ICS 29.180 SLOVENSKÁ TECHNICKÁ NORMA Jún 2025

STN	**Bezpečnosť transformátorov, tlmiviek, napájacích zdrojov a ich kombinácií Časť 2-16: Osobitné požiadavky na spínané napájacie zdroje a transformátory pre spínané napájacie zdroje na všeobecné používanie a ich skúšky**	**STN EN IEC 61558-2-16** 35 1330

Safety of transformers, reactors, power supply units and combinations thereof - Part 2-16: Particular requirements and tests for switch mode power supply units and transformers for switch mode power supply units for general applications

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 05/25

Obsahuje: EN IEC 61558-2-16:2025, IEC 61558-2-16:2021, IEC 61558-2-16:2021/COR1:2023

Oznámením tejto normy sa od 31.03.2028 ruší
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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 61558-2-16

March 2025

ICS 29.180

Supersedes EN 61558-2-16:2009

English Version

Safety of transformers, reactors, power supply units and combinations thereof - Part 2-16: Particular requirements and tests for switch mode power supply units and transformers for switch mode power supply units for general applications (IEC 61558-2-16:2021 + COR1:2023)

Sécurité des transformateurs, bobines d'inductance, blocs d'alimentation et combinaisons de ces éléments - Partie 2-16: Exigences particulières et essais pour les blocs d'alimentation à découpage et les transformateurs pour blocs d'alimentation à découpage pour applications d'ordre général
(IEC 61558-2-16:2021 + COR1:2023)

Sicherheit von Transformatoren, Drosseln, Netzgeräten und entsprechenden Kombinationen - Teil 2-16: Besondere Anforderungen und Prüfungen für Schaltnetzteile und Transformatoren für Schaltnetzteile für allgemeine Anwendungen
(IEC 61558-2-16:2021 + COR1:2023)

This European Standard was approved by CENELEC on 2024-10-16. 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 CEN-CENELEC Management Centre 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 CEN-CENELEC Management Centre has the same status as the official versions.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Ref. No. EN IEC 61558-2-16:2025 E

EN IEC 61558-2-16:2025 (E)

European foreword

The text of document 96/509/FDIS, future edition 2 of IEC 61558-2-16 + COR1:2023, prepared by TC 96 "Transformers, reactors, power supply units, and combinations thereof" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 61558-2-16:2025.

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) 2026-03-31
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2028-03-31

This document supersedes EN 61558-2-16:2009 and all of its amendments and corrigenda (if any).

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

This document is read in conjunction with EN IEC 61558-1:2019.

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

Endorsement notice

The text of the International Standard IEC 61558-2-16:2021 + COR1:2023 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 60204-1:2016	NOTE	Approved as EN 60204-1:2018
IEC 60364-4-41:2005	NOTE	Approved as HD 60364-4-41:2017 +A11:2017
IEC 60601-1:2005	NOTE	Approved as EN 60601-1:2006 (not modified) +A11:2011
IEC 61010-1:2010	NOTE	Approved as EN 61010-1:2010 (not modified)
IEC 61204-7:2016	NOTE	Approved as EN IEC 61204-7:2018 (not modified)
IEC 61347 series	NOTE	Approved as EN 61347 series
IEC 61558 series	NOTE	Approved as EN 61558 series
IEC 62040 series	NOTE	Approved as EN 62040 series
IEC 62368-1	NOTE	Approved as EN IEC 62368-1

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

NOTE 1 Where 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.cencenelec.eu.

Annex ZA of EN IEC 61558-1 is applicable, except as follows:

Add:

Publication	Year	Title	EN/HD	Year
IEC 60664-4	2005	Insulation coordination for equipment within low-voltage systems - Part 4: Consideration of high-frequency voltage stress	EN 60664-4	2006
-	-		+AC	2006
IEC 61558-1	2017	Safety of transformers, reactors, power supply units and combinations thereof - Part 1: General requirements and tests	EN IEC 61558-1	2019
IEC 61558-2-1	-	Safety of transformers, reactors, power supply units and combinations thereof - Part 2-1: Particular requirements and tests for separating transformers and power supplies incorporating separating transformers for general applications	EN IEC 61558-2-1	-
IEC 61558-2-4	-	Safety of transformers, reactors, power supply units and combinations thereof - Part 2-4: Particular requirements and tests for isolating transformers and power supply units incorporating isolating transformers for general applications	EN IEC 61558-2-4	-
IEC 61558-2-6	-	Safety of transformers, reactors, power supply units and combinations thereof - Part 2-6: Particular requirements and tests for safety isolating transformers and power supply units incorporating safety isolating transformers for general applications	EN IEC 61558-2-6	-
IEC 61558-2-13	-	Safety of transformers, reactors, power supply units and combinations thereof - Part 2-13: Particular requirements and tests for auto-transformers and power supply units incorporating auto-transformers for general applications	EN IEC 61558-2-13	-

