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colour inside

GROUP SAFETY PUBLICATION

Safety of transformers, reactors, power supply units and ~~similar products for supply voltages up to 1 100 V~~ combinations thereof –
Part 2-4: Particular requirements and tests for isolating transformers and power supply units incorporating isolating transformers for general applications

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

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CONTENTS

FOREWORD 4
INTRODUCTION 7
1 Scope 8
2 Normative references 9
3 Terms and definitions 9
4 General requirements 9
5 General notes on tests 9
6 Ratings 10
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 11
13 Short-circuit voltage 13
14 Heating 13
15 Short-circuit and overload protection 13
16 Mechanical strength 13
17 Protection against harmful ingress of dust, solid objects and moisture 13
18 Insulation resistance, dielectric strength and leakage current 13
19 Construction 13
20 Components 16
21 Internal wiring 16
22 Supply connection and other external flexible cable or cords 16
23 Terminals for external conductors 16
24 Provisions for protective earthing 16
25 Screws and connections 16
26 Creepage distances, clearances and distances through insulation 16
27 Resistance to heat, fire and tracking 16
28 Resistance to rusting 16
Annexes 17
~~Annex C Creepage distances (cr), clearances (cl) and distances through insulation (dti) Material group II (400 ≤CTI <600) .....~~
~~Annex D Creepage distances (cr), clearances (cl) and distances through insulation (dti) Material group I (CTI ≥600) .....~~
~~Annex R Explanations of the application of 4.2 of IEC 60664-1:2007 (see IEC 61558-1 Subclause 26.2) .....~~
Bibliography 18

~~Table 101 – Output voltage difference .....~~
Table 101 – Symbols indicating the kind of transformer 11
Table 102 – Output voltage ratio 12

INTERNATIONAL ELECTROTECHNICAL COMMISSION

SAFETY OF TRANSFORMERS, REACTORS, POWER SUPPLY UNITS AND ~~SIMILAR PRODUCTS FOR SUPPLY VOLTAGES UP TO 1 100 V~~ COMBINATIONS THEREOF –

Part 2-4: Particular requirements and tests for isolating transformers and power supply units incorporating isolating transformers 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.
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) 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.

This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 61558-2-4:2009. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

International standard IEC 61558-2-4 has been prepared by IEC technical committee 96: Transformers, reactors, power supply units and combinations thereof.

This third edition cancels and replaces the second edition published in 2009. 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) a new symbol for power supply unit with linearly regulated output voltage.

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

FDIS	Report on voting
96/505/FDIS	96/511/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 isolating transformers and power supply units incorporating isolating transformers 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.

IMPORTANT – The 'colour inside' logo on the cover page of this publication 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.

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.

SAFETY OF TRANSFORMERS, REACTORS, POWER SUPPLY UNITS AND ~~SIMILAR PRODUCTS FOR SUPPLY VOLTAGES UP TO 1 100 V~~ COMBINATIONS THEREOF –

Part 2-4: Particular requirements and tests for isolating transformers and power supply units incorporating isolating transformers for general applications

1 Scope

Replacement

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

NOTE 1 Safety includes electrical, thermal and mechanical aspects.

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

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

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

The **rated supply voltage** does not exceed ~~1 100~~ 1 000 V AC and the **rated supply frequency** and the **internal operating frequencies** do not exceed 500 Hz.

The **rated output** does not exceed:

- 25 kVA for single-phase **transformers**;
- 40 kVA for polyphase **transformers**.

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

NOTE ~~3~~2 **Transformers** intended to supply distribution networks are not included in the scope.

The **no-load output voltage** or the **rated output voltage** does exceed 50 V AC or 120 V ripple-free DC, and where applicable, 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.

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**.

NOTE 3 **Transformers** covered by this document are used in applications where **double or reinforced insulation** between circuits is required by the installation rules or by the end product standard.

~~NOTE 4~~ Attention is drawn to the following:

- additional requirements for **transformers** intended to be used in vehicles, on board ships, and aircraft (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 5~~ Future technological development of **transformers** ~~may~~ can 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:~~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 61558-2-4

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INTERNATIONAL STANDARD

GROUP SAFETY PUBLICATION

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 61558-2-4:2021-05(en)

CONTENTS

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

Table 101 – Symbols indicating the kind of transformer 10
Table 102 – Output voltage ratio 11

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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