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Safety of transformers, reactors, power supply units and similar products for voltages up to 1100 V -- Part 2-16: Particular requirements and tests for switch mode power supply units and transformers for switch mode power supply units

iTeh STANDARD PREVIEW

Sicherheit von Transformatoren, Drosseln, Netzgeräten und dergleichen für Versorgungsspannungen bis 1100 V -- Teil 2-16: Besondere Anforderungen und Prüfungen an Schaltnetzteilen (SMPSU) und Transformatoren in Schaltnetzteilen.

[SIST EN 61558-2-16:2010](https://standards.iteh.ai/catalog/standards/sist/6b5cbe70-211c-477b-ad97-2020-01-01/sist-en-61558-2-16:2010)

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Sécurité des transformateurs, bobines d'inductance, blocs d'alimentation et produits analogues pour des tensions d'alimentation jusqu'à 1 100 V -- Partie 2-16: Règles particulières et essais pour les blocs d'alimentation à découpage et les transformateurs pour blocs d'alimentation à découpage

Ta slovenski standard je istoveten z: EN 61558-2-16:2009

ICS:

29.180 Transformatorji. Dušilke Transformers. Reactors

SIST EN 61558-2-16:2010 en,fr

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English version

**Safety of transformers, reactors, power supply units
and similar products for supply voltages up to 1 100 V -
Part 2-16: Particular requirements and tests
for switch mode power supply units and transformers
for switch mode power supply units
(IEC 61558-2-16:2009)**

Sécurité des transformateurs,
bobines d'inductance, blocs d'alimentation
et produits analogues pour des tensions
d'alimentation jusqu'à 1 100 V -
Partie 2-16: Règles particulières et essais
pour les blocs d'alimentation à découpage
et les transformateurs pour
blocs d'alimentation à découpage
(CEI 61558-2-16:2009)

Sicherheit von Transformatoren,
Drosseln, Netzgeräten und dergleichen
für Versorgungsspannungen bis 1 100 V -
Teil 2-16: Besondere Anforderungen
und Prüfungen an Schaltnetzteilen
(SMPSU) und Transformatoren
in Schaltnetzteilen
(IEC 61558-2-16:2009)

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This European Standard was approved by CENELEC on 2009-10-01. 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.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, 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

Central Secretariat: Avenue Marnix 17, B - 1000 Brussels

Foreword

The text of document 96/330/FDIS, future edition 1 of IEC 61558-2-16, prepared by IEC TC 96, Transformers, reactors, power supply units and similar products for low voltage up to 1 100 V, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61558-2-16 on 2009-10-01.

This European Standard supersedes EN 61558-2-17:1997.

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) 2010-07-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2012-10-01

This standard is to be used in conjunction with EN 61558-1 and its amendments. It is based on EN 61558-1:2005.

This Part 2-16 supplements or modifies the corresponding clauses in EN 61558-1, so as to convert that publication into the European Standard: *Particular requirements and tests for switch mode power supply units and transformers for switch mode power supply units.*

When a particular subclause of Part 1 is not mentioned in this part, that subclause applies as far as is reasonable. Where this standard states "addition", "modification" or "replacement", the relevant text of Part 1 is to be adapted accordingly. (standards.iteh.ai)

In this part, the following print types are used:

- requirements proper: in roman type; [SIST EN 61558-2-16:2010](https://standards.iteh.ai/catalog/standards/sist/6b5cbe70-211c-477b-ad97-e349e67ed8b/sist-en-61558-2-16-2010)
- *test specifications*: in italic type; <https://standards.iteh.ai/catalog/standards/sist/6b5cbe70-211c-477b-ad97-e349e67ed8b/sist-en-61558-2-16-2010>
- explanatory matter: in smaller roman type.

In the text of this standard, the words in **bold** are defined in Clause 3.

Subclauses, notes, figures and tables additional to those in Part 1 are numbered starting from 101; supplementary annexes are entitled AA, BB, etc.

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61558-2-16:2009 was approved by CENELEC as a European Standard without any modification.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

Addition to Annex ZA of EN 61558-1:

