BRITISH STANDARD

BS EN 61558-2-19:2001
IEC 61558-2-19: 2000

Safety of power transformers, power supply units and similar devices —

Part 2-19: Particular requirements for perturbation attenuation transformers

The European Standard EN 61558-2-19:2001 has the status of a British Standard

ICS 29.180

National foreword

This British Standard is the official English language version of EN 61558-2-19:2001. It is identical with IEC 61558-2-19:2000.

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.

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 14, an inside back cover and a back cover.

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EUROPEAN STANDARD **EN 61558-2-19**

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English version

Safety of power transformers, power supply units and similar devices Part 2-19: Particular requirements for perturbation attenuation transformers

(IEC 61558-2-19:2000)

Sécurité des transformateurs, blocs d'alimentation et dispositifs analogues Partie 2-19: Règles particulières pour les transformateurs d'atténuation de perturbations (CEI 61558-2-19:2000)

Sicherheit von Transformatoren, Netzgeräten und dergleichen Teil 2-19: Besondere Anforderungen an Störminderungs-Transformatoren (IEC 61558-2-19:2000)

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

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Foreword

The text of document 96/147/FDIS, future edition 1 of IEC 61558-2-19, prepared by IEC TC 96, Small power transformers, reactors and power supply units: Safety requirements, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61558-2-19 on 2001-01-01.

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)	2001-10-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2004-01-01

This part 2-19 is to be used in conjunction with EN 61558-1:1997.

This part 2-19 supplements or modifies the corresponding clauses of EN 61558-1. When a particular subclause of part 1 is not mentioned in this part 2-19, that subclause applies as far as is reasonable. Where this part 2-19 states "addition", "modification" or "replacement", the relevant text of part 1 is to be adapted accordingly.

In this standard, the following print types are used:
- requirements: in roman type;
- *test specifications: in italic type;*
- notes: in smaller roman type.

The words in **bold** in the text of the standard are defined in clause 3.

Subclauses, tables or figures which are additional to those in part 1 are numbered starting from 101.

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Endorsement notice

The text of the International Standard IEC 61558-2-19:2000 was approved by CENELEC as a European Standard without any modification.

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CONTENTS

SAFETY OF POWER TRANSFORMERS, POWER SUPPLY UNITS AND SIMILAR DEVICES –

Part 2-19: Particular requirements for perturbation attenuation transformers

1 Scope

Replacement:

This International Standard deals with all aspects of safety such as electrical, thermal and mechanical.

This part 2-19 of IEC 61558 applies to **stationary** or **portable**, single-phase or poly-phase, air-cooled (natural or forced), **independent** or **associated**, **isolating** or **safety isolating transformers**, having a **rated supply voltage** not exceeding 1 000 V a.c., a **rated frequency** not exceeding 500 Hz, a **rated output** not exceeding 10 kVA. **Perturbation attenuation transformers** are intended to the supply of office machines and the like and have a mid-point lead out in the **output circuit** in order to attenuate mains borne disturbances.

In addition, **double** or **reinforced insulation** between circuits required by the installation rules or by the appliance specification is fulfilled by using this transformer.

NOTE 1 Connection of an appliance via transformers of the kind referred to here does not imply that the requirements for this appliance are allowed to be less stringent.

Perturbation attenuation isolating transformers:

– have a **no-load output voltage** and a **rated output voltage** exceeding 50 V a.c. or 120 V ripple-free d.c. and not exceeding 500 V a.c. or 708 V ripple free d.c.; the **no-load output voltage** and the **rated output voltage** may exceed these limits in order to be in accordance with the national wiring rules or special purposes, however they shall not exceed 1 000 V a.c. or 1 415 V ripple free d.c.

Perturbation attenuation safety isolating transformers:

– have a **no-load output voltage** and a **rated output voltage** not exceeding 50 V a.c. or 120 V ripple-free d.c.

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

Where an **isolating transformer** provides supply to two or more items of equipment, a connection of exposed-conductive-parts of such equipment is required in accordance with section 413.5 of IEC 60364-4-41.

NOTE 2 For transformers filled with liquid dielectric or pulverised material, such as sand, additional requirements are under consideration.

NOTE 3 Attention is drawn to the fact that:

– for transformers intended to be used in tropical countries, special requirements may be necessary;

– in locations where special environmental conditions prevail, particular requirements may be necessary.

NOTE 4 This part 2-19 does not prevent the use of other types of transformers as attenuation transformer without mid-point in the **output circuit**.

This standard does not cover the performances of the function "attenuation". This function may be obtained by different features, for example: screen or special lamination.

This standard also applies to transformers incorporating electronic circuits. This standard does not apply to external circuits and their components intended to be connected to the input and output terminals or socket-outlets of the transformer.

2 Normative references

This clause of part 1 is applicable.

