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Low-voltage switch mode power supplies - Part 7: Safety requirements

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN IEC 61204-7:2018 sisaldab Euroopa standardi EN IEC 61204-7:2018 ingliskeelset teksti.	This Estonian standard EVS-EN IEC 61204-7:2018 consists of the English text of the European standard EN IEC 61204-7:2018.
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English Version

**Low-voltage switch mode power supplies - Part 7: Safety
requirements
(IEC 61204-7:2016)**

Alimentations à découpage basse tension - Partie 7:
Exigences de sécurité
(IEC 61204-7:2016)

Stromversorgungsgeräte für Niederspannung mit
Gleichstromausgang - Teil 7: Sicherheitsanforderungen
(IEC 61204-7:2016)

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

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European foreword

The text of document 22E/175/FDIS, future edition 2 of IEC 61204-7, prepared by IEC/SC 22E "Stabilized power supplies" of IEC/TC 22 "Power electronic systems and equipment" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 61204-7:2018.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2018-09-16
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2021-03-16

This document supersedes EN 61204-7:2006.

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

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For the relationship with EU Directive 2014/35/EU, see informative Annex ZZ, which is an integral part of this document.

Endorsement notice

The text of the International Standard IEC 61204-7:2016 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standard indicated :

IEC 60085	NOTE	Harmonized in EN 60085.
IEC 61140	NOTE	Harmonized in EN 61140.
IEC 60127 series	NOTE	Harmonized in EN 60127 series.
IEC 60146-1-1	NOTE	Harmonized in EN 60146-1-1.
IEC 60317-43	NOTE	Harmonized in EN 60317-43.
IEC 60364-4-41	NOTE	Harmonized in HD 60364-4-41.
IEC 60747-5-1	NOTE	Harmonized in EN 60747-5-1.
IEC 60747-5-2	NOTE	Harmonized in EN 60747-5-2.

IEC 60950-1:2005	NOTE	Harmonized in EN 60950-1:2006 (modified).
A1:2009		A1:2010 (modified)
A2:2013		A2:2013 (modified)
IEC 61032:1997	NOTE	Harmonized in EN 61032:1998.
IEC 61180 series	NOTE	Harmonized in EN 61180 series.
IEC 61347-2-2	NOTE	Harmonized in EN 61347-2-2.
IEC 61349-1:2011	NOTE	Harmonized in EN 61349-1:2011.
IEC 61508 series	NOTE	Harmonized in EN 61508 series.
IEC 61558 series	NOTE	Harmonized in EN 61558 series.
IEC 61643-21	NOTE	Harmonized in EN 61643-21.
IEC 61643-311	NOTE	Harmonized in EN 61643-311.
IEC 61643-321	NOTE	Harmonized in EN 61643-321.
IEC 61643-331	NOTE	Harmonized in EN 61643-331.
IEC 62386 series	NOTE	Harmonized in EN 62386 series.

Annex ZA

(normative)

Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60227	series	Polyvinyl chloride insulated cables of rated - voltages up to and including 450/750 V -- Part 1: General requirements		series
IEC 60245	series	Rubber insulated cables - Rated voltages - up to and including 450/750 V -- Part 1: General requirements		series
IEC 60320	series	Appliance couplers for household and similar general purposes - Part 1: General requirements	EN 60320	series
IEC 60384-14	2013	Fixed capacitors for use in electronic equipment -- Part 14: Sectional specification - Fixed capacitors for electromagnetic interference suppression and connection to the supply mains	EN 60384-14	2013
IEC 60417	2002	Graphical symbols for use on equipment	-	-
IEC 60529	1989	Degrees of protection provided by enclosures (IP Code)	EN 60529	1991
-	-		+ corrigendum May 1993	
IEC 60529 AMD 1	1999	Degrees of protection provided by enclosures (IP_code); Amendment_1	-	-
IEC 60529 AMD 2	2013	Degrees of protection provided by enclosures (IP_code); Amendment_2	-	-
IEC 60695-11-5	-	Fire hazard testing - Part 11-5: Test flames - Needle-flame test method - Apparatus, confirmatory test arrangement and guidance	EN 60695-11-5	2017
IEC 60695-11-20	1999	Fire hazard testing - Part 11-20: Test flames - 500_W flame test methods	-	-
IEC 60730-1	2010	Automatic electrical controls for household and similar use -- Part 1: General requirements	EN 60730-1	2011 (mod)

