

INTERNATIONAL STANDARD



GROUP ENERGY EFFICIENCY PUBLICATION

**Safety of transformers, reactors, power supply units and combinations thereof –
Part 2-5: Particular requirements and tests for transformers for shavers, power
supply units for shavers and shaver supply units**

Document Preview

[IEC 61558-2-5:2024](#)

<https://standards.iteh.ai/catalog/standards/iec/3baaa7f5-fb5e-4d7d-ab9e-334583b1bd7f/iec-61558-2-5-2024>





THIS PUBLICATION IS COPYRIGHT PROTECTED
Copyright © 2024 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Secretariat
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, ...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch

Discover our powerful search engine and read freely all the publications previews, graphical symbols and the glossary. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 500 terminological entries in English and French, with equivalent terms in 25 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

International
Standards
iteh.ai
Document Preview

[IEC 61558-2-5:2024](https://standards.iteh.ai/catalog/standards/iec/3baaa7f5-fb5e-4d7d-ab9e-334583b1bd7f/iec-61558-2-5-2024)

<https://standards.iteh.ai/catalog/standards/iec/3baaa7f5-fb5e-4d7d-ab9e-334583b1bd7f/iec-61558-2-5-2024>



IEC 61558-2-5

Edition 3.0 2024-08
REDLINE VERSION

INTERNATIONAL STANDARD



GROUP ENERGY EFFICIENCY PUBLICATION

**Safety of transformers, reactors, power supply units and combinations thereof –
Part 2-5: Particular requirements and tests for transformers for shavers, power
supply units for shavers and shaver supply units**

Document Preview

[IEC 61558-2-5:2024](https://standards.iteh.ai/catalog/standards/iec/3baaa7f5-fb5e-4d7d-ab9e-334583b1bd7f/iec-61558-2-5-2024)

<https://standards.iteh.ai/catalog/standards/iec/3baaa7f5-fb5e-4d7d-ab9e-334583b1bd7f/iec-61558-2-5-2024>

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 29.180

ISBN 978-2-8322-9557-1

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD.....	3
INTRODUCTION.....	2
1 Scope.....	7
2 Normative references	8
3 Terms and definitions	8
4 General requirements	9
5 General notes on tests	9
6 Ratings.....	9
7 Classification.....	10
8 Marking and other information	10
9 Protection against electric shock	11
10 Change of input voltage setting	11
11 Output voltage and output current under load	11
12 No-load output voltage	12
13 Short-circuit voltage.....	12
14 Heating.....	12
15 Short-circuit and overload protection	12
16 Mechanical strength	13
17 Protection against harmful ingress of dust, solid objects and moisture	14
18 Insulation resistance, dielectric strength and leakage current	14
19 Construction	14
20 Components	16
21 Internal wiring.....	16
22 Supply connection and other external flexible cables or cords	17
23 Terminals for external conductors.....	17
24 Provisions for protective earthing.....	17
25 Screws and connections	17
26 Creepage distances, clearances and distances through insulation.....	17
27 Resistance to heat, fire and tracking.....	17
28 Resistance to rusting	17
Annexes	18
Bibliography.....	19
Table 101 – Symbols indicating the kind of transformer	11
Table 102 – Values of heights of fall	13

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**SAFETY OF TRANSFORMERS, REACTORS,
POWER SUPPLY UNITS AND COMBINATIONS THEREOF –****Part 2-5: Particular requirements and tests for transformers for shavers,
power supply units for shavers and shaver 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.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 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) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at <https://patents.iec.ch>. IEC shall not be held responsible for identifying any or all such patent rights.

This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 61558-2-5:2010. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

IEC 61558-2-5 has been prepared by IEC technical committee 96: Transformers, reactors, power supply units and combinations thereof. It is an International Standard.

This third edition cancels and replaces the second edition published in 2010. 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) new symbol for power supply unit with linearly regulated output voltage.

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

Draft	Report on voting
96/599/FDIS	96/600/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/publications.

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

This document is to be used in conjunction with 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 transformers for shavers, power supply units for shavers and shaver supply units*.

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 adopted 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, or
- revised.

IMPORTANT – The "colour inside" logo on the cover page of this document indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[IEC 61558-2-5:2024](https://standards.iteh.ai/catalog/standards/iec/3baaa7f5-fb5e-4d7d-ab9e-334583b1bd7f/iec-61558-2-5-2024)

<https://standards.iteh.ai/catalog/standards/iec/3baaa7f5-fb5e-4d7d-ab9e-334583b1bd7f/iec-61558-2-5-2024>

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, which is about Electrical installations and protection against electric shock, 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 used because of responsibility for example 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 used 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.