3 Definitions

This clause of part 1 is applicable except as follows:

Addition:

3.101
perturbation attenuation transformer
transformer with a mid-point in the **secondary winding** used for mains-borne perturbation attenuation, which is intended to limit the influence of transients occurring on the mains on the appliances connected to the transformer

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:

– 500 V a.c. or 708 V ripple free d.c. for **perturbation attenuation isolating transformers**;
– 50 V a.c. and/or 120 V ripple free d.c. for **perturbation attenuation safety isolating transformers**.

Preferred values for the **rated output voltage** for a.c. are:

– 72 V, 120 V, 230 V, 400 V and 440 V for **perturbation attenuation isolating transformers**;
– 6 V, 12 V, 24 V, 42 V and 48 V for **perturbation attenuation safety isolating**.

6.102 The **rated output** shall not exceed 10 kVA.

Preferred values for the **rated output** are:

– 10 VA, 16 VA, 25 VA, 40 VA, 63 VA, 100 VA, 160 VA, 250 VA, 400 VA, 630 VA, 1 000 VA, 1 600 VA, 2 500 VA, 4 000 VA, 6 300 VA and 10 000 VA.

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

6.104 The **rated supply voltage** shall not exceed 1 000 V a.c.

Compliance with the requirements of 6.101 to 6.104 are checked by inspection of the marking.

7 Classification

This clause of part 1 is applicable except as follows:

7.2 *Modification:*

According to short-circuit protection or protection against abnormal use:

– **inherently short-circuit proof transformers;**
– **non-inherently short-circuit proof transformers;**
– **fail safe transformers.**

8 Marking and other information

This clause of part 1 is applicable except as follows:

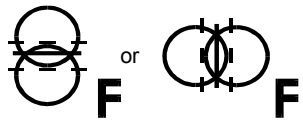
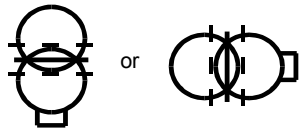
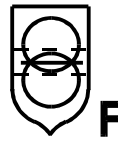
8.1 *Modification:*

h) **perturbation attenuation transformers** shall be marked with one of the graphical symbols shown in 8.11.

8.3 This subclause of part 1 does not apply.

8.4 This subclause of part 1 does not apply.

8.11 *Addition:*

Symbol	Explanation	Number of symbol in IEC 60417 *
	**Fail-safe isolating perturbation attenuation transformer**	
	**Short-circuit proof isolating perturbation attenuation transformer** (inherently or non-inherently)	
	**Fail-safe safety isolating perturbation attenuation transformer**	
	**Short-circuit proof safety isolating perturbation attenuation transformer** (inherently or non-inherently)	
* IEC 60417 (all parts):1998.		

Addition:

8.101 All transformers shall be accompanied by an instruction sheet indicating the use of the transformer, and warning the users not to connect:

– the mid-point to the protective earth of the fixed installation;

– the secondary side of the transformer to the fixed wiring.

8.102 Ratio between the input and output voltages

In the case of **independent isolating transformers** with a ratio between the input and the output voltages lower than 1:1, the transformer shall be accompanied by an instruction sheet indicating that attention should be paid to the correct application.

9 Protection against accessibility to hazardous live parts

This clause of part 1 is applicable.

10 Change of input voltage setting

This clause of part 1 is applicable except as follows:

Transformers with more than one **rated supply voltage** are not allowed.

Transformers provided with a device for adjusting the input connections (e.g. tappings) to suit supply voltages are also not allowed.

11 Output voltage and output current under load

This clause of part 1 is applicable except as follows:

11.1 *Replacement of the first two paragraphs:*

When the transformer is connected to the **rated supply voltage** at **rated frequency** and the secondary loaded by the **rated output** at cos φ = 1, the output voltage shall not differ from the rated value by more than 3 %.

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:

– 500 V a.c. or 708 V ripple free d.c. for **perturbation attenuation isolating transformers**;

– 50 V a.c. or 120 V ripple free d.c. for **perturbation attenuation safety isolating transformers**,

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 **no-load output voltage** and the output voltage under load 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 **no-load output voltage** measured in this clause and the output voltage under load measured during the test of clause 11, expressed as a percentage of the latter voltage, shall not exceed 6 %.*

NOTE The ratio is defined as follows: $\frac{U_{\text{no-load}} - U_{\text{load}}}{U_{\text{load}}} \times 100$

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, via other metal parts.

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

19.1.1 The insulation between the **input** and **output winding**(s) shall consist of **double** or **reinforced insulation**.

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 **double** or **reinforced 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 transformers with intermediate metal parts (e.g. the iron core) not connected to the **body** and located between the **input** and **output windings**, the insulation between the intermediate metal part and the **input windings** or between the intermediate metal part and the **output windings**, shall consist of at least **basic insulation**.

NOTE An intermediate metal part which is not separated from the **input** or **output windings** or the **body** by at least **basic insulation**, is considered to be connected to the relevant part(s).

