

English version

**Low-voltage electrical installations -  
Part 4-444: Protection for safety -  
Protection against voltage disturbances and electromagnetic  
disturbances  
(IEC 60364-4-44:2007 (CLAUSE 444), modified)**

Installations électriques à basse tension -  
Partie 4-444: Protection pour assurer la  
sécurité -  
Protection contre les perturbations de  
tension et les perturbations  
électromagnétiques  
(CEI 60364-4-44:2007 (CLAUSE 444),  
modifiée)

Errichten von Niederspannungsanlagen -  
Teil 4-444: Schutzmaßnahmen –  
Schutz bei Störspannungen und  
elektromagnetischen Störgrößen  
(IEC 60364-4-44:2007 (CLAUSE 444),  
modifiziert)

This Harmonization Document was approved by CENELEC on 2010-05-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for implementation of this Harmonization Document at national level.

Up-to-date lists and bibliographical references concerning such national implementations may be obtained on application to the Central Secretariat or to any CENELEC member.

This Harmonization Document exists in three official versions (English, French, German).

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

**CENELEC**

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

**Management Centre: Avenue Marnix 17, B - 1000 Brussels**

## Foreword

The text of the International Standard IEC 60364-4-44:2007, Clause 444, prepared by IEC TC 64, Electrical installations and protection against electric shock, together with the common modifications prepared by CENELEC TC 64, Electrical installations and protection against electric shock, was submitted to the formal vote and was approved by CENELEC as HD 60364-4-444 on 2010-05-01.

This European Standard supersedes R064-004:1999.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN and CENELEC shall not be held responsible for identifying any or all such patent rights.

The following dates were fixed:

- latest date by which the HD has to be implemented  
at national level by publication of a harmonized  
national standard or by endorsement (dop) 2011-05-01
- latest date by which the national standards conflicting  
with the HD have to be withdrawn (dow) 2013-05-01

In this document, the common modifications are indicated by a vertical line at the left margin of the text.

Clauses, subclauses, notes, tables and figures which are additional to those of Clause 444 of IEC 60364-4-44:2007 are prefixed “Z”.

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#### **444.1 Scope**

To provide requirements and recommendations for electrical installations in order to avoid or reduce the impact of electromagnetic disturbances.

The rules of this part do not apply to systems that are wholly or partly under the control of public power supply companies (see scope of HD 60364-1:2008) although voltage and electromagnetic disturbances may be conducted or induced into electrical installations via these supply systems.

Applying the EMC-measures described by the standard can be seen as a part of good engineering practices to achieve EMC of fixed installations as required by the EMC-Directive 2004/108/EC.

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July 2010

## 444 Measures against electromagnetic influences

### 444.0 Introduction

Clause 444 provides requirements and recommendations to enable avoidance and reduction of electromagnetic disturbances.

The document, Clause 444, is intended for architects and for those involved in the design, installation and maintenance of electrical installations.

Electromagnetic Interference (EMI) disturbs or damages information technology systems (ICT), broadcast communication technologies (BCT), command, control and communication (CCCB), process monitoring, control and automation systems (PMCA). Currents due to lightning, switching operations, short-circuits and other electromagnetic phenomena may cause overvoltages and electromagnetic interference.

These effects can occur

- where large conductive loops exist,
- where different electrical wiring systems are installed in common routes, e.g. power supply, communication, control or signal cables.

Power cables carrying large currents with a high rate of rise of current ( $di/dt$ ) can induce overvoltages in command, control and communication cables of electrical installation systems, which can influence or damage the connected electrical equipment.

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### 444.2 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.

EN 50117-4-1:2008	Coaxial cables - Part 4-1: Sectional specification for cables for BCT cabling in accordance with EN 50173 - Indoor drop cables for systems operating at 5 MHz - 3 000 MHz
EN 50173-1:2007	Information technology - Generic cabling systems - Part 1: General requirements
EN 50174-2:2009	Information technology - Cabling installation - Part 2: Installation planning and practices inside buildings
EN 50174-3:2003	Information technology - Cabling installation - Part 3: Installation planning and practices outside buildings
EN 50288 series	Multi-element metallic cables used in analogue and digital communication and control
EN 50310:2006	Application of equipotential bonding and earthing in buildings with information technology equipment
EN 60950-1	Information technology equipment - Safety - Part 1: General requirements (IEC 60950-1)

