13.2.2 Electric toys for use in water or for use with liquids

Electric toys for use in water and **electric toys** for use with liquid shall not require a connection to a **transformer**, **power supply** or **battery charger** in order to work in the water or with the liquid.

Compliance is checked by inspection.

13.2.3 Electric toys for children under the age of 3 years

Electric toys using **transformers** and **power supplies** shall not be intended for use by children under 3 years.

Compliance is checked by inspection.

13.3 Thermal cut-outs

Non-self-resetting thermal cut-outs, necessary for compliance with this standard, shall only be resettable with the aid of a **tool**.

Compliance is checked by inspection and by a manual test.

13.4 Batteries

13.4.1 Small batteries

Batteries that fit wholly within the small parts cylinder as specified in ⟨A11⟩ 8.2 of EN 71-1:2014+A1:2018 ⟨A11⟩ shall not be removable without the aid of a tool.

⟨A11⟩ For parts of **electric toys** containing batteries, where the part fits wholly within the small parts cylinder as specified in 8.2 of EN 71-1:2014+A1:2018, batteries shall not be accessible without the aid of a tool. ⟨A11⟩

Compliance is checked by inspection and by the following test.

A force is applied to the part under consideration without jerks for 10 s in the most unfavourable direction. The force is as follows:

– *push force, 50 N;*
– *pull force:*
  - *if the shape of the part is such that the fingertips cannot easily slip off, 50 N;*
  - *if the projection of the part that is gripped is less than 10 mm in the direction of removal, 30 N.*

The push force is applied by test probe 11 of ⟨A11⟩ EN 61032:1998 ⟨A11⟩. The pull force is applied by a suitable means, such as a suction cup, so that the test results are not affected. While the force is being applied, the test fingernail of Figure 7 of ⟨A11⟩ EN 60335-1:2012+A12+A13 ⟨A11⟩, is inserted in any aperture or joint with a force of 10 N. The fingernail is then slid sideways with a force of 10 N but is not twisted or used as a lever.

If the shape of the part is such that an axial pull is unlikely, the pull force is not applied but the test fingernail is inserted in any aperture or joint with a force of 10 N and is then pulled for 10 s by means of the loop with a force of 30 N in the direction of removal.

If the part is likely to be twisted, the following torque is applied at the same time as the pull or push force:

– *2 Nm, for major dimensions up to 50 mm;*

– *4 Nm, for major dimensions over 50 mm.*

This torque is also applied when the test fingernail is pulled by means of the loop. If the projection of the part which is gripped is less than 10 mm, the torque is reduced by 50 %.

The part shall not become detached.

NOTE The types and dimensions of batteries are specified in [A11] EN 60086-2:2016 [A11].

13.4.2 Other batteries

Batteries shall not be removable without the aid of a **tool** unless the security of the battery compartment cover is adequate.

Compliance is checked by inspection and by the following test.

An attempt is made to gain access to the battery compartment by manual means. It shall not be possible to open the cover unless at least two independent movements have to be applied simultaneously.

*The **electric toy** is placed on a horizontal steel surface. A cylindrical metallic mass of 1 kg, having a diameter of 80 mm, is dropped from a height of 100 mm so that its flat face falls onto the **electric toy**. The test is carried out once with the cylindrical metallic mass striking the **electric toy** in the most unfavourable place.*

The battery compartment shall not become open.

The battery compartment shall not have become open as a result of the preconditioning of 5.2.

13.4.3 Electrolyte leakage

Rechargeable batteries with liquid electrolyte shall not leak when the **electric toy** is placed in any position. The electrolyte shall not become accessible even if a **tool** has to be used to remove covers or similar parts.

Compliance is checked by inspection.

13.4.4 Electric toys placed above a child

Electric toys that are used with batteries where the intended fixed position of the battery compartment can be above a child shall have a battery compartment that prevents battery electrolyte leakage from the **electric toy**. The requirement does not apply to **electric toys** using batteries where the total volume of all batteries is less than 100 mm^3.

NOTE Cot mobiles are an example of an **electric toy** intended to be fixed above the child.

Compliance is checked by the following test.

