
Varnost transformatorjev, dušilk, napajalnikov in kombinacij teh elementov - 2-14. del: Posebne zahteve in preskusi za spremenljive transformatorje in napajalnike z vgrajenimi spremenljivimi transformatorji

Safety of transformers, reactors, power supply units and combinations thereof - Part 2-14: Particular requirements and tests for variable transformers and power supply units incorporating variable transformers for general applications

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Sécurité des transformateurs, bobines d'inductance, blocs d'alimentation et des combinaisons de ces éléments - Partie 2-14: Exigences particulières et essais pour les transformateurs variables et les blocs d'alimentation incorporant des transformateurs variables

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IEC TC 96 : TRANSFORMERS, REACTORS, POWER SUPPLY UNITS, AND COMBINATIONS THEREOF	
SECRETARIAT: Germany	SECRETARY: Mr Wolfgang Reichelt
OF INTEREST TO THE FOLLOWING COMMITTEES: SC 3C, TC 14, TC 22, SC 22E, SC 34C, TC 51, TC 55, TC 61, SC 62A, TC 64, TC 66, TC 77, TC 97, TC 106, TC 108, TC 109, TC 111, TC 112	PROPOSED HORIZONTAL STANDARD: <input type="checkbox"/> Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.
FUNCTIONS CONCERNED: <input type="checkbox"/> EMC <input type="checkbox"/> ENVIRONMENT <input type="checkbox"/> QUALITY ASSURANCE <input checked="" type="checkbox"/> SAFETY	
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<p>Attention IEC-CENELEC parallel voting</p> <p>The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting.</p> <p>The CENELEC members are invited to vote through the CENELEC online voting system.</p>	

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TITLE:

Safety of transformers, reactors, power supply units and combinations thereof - Part 2-14: Particular requirements and tests for variable transformers and power supply units incorporating variable transformers for general applications

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

Part 2-14: Particular requirements and tests for variable transformers and power supply units incorporating variable transformers for general applications

FOREWORD

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International standard IEC 61558-2-14 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 2012. 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) Description of constructions moved to IEC 61558-1:2017;
- c) New symbols for power supply units with linearly regulated output voltages and required current collector position changes.

96

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

Draft	Report on voting
96/XXX/FDIS	96/XXX/RVD

98

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

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

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

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

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

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

109 This document supplements or modifies the corresponding clauses in IEC 61558-1:2017, so as
110 to convert that publication into the IEC standard: *Particular requirements and tests for variable
111 transformers and power supply units incorporating variable transformers for general
112 applications.*

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

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

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

120 In this document, the following print types are used:

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

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

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

127 The committee has decided that the contents of this document will remain unchanged until the
128 stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to
129 the specific document. At this date, the document will be

- 130 • reconfirmed,
- 131 • withdrawn,
- 132 • replaced by a revised edition, or
- 133 • amended.

INTRODUCTION

IEC/TC 96 has 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 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 e.g. 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.

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

Part 2-14: Particular requirements and tests for variable transformers and power supply units incorporating variable transformers for general applications

1 Scope

Replacement

This part of IEC 61558 deals with the safety of **variable transformers** for general applications and **power supply units** incorporating **variable transformers** for general applications. **Variable transformers** incorporating **electronic circuits** are also covered by this document.

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

Unless otherwise specified, from here onward, the term **transformer** covers **variable transformers** for general applications and **power supply units** incorporating **variable transformers** for general applications.

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 does not apply to **transformers** covered by IEC 60076-11.

This document is applicable to **stationary** or **portable**, single-phase or polyphase, air-cooled (natural or forced) **independent** or **associated variable dry-type transformers**.

- **variable auto-transformers;**
- **variable separating transformers;**
- **variable isolating transformers;**
- **variable safety isolating transformers.**

The windings can be encapsulated or non-encapsulated.

The **rated supply voltage** does not exceed 1 000 V AC and the **rated supply frequency** and the **internal operational frequencies** do not exceed 500 Hz.

The **rated output** does not exceed:

- 40 kVA for single-phase **variable auto-transformers;**
- 200 kVA for poly-phase **variable auto-transformers;**
- 1 kVA for single-phase **variable separating transformers;**
- 5 kVA for poly-phase **variable separating transformers;**
- 25 kVA for single-phase **variable isolating transformers;**
- 40 kVA for poly-phase **variable isolating transformers;**
- 10 kVA for single-phase **variable safety isolating transformers;**
- 16 kVA for poly-phase **variable safety isolating transformers.**

This document is applicable to **variable transformers** without limitation of the **rated output** subject to an agreement between the purchaser and the manufacturer.

