



Irish Standard
I.S. EN 61558-2-14:2013

Safety of transformers, reactors, power supply units and combination thereof --
Part 2-14: Particular requirements and tests for variable transformers and power supply units incorporating variable transformers (IEC 61558-2-14:2012 (EQV))

I.S. EN 61558-2-14:2013

Incorporating amendments/corrigenda issued since publication:

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I.S. xxx: Irish Standard – national specification based on the consensus of an expert panel and subject to public consultation.

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EUROPEAN STANDARD
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EN 61558-2-14

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ICS 29.180

English version

**Safety of transformers, reactors, power supply units
and combination thereof -
Part 2-14: Particular requirements and tests for variable transformers
and power supply units incorporating variable transformers
(IEC 61558-2-14:2012)**

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
(CEI 61558-2-14:2012)

Sicherheit von Transformatoren, Drosseln,
Netzgeräten und deren Kombinationen -
Teil 2-14: Besondere Anforderungen und
Prüfungen für Stelltransformatoren
und Netzgeräte, die Stelltransformatoren
enthalten
(IEC 61558-2-14:2012)

This European Standard was approved by CENELEC on 2012-12-27. 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.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

CENELEC

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

Management Centre: Avenue Marnix 17, B - 1000 Brussels

Foreword

The text of document 96/395/FDIS, future edition 1 of IEC 61558-2-14, prepared by IEC/TC 96 "Transformers, reactors, power supply units and combination thereof" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61558-2-14:2013.

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) 2013-09-27
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2015-12-27

This standard is to be used in conjunction with EN 61558-1:2005 + A1:2009.

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

A list of all parts of the EN 61558 series, under the general title: *Safety of transformers, reactors, power supply units and combination thereof*, can be found on the CENELEC 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 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.

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 standard covers the Principle Elements of the Safety Objectives for Electrical Equipment Designed for Use within Certain Voltage Limits (LVD - 2006/95/EC).

Endorsement notice

The text of the International Standard IEC 61558-2-14:2012 was approved by CENELEC as a European Standard without any modification.

In the Bibliography of EN 61558-1:2005, the following notes have to be **added** for the standards indicated:

IEC 60076-11	NOTE	Harmonised as EN 60076-11.
IEC 61558-2-16	NOTE	Harmonised as EN 61558-2-16.

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 When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Annex ZA of EN 61558-1:2005 is applicable except as follows:

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
<i>In Annex ZA of EN 61558-1:2005 add:</i>				
IEC 61558-1	2005	Safety of power transformers, power	EN 61558-1	2005
+ corr. March	2010	supplies, reactors and similar products -	+ corr. August	2006
+ corr. March	2008	Part 1: General requirements and tests	+ A1	2009
+ corr. April	2011			
+ A1	2009			

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

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

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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- 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 61558-2-14 has been prepared by technical committee 96: Transformers, reactors, power supply units and combination thereof.

This first edition cancels and replaces the chapter IV of the IEC 60989 published in 1991. It is a technical revision.

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

- a) update of the existing text;
- b) complete editorial review.

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

FDIS	Report on voting
96/395/FDIS	96/398/RVD

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 has the status of a group safety publication in accordance with IEC Guide 104:2010, *The preparation of safety publications and the use of basic safety publications and group safety publications*.

This part 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 and its Amendment 1 (2009).

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 variable transformers and power supply units incorporating variable transformers*.

A list of all parts of the IEC 61558 series, under the general title: *Safety of transformers, reactors, power supply units and combination 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 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 stability 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.

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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 COMBINATION THEREOF –

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

1 Scope

Replacement:

This part of IEC 61558 deals with safety of **variable transformers** for general applications and **power supply units** incorporating **variable transformers** for general applications.

Transformers incorporating **electronic circuits** are also covered by this standard.

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.

The **rated supply voltage** does not exceed 1 000 V a.c., and the **rated supply frequency** does not exceed 500 Hz.

This standard is applicable to **transformers** and **power supply units** (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

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

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

- **variable auto-transformers** and **power supply units** incorporating **variable auto-transformers**;
- **variable separating transformers** and **power supply units** incorporating **variable separating transformers**;
- **variable isolating transformers** and **power supply units** incorporating **variable isolating transformers**;
- **variable safety isolating transformers** and **power supply units** incorporating **variable safety isolating transformers**.

The windings may be encapsulated or non-encapsulated.

The **rated output** does not exceed:

- 40 kVA for single-phase **variable auto-transformers** and **power supply units** incorporating single-phase **variable auto-transformers**;

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

This part is applicable to **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 and power supply units incorporating variable auto-transformers:

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

NOTE 3 Normally, the **variable auto-transformers** and **power supply units** 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 can be provided by other features of the equipment, such as the **body**.

Variable auto-transformers and power supply units incorporating variable auto-transformers intended to be used by technically skilled or trained personnel are considered as **associated transformers** and **associated power supply units** and may have a **rated output voltage** less than 50 V a.c.

For variable separating transformers and power supply units incorporating variable separating transformers:

- the **no-load output voltage** or the **rated output voltage** does not exceed 1 000 V a.c. or 1 415 V ripple free d.c.;
- for **portable separating transformers** the **rated output voltage** does exceed 50 V a.c. or 120 V ripple-free d.c.;
- covered by this part may only be used where **double or reinforced insulation** between circuits is not required by the installation rules or by the end product standard.

NOTE 4 Normally, **variable separating transformers** and **power supply units** are intended to be associated with equipment to provide voltages different from the supply voltage for the functional reasons. The protection against electric shock can be provided (or completed) by other features of the equipment, such as the **body**. Parts of **output circuits** can be connected to the protective earth.

NOTE 5 **Variable separating transformers and power supply units incorporating variable separating transformers** intended to be used by technically skilled or trained personal are considered as **associated transformers** and **associated power supply units** and can have a **rated output voltage** less than 50 V a.c. or 120 V ripple-free d.c.

For variable isolating transformers and power supply units incorporating variable isolating transformers:

- the **no-load output voltage** or the **rated output voltage** does not exceed 500 V a.c. or 708 V ripple free d.c. The **no-load output voltage** and the **rated output voltage** may be up to 1 000 V a.c. or 1 415 V ripple free d.c. for special applications or in accordance with national wiring rules;
- for **independent isolating transformers** the **rated output voltage** does not exceed 250 V a.c.;
- 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 and power supply units incorporating safety isolating transformers:

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

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

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.) can 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 are also considered;
- the different conditions for transportation, storage, and operation of the **transformers** are also be considered;
- additional requirements in accordance with other appropriate standards and national rules can be applicable to **transformers** intended for use in special environments, such as tropical environment.

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

2 Normative references

This clause of Part 1 is applicable except as follows.

Addition:

IEC 61558-1:2005, *Safety of power transformers, power supplies, reactors and similar products – Part 1: General requirements and tests*

Amendment 1 (2009)

3 Terms and definitions

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

3.1 Transformers

Addition:

3.1.101

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

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