

BRITISH STANDARD

**BS EN
61558-2-7 : 1998**

Safety of power transformers, power supply units and similar

Part 2.7 Particular requirements for transformers for toys

The European Standard EN 61558-2-7 : 1997 has the status of a
British Standard

ICS 29.180

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 13, a blank page, an inside back cover and a back cover.

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Partly supersedes EN 60742:1995

Descriptors: Transformers, toys, electric toys, 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 2-7: Particular requirements for transformers for toys
(IEC 61558-2-7:1997, modified)**

Sécurité des transformateurs, blocs
d'alimentation et analogues
Partie 2-7: Règles particulières pour les
transformateurs pour jouets
(CEI 61558-2-7:1997, modifiée)

Sicherheit von Transformatoren,
Netzgeräten und dergleichen
Teil 2: Besondere Anforderungen an
Transformatoren für Spielzeuge
(IEC 61558-2-7:1997, modifiziert)

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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 96/51/FDIS, future edition 1 of IEC 61558-2-7, 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 61558-2-7 on 1997-07-01, together with common modifications prepared by the CENELEC BTTF 64-1, Isolating and safety isolating transformers.

This European Standard supersedes chapter III, section 2 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with the EN have to be withdrawn (dow) 2000-08-01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 2 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 2-7 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 transformers for toys".

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 figures 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.

SAFETY OF POWER TRANSFORMERS, POWER SUPPLY UNITS AND SIMILAR –

Part 2: Particular requirements for transformers for toys

1 Scope

Replacement:

This part 2 of IEC 61558 applies to **transformers for toys** having a **rated supply voltage** not exceeding 250 V a.c., a **rated frequency** of 50/60 Hz, a **rated output voltage** not exceeding 24 V a.c. or 33 V ripple-free d.c. and a **rated output** not exceeding 200 VA and a **rated output current** not exceeding 10 A.

This standard does not in general take into account playing with the transformer by children.

2 Normative references

This clause of part 1 is applicable.

3 Definitions

This clause of part 1 is applicable except as follows:

Addition:

3.1.101 **transformer for toys: safety isolating transformer** designed to supply toys and having a **rated output voltage** not exceeding 24 V a.c. or 33 V ripple-free d.c.

4 General requirements

This clause of part 1 is applicable.

5 General notes on tests

This clause of part 1 is applicable except as follows:

5.12 This subclause is not applicable.

6 Ratings

This clause of part 1 is applicable except as follows:

Addition:

6.101 The **rated output voltage** shall not exceed 24 V a.c. or 33 V ripple-free d.c.

Preferred values are: 1,5 V; 3 V; 4,5 V; 6 V; 9 V; 12 V and 24 V.

6.102 **Transformers for toys** shall have only one **rated supply voltage** not exceeding 250 V.

6.103 The **rated output** shall not exceed 200 VA.

6.104 The **rated output current** shall not exceed 10 A.

7 Classification

This clause of part 1 is applicable except as follows:

7.1 Replacement:

According to their protection against electric shock:

Transformers for toys shall be of **class II** construction

7.2 Replacement:

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

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

7.4 Replacement:

According to their mobility:

- **portable transformers;**
- **stationary transformers.**

7.5 Replacement:

According to their time of operation:

Transformers for toys shall be designed for continuous operation

8 Marking and other information

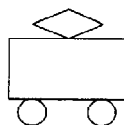
This clause of part 1 is applicable except as follows:

8.1 Modification:

- n) transformers suitable for outdoor use shall be marked with the appropriate IP degree.

8.11 Addition:

The following symbol shall be used (IEC 417 standard sheet 417 IEC 5219) for transformers for toys.



9 Protection against accessibility to hazardous live parts

This clause of part 1 is applicable except as follows:

9.2 Modification:

The standard test finger of figure 2 is replaced by the small test finger of figure 101.

9.2 Addition:

It shall not be possible to gain access to **live parts** of the input circuit, or to metal parts separated from live parts by **basic insulation** only, even after the removal of covers, which can be removed with the aid of a tool.

10 Change of input voltage setting

This clause of part 1 is applicable except as follows:

Replacement:

Transformers for toys shall have only one **rated supply voltage** or one supply voltage range.

Compliance is checked by inspection.

11 Output voltage and output current under load

This clause of part 1 is applicable except as follows:

11.1 Modification:

When the transformer is connected to **rated supply voltage**, at **rated frequency** and loaded with an impedance which would give **rated output** at **rated output voltage** and, for a.c. rated power factor, the output voltage shall not differ from the rated value by more than 10 % for a.c. or 15 % for d.c.

This requirement is applicable to all output windings and their tapping.