<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	- ¹⁾	-
IEC 60364-4-41 (mod)	- ²⁾	Low-voltage electrical installations - Part 4-41: Protection for safety - Protection against electric shock	HD 60364-4-41 + corr. July	2007 ³⁾ 2007
IEC 60601-1	- ²⁾	Medical electrical equipment - Part 1: General requirements for basic safety and essential performance	EN 60601-1	2006 ³⁾
IEC 60664-4	2005	Insulation coordination for equipment within low-voltage systems - Part 4: Consideration of high-frequency voltage stress	EN 60664-4 + corr. October	2006 2006
IEC 60950-1 (mod)	- ²⁾	Information technology equipment - Safety - Part 1: General requirements	EN 60950-1 + A11	2006 ³⁾ 2009
IEC 61010-1	- ²⁾	Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements	EN 61010-1 + corr. June	2001 ³⁾ 2002
IEC 61204-7	2006	Low voltage power supplies, d.c. output - Part 7: Safety requirements	EN 61204-7 + A11	2006 2009
IEC 61347 (mod)	Series	Lamp controlgear	EN 61347	Series
IEC 61558-1	2005	Safety of power transformers, power supplies, reactors and similar products - Part 1: General requirements and tests	EN 61558-1 + corr. August	2005 2006
IEC 61558-2-1	- ²⁾	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 61558-2-1	2007 ³⁾
IEC 61558-2-4	- ²⁾	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	EN 61558-2-4	2009 ³⁾

¹⁾ The HD 21 series, which is related to, but not directly equivalent with the IEC 60227 series, applies instead.

²⁾ Undated reference.

³⁾ Valid edition at date of issue.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61558-2-6	– ²⁾	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	EN 61558-2-6	2009 ³⁾
IEC 61558-2-13	– ²⁾	Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1 100 V - Part 2-13: Particular requirements and tests for auto transformers and power supply units incorporating auto transformers	EN 61558-2-13	2009 ³⁾
IEC 62040	Series	Uninterruptible Power Systems (UPS)	EN 62040	Series

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<https://standards.iteh.ai/catalog/standards/sist/6b5cbe70-211c-477b-ad97-ee349e67ed8b/sist-en-61558-2-16-2010>



IEC 61558-2-16

Edition 1.0 2009-06

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NORME INTERNATIONALE

GROUP SAFETY PUBLICATION
PUBLICATION GROUPEE DE SÉCURITÉ

**Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1 100 V –
Part 2-16: Particular requirements and tests for switch mode power supply units and transformers for switch mode power supply units**

<https://standards.iteh.ai/catalog/standards/sist/6b5cbe70-211c-477b-ad97->

**Sécurité des transformateurs, bobines d'inductance, blocs d'alimentation et produits analogues pour des tensions d'alimentation jusqu'à 1 100 V –
Partie 2-16: Règles particulières et essais pour les blocs d'alimentation à découpage et les transformateurs pour blocs d'alimentation à découpage**

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INTERNATIONALE

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**SAFETY OF TRANSFORMERS, REACTORS, POWER SUPPLY UNITS
AND SIMILAR PRODUCTS FOR SUPPLY VOLTAGES UP TO 1 100 V –****Part 2-16: Particular requirements and tests for switch mode power supply
units and transformers for switch mode power supply units**

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 61558-2-16 has been prepared by IEC technical committee 96: Transformers, reactors, power supply units and similar products for low voltage up to 1 100 V.

This first edition of IEC 61558-2-16 cancels and replaces IEC 61558-2-17, published in 1997. It constitutes a technical revision.

This part has the status of a group safety publication in accordance with IEC Guide 104 (1997): *The preparation of safety publications and the use of basic safety publications and group safety publications.*

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

FDIS	Report on voting
96/330/CDV	96/333/RVC

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

This Part 2-16 is intended to be used in conjunction with the latest edition of IEC 61558-1 and its amendments. It is based on the second edition (2005) of that standard.

This part supplements or modifies the corresponding clauses in IEC 61558-1, so as to convert that publication into the IEC standard: *Particular requirements and tests for switch mode power supply units and transformers for switch mode power supply units.*

A list of all parts of the IEC 61558 series can be found on the IEC website under the title: *Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1 100 V.*

Future standards in this series will carry the new general title as cited above. Titles of existing standards in this series will be updated at the time of the next edition.

Where a particular subclause of Part 1 is not mentioned in this part, that subclause applies as far as is reasonable. Where this part states "addition", "modification" or "replacement", the relevant text of Part 1 is to be adapted accordingly.

In this part, the following print types are used:

- requirements proper: in roman type;
- *test specifications: in italic type;*
- explanatory matter: in smaller roman type.

In the text of this part, the words in **bold** are defined in Clause 3.

Subclauses, notes, figures and tables additional to those in Part 1 are numbered starting from 101; supplementary annexes are entitled AA, BB, etc.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

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

NOTE The attention of National Committees is drawn to the fact that equipment manufacturers and testing organizations may need a transitional period following publication of a new, amended or revised IEC publication in which to make products in accordance with the new requirements and to equip themselves for conducting new or revised tests.

It is the recommendation of the committee that the content of this publication be adopted for implementation nationally not earlier than 12 months from the date of publication.

SAFETY OF TRANSFORMERS, REACTORS, POWER SUPPLY UNITS AND SIMILAR PRODUCTS FOR SUPPLY VOLTAGES UP TO 1 100 V –

Part 2-16: Particular requirements and tests for switch mode power supply units and transformers for switch mode power supply units

1 Scope

Replacement:

This part of IEC 61558 deals with the safety of **switch mode power supply units** and **transformers** for **switch mode power supply units**. **Transformers** incorporating **electronic circuits** are also covered by this standard.

