BRITISH STANDARD

BS EN 61558-2-6 : 1998 IEC 61558-2-6 : 1997

Safety of power transformers, power supply units and similar

Part 2.6 Particular requirements for safety isolating transformers for general use

The European Standard EN 61558-2-6 : 1997 has the status of a British Standard

ICS 29.180

National foreword

This British Standard is the English language version of EN 61558-2-6 : 1997. It was derived by CENELEC from IEC 61558-2-6 : 1997.

The BS EN 61558 series of standards will ultimately supersede BS 3535 : Part 1, dual numbered as BS EN 60742 : 1989, and BS 3535 : Part 2. Until that time arrives, these latter standards are only to be used for equipment not covered by the BS EN 61558 series.

The UK participation in its preparation was entrusted to Technical Committee PEL/96, Small transformers, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

From 1 January 1997, all IEC publications have the number 60000 added to the old number. For instance, IEC 27-1 has been renumbered as IEC 60027-1. For a period of time during the change over from one numbering system to the other, publications may contain identifiers from both systems.

Cross-references

Attention is drawn to the fact that CEN and CENELEC Standards normally include an annex which lists normative references to international publications with their corresponding European publications. The British Standards which implement these international or European publications may be found in the BSI Standards Catalogue under the section entitled 'International Standards Correspondence Index', or by using the 'Find' facility of the BSI Standards Electronic Catalogue.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 10, an inside back cover and a back cover.

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EUROPEAN STANDARD
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Descriptors: Protective transformers, safety requirements, detail specifications, characteristics, ability to withstand short circuit, overload protection, temperature rise, mechanical strength, insulation resistance

English version

Safety of power transformers, power supply units and similar Part 2-6: Particular requirements for safety isolating transformers for general use (IEC 61558-2-6:1997)

Sécurité des transformateurs, blocs d'alimentation et analogues
Partie 2-6: Règles particulières pour les transformateurs de sécurité pour usage général
(CEI 61558-2-6:1997)

Sicherheit von Transformatoren, Netzgeräten und dergleichen
Teil 2: Besondere Anforderungen an Sicherheitstransformatoren für allgemeine Anwendungen
(IEC 61558-2-6:1997)

This European Standard was approved by CENELEC on 1997-07-01. 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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

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Foreword

The text of document 96/50/FDIS, future edition 1 of IEC 61558-2-6, prepared by IEC TC 96, Small power transformers, reactors and power supply units and special transformers, reactors and power supply units: safety requirements, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61558-2-6 on 1997-07-01.

This European Standard supersedes chapter III, section 1 of EN 60742:1995.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 1998-02-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2000-08-01

For products which have complied with chapter III, section 1 of EN 60742:1995 before 2000-08-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 2001-08-01.

This part 2-6 of EN 61558 is to be used in conjunction with EN 61558-1:1997.

This part 2 supplements or modifies the corresponding clauses of EN 61558-1, so as to convert it into the European Standard "Particular requirements for safety isolating transformers for general use".

When a particular clause or subclause of part 1 is not mentioned in this part 2, that clause or subclause applies as far as is reasonable. Where this part 2 states "addition", "modification" or "replacement", the relevant text of part 1 is to be adapted accordingly.

Subclauses and tables which are additional to those in part 1 are numbered starting from 101.

There are no special national conditions (snc) causing a deviation from this European Standard other than those listed in annex ZA of EN 61558-1.

Endorsement notice

The text of the International Standard IEC 61558-2-6:1997 was approved by CENELEC as a European Standard without any modification.

SAFETY OF POWER TRANSFORMERS, POWER SUPPLY UNITS AND SIMILAR –

Part 2: Particular requirements for safety isolating transformers for general use

1 Scope

Replacement:

This part 2 of IEC 61558 applies to stationary or portable, single-phase or polyphase, air-cooled **safety isolating transformers**, associated or otherwise, having a **rated supply voltage** not exceeding 1000 V a.c. and **rated frequency** not exceeding 500 Hz, the **rated output** not exceeding:

- 10 kVA for single-phase transformers;
- 16 kVA for polyphase transformers.

This standard is also applicable to **safety isolating transformers** without limitation of the **rated output;** however such transformers are considered as special transformers and are subjected to an agreement between the purchaser and the supplier.

The **no-load output voltage** and the **rated output voltage** does not exceed:

50 V a.c. r.m.s. and/or

120 V ripple-free d.c.

between conductors or between any conductor and earth.

This standard is applicable to **dry type transformers**. The windings may be encapsulated or non-encapsulated.

2 Normative references

This clause of part 1 is applicable.

