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Electronic equipment for use in power installations

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English version

Electronic equipment for use in power installations

Équipement électronique utilisé dans
les installations de puissance

Ausrüstung von Starkstromanlagen mit
elektronischen Betriebsmitteln

This European Standard was approved by CENELEC on 1997-07-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

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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 was prepared by the Task Force CENELEC BTTF 60-1, Assembly of electronic equipment.

A first draft was submitted to CENELEC enquiry (6MP) in August 1994 but failed to be accepted. A second draft was submitted to CENELEC enquiry (2MP) in September 1995 and was accepted. The text of the final draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 50178 on 1997-07-01.

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) 1998-06-01
- latest date by which the national standards
conflicting with the EN have to be withdrawn (dow) 2003-06-01

Annexes designated "informative" are given for information only.
In this standard annexes A and B are informative.

Annex A offers additional information e.g. as a basis for design purposes. It also indicates items where new standards are expected to be established. Functions or characteristics presented in the informative annex A may be used as options of the electronic equipment, provided that test methods are specified and test equipment is available. In any case, these points have to be discussed and clarified between customer and manufacturer.

Annex B is under consideration. It is intended to contain tables with all important figures and values. It shows a condensed overview on the conditions and requirements for convenience of the user of the standard.

The requirements of this European Standard are based on basic or generic standards issued by IEC or CLC where these standards exist. This is valid especially for safety and environmental requirements. Additional requirements are stipulated where necessary.

This European Standard is a harmonized standard for electronic equipment for use in power installations according to the Low Voltage Directive 73/23/EEC. No additional requirements are to be met for compliance with this directive.

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Introduction

As the title indicates this European Standard applies where electronic equipment is to be installed or is used in power installations. The term electronic equipment denotes equipment which may contain information technology equipment as well as power electronic equipment and non-electronic components. Electronic equipment may be designed and used as stand-alone-equipment or as sub-assemblies built as cubicles, plug-in-units or assembled printed circuit boards. However the EMC requirements are always to be fulfilled on the apparatus or system level.

The term power installation as used in this European Standard denotes an installation with assembled electrical and electronic equipment in a given location and designed for coordinated operation and connected to an electricity supply system. Although the use of the installation is not specified it is expected that the main purpose will be controlling, regulating and converting electrical energy. In all cases within this European Standard a power installation is interacting with the electricity supply system, either directly e.g. by means of control, regulating and protection system, or indirectly e.g. by means of measurements leading to intervention by personnel. However, power installation as used in other standards may have other definitions.

As the title "Electronic Equipment for Use in Power Installations" implies the standard mainly applies where electronic equipment is integrated into or is used in power installations. As the standard is also concerned with the design and testing of electronic equipment, the appropriate clauses within it apply in cases where no other applicable specifications exist in individual product-standards.

Beyond that the main intention of the standard is to stipulate minimum requirements for the design and manufacture of electronic equipment, for protection against electric shock, for testing and for the integration into systems for power installations. Right from the beginning and reflecting the experiences of the experts it seems necessary to use minimum requirements in order to achieve a certain technical level with respect to safety and reliability. This is especially true where electronic equipment is assembled into power installations.

In all cases where more severe requirements are defined in individual product-standards or purchasing specifications they shall take precedence over the requirements of this European Standard. This may be true for special safety related applications of electronic equipment or applications under special environmental conditions.

In the other cases where a product-standard does not meet the minimum requirements of this European Standard and therefore prevents the direct use of electronic equipment designed and manufactured fulfilling the requirements of those product-standards additional means has to be considered in power installations. One possibility is to influence the environmental conditions in which the electronic equipment is operating so that they are compatible with the requirements of this European Standard. This can be done by special casing or means of filtering for example. The other possibility is to improve the electronic equipment so that it meets the requirements of this European Standard.

1 Scope

This European Standard applies to the use of electronic equipment (EE) in power installations where a uniform technical level with respect to safety and reliability is necessary. This standard also applies to EE which are not covered by a specific product standard.

This European Standard defines the minimum requirements for the design and manufacture of EE, for protection against electric shock, for testing and its integration into systems for power installations.

This European Standard does not cover the following applications: Electrical accessories and electrical appliances for household and similar purposes, medical equipment, electric railway equipment, data processing without control on systems and processes, public and private non-industrial telecommunication and radio communication equipment and networks, protection relays, residual-current-operated protective devices, uninterruptible power supplies, lighting equipment and public charging equipment for electrical vehicles.