In addition, the following applies:

– for **class I transformers**, the insulation between the **input** and **output windings** via the intermediate metal part shall consist of **double** or **reinforced insulation;**
– for **class II transformers**, the insulation between the **input** and **output windings** via the intermediate metal part shall consist of **double** or **reinforced insulation;** 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**.

19.1.3 Class I transformers shall not have **protective screening** between **input** and **output windings**.

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

Addition:

19.101 There shall be no connection between the **output circuit** and the protective earth.

19.102 There shall be no connection between the **output circuit** and the **body**.

Compliance is checked by inspection.

19.103 The input and output terminals for the connection of external wiring shall be so located that the distance measured between the points of introduction of the conductors into these terminals is not less than 25 mm between the input and output terminals. 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.

19.104 to **19.110** Void

19.111 For **independent transformers**, the socket-outlets if any, shall be part of the transformer. For **associated transformers,** the connection to the appliance is ensured by a cable or a flexible cable with **double insulation**.

19.112 The **output winding** shall be provided with a mid-point connection to the earthing terminal of the socket-outlets, if any. For transformers with more than one **output winding**, the windings shall be separated by **double** or **reinforced insulation**. Alternatively, the mid-point tapping of the windings can be connected together to a common point connected to the

earthing terminal in all the socket-outlets, if any. The earthing terminals of the socket-outlets in the **output circuits** shall not be connected to the protective earth.

Compliance is checked by inspection, by the tests of 18.1 and by measurements according to clause 26.

NOTE **Perturbation attenuation transformers** can be provided with **enclosures** of both metal and insulation material.

19.113 The transformer shall be provided with a disconnecting protective device as shown in figure 101, breaking the **output circuit** in case of a short circuit in the connected appliance between the phase conductor and the conductor connected to the mid-point or between the two phase conductors. In this case, the disconnecting protective device shall operate within the time stated in table 101.

NOTE This table has been extracted from table 41A of IEC 60364-4-41.

Compliance is checked by inspection and by the following tests:

Disconnecting protective devices are checked by connecting the input of the transformer to a voltage of 0,94 to 1,06 times the rated voltage, whichever is the more severe, and the terminals in the output, one at a time, are connected to the mid-point and then with each other. The disconnecting protective device shall then operate within the time stated in table 101.

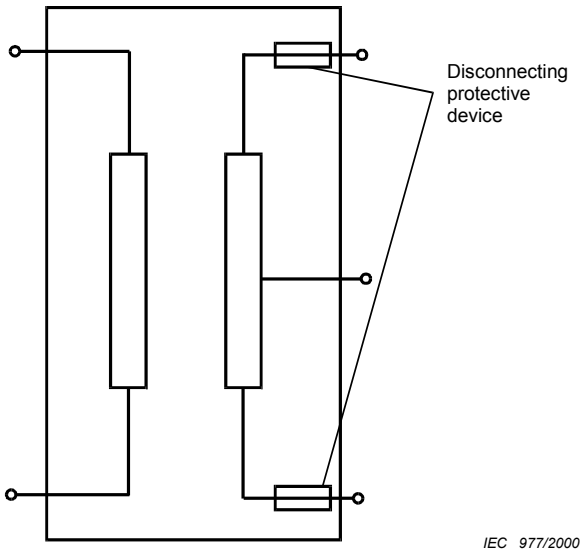


Figure 101 – Protection of the output circuit in case of short circuit

Table 101 – Maximum disconnecting time

U_o * V	Maximum disconnecting time s
120	0,8
230	0,4
277	0,4
400	0,2
>400	0,1

* U_o is the nominal a.c. r.m.s. voltage to earth.

connected to the earth, the insulation between the screen and the **output windings** shall consist of **double** or **reinforced insulation**.

20 Components

This clause of part 1 is applicable except as follows:

Modification:

20.3 For transformers with a ratio of 1:1 between the input and the output voltages and intended for use in voltage band II, the socket-outlet in the output circuit shall be such that it can accept a plug intended for direct connection to the mains supply in the country concerned.

Addition:

20.101 In **perturbation attenuation transformers** intended for permanent connection to the fixed wiring, the disconnecting protective device according to 19.113 shall consist of a fuse in accordance with IEC 60269-3-1 or a miniature circuit-breaker. In portable **perturbation attenuation transformers**, the disconnecting protective device may consist of a fuse in accordance with IEC 60127, with rated current up to 6,3 A.

Compliance is checked by inspection.

21 Internal wiring

This clause of part 1 is applicable.

22 Supply connection and other external flexible cords

This clause of part 1 is applicable except as follows:

Type Z attachments are allowed only for output up to and including 250 VA.

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 Screws and connections

This clause of part 1 is applicable.

26 Creepage distances, clearances and distances through insulation

This clause of part 1 is 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.

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BS EN 61558-2-19:2001 IEC 61558-2-19: 2000

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