EN 61000-6-x series	Electromagnetic compatibility (EMC) - Part 6-x: Generic standards (IEC 61000-6-x series)
EN 61386 series	Conduit systems for cable management (IEC 61386 series)
EN 61558-2-1	Safety of power transformers, power supplies, reactors and similar products - Part 2-1: Particular requirements and tests for separating transformers and power supplies incorporating separating transformers for general applications (IEC 61558-2-1)
EN 61558-2-4	Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1 100 V - Part 2-4: Particular requirements and tests for isolating transformers and power supply units incorporating isolating transformers (IEC 61558-2-4)
EN 61558-2-6	Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1 100 V - Part 2-6: Particular requirements and tests for safety isolating transformers and power supply units incorporating safety isolating transformers (IEC 61558-2-6)
EN 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 61558-2-15)
EN 62305-3	Protection against lightning - Part 3: Physical damage to structures and life hazard (IEC 62305-3)
HD 60364-1:2008	Low-voltage electrical installations - Part 1: Fundamental principles, assessment of general characteristics, definitions (IEC 60364-1:2005, mod)
HD 60364-4-41:2007	Low-voltage electrical installations - Part 4-41: Protection for safety - Protection against electric shock (IEC 60364-4-41:2005, mod.)
HD 60364-5-52:200X <sup>1)</sup>	Low-voltage electrical installations - Part 5-52: Selection and erection of electrical equipment - Wiring systems (IEC 60364-5-52:2009)
HD 60364-5-54:2007	Low-voltage electrical installations - Part 5-54: Selection and erection of electrical equipment - Earthing arrangements, protective conductors and protective bonding conductors (IEC 60364-5-54:2002, mod.)
IEC/TR 61000-2-5:1995	Electromagnetic compatibility (EMC) - Part 2: Environment - Section 5: Classification of electromagnetic environments. Basic EMC publication
ETSI EN 300 253:2002	Equipment Engineering (EE) - Earthing and bonding of telecommunication equipment in telecommunication centres

### 444.3 Definitions

See HD 60364-1:2008 for basic definitions. For the purposes of this document, the following definitions apply:

#### 444.3.1

##### **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)

NOTE The term “electromagnetic shield” denotes any structure used to divert, block or impede the passage of electromagnetic energy. In general, a BN does not need to be connected to earth but BN considered in the present document will have an earth connection

[3.1.2 of EN 50310:2006]

<sup>1)</sup> At draft stage.

#### 444.3.2

##### **bonding ring conductor, BRC**

an earthing bus conductor which forms a closed connecting ring

[3.1.3 of EN 50310:2006]

NOTE Normally a bonding ring conductor has multiple connections to the CBN and therefore improves its quality.

#### 444.3.3

##### **common equipotential bonding system**

##### **common bonding network, CBN**

equipotential bonding system providing both protective-equipotential-bonding and functional-equipotential-bonding

[IEV 195-02-25]

#### 444.3.4

##### **equipotential bonding**

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

[IEV 195-01-10]

#### 444.3.5

##### **earth-electrode network**

part of an earthing arrangement comprising only the earth electrodes and their interconnections

[IEV 195-02-21]

#### 444.3.6

##### **meshed bonding network, MESH-BN**

bonding network in which all associated equipment frames, racks and cabinets and usually the DC power return conductor, are bonded together as well as at multiple points to the CBN.

[3.1.2 of ETSI EN 300 253:2002-04]

NOTE The MESH-BN enhances the effect of the CBN.

#### 444.3.7

##### **by-pass conductor, PEC**

conductor usually laid along the cable route to provide a low impedance connection between the earthing arrangements at the ends of the cable route

[IEV 195-02-29]

NOTE See Figure 44R1 of the present document

### 444.4 Mitigation of electromagnetic interference (EMI)

Consideration shall be given by the designer and installer of the electrical installation to the measures described below for reducing the electric and magnetic influences on electrical equipment.

Only electrical equipment, which meets the requirements in the appropriate EMC standards or the EMC requirements of the relevant product standard shall be used, see also 515.3.1.2.

#### 444.4.1 Sources of EMI

Electrical equipment sensitive to electromagnetic influences should not be located close to potential sources of electromagnetic emission such as

- switching devices for inductive loads,
- electric motors,
- fluorescent lighting,
- welding machines,
- rectifiers,