NOTE 2 **Transformers** intended to supply distribution networks are not included in the scope.

For **variable auto-transformers**:

- the **no-load output voltage** or the **rated output voltage** does not exceed 1 000 V AC or 1 415 V ripple free DC;
- for **independent variable auto-transformers** the **rated output voltage** does exceed 50 V AC or 120 V ripple-free DC but not exceed 250 V AC.

NOTE 3 Normally **variable auto-transformers** are intended to be associated with the equipment to provide voltages different from the supply voltage for the functional reasons. The protection against electric shock may be provided or completed by other features of the equipment, such as the **body**.

NOTE 4 **Variable auto-transformers** intended to be used by technically skilled or trained personnel are considered as **associated variable transformers** may have a rated output voltage less than 50 V AC.

For **variable separating transformers**:

- the **no-load output voltage** or the **rated output voltage** does not exceed 1 000 V AC or 1 415 V ripple free DC;
- for **portable variable separating transformers** the **rated output voltage** does exceed 50 V AC or 120 V ripple-free DC;
- are only used where **double** or **reinforced insulation** between circuits is not required by the installation rules or by the end product standard.

NOTE 5 Normally **variable separating transformers** are intended to be associated with equipment to provide voltages different from the supply voltage for the functional reasons. The protection against electric shock may be provided or completed by other features of the equipment, such as the **body**. Parts of **output circuits** may be connected to the protective earthing.

NOTE 6 **Variable separating transformers** intended to be used by technically skilled or trained personal are considered as **associated variable transformers** and may have a **rated output voltage** less than 50 V AC or 120 V ripple-free DC.

For **variable isolating transformers**:

- the **no-load output voltage** or the **rated output voltage** does not exceed 500 V AC or 708 V ripple free DC The **no-load output voltage** and the **rated output voltage** may be up to 1 000 V AC or 1 415 V ripple free DC for special applications or in accordance with national wiring rules;
- for **independent variable isolating transformers** the **rated output voltage** does not exceed 250 V AC;
- are used where **double** or **reinforced insulation** between circuits is required by the installation rules or by the end product standard.

For **variable safety isolating transformers**:

- the **no-load output voltage** or the **rated output voltage** does not exceed 50 V AC or 120 V ripple-free DC;
- are used where **double** or **reinforced insulation** between circuits is required by the installation rules or by the end product standard.

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

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.);
- 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 **transformers**;
- additional requirements in accordance with other appropriate standards and national rules can be applicable to **transformers** intended for use in special environments.

Future technological development of **transformers** may necessitate a need to increase the upper limit of the frequencies. Until then this document may 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 61558-1:2017, *Safety of transformers, reactors, power supply units and combinations thereof – Part 1: General requirements and tests*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in Part 1 apply.

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

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

Addition

3.3

variable transformer

transformer having unlimited numbers of transformation ratios and adjustable by means of a movable **current collector** positioned along a continuous path of locally exposed winding turns

3.1.102

variable auto-transformer

variable transformer in which input and output voltages are derived from a common winding

Addition

3.2.101

current collector

assembly of moving contact parts which serve to transmit current from a point on the contact path to the tapping point at the bushings or terminals

3.2.102

drive

mechanical assembly used for moving the **current collector**

3.2.103**fixed winding**

winding or part of the winding with no means for varying the transformation ratio

3.2.104**variable winding**

winding or part of the winding with a contact path used for varying the transformation ratio

Modification

3.5.5 is not applicable.

*Addition***3.5.101****rated output voltage range**

output voltage range (for poly-phase **transformer** and **power supply units**, the phase-to-phase voltage) at **rated supply voltage**, **rated supply frequency**, **rated output current**, and **rated power factor** assigned to the **transformer** or **power supply unit** by the manufacturer

4 General requirements

This clause of Part 1 is applicable except as follows:

Addition

If the **current collector** shall not stay permanently in the same position it shall be marked on the **variable transformer** with the symbol IEC 60417-6263:2014-03 (see 8.11) placed adjacent to the supply information (e.g. on the rating plate).

5 General notes on tests

This clause of Part 1 is applicable except as follows:

5.3*Addition*

The test of 16.101 shall be conducted before all other tests.

6 Ratings

This clause of Part 1 is applicable except as follows:

Addition

6.101 The **rated output voltage** shall not exceed:

- 1 000 V AC or 1 415 V ripple-free DC for **variable auto-transformers** and **variable separating transformers**;
- 500 V AC or 708 V ripple-free DC for **variable isolating transformers**; the **rated output voltage** may exceed these limits in order to be in accordance with the national wiring rules, however, it shall not exceed 1 000 V AC or 1 415 V ripple free DC;