*All batteries are removed from the **electric toy**. The **electric toy** is placed in its normal orientation and the battery compartment is filled with the quantity of water specified in Table 2, the water being at a temperature of 21 °C ± 5 °C.*

*The **electric toy's** casing may be broken to gain access to the closed battery compartment in order to add water but any damage shall not affect the result of the test.*

*After adding the water, the compartment is closed in accordance with the manufacturer's instructions taking care to avoid losing any water from the **electric toy** before the test is started. The **electric toy** is left in position for a period of 5 min.*

*During the test, water shall not leak from the **electric toy**.*

Table 2 – Quantity of water per battery

Battery type	Quantity of water ml
LR03/R03 (AAA)	0,25
LR6/R6 (AA)	0,5
LR14/R14 (C)	1,0
LR20/R20 (D)	2,0
6LR61/6R61 (9V)	0,75
Button batteries and **coin batteries**[1]	0,1
[1] See IEC 60086-2 category 3 and category 4 batteries.	

13.4.5 Parallel connection of batteries

Batteries shall not be connected in parallel unless

– the reverse insertion of batteries,
– unbalanced discharging, or
– unbalanced charging

does not impair compliance with this standard.

Compliance is checked by inspection or by a review of the circuit diagram.

13.4.6 Battery compartment fasteners

If screws or similar fasteners are used to secure a door or cover providing access to the battery compartment, the screw or similar fastener shall be captive to ensure that they remain with the door, cover or equipment.

Compliance is checked by inspection and by the following test after the battery door or cover is opened.

A force of 20 N is applied to the screw or similar fastener without jerks for a duration of 10 s in any direction.

The screw or similar fastener shall not become separated from the door, cover or equipment.

13.5 Plug and sockets

Plugs and socket-outlets of **electric toys** shall not be interchangeable with plugs and socket-outlets listed in IEC TR 60083. This requirement is not applicable to plugs which are too large to be introduced into the mains socket outlets or that are too small so they can only be loosely inserted and do not stay firmly in place in the socket outlet aperture while in contact with the supply mains.

Connectors such as jack types, USB types, RCA phono types with a diameter or diagonal measurement between 3,75 mm and 5,25 mm and length greater than 7 mm are considered to fail this requirement.

Electric toys shall not use wires without connectors.

Compliance is checked by inspection and by manual test.

13.6 Charging batteries

It shall be possible to charge secondary batteries inside the **electric toy** only if the following conditions are met

– connection to, or replacement with primary batteries shall not be possible;
– charging of other batteries or **electric toys** from the **electric toy** shall not be possible;
– connection of an incorrect polarity shall not be possible by constructions;
– ⟦A11⟩ the **power supply** shall comply with 15.3; ⟨A11⟧
– operation of the **electric toy** while charging shall not be possible unless the **electric toy** meets the requirements for **electric toys** using a **transformer** or a **power supply** and the **transformer** or **power supply** complies with 15.3;
– **electric toys** for children under 3 years cannot operate while being charged.

Mobile **electric toys** shall not move during charging.

Compliance is checked by inspection and the tests of this standard.

13.7 Series motors

Electric toys shall not incorporate series motors having a power input exceeding 20 W.

*Compliance is checked by measurement, the **electric toy** being supplied at **rated voltage** and operated under **normal operation**.*

13.8 Working voltage

Internal parts of an **electric toy** having a **working voltage** exceeding 24 V shall not lead to any risk of harmful electric shock.

In all conditions of test, the following values shall be met:

– the **working voltage** between any two parts of the **electric toy** shall not exceed 5 kV when the **electric toy** is supplied at **rated voltage**;
– the maximum current from a circuit with a generated voltage exceeding 24 V shall be less than 2 mA for DC and the peak value shall not exceed 0,7 mA for AC;
– the capacitance of a circuit with a generated voltage exceeding 24 V and up to and including 450 V shall be less than 0,1 μF;
– the discharge from circuits with a generated voltage exceeding 450 V and up to and including 5 kV shall not exceed 45 μC.

*Compliance is checked by inspection and measurement. The **electric toy** under test is supplied by an external power source at **rated voltage**. Protective parts or parts preventing access to live parts are removed, even if the **electric toy** has to be damaged.*

Voltages and currents are measured between the relevant parts of the circuit and any pole of the supply source. The current is measured using the circuit in Figure 4 of IEC 60990:2016. Discharges are measured immediately after the interruption of the supply. The quantity of

electricity in the discharge is measured using a resistor having a nominal non-inductive resistance of 2 000 Ω.

13.9 Electric toys connecting to other equipment

Electric toys that can connect to class I equipment shall be safe when connected to that equipment in case of a fault in the equipment that the **electric toy** is connected to.