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 standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

European Standards

EN 29000	1988	Quality management and quality assurance Guidelines for selection and use
EN 50081-1		Electromagnetic compatibility - Generic emission standard - Part 1: Residential, commercial and light industry
EN 50081-2		Electromagnetic compatibility - Generic emission standard - Part 2: Industrial environment
EN 50082-1		Electromagnetic compatibility - Generic immunity standard - Part 1: Residential, commercial and light industry
EN 50082-2		Electromagnetic compatibility - Generic immunity standard - Part 2: Industrial environment
prEN 50093	1991	Basic immunity standard for voltage dips, short interruptions and voltage variations
EN 60068-2-2	1993	Basic environmental testing procedures - Part 2: Tests
+A1	1993	Tests B: Dry heat (IEC 68-2-2:1974
+A2	1994	+ IEC 68-2-2/A1:1993 + IEC 68-2-2/A2:1994)
EN 60068-2-6	1995	Basic environmental testing procedures - Part 2: Tests Test Fc and guidance: Vibration (sinusoidal) (IEC 68-2-6:1995)
EN 60068-2-31	1993	Basic environmental testing procedures - Part 2: Tests - Test Ec: Drop and topple, primarily for equipment-type specimens (IEC 68-2-31:1969 + A1:1982)
EN 60071-1	1995	Insulation coordination Part 1: Terms, definitions, principle and rules (IEC 71-1:1993)
EN 60146-1-1	1993	Semiconductor convertors - General requirements and line commutated convertors - Part 1-1: Specifications of basic requirements (IEC 146-1-1:1991)
EN 60269-1	1989	Low-voltage fuses - Part 1: General requirements (IEC 269-1:1986)

EN 60352-1	1994	Solderless connections - Part 1: Solderless wrapped connections - General requirements, test methods and practical guidance (IEC 352-1:1983)
EN 60352-2	1994	Solderless connections - Part 2: Solderless crimped connections - General requirements, test methods and practical guidance (IEC 352-2:1990)
EN 60529	1991	Degrees of protection provided by enclosures (IP-Code) (IEC 529:1989)
EN 60721-3-1	1993	Classification of environmental conditions Part 3: Classification of groups of environmental parameters and their severities - Storage (IEC 721-3-1:1987 + A1:1991)
EN 60721-3-2	1993	Classification of environmental conditions Part 3: Classification of groups of environmental parameters and their severities - Transportation (IEC 721-3-2:1985 + A1:1991)
EN 60721-3-3	1995	Classification of environmental conditions Part 3: Classification of groups of environmental parameters and their severities - Stationary use at weatherprotected locations (IEC 721-3-3:1994)
EN 60721-3-4	1995	Classification of environmental conditions Part 3: Classification of groups of environmental parameters and their severities - Stationary use at non-weatherprotected locations (IEC 721-3-4:1995)
EN 61008-1	1994	Residual current operated circuit-breakers without integral overcurrent protection for household and similar uses (RCCB's) - Part 1: General rules (IEC 1008-1:1990 + A1:1992)
EN 61136-1	1995	Semiconductor power converters - Adjustable speed electric drive systems - General requirements - Part 1: Rating specifications, particularly for d.c. motor drives (IEC 1136-1:1992, modified)
EN 61180-1	1994	High-voltage test technique for low-voltage equipment Part 1: Definitions, test and procedure requirements (IEC 1180-1:1992)
EN 61800-3	1996	Adjustable speed electrical power drive systems - Part 3: EMC product standard including specific test methods (IEC 1800-3:1996)
ENV 61000-2-2	1993	Electromagnetic compatibility (EMC) Part 2: Environment - Section 2: Compatibility levels for low-frequency conducted disturbances and signalling in public low-voltage power supply systems (IEC 1000-2-2:1990, modified)

Harmonization Documents

HD 21.7 S1	1990	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V - Part 7: Single core non-sheathed cables for internal wiring for a conductor temperature of 90°C
HD 193 S2	1982	Voltage bands for electrical installation of buildings (IEC 449:1973 + A1:1979)
HD 214 S2	1980	Method for determining the comparative and the proof tracking indices of solid insulation materials under moist conditions (IEC 112:1979)
HD 243 S12	1995	Graphical symbols for use on equipment (IEC 417:1973 + IEC 417A:1974 to IEC 417M:1994)
HD 323.2.3 S2	1987	Basic environmental testing procedures - Part 2: Tests - Test Ca: Damp heat, steady state (IEC 68-2-3:1969 + A1:1984)
HD 323.2.28 S1	1988	Basic environmental testing procedures - Part 2: Tests - Guidance for damp heat tests (IEC 68-2-28:1980)