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[IEC 61558-2-5:2024](https://standards.iteh.ai/catalog/standards/iec/3baaa7f5-fb5e-4d7d-ab9e-334583b1bd7f/iec-61558-2-5-2024)

<https://standards.iteh.ai/catalog/standards/iec/3baaa7f5-fb5e-4d7d-ab9e-334583b1bd7f/iec-61558-2-5-2024>

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

Part 2-5: Particular requirements and tests for transformers for shavers, power supply units for shavers and shaver supply units

1 Scope

Replacement:

This part of IEC 61558 deals with the safety of **shaver transformers, power supply units** incorporating a **shaver transformer**, and **shaver supply units**. Shaver transformers incorporating **electronic circuits** are also covered by this document.

NOTE 1 Safety includes electrical, thermal and mechanical ~~and chemical~~ aspects.

Unless otherwise specified, from here onward, the term **transformer** covers **shaver transformers** and **power supply units** incorporating **shaver transformers** and **shaver supply units**.

For **power supply units** (linear) this document is applicable. For **switch mode power supply units** IEC 61558-2-16 is applicable together with this document. Where two requirements are in conflict, the most severe take precedence.

This document is applicable to **stationary**, single-phase, air-cooled (natural or forced) **independent or associated dry-type transformers**. The windings ~~may~~ can be encapsulated or non-encapsulated.

~~This standard is applicable to transformers and power supply (linear) with internal operational frequencies not exceeding 500 Hz.~~

~~This standard used in combination with Part 2-16 for switch mode power supply units (SMPS) is also applicable to power supplies with internal operational frequencies higher than 500 Hz. Where the two requirements are in conflict the most severe take precedence.~~

The **rated supply voltage** does not exceed 250 V AC and the **rated supply frequency** and the **internal operating frequencies** do not exceed 500 Hz.

The **rated output** is not less than 20 VA and does not exceed 50 VA.

The **no-load output voltage** does not exceed 275 V AC and the **rated output voltage** does not exceed 250 V AC.

This document is not applicable to external circuits and their components intended to be connected to the input and output terminals or socket-outlets of the **transformers**.

NOTE 2 **Transformers** covered by this document are only used in applications where **double** or **reinforced insulation** between circuits is **required** specified by the installation rules for bathrooms and similar locations, or by the appliance specifications.

NOTE 3 **Transformers** covered by this document ~~may~~ can be flush or surface mounted or incorporated in luminaires, mirrors, and other equipment containing one or more socket-outlet(s).

~~NOTE 3~~ Attention is drawn to the following, if applicable:

- 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~~ can be applicable to **transformers** intended for use in special environments.

~~NOTE 4~~ Future technological development of **transformers** ~~may~~ can necessitate a need to increase the upper limit of the frequencies. Until then this document ~~may~~ 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 technical committees 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 technical committee is, wherever applicable, to make use of basic safety publications and/or group safety publications in the preparation of its publications.

2 Normative references

This clause of IEC 61558-1:2017 is applicable except as follows:

Addition:

<https://standards.iteh.ai/> IEC 60068-2-62:1991, *Environmental testing – Part 2: Test methods – Test Ef: Impact, pendulum hammer*¹

IEC TR 60083, *Plugs and socket-outlets for domestic and similar general use standardized in member countries of IEC*

IEC 60670 (all parts), *Boxes and enclosures for electrical accessories for household and similar fixed electrical installations*

IEC 61558-1:2005/2017, ~~Safety of power transformers, power supplies, reactors and similar products~~ *Safety of transformers, reactors, power supply units and combinations thereof – Part 1: General requirements and tests*

IEC 61558-2-16, *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*

3 Terms and definitions

~~This clause of Part 1 is applicable except as follows:~~

¹ This publication was withdrawn and replaced with IEC 60068-2-75 (1997), but for the purposes of this document IEC 60068-2-62 is cited.

For the purposes of this document, the terms and definitions given in IEC 61558-1:2017 apply, except as follows:

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1 Transformers

Addition:

3.1.101

shaver transformer

isolating transformer for fixed installation and with a limited output, designed to supply electric shavers, toothbrushes, and similar appliances rated 50 VA or less used in a bathroom which supplies only one shaver, or the like, at a time

3.1.102

shaver supply unit

accessory embodying a **shaver transformer** or a **power supply unit** incorporating a **shaver transformer**, and one or more socket outlets allowing the use of only one plug at a time

4 General requirements

This clause of IEC 61558-1:2017 is applicable.

5 General notes on tests

This clause of IEC 61558-1:2017 is applicable.

<https://standards.iteh.ai/catalog/standards/iec/3baaa715-fb5e-4d7d-ab9e-334583b1bd7f/iec-61558-2-5-2024>

6 Ratings

This clause of IEC 61558-1:2017 is applicable except as follows:

~~Replacement~~ *Addition:*

6.101 The **rated output voltage** shall not exceed 250 V AC.

For **independent transformers**, this **output voltage** limitation applies even when **output windings**, not intended for interconnection, are connected in series.

