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INTERNATIONAL STANDARD

NORME INTERNATIONALE

GROUP SAFETY PUBLICATION
PUBLICATION GROUPÉE DE SÉCURITÉ

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

Sécurité des transformateurs, bobines d'inductance, blocs d'alimentation et produits analogues pour des tensions d'alimentation jusqu'à 1 100 V – Partie 2-13: Règles particulières et essais pour les autotransformateurs et les blocs d'alimentation incorporant des autotransformateurs

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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 2-13: Particular requirements and tests for auto transformers and power supply units incorporating auto transformers

FOREWORD

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International standard IEC 61558-2-13 has been prepared by IEC technical committee 96: Transformers, reactors, power supply units and similar products for low voltages up to 1 100 V.

This second edition cancels and replaces the first edition published in 1999. It constitutes a technical revision. The main changes consist of updating this part in accordance with Part 1 (2005), and increasing the supply voltages up to 1 100 V to be in line with the standards of TC 14.

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*.

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

FDIS	Report on voting
96/318/FDIS	96/323/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 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 auto transformers and power supply units incorporating auto transformers.*

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.

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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

1 Scope

Replacement:

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

NOTE 1 Safety includes electrical, thermal and mechanical aspects.

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

NOTE 2 : For **power supply units** (linear) this part is applicable. For **switch mode power supply units,** IEC 61558-2-16 is applicable together with this part.

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

The **rated supply voltage** does not exceed 1 100 V a.c., and the **rated supply frequency** and the **internal operating frequencies** do not exceed 500 Hz.

The **core power** does not exceed:

– 2 kVA for single-phase **transformers**;

– 10 kVA for polyphase **transformers**.

The **rated output** does not exceed:

– 40 kVA for single-phase **transformers**;

– 200 kVA for polyphase **transformers**.

This part is applicable to **transformers** without limitation of the **core power** and the **rated output** both being subject to an agreement between the purchaser and the manufacturer.

Where applicable, 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., and for **independent transformers,** the **no-load output voltage** and the **rated output voltage** exceeds 50 V a.c., or 120 V ripple-free d.c.

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**.

Transformers covered by this part are used only in applications where no **insulation** between circuits is required by the installation rules or by the end product standard.

NOTE 3 Attention is drawn to the following:

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– 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.

NOTE 4 Future technological development of **transformers** may 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*

3 Terms and definitions

This clause of Part 1 is applicable except as follows:

Modification:

Delete the third paragraph.

Note 2 of 3.7.22 is not applicable.

Addition:

3.1.101
auto-transformer
transformer in which **input** and **output windings** have a common part

NOTE 1 **Auto-transformers** may have supplementary windings (see Figure 101) or tappings (see Figure 102) for adjustment purposes.

NOTE 2 Transformers with windings separated at least by functional insulation and electrically connected, will be treated as **auto-transformers** (see Figure 103).

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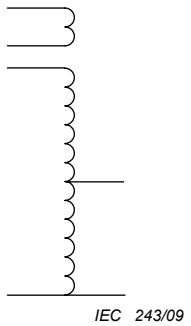

Figure 101 – Windings

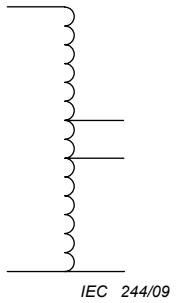

Figure 102 – Tappings

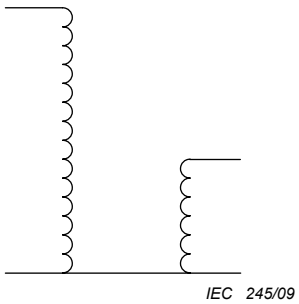

Figure 103 – Windings separated by functional isolation

3.5.101
core power
power transformed by the core, if this core was used in a **transformer** with separate windings at the same **supply voltage**, **output voltage**, **frequency**, **power factor** and thermal characteristics.

4 General requirements

This clause of Part 1 is applicable.

5 General notes on tests

This clause of Part 1 is applicable.

6 Ratings

Replacement:

6.101 The **rated output voltage** shall not exceed 1 000 V a.c. or 1 415 V ripple-free d.c. For **independent transformers**, the **rated output voltage** shall exceed 50 V a.c. or 120 V ripple-free d.c.

6.102 The **rated output** shall not exceed:

– 40 kVA for single-phase **transformers**;
– 200 kVA for polyphase **transformers**.

Transformers without limitation of the **rated output** shall be subject to agreement between the purchaser and the manufacturer.

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 1 100 V a.c.

6.105 The **core power** shall not exceed:

– 2 kVA for single-phase **transformers**;

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– 10 kVA for polyphase **transformers**.

Transformers without limitation of the **core power** shall be subject to agreement between the purchaser and the manufacturer.

The relation between the core power and the rated output is given in the following formula:

$$\textbf{Core power}\ (\text{VA}) = \frac{V_{max} - V_{min}}{V_{max}} \times \textbf{rated output}\ (\text{VA})$$

where V_{max} and V_{min} are the highest and lowest values (**rated supply voltage** or **rated output voltage**).

NOTE In this case, the limitation of the **core power** is applicable to the **rated output**.

This formula is not applicable to a **transformer** with separate windings which are electrically connected (see Figure 103). In this case, the **core power** of the **transformer** is equal to the **rated output**.

Compliance with the requirements of 6.101 to 6.105 is checked by inspection of the marking.

7 Classification

This clause of Part 1 is applicable.

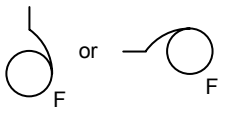
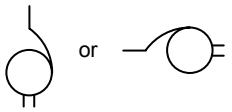
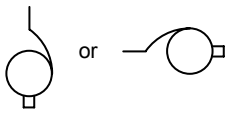
8 Marking and other information

This clause of Part 1 is applicable except as follows:

8.1 *h) Replacement:*

The transformers shall be marked with one of the graphical symbols shown in 8.11;

8.11 *Addition:*

Symbol or graphical symbol	Explanation or title	Identification
	Fail-safe **auto-transformer**	60417-5941
	Non-short-circuit proof **auto-transformer**	60417-5942
	Short-circuit proof **auto-transformer** (inherently or non-inherently)	60417-5943

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