HD 366 S1	1977	Classification of electrical and electronic equipment with regard to protection against electric shock (IEC 536:1976)
HD 384.2 S1	1986	International Electrotechnical Vocabulary (IEV) Chapter 826: Electrical installations of buildings (IEC 50(826):1982)
HD 384.3 S2	1995	Electrical installation of buildings Part 3: Assessment of general characteristics (IEC 364-3:1993, modified)
HD 384.4.41 S2	1996	Electrical installation of buildings Part 4: Protection for safety - Chapter 41: Protection against electric shock (IEC 364-4-41:1992, modified)
HD 384.4.43 S1	1980	Electrical installation of buildings Part 4: Protection for safety - Chapter 43: Protection against overcurrent (IEC 364-4-43:1977, modified)
HD 384.4.47 S2	1995	Electrical installation of buildings Part 4: Protection for safety - Chapter 47: Application of protective measures for safety - Section 470: General - Section 471: Measures of protection against electric shock (IEC 364-4-47:1981 + A1:1993, modified)
HD 384.4.473 S1	1980	Electrical installation of buildings Part 4: Protection for safety - Chapter 47: Application of protective measures for safety - Section 473: Measures of protection against overcurrent (IEC 364-4-473:1977, modified)
HD 384.5.523 S1	1991	Electrical installation of buildings Part 5: Selection and erection of electrical equipment Chapter 52: Wiring systems - Section 523: Current-carrying capacities (IEC 364-5-523:1983, modified)
HD 384.5.54 S1	1988	Electrical installation of buildings Part 5: Selection and erection of electrical equipment - Chapter 54: Earthing arrangements and protective conductors (IEC 364-5-54:1980, modified)
HD 384.6.61 S1	1992	Electrical installation of buildings Part 6: Verification - Chapter 61: Initial verification (IEC 364-6-61:1986, modified)
HD 413.3 S1	1987	Operating conditions for industrial-process measurement and control equipment - Part 3: Mechanical influences (IEC 654-3:1983)
HD 472 S1	1989	Nominal voltages for low voltage public electricity supply systems (IEC 38:1983, modified)
HD 493.1 S1	1988	Dimensions and mechanical structures of 482,6 mm (19 in) series Part 1: Panels and racks (IEC 297-1:1986)
HD 540.2 S1	1991	Insulation co-ordination Part 2: Application guide (IEC 71-2:1976)
HD 540.3 S1	1991	Insulation co-ordination Part 3: Phase-to-phase insulation co-ordination Principle, rules and application guide (IEC 71-3:1982)
HD 588.1 S1	1991	High voltage test techniques - Part 1: General definitions and test requirements (IEC 60-1:1989)
HD 625.1 S1	1996	Insulation coordination for equipment within low-voltage systems Part 1: Principles, requirements and tests (IEC 664-1:1992, modified)

IEC-Publications

IEC 50 (151)	1978	International Electrotechnical Vocabulary (IEV) Chapter 151: Electrical and magnetic devices
IEC 50 (161)	1990	International Electrotechnical Vocabulary (IEV) Chapter 161: Electromagnetic compatibility
IEC 364-6-61 Amendment 1	1993	Electrical installation of buildings Part 6: Verification - Chapter 61: Initial verification
IEC 536-2	1992	Classification of electrical and electronic equipment with regard to protection against electric shock Part 2: Guidelines to requirements for protection against electric shock
IEC 664-3	1992	Insulation coordination for equipment within low-voltage systems - Part 3: Use of coatings to achieve insulation coordination of printed board assemblies
IEC 747	series	Semiconductor devices, discrete devices
IEC 748	series	Semiconductor devices, integrated circuits
IEC 755 + Amendment 1 + Amendment 2	1983 1988 1992	General requirements for residual-current-operated protective devices
IEC 990	1990	Methods of measurement of touch current and protective conductor current
IEC 1000-2-1	1990	Electromagnetic compatibility (EMC) Part 2: Environment - Section 1: Description of the environment - Electromagnetic environment for low-frequency conducted disturbances and signalling in public power supply systems
IEC 1140	1992	Protection against electric shock - Common aspects for installation and equipment
IEC 1201	1992	Extra low voltage (ELV) - Limit values
IEC-Guide 106	1989	Guide for specifying environmental conditions for equipment performance rating