6.102 The **rated output** shall not be less than 20 VA and shall not exceed 50 VA.

6.103 The **rated supply frequency** and the **internal operating frequencies** shall not exceed 500 Hz.

6.104 The **rated supply voltage** shall not exceed 250 V AC.

Compliance with the requirements of 6.101 to 6.104 is checked by inspection of the marking.

7 Classification

This clause of IEC 61558-1:2017 is applicable except as follows:

7.2

Replacement:

7.2 According to short-circuit ~~protection~~ characteristic or protection against abnormal ~~conditions~~ use:

- **inherently short-circuit proof transformers;**
- **non-inherently short-circuit proof transformers;**

7.8

Replacement:

7.8 According to their transient overvoltage condition:

- **overvoltage category II**

8 Marking and other information

This clause of IEC 61558-1:2017 is applicable except as follows:

~~**8.1 h)** Replacement of the first sentence by the following:
relevant graphical symbols shown in 8.11 indicating the kind of **transformer**;~~

8.1 n) Modification:

[IEC 61558-2-5:2024](https://standards.iteh.ai/catalog/standards/iec/3baaa7f5-fb5e-4d7d-ab9e-334583b1bd7f/iec-61558-2-5-2024)

<https://standards.iteh.ai/catalog/standards/iec/3baaa7f5-fb5e-4d7d-ab9e-334583b1bd7f/iec-61558-2-5-2024>

indication of the protection code IP for **transformers**, if higher than IP00;

indication of the protection code IP for **shaver supply units**, if higher than IP21.

8.1

h)

Replacement:

Replace the content up to the first semi-colon by the following:

relevant graphical symbols shown in Table 101 that indicate the kind of **transformer**

m)

Modification:

indication of the degree of protection (IP code) for **transformers**, if higher than IP00;

indication of the degree of protection (IP code) for **shaver supply units**, if higher than IP21.



8.7*Addition:*

For **shaver supply units** provided with a single-pole switch, the switched pole shall be connected to the line.

8.11*Addition:*

The symbol for linear **power supply units** shall be used in conjunction with the symbol indicating the kind of **transformer**.

Table 101 – Symbols indicating the kind of transformer

Symbol or graphical symbol	Explanation or title	Identification
	Shaver supply units and shaver transformers	IEC 60417-5225 (2009-05) :2002-10
	Power supply unit, linear	IEC 60417-6210:2013-10

8.13IEC 61558-2-5:2024<https://standards.iteh.ai/catalog/standards/iec/3baaa7f5-fb5e-4d7d-ab9e-334583b1bd7f/iec-61558-2-5-2024>*Addition:*

For **shaver supply units**, the marking for **rated output voltage(s)** and for the symbol of 8.11 shall be indicated on the front of the **enclosure** so as to be visible when the unit is mounted as in normal use. For **shaver supply units** intended to provide different output voltages, the selected output voltage setting shall be clearly discernible.

For **transformers**, the marking with the symbol of 8.11 shall be provided only if the **transformer** is supplied separately.

9 Protection against electric shock

This clause of IEC 61558-1:2017 is applicable.

10 Change of input voltage setting

This clause of IEC 61558-1:2017 is applicable.

11 Output voltage and output current under load

This clause of IEC 61558-1:2017 is applicable.

12 No-load output voltage

This clause of IEC 61558-1:2017 is applicable except as follows:

Addition

12.101 The **no-load output voltage** shall not exceed 275 V AC.

For **independent transformers**, this **output voltage** limitation applies even when **output windings**, not intended for interconnection, are connected in series.

12.102 The difference between the **no-load output voltage** and the **output voltage** under load shall not be excessive.

The ratio between the **no-load output voltage** measured in Clause 12 and the **output voltage** under load measured during the test of Clause 11, expressed as a percentage of the latter voltage, shall not exceed 20 %.

The ratio is determined by Formula (101):

$$\frac{U_{\text{no-load}} - U_{\text{load}}}{U_{\text{load}}} \times 100(\%) \quad (101)$$

where

$U_{\text{no-load}}$ is the no-load output voltage, expressed in V;

U_{load} is the output voltage under load, expressed in V.

Compliance with the requirements of 12.101 and 12.102 is checked by measuring the **no-load output voltage** at the **ambient temperature** when the **transformer** is connected to the **rated supply voltage** at the **rated supply frequency**.

~~The difference between the no-load output voltage measured in this clause and the output voltage under load measured during the test of Clause 11, expressed as a percentage of the latter voltage, shall not exceed 20 %.~~

~~NOTE The ratio is defined as follows: $\frac{U_{\text{no-load}} - U_{\text{load}}}{U_{\text{load}}} \times 100\%$~~

13 Short-circuit voltage

This clause of IEC 61558-1:2017 is applicable.

14 Heating

This clause of IEC 61558-1:2017 is applicable.

15 Short-circuit and overload protection

This clause of IEC 61558-1:2017 is applicable.