3 Definitions

This clause of part 1 is applicable.

4 General requirements

This clause of part 1 is applicable.

5 General notes on tests

This clause of part 1 is applicable.

6 Ratings

This clause of part 1 is applicable except as follows:

Addition:

6.101 The **rated output voltage** shall not exceed 50 V a.c. and/or 120 V ripple-free d.c.

For a.c. the preferred values for the **rated output voltage** are: 6 V, 12 V, 24 V, 42 V and 48 V.

6.102 The **rated output** shall not exceed 10 kVA for single-phase transformers and 16 kVA for polyphase transformers except for special safety isolating transformers.

Preferred values for the rated output are:

- 25 VA, 40 VA, 63 VA, 100 VA, 160 VA, 250 VA, 400 VA, 630 VA, 1000 VA, 1600 VA, 2500 VA, 4000 VA, 6300 VA, 10 000 VA for single-phase transformers;
- 630 VA, 1000 VA, 1600 VA, 2500 VA, 4000 VA, 6300 VA, 10 000 VA and 16 000 VA for polyphase transformers.

6.103 The **rated frequency** shall not exceed 500 Hz.

6.104 The **rated supply voltage** shall not exceed 1000 V a.c.

7 Classification

This clause of part 1 is applicable.

8 Marking and other information

This clause of part 1 is applicable except as follows:

8.11 *Addition:*

	**Fail-safe safety isolating transformer**
	**Non-short-circuit-proof safety isolating transformer**
	**Short-circuit-proof safety isolating transformer** (inherently or non-inherently)

Addition:

8.101 For transformers intended for connection to the supply by means of a cable or cord and a plug, an instruction sheet or the like shall be delivered with the transformer, drawing the attention of the user to the fact that the output circuit(s) shall be installed and protected in accordance with national wiring rules.

9 Protection against accessibility to hazardous live parts

This clause of part 1 is applicable except as follows:

9.2 *Addition before the first paragraph:*

Live parts at **no-load output voltage** not exceeding 35 V peak a.c. or 60 V ripple-free d.c. may be accessible.

Addition of the following new text after the second dash:

- parts giving access to **live parts** which are normally connected to an output circuit, which due to the nature of its use, is accessible, provided that, for **no-load output voltages** exceeding 35 V peak a.c. or 60 V ripple-free d.c. only one pole becomes accessible.

10 Change of input voltage setting

This clause of part 1 is applicable except as follows:

Addition:

10.101 **Portable transformers** shall have only one **rated supply voltage** unless the transformer is not capable of producing an output voltage in excess of the limits allowed in the scope if the higher marked voltage is accidentally connected to the lower voltage winding.

NOTE – For the purpose of this requirement, a **portable transformer** provided with a device for adjusting the input connections to suit supply voltages over a range of not more than 10 % of the value corresponding with the midpoint of that range, is not considered to be a transformer with more than one supply voltage.

11 Output voltage and output current under load

This clause of part 1 is applicable.

12 No-load output voltage

This clause of part 1 is applicable except as follows:

Addition:

12.101 The **no-load output voltage** shall not exceed 50 V a.c. and on 120 V ripple-free d.c. under any circumstances even when independent output windings which are not intended to be connected in series are connected in series.

12.102 The difference between the **output voltages** at **no-load** and **at rated output** shall not be excessive.

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

The difference between the value measured and the output voltage measured during the test of clause 11, expressed as a percentage of the latter voltage, shall not exceed the value shown in table 101.

NOTE – The ratio is defined as follows:

$$\frac{U_{\text{no-load}} - U_{\text{load}}}{U_{\text{load}}} \times 100$$

Table 101 – Output voltage deviation

Type of transformer	Ratio between **output voltage at no-load** and at **rated output** %
Inherently short-circuit proof transformers:	
– up to and including 63 VA	100
– over 63 VA up to and including 630 VA	50
– over 630 VA	20
Other transformers:	
– up to and including 10 VA	100
– over 10 VA up to and including 25 VA	50
– over 25 VA up to and including 63 VA	20
– over 63 VA up to and including 250 VA	15
– over 250 VA up to and including 630 VA	10
– over 630 VA	5

13 Short-circuit voltage

This clause of part 1 is applicable.

14 Heating

This clause of part 1 is applicable.

15 Short-circuit and overload protection

This clause of part 1 is applicable.

16 Mechanical strength

This clause of part 1 is applicable.

17 Protection against harmful ingress of dust, solid objects and moisture

This clause of part 1 is applicable.

18 Insulation resistance and dielectric strength

This clause of part 1 is applicable.

