does not address the specific requirements for telecommunication centres; these are specified in ETS 300 253.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 41003, *Particular safety requirements for equipment to be connected to telecommunication networks*.

EN 50174-2, *Information technology – Cabling installation – Part 2: Installation planning and practices inside buildings*.

EN 60950, *Safety of information technology equipment (IEC 60950:1999, modified)*.

ETS 300 253, *Equipment Engineering (EE) – Earthing and bonding of telecommunication equipment in telecommunication centres*.

HD 384.2 S1, *International Electrotechnical Vocabulary – Chapter 826: Electrical installations of buildings (IEC 60050-826:1982)*.

HD 384.3 S2, *Electrical installations of buildings – Part 3: Assessment of general characteristics of installations (IEC 60364-3:1993, modified)*.

HD 384.4.41 S2, *Electrical installations of buildings – Part 4: Protection for safety – Chapter 41: Protection against electric shock (IEC 60364-4-41:1992, modified)*.

HD 384.5.54 S1, *Electrical installations of buildings – Part 5: Selection and erection of electrical equipment – Chapter 54: Earthing arrangements and protective conductors (IEC 60364-5-54:1980, modified)*.

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

3 Definitions, abbreviations and symbols

3.1 Definitions

For the purposes of this European Standard, the following definitions apply.

NOTE 1 The definitions with respect to earthing and bonding are taken from series IEC 60050 and HD 384.2 S1, respectively. Furthermore, definitions specific to information technology installations given in ETS 300 253:1995 are used. Reference to these standards is indicated, where appropriate, in square brackets. These definitions are reproduced here to assist the reader of this standard.

NOTE 2 The concept of the various electricity distribution systems (TN-S, TN-C, TT and IT) is introduced in detail in HD 384.3 S2.

3.1.1

bonding mat

essential means to provide a SRPP by a discernible, nearly regular mesh structure. The bonding mat may be located either below or above a collection of equipment constituting a system block

[3.2.2 of ETS 300 253:1995]

3.1.2

bonding network (BN)

set of interconnected conductive structures that provides an “electromagnetic shield” for electronic systems and personnel at frequencies from direct current (DC) to low radio frequency (RF). The term “electromagnetic shield” denotes any structure used to divert, block or impede the passage of electromagnetic energy. In general, a BN need not be connected to earth but all BNs considered in this standard will have an earth connection

[3.2.2 of ETS 300 253:1995]

3.1.3

bonding ring conductor (BRC)

an earthing bus conductor which forms a closed connected ring. Normally a BRC has multiple connections to the CBN and therefore improves its quality

3.1.4

common bonding network (CBN)

principal means for effective bonding and earthing inside a telecommunication building. It is the set of metallic components that are intentionally or incidentally interconnected to form the principal BN in a building. These components include: structural steel or reinforcing rods, metallic plumbing, alternating current (AC) power conduit, protective conductors (PE), cable racks and bonding conductors. The CBN always has a mesh topology and is connected to the earthing network

[3.2.2 of ETS 300 253:1995]

3.1.5

DC return conductor

(+) conductor of the –48 V or –60 V secondary DC supply

[3.2.2 of ETS 300 253:1995]

3.1.6

earth

conductive mass of the earth, whose electric potential at any point is conventionally taken as equal to zero

[826-04-01 of HD 384.2 S1:1986]