IEC 61558-2-16

Edition 2.0 2021-06

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Safety of transformers, reactors, power supply units and combinations thereof – Part 2-16: Particular requirements and tests for switch mode power supply units and transformers for switch mode power supply units for general applications

Sécurité des transformateurs, bobines d'inductance, blocs d'alimentation et combinaisons de ces éléments – Partie 2-16: Exigences particulières et essais pour les blocs d'alimentation à découpage et les transformateurs pour blocs d'alimentation à découpage pour applications d'ordre général

IEC 61558-2-16:2021-06(en-fr)

IEC 61558-2-16

Edition 2.0 2021-06

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CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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SAFETY OF TRANSFORMERS, REACTORS, POWER SUPPLY UNITS AND COMBINATIONS THEREOF –

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

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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8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International standard IEC 61558-2-16 has been prepared by IEC technical committee 96: Transformers, reactors, power supply units and combinations thereof.

This second edition cancels and replaces the first edition published in 2009 and amendment 1:2013. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) adjustment of structure and references in accordance with IEC 61558-1:2017;
b) definitions of different voltage characteristics;
c) partial discharge and description of constructions moved to IEC 61558-1:2017;
d) alternative method for dimensioning of **clearances**;
e) removal of requirements for homogeneous field conditions.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
96/509/FDIS	96/513/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

It has the status of a group safety publication in accordance with IEC Guide 104.

This International Standard is to be used in conjunction with IEC 61558-1:2017.

NOTE When "Part 1" is mentioned in this standard, it refers to IEC 61558-1:2017.

This document supplements or modifies the corresponding clauses in IEC 61558-1:2017, 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 for general applications.*

A list of all parts in the IEC 61558 series, published under the general title *Safety of transformers, reactors, power supply units and combinations thereof,* can be found on the IEC website.

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 this document states "*addition*", "*modification*" or "*replacement*", the relevant text of IEC 61558-1:2017 is to be adapted accordingly.

In this document, 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 document, the words in **bold** are defined in Clause 3.

Subclauses, notes, figures and tables additional to those in IEC 61558-1:2017 are numbered starting from 101; supplementary annexes are entitled AA, BB, etc.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

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

The contents of the corrigendum 1 (2023-09) have been included in this copy.

INTRODUCTION

IEC TC 96 has a group safety function in accordance with IEC Guide 104 for transformers other than those intended to supply distribution networks, in particular transformers and power supply units intended to allow the application of protective measures against electric shock as defined by TC 64, but in certain cases including the limitation of voltage and horizontal safety function for SELV, in accordance with IEC 60364-4-41.

The group safety function (GSF) is necessary because of responsibility for safety extra-low voltage (SELV) in accordance with IEC 61140:2016, 5.2.6 and IEC 60364-4-41:2017, 414.3.1 or control circuits in accordance with IEC 60204-1:2016, 7.2.4.

The group safety function is needed for each part of IEC 61558-2 because different standards of the IEC 61558 series can be combined in one construction but in certain cases with no limitation of rated output power.

For example, an auto-transformer in accordance with IEC 61558-2-13 can be designed with a separate SELV-circuit in accordance with the particular requirements for IEC 61558-2-6 relating to the general requirements of IEC 61558-1.

SAFETY OF TRANSFORMERS, REACTORS, POWER SUPPLY UNITS AND COMBINATIONS THEREOF –

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

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**.

NOTE 1 Safety includes electrical, thermal and mechanical aspects.

Unless otherwise specified, from here onward, the term **SMPS** covers **switch mode power supply units** for general applications.

SMPS covered by this document are air cooled (natural or forced) **independent**, **associated**, **stationary**, **portable**, single-phase or polyphase with the **rated supply voltage** not exceeding 1 000 V AC, 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.

NOTE 2 As the maximum **rated supply voltage** of the internal **transforme**r is 1 000 V AC, the maximum **rated supply voltage** of the **switch mode power supply unit** can be lower due to the type of rectification.

NOTE 3 For higher frequencies, additional requirements can be necessary. However, this document can be used for guidance.