19 Construction

This clause of part 1 is applicable except as follows:

Replacement:

19.1 The input and output circuits shall be electrically separated from each other, and the construction shall be such that there is no possibility of any connection between these circuits, either directly or indirectly, through other metal parts.

Compliance is checked by inspection, taking clauses 18, 19 and 26 into consideration.

19.1.1 The insulation between the input and output winding(s) shall consist of **double** or **reinforced insulation**, unless the requirements of 19.1.3 are complied with.

In addition, the following applies:

– for **class I transformers**, the insulation between the input windings and the body shall consist of basic insulation, and the insulation between the output windings and the body shall consist of **supplementary insulation**;

– **for class II transformers**, the insulation between the input windings and the body, and between the output windings and the body, shall consist of **double** or **reinforced insulation**.

19.1.2 For **class I transformers** where an intermediate metal part (e.g. the iron core), not connected to the body, is located between the input and output windings, the insulation between the input and output windings via the intermediate metal part shall consist of **double** or **reinforced insulation**, and, for class II transformers, the insulation between the input windings and the body and between the output windings and the body via the intermediate metal part shall consist of **double** or **reinforced insulation**. The insulation between the intermediate metal part and the input or output windings shall in both cases consist of at least **basic insulation**.

NOTE – An intermediate metal part which is separated from one of the input or output windings by double or reinforced insulation is considered as being connected to the other winding.

19.1.3 For **class I transformers**, the insulation between the input and output windings may consist of **basic insulation** plus **protective screening** instead of **double** or **reinforced insulation**, provided the following conditions are complied with:

– the insulation between the input winding and the **protective screen** shall comply with the requirements for **basic insulation** (rated for the input voltage);

– the insulation between the **protective screen** and the output winding shall comply with the requirements for **basic insulation** (rated for the output voltage);

– the **protective screen shall**, unless otherwise specified, consist of a metal foil or of a wire wound screen extending at least to the full width of one of the windings adjacent to the screen; a wire wound screen shall be wound tight without space between the turns;

– the lead-out wire of the protective screen shall have a cross-section at least corresponding to the rated current of the overload device to ensure that, if a breakdown of insulation should occur, the overload device will open the circuit before the lead-out is destroyed;

– the lead-out wire shall be soldered to the protective screen or fixed in an equally reliable manner.

NOTE – For the purpose of this subclause, the term "windings" does not include internal circuits.

Examples of construction of windings are given in annex M of part 1.

19.1.4 For transformers intended for connection to the mains by means of a plug, the alternative with **basic insulation** plus **protective screening** is not allowed.

Addition:

19.101 **Portable transformers** having a **rated output** not exceeding 630 VA shall be of **class II.**

19.102 There shall be no connection between the output winding and the body or the protective earthing circuit, if any. However, such a connection is allowed for **associated transformers** provided that it is allowed by the relevant equipment standard.

19.103 Transformers shall not be provided with capacitors which electrically connect input and output circuits.

Compliance is checked by inspection.

19.104 The input and output terminals for the connection of external wiring shall be so located that the distance, measured at the point of introduction of the conductor, from input to output clamping units of these terminals is not less than 25 mm. If that distance is achieved by a barrier, this barrier shall be of insulating material and be permanently fixed to the transformer.

Compliance is checked by inspection and by measurement disregarding intermediate metal parts.

20 Components

This clause of part 1 is applicable except as follows:

20.3 *Addition:*

Plugs and socket-outlets on the output side shall comply with IEC 884-2-4 and IEC 906-3.

21 Internal wiring

This clause of part 1 is applicable.

22 Supply connection and other external flexible cable or cords

This clause of part 1 is applicable.

23 Terminals for external conductors

This clause of part 1 is applicable.

24 Provision for protective earthing

This clause of part 1 is applicable.

25 Screw and connection

This clause of part 1 is applicable.

26 Creepage distances, clearances and distances through insulation

This clause of part 1 is applicable except as follows:

Box 1 of table 13, table C.1 and table D.1 is not applicable.

27 Resistance to heat, abnormal heat, fire and tracking

This clause of part 1 is applicable.

28 Resistance to rusting

This clause of part 1 is applicable.

Annexes

The annexes of part 1 are applicable except as follows:

Annex C

Material group II

This annex of part 1 is applicable except as follows:

Box 1 of table C.1 is not applicable.

Annex D

Material group I

This annex of part 1 is applicable except as follows:

Box 1 of table D.1 is not applicable.

BS EN 61558-2-6 : 1998 IEC 61558-2-6 : 1997

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