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 33 V a.c. or 46 V ripple-free d.c., under any circumstance even if all independent windings are connected in series.

12.102 The difference between the **output voltage at no-load** and **rated output** (measured during the test of clause 11) expressed as a percentage of the latter voltage, shall not exceed 100 %.

13 Short-circuit voltage

The clause of part 1 is not applicable.

14 Heating

This clause of part 1 is applicable except as follows:

Table 1:

Modification:

Parts	Temperature °C
<p>External enclosures 3), handles and the like of portable transformers:</p> <p>- if, in normal use, these parts are continuously held (for example for hand held transformers):</p> <ul style="list-style-type: none"> • of metal • of other materials <p>- if, in normal use, these parts are not continuously held:</p> <ul style="list-style-type: none"> • of metal • of other material 	<p>50</p> <p>60</p> <p>50</p> <p>60</p>

15 Short-circuit and overload protection

This clause of part 1 is applicable except as follows:

15.1 *Addition:*

Transformers for toys shall be of either short-circuit-proof or fail-safe construction. Short-circuit-proof transformers shall withstand overload which may occur in normal use. They shall not incorporate fuses.

If the short-circuit output current exceeds 20 A, a non-self-resetting overload release shall be incorporated.

Non-self-resetting overload releases, if any, shall be incorporated in the input circuit.

Table 3

Modification:

External enclosures (which may be touched with the small test finger of figure 101) if of:

- metal 50 °C
- other material 60 °C

Addition:

15.3.101 *Transformers for toys with a short-circuit current exceeding 20 A, are connected in the cold condition, to rated supply voltage and the output circuits are short-circuited while the other windings are open-circuited.*

If the transformer has more than one output circuit, these output circuits are, if necessary, short-circuited in turn.

The overload release shall operate within 1 s.

15.5.2 Modification:

For fail-safe transformers for toys, the temperature of any part of the enclosure of the transformers which may be touched with the small test finger of figure 101 shall not exceed if of:

- metal 50 °C
- other material 60 °C

16 Mechanical strength

This clause of part 1 is applicable except as follows:

16.1 Replacement of the second paragraph:

*Compliance is checked by the test of 16.2 for **stationary transformers** and by the tests of 16.2, 16.3, 16.4 and 16.101 as appropriate for **portable transformers**.*

Addition:

16.101 *In addition, transformers for toys are subjected to the following test:*

The transformer is dropped against a steel bar which is mounted on a solid wall of brick, stone, concrete or the like, as shown in figure 102.

The bar is of 40 mm x 40 mm x 5 mm right-angle section with the corner rounded to a radius of 5 mm. It is mounted in contact with the wall, or, if necessary, in contact with a steel packing block which is in contact with the wall.

The transformer is suspended by its flexible cable or cord so that it rests against the corner of the bar, the point of suspension being 1 m above the bar. It is then drawn away from the bar in a plane perpendicular to the wall until it has risen through a height of 40 cm.

The transformer is allowed to fall against the bar. For rectangular transformers, one blow is applied to each of the four sides and four edges of the transformer; for other transformers the same number of blows is applied as near as possible, similarly disposed.

The steel packing block is only necessary if the shape of the transformer is such that, without it, the transformer does not hit the bar.

In addition, the transformer is allowed to fall freely from a height of 40 cm on to a steel plate, at least 5 mm thick, placed on a flat concrete base.

The number of falls is 10 the transformer being with the cable mounted as for normal use, the orientation of the transformer being different for each fall.

After the test, the transformer shall show no damage within the meaning of this standard. In particular, live parts shall not have become accessible.

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

This clause of part 1 is applicable.

18 Insulation resistance and electric strength

This clause of part 1 is applicable.

19 Construction

This clause of part 1 is applicable except as follows:

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19.1 Replacement:

Transformers for toys shall be of class II.

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**.

In addition 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 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 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 part which is separated from one of the windings by **double or reinforced insulation** is considered as being connected to the other winding.

19.16 Addition:

Transformers for toys shall comply with the requirements for protection index IP4X or higher with the exception of output terminals.

Transformers for toys for outdoor use shall have a protection index of IP67 or higher.

Compliance is checked by tests of clause 17.

Addition:

19.101 Transformers with a.c. terminals in the output circuit shall be so designed that, when the output circuits of two or more transformers are connected together and one of them is connected to the mains and the other not connected to the mains, the voltage between the bare pins of this latter shall not exceed 33 V a.c.

Compliance is checked by measurement of the voltage between the pins of the plug.

If the requirement that the voltage between bare pins of the plug shall not exceed 33 V a.c. cannot be met, a warning text shall be provided in the official language(s) of the country in which the transformer is to be sold, directly on the transformer or in an instruction sheet delivered with the transformer.