NOTE Equipment that could be class I include: computers, consoles, monitor screens, other audio-video equipment or fixed USB power supplies.

Electric toys that can connect to class I equipment shall comply with one of the following conditions:

a) the **electric toy** shall include an instruction to advise that the **electric toy** shall only be connected to equipment of Class II or class III (see 7.4); or

b) conductive parts of the **electric toy** electrically connected to class I equipment shall not be accessible in the **electric toy** and the insulation between such parts and **accessible parts** shall have a thickness of at least 1 mm and an adequate electric strength.

Compliance with condition a) is checked by inspection.

Compliance with condition b) is checked by the following test.

*The test is carried out with the **electric toy** in the fully assembled condition with battery compartment covers in place, unless it is necessary that the covers be removed for the correct use of the **electric toy**. The connector of the **interconnection cord set** is fully inserted in the relevant appliance inlet of the **electric toy**. The plug-connector at the other end of the cord for connecting to the equipment is not tested. Further connections from the **electric toy** to other parts of the **electric toy** are not connected.*

*The **electric toy** is operated under **normal operation** according to 9.3.*

*The **electric toy** is then disconnected from the supply and the insulation is immediately subjected to a voltage of 1 500 V having a frequency of 50 Hz or 60 Hz for 1 min, in accordance with IEC 61180.*

The high-voltage source used for the test is to be capable of supplying a short-circuit current Is between the output terminals after the output voltage has been adjusted to the appropriate test voltage. The overload release of the circuit is not to be operated by any current below the tripping current Ir. The value of Is is 200 mA and the value of Ir is 100 mA.

*The test voltage is applied between conductive parts intended to be connected to a computer, console, monitor screen or other audio-video equipment and **accessible parts**, non-metallic parts being covered with metal foil. The metal foil is placed on and following the surface but is not pushed down into recesses or appliance inlets. The above mentioned connector inserted into the appliance-inlets is also covered by metal foil.*

No breakdown shall occur during the test.

NOTE 1 The maximum voltage which is considered to be transferred to the **electric toy** from the equipment is 230 V.

NOTE 2 Glow discharges without drop in voltage are neglected.

*For **electric toys** that can connect to class I equipment complying with 13.9 b), the distances as stated in Clause 17 shall be fulfilled.*

13.10 Speed limitation of ride-on electric toys

A11 The maximum speed of **electric ride-on toys** for children under 3 years shall not exceed the limits in 5.6 of EN 71-1:2014+A1:2018.The maximum speed of **electric ride-on toys** shall not exceed the limits in 4.15.1.8 of EN71-1:2014+A1:2018 for toys intended for children of 3 years and over.

Compliance is checked by the test method specified in 8.29 of EN71-1:2014+A1:2018. 〈A11

14 Protection of cords and wires

14.1 Edges and moving parts

Wireways shall be smooth and free from sharp edges.

Cords and wires shall be protected so that they do not come into contact with burrs, cooling fins or similar edges that may cause damage to their insulation.

Holes in metal through which cords and wires pass shall have smooth well-rounded surfaces or be provided with bushings.

Cords and wires shall be effectively prevented from coming into contact with **moving parts**.

Compliance is checked by inspection.

14.2 Fixed parts

Bare wiring and heating elements shall be rigid and fixed so that during normal use **clearances** and **creepage distances** cannot be reduced below the values specified in Clause 17.

Compliance is checked by inspection and by measurement.

15 Components

15.1.1 General

Components shall comply with the safety requirements specified in the relevant A11 standards 〈A11 as far as they reasonably apply.

Compliance is checked by inspection and by the tests of 15.1.2 and 15.1.3.

NOTE 1 Compliance with the A11 relevant standard 〈A11 for the relevant component does not necessarily ensure compliance with the requirements of this standard.

NOTE 2 The compliance of **light-emitting diode** (**LED**), **laser** components and UV-emitting lamps is assessed using Clause 19 of Annex E.

15.1.2 Switches and automatic controls

Switches and automatic controls carrying a current exceeding 3 A during the tests of 9.3 and 9.4 shall comply with Annex C. However, if they have been separately tested and found to comply with IEC 61058-1 or IEC 60730-1 respectively under the conditions occurring in the ***electric toy*** *and for the number of cycles specified in Annex C, they may be used without further tests.*

NOTE There are no specific requirements for switches and automatic controls carrying a current up to 3 A.