IEC 60738-1	2006	Thermistors - Directly heated positive temperature coefficient -- Part 1: Generic specification	EN 60738-1	2006
IEC 60747-5-5	2007	Semiconductor devices - Discrete devices - Part 5-5: Optoelectronic devices - Photocouplers	EN 60747-5-5	2011
IEC 60799	-	Electrical accessories - Cord sets and interconnection cord sets	EN 60799	1998
IEC 60851-3	2009	Winding wires - Test methods -- Part 3: Mechanical properties	EN 60851-3	2009
IEC 60851-5	2008	Winding wires - Test methods -- Part 5: Electrical properties	EN 60851-5	2008
IEC 60851-6	1996	Winding wires - Test methods -- Part 6: Thermal properties	-	-
IEC 60947-1	-	Low-voltage switchgear and controlgear -- Part 1: General rules	EN 60947-1	2007
IEC 60947-3	-	Low-voltage switchgear and controlgear -- Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units	EN 60947-3 +A1 +A2	2009 2012 2015
IEC 60990	1999	Methods of measurement of touch current and protective conductor current	EN 60990	1999
IEC 61010-1	2010	Safety requirements for electrical equipment for measurement, control and laboratory use -- Part 1: General requirements	EN 61010-1	2010
IEC 61058-1	2000	Switches for appliances -- Part 1: General requirements	-	-
+ A1	2001		EN 61058-1	2002
+ A2	2007		+ A2	2008
+ corrigendum Jan.	2009		-	-
IEC 61293	1994	Marking of electrical equipment with ratings related to electrical supply - Safety requirements	EN 61293	1994
IEC 61558-1	2005	Safety of power transformers, power supplies, reactors and similar products -- Part 1: General requirements and tests	EN 61558-1	2005
-	-		+ corrigendum Aug.	2006
+ A1	2009		+ A1	2009
IEC 61558-2	series	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	EN 61558-2	series
IEC 61810-1	2008	Electromechanical elementary relays -- Part 1: General requirements	EN 61810-1	2008

IEC 62368-1	2014	Audio/video, information and communication technology equipment -- Part 1: Safety requirements	EN 62368-1	2014 (mod)
-	-		+ AC	2015
-	-		+ A11	2017
-	-		+ AC	2017-03
IEC 62477-1	2012	Safety requirements for power electronic converter systems and equipment -- Part 1: General	EN 62477-1	2012
-	-		+ A11	2014

Annex ZZ

(informative)

Relationship between this European Standard and the safety objectives of Directive 2014/35/EU [2014 OJ L96] aimed to be covered

This European Standard has been prepared under a Commission's standardization request relating to harmonized standards in the field of the Low Voltage Directive, M/511, to provide one voluntary means of conforming to safety objectives of Directive 2014/35/EU of the European Parliament and of the Council of 26 February 2014 on the harmonization of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits [2014 OJ L96].

Once this standard is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of this standard given in Table ZZ.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding safety objectives of that Directive, and associated EFTA regulations.

Table ZZ.1 – Correspondence between this European Standard and Annex I of Directive 2014/35/EU [2014 OJ L96]

Safety objectives of Directive 2014/35/EU	Clause(s) / sub-clause(s) of this EN	Remarks / Notes
(1)(a)	6	
(1)(b)	6 Annex AC 5	
(1)(c)	<i>Refer to 2a) to 2d) and 3a) to 3c) in this table.</i> <i>Refer to standard clause 1, 6</i> Annex AC 5	
(2)(a)	4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.11, 4.12, 5.2, Annex A, Annex D, Annex F, Annex AA, Annex AC	Hazards arising from electric, magnetic, and electromagnetic fields, other ionizing and non-ionizing radiation are covered in separate standards.
(2)(b)	4.3, 4.4, 4.6, 4.10, 4.11, 4.12, Annex AC	
(2)(c)	4.7, 4.9, 4.11, 4.12, 5.2	
(2)(d)	4.1 4.2, 4.11, 4.12, 5.2, Annex D, Annex F, Annex AA, Annex AC	
(3)(a)	4.7, 4.9, 4.12, 5.2	Hazards arising from electric, magnetic, and electromagnetic fields, other ionizing and non-ionizing radiation are covered in separate standards. Hazards arising from unattended operation have been duly considered.
(3)(b)	4.2, 4.9, 5.2	
(3)(c)	4.1, 4.2, 4.3, 5.2, Annex AA, Annex AC	

WARNING 1 — Presumption of conformity stays valid only as long as a reference to this European Standard is maintained in the list published in the Official Journal of the European Union. Users of this standard should consult frequently the latest list published in the Official Journal of the European Union.