NOTE 1 Safety includes electrical, thermal and mechanical aspects.

This part applies to:

- a) **switch mode power supply units** incorporating **safety isolating transformers** providing **SELV, PELV** or **FELV** a.c. or d.c. **output voltage(s)**, or a combination thereof according to IEC 61140 and IEC 60364-4-41 for use with household and other consumer products, except for products covered by IEC 60065, IEC 61347 series, IEC 61204-7 and IEC 60950-1;
- b) **switch mode power supply units** with a maximum **output voltage** not exceeding 1 000 V a.c. or 1 414 V ripple-free d.c. for use with household and other consumer products, except for products covered in a) and products covered by IEC 60065, IEC 61347 series, IEC 61204-7 and IEC 60950-1;
- c) this standard may be used for **transformers** for use in **switch mode power supply units** (see Annex BB).

This part covers the safety requirements for:

- separating SMPS for general use corresponding to Part 2-1;
- isolating SMPS for general use corresponding to Part 2-4;
- safety isolating SMPS for general use corresponding to Part 2-6;
- auto-SMPS for general use corresponding to Part 2-13.

For SMPS for specific application corresponding to the other Parts 2 of 61558 series, the necessary requirements of the relevant Parts 2 are applicable. In addition, the requirements listed in this part apply. Where the two requirements are in conflict, the most severe take precedence.

NOTE 2 As the maximum **rated supply voltage** of the internal **transformer** is 1 000 V, the maximum **rated supply voltage** of the **switch mode power supply** may be lower due to type of rectification.

Switch mode power supply units covered by this standard are air cooled (natural or forced) **independent, associated, stationary, portable**, single-phase, or polyphase, with the **rated supply voltage** not exceeding 1 100 V a.c., the **rated supply frequency** not exceeding 500 Hz, the **rated internal operating frequency** exceeding 500 Hz, but not exceeding 100 MHz, and the **rated output** not exceeding 1 kVA or 1 kW, incorporating **dry-type transformers** with encapsulated or non-encapsulated windings.

Associated transformers for switch mode power supply units covered by Annex BB of this standard shall have a **rated output** not exceeding:

- 25 kVA for single-phase **transformers**;
- 40 kVA for polyphase **transformers**.

NOTE 3 For higher frequencies, additional requirements may be necessary. However, this standard may be used as a guide.

The **no-load output voltage** or the **rated output voltage** of **switch mode power supply units** shall not exceed:

- 1 000 V a.c. or 1 415 V ripple-free d.c. when **separating transformers** or **auto-transformers** are used;
- 500 V a.c. or 708 V ripple-free d.c. when **isolating transformers** are used;
- 50 V a.c. or 120 V ripple-free d.c. when **safety isolating transformers** are used.

The **no-load output voltage** or the **rated output voltage** of **independent switch mode power supply units** shall not be less than:

- 50 V a.c. or 120 V ripple-free d.c. when **separating transformers** or **autotransformers** are used.

This standard is also applicable to **switch mode power supply units**, converters and inverters without limitation of the **rated output**. However, such **switch mode power supply units** are for special applications and are subject to an agreement between the purchaser and the manufacturer.

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NOTE 4 In the context of this standard, converters and invertors are considered to be **switch mode power supply units**.

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This standard may also be used as a guide for products not covered by the scope of this standard, the scope of IEC 61204-7, or the scope of IEC 61347 series.

This standard does not apply to:

- motor-generator sets;
- uninterruptible power supplies (UPS) according to IEC 62040;
- **switch mode power supply units** covered by IEC 61204-7 (i.e., low-voltage power supply devices, d.c. output, performance characteristics) and d.c. power and distribution equipment and **switch mode power supply units** for use in applications covered by IEC 60950-1, IEC 61010-1, IEC 60601-1, and IEC 60065;
- lamp control gear covered by IEC 61347-1;
- external circuits and their components intended to be connected to the input terminals and output terminals of the **transformers**.

NOTE 5 IEC 61204-7 will be updated by SC 22E.

NOTE 6 Attention is drawn to the following:

- for **transformers** intended to be used in vehicles, on board ships and aircraft, additional requirements (from other applicable standards, national rules, etc.) may be necessary;
- measures to protect the **enclosure** and the components inside the enclosure against external influences such as fungus, vermin, termites, solar-radiation, and icing should also be considered;
- the different conditions for transportation, storage, and operation of the **transformers** should also be considered;
- additional requirements in accordance with other appropriate standards and national rules may be applicable to **transformers** intended for use in special environments, such as tropical environment.