NOTE – As an example, the following text is given: "Warning! Risk of dangerous voltage - do not touch the pins of the withdrawn plug if the transformer is connected to the same toy as other transformers".

19.102 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 the distance is achieved by a barrier, this barrier shall be of insulating material and be permanently fixed to the transformer.

20 Components

This clause of part 1 is applicable except as follows:

20.2 Addition:

Transformers for toys shall not be fitted with switches in supply flexible cables or cords.

20.3 Addition:

It shall not be possible to make permanent contact, not even with one pin, between plugs accepted by socket-outlets in the output circuit of the transformer and connectors of appliance couplers according to IEC 320.

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

Compliance is checked by inspection.

20.5.1 Modification:

For **non-self-resetting thermal cut-outs** and **non-self-resetting overload releases**, the number of cycles of operation is increased from 300 to 1000.

Addition:

20.101 **Non-self-resetting thermal cut-outs** and **non-self-resetting overload releases** shall be trip-free and it shall be possible to reset them without removing covers.

*Compliance is checked by short-circuiting the output terminals, the transformer being connected to **rated supply voltage**, until the device operates. If more than one set of output terminals is provided, each set shall be tested in turn.*

*It shall not be possible to maintain the **thermal cut-out** or the **overload release** in the "ON" position by operating the resetting means.*

The short-circuit is then removed and it shall be possible to put the device in the "on" position without removing any cover, after cooling if necessary.

20.102 Control devices, if any, shall be in the output circuit and shall operate reliably.

Compliance is checked by inspection and by the following test:

The control is operated 5000 times each time from one extreme of the range to the other, at a uniform rate of approximately 30 changes per minute, the transformer being connected to rated supply voltage and loaded with rated output current at unity power factor. During this test, no interruption of the current shall occur, except for any "off" position.

After the test, the temperature of the windings shall not exceed the values specified in 14.2 and the no-load input current shall not have been altered by short circuit between the turns of windings of the output circuit.

20.103 The operating means of control devices, if any, shall not be fixed to the transformer with the exception of transformers for railways.

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 except as follows:

22.3 Modification:

Appliance couplers are not allowed in the supply of toy transformers.

22.5 Modification:

Power supply cords of transformers complying with requirements for protection index IP4X shall not be lighter than ordinary tough rubber sheathed cord (code designation H05 RR-F) or ordinary polyvinyl chloride sheathed flexible cord (code designation H05 VV-F or H05 VVH2-F).

Power supply cords of transformers with a protection index of IP67 shall be not lighter than ordinary polychloroprene sheathed cord (code designation 245 IEC 57 of IEC 245-1).

22.6 Replacement:

Appliance couplers are not allowed in the supply of toy transformers.

22.7 Modification:

For transformers for toys having a mass greater than 500 g, excluding the cable or cord, the cross-sectional area of the supply cable or cord shall be at least 1 mm².

22.9 Modification:

Power supply cords may be assembled with the transformer by type Y and type Z attachments. Type X attachment is not allowed.

23 Terminals for external conductors

This clause of part 1 is applicable.

24 Provision for protective earthing

This clause of part 1 is not 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 except as follows:

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

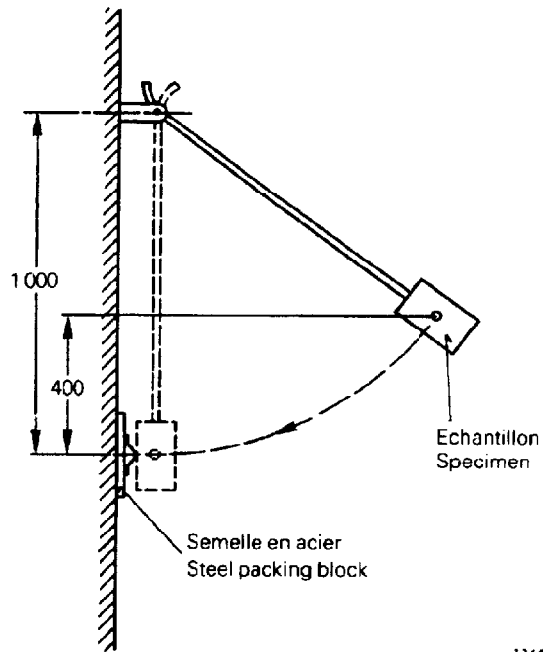
27 Resistance to heat, abnormal heat, fire and tracking

This clause of part 1 is applicable.

28 Resistance to rusting

This clause of part 1 is applicable.

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Figure 102 – Arrangement pour l'essai de choc pour les transformateurs pour jouets (voir 16.101)

Arrangement for impact test for transformers for toys (see 16.101)

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.

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