This document is applicable to **SMPS**, converters and inverters without limitation of the **rated output** subject to an agreement between the purchaser and the manufacturer.

NOTE 4 In the context of this document, converters and inverters are considered to be **SMPS**.

This document applies to:

a) **SMPS** incorporating **safety isolating transformers** providing **SELV, PELV,** AC or DC **output voltage(s)** or a combination thereof in accordance with IEC 61140 and IEC 60364-4-41 for use with household and other consumer products,

b) **SMPS** with a maximum **output voltage** not exceeding 1 000 V AC or 1 415 V ripple-free DC for use with household and other consumer products, except for products covered in a),

c) This document can be used for **transformers** for use in **SMPS** (see Annex BB).

This document does not apply to:

- motor-generator sets;
- uninterruptible power supplies (UPS) in accordance with the IEC 62040 series;
- **SMPS** covered by IEC 61204-7 (i.e. low-voltage power supply devices DC output, performance characteristics) and DC power and distribution equipment and **SMPS** for use in applications covered by IEC 61010-1 and IEC 60601-1;
- lamp control gear covered by the IEC 61347 series;

- external circuits and their components intended to be connected to the input terminals and output terminals of the **SMPS**;
- equipment in accordance with IEC 60065, IEC 60950-1 and IEC 62368-1.

This document can also be used for guidance for products not covered by the scope of this document, the scope of IEC 61204-7 or the scope of the IEC 61347 series.

This document covers the safety requirements for:

- **SMPS** incorporating **separating transformers** for general use corresponding to IEC 61558-2-1;
- **SMPS** incorporating **isolating transformers** for general use corresponding to IEC 61558-2-4;
- **SMPS** incorporating **safety isolating transformers** for general use corresponding to IEC 61558-2-6;
- **SMPS** incorporating **auto-transformers** for general use corresponding to IEC 61558-2-13.

For **SMPS** for specific applications corresponding to the other documents of the IEC 61558-2 series, the necessary requirements of the relevant documents of the IEC 61558-2 series are applicable. In addition, the requirements listed in this document apply. Where two requirements are in conflict, the more severe takes precedence.

The **no-load output voltage** or the **rated output voltage** of **SMPS** does not exceed:

- 1 000 V AC or 1 415 V ripple-free DC when **SMPS** incorporating **separating transformers** or **auto-transformers** are used;
- 500 V AC or 708 V ripple-free DC when **SMPS** incorporating **isolating transformers** are used;
- 50 V AC or 120 V ripple-free DC when **SMPS** incorporating **safety isolating transformers** is used.

The **no-load output voltage** or the **rated output voltage** of **independent SMPS** is not less than:

- 50 V AC or 120 V ripple-free DC when **separating transformers**, **isolating transformers** or **auto-transformers** are used.

Attention is drawn to the following:

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

Future technological development of **SMPS** can necessitate a need to increase the upper limit of the frequencies. Until then, this document can be used as a guidance document.

This group safety publication focusing on safety guidance is primarily intended to be used as a product safety standard for the products mentioned in the scope, but is also intended to be used by TCs in the preparation of publications for products similar to those mentioned in the scope of this group safety publication, in accordance with the principles laid down in IEC Guide 104 and ISO/IEC Guide 51.

One of the responsibilities of a TC is, wherever applicable, to make use of BSPs and/or GSPs in the preparation of its publications.

2 Normative references

This clause of Part 1 is applicable except as follows:

Addition:

IEC 60664-4:2005, *Insulation coordination for equipment within low-voltage systems – Part 4: Consideration of high-frequency voltage stress*

IEC 61558-1:2017, *Safety of transformers, reactors, power supply units and combinations thereof – Part 1: General requirements and tests*

IEC 61558-2-1, *Safety of power transformers, power supplies, reactors and combinations thereof – Part 2-1: Particular requirements and tests for separating transformers and power supplies incorporating separating transformers for general applications*

IEC 61558-2-4, *Safety of transformers, reactors, power supply units and combinations thereof – Part 2-4: Particular requirements and tests for isolating transformers and power supply units incorporating isolating transformers for general applications*

IEC 61558-2-6, *Safety of transformers, reactors, power supply units and combinations thereof – Part 2-6: Particular requirements and tests for safety isolating transformers and power supply units incorporating safety isolating transformers for general applications*

IEC 61558-2-13, *Safety of transformers, reactors, power supply units and combinations thereof – Part 2-13: Particular requirements and tests for auto transformers and power supply units incorporating auto transformers*