WARNING 2 — Other Union legislation may be applicable to the product(s) falling within the scope of this standard.

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INTRODUCTION

IEC 62477-1:2012, used by this document as a reference, relates to products that include power electronic converters, with a rated system voltage not exceeding 1 000 V AC or 1 500 V DC. It specifies requirements to reduce risks of fire, electric shock, thermal, energy and mechanical hazards, except functional safety as defined in IEC 61508 (all parts). The objectives of this standard are to establish a common terminology and basis for the safety requirements of products that contain power electronic converters across several IEC technical committees.

IEC 62477-1:2012 was developed with the intention

- to be used as a reference document for product committees inside IEC technical committee 22: Power electronic systems and equipment in the development of product standards for power electronic converter systems and equipment,
- to replace IEC 62103 as a product family standard providing minimum requirements for safety aspects of power electronic converter systems and equipment in apparatus for which no product standard exists, and

NOTE The scope of IEC 62103 contains reliability aspects, which are not covered by this document.

- to be used as a reference document for product committees outside TC 22 in the development of product standards of power electronic converter systems and equipment intended for renewable energy sources. TC 82, TC 88, TC 105 and TC 114, in particular, have been identified as relevant technical committees at the time of publication.

As such, IEC technical sub-committee 22E: Stabilized switched-mode power supplies carefully considered the relevance of each paragraph of IEC 62477-1:2012 for the SMPS and referenced, added, replaced or modified requirements as relevant. This is because product-specific topics not covered by the reference document are the responsibility of the technical committee using the reference document.

The reference document, being a group safety standard, will not take precedence over this product-specific standard according to IEC Guide 104. IEC Guide 104 provides information about the responsibility of product committees to use group safety standards for the development of their own product standards.

LOW-VOLTAGE SWITCH MODE POWER SUPPLIES –

Part 7: Safety requirements

0 Principles of safety

Safety principles of this document follow the concepts of IEC Guide 116 and Annex D of CENELEC Guide 32:2014.

NOTE The principles of safety are mainly adopted from IEC 60950-1:2005/AMD1:2009/AMD2:2013.

0.1 General

The following principles have been adopted by IEC technical committee 22E in the development of this document. These principles do not cover performance or functional characteristics of equipment.

It is essential that designers understand the underlying principles of safety requirements in order that they can engineer safe equipment.

These principles are not an alternative to the detailed requirements of this document, but are intended to provide designers with an appreciation of the basis of these requirements. Where the equipment involves technologies, components and materials or methods of construction not specifically covered, the design of the equipment should provide a level of safety not less than that described in these principles of safety.

NOTE The need for additional detailed requirements to cope with a new situation is brought promptly to the attention of the appropriate committee.

Designers will take into account not only normal operating conditions of the equipment but also likely fault conditions, consequential faults, foreseeable misuse and external influences such as temperature, altitude, pollution, moisture, overvoltages on the **mains supply** and **non-mains supply**.

Dimensioning of insulation spacings should take account of possible reductions by manufacturing tolerances, or where deformation could occur due to handling, shock and vibration likely to be encountered during manufacture, transport and normal operation.

The following priorities should be observed in determining what design measures to adopt:

- where possible, specify design criteria that will eliminate, reduce or guard against hazards;
- where the above is not practicable because the functioning of the equipment would be impaired, specify the use of protective means independent of the equipment, such as personal protective equipment (which is not specified in this document);
- where neither of the above measures is practicable, or in addition to those measures, specify the provision of markings and instructions regarding the residual risks.

There are two types of persons whose safety needs to be considered, **operators** (or **users**) and **service persons**.

Operator is the term applied to all persons other than **service persons**. Requirements for protection should assume that **operators** are not trained to identify hazards, but will not intentionally create a hazardous situation. Consequently, the requirements will provide protection for cleaners and casual visitors as well as the assigned **operators**. In general,