15.1.3 Other components

*If components are marked with their operating characteristics, the conditions under which they are used in the **electric toy** shall be in accordance with these markings, unless otherwise specified.*

The testing of components that have to comply with other standards is, in general, carried out separately, according to the relevant standard.

*If the component is used within the limits of its marking, it is tested in accordance with the conditions occurring in the **electric toy**, the number of samples being that required by the relevant standard.*

When no 〖A11〗 *standard* 〈A11〉 *exists for the relevant component, when the component is not marked or is not used in accordance with its marking, it is tested under the conditions occurring in the **electric toy**. The number of samples is, in general, that required by a similar specification.*

15.2 Prohibited components

Electric toys shall not be fitted with

– **thermal cut-outs** that can be reset by a soldering operation;
– mercury switches.

Compliance is checked by inspection.

15.3 Transformers and power supplies

Transformers and linear **power supplies** shall comply with IEC 61558-2-7.

Switch mode **power supplies** shall comply with IEC 61558-2-7 and IEC 61558-2-16.

A **battery charger** that supplies an **electric toy** is considered to be also a **power supply**.

Compliance is checked by inspection or by testing according to the relevant standard(s).

NOTE The **transformer** and **power supply** are tested separately from the **electric toy**.

15.4 Battery chargers

Battery chargers supplied with an **electric toy** shall be **battery chargers** for use by children and shall comply with IEC 60335-2-29:2016 and Annex AA of that standard.

Compliance is checked by inspection or by testing according to the relevant standard(s).

NOTE The **battery charger** is tested separately from the **electric toy**.

15.5 Batteries

Primary batteries supplied with **electric toys** shall comply with the relevant parts of the IEC 60086 series.

Secondary batteries supplied with **electric toys** shall comply with IEC 62133.

Compliance is checked by inspection or by testing according to the relevant standard.

16 Screws and connections

16.1 Fixings

Fixings, the failure of which may impair compliance with this standard and electrical connections shall withstand the mechanical stresses occurring during play.

Screws used for these purposes shall not be of metal that is soft or liable to creep, such as zinc or aluminium. If they are of insulating material they shall have a nominal diameter of at least 3 mm and they shall not be used for any electrical connection.

Screws or rivets used for electrical connections shall affix to metal.

Compliance is checked by inspection and by the following test.

Screws and nuts are tested if they are used for electrical connections or are likely to be tightened by the user.

The screws or nuts are tightened and loosened without jerking

– *10 times, for screws in engagement with a thread of insulating material;*
– *5 times, for nuts and other screws.*

Screws in engagement with a thread of insulating material are completely removed and reinserted each time.

The test is carried out using a suitable screwdriver, spanner or key and by applying a torque as shown in Table 3.

Column I is applicable for metal screws without heads if the screw does not protrude from the hole when tightened.

Column II is applicable for other metal screws and for nuts and screws of insulating material.

Table 3 – Torque for testing screws and nuts

Nominal diameter of screw (outer thread diameter) mm	**Torque** Nm	
	I	**II**
< 2,8	0,2	0,4
> 2,8 and ≤ 3,0	0,25	0,5
> 3,0 and ≤ 3,2	0,3	0,6
> 3,2 and ≤ 3,6	0,4	0,8
> 3,6 and ≤ 4,1	0,7	1,2
> 4,1 and ≤ 4,7	0,8	1,8
> 4,7 and ≤ 5,3	0,8	2,0
> 5,3	—	2,5

No damage impairing compliance with this standard shall occur.

The shape of the blade of the test screwdriver shall fit the head of the screw.

16.2 Connections

Electrical connections carrying a current exceeding 0,5 A shall be constructed so that contact pressure is not transmitted through insulating material that is liable to shrink or to distort unless there is sufficient resiliency in the metallic parts to compensate for any possible shrinkage or distortion of the insulating material.

Compliance is checked by inspection.

NOTE Ceramic material is not considered liable to shrink or to distort.

17 Clearances and creepage distances

Clearances and **creepage distances** of **functional insulation** shall not be less than 0,5 mm except when the **electric toy** meets the requirements of Clause 9 with this distance short-circuited.

However, for **functional insulation** on printed circuit boards, except at their edges, this distance may be reduced to 0,2 mm provided that the degree of pollution in the microenvironment in which the insulation is located is unlikely to exceed pollution degree 2 during normal use of the **electric toy**.

Internal parts of **electric toys** that comply with 13.8 and have a voltage exceeding 24 V shall have **clearance** and **creepage distances** for **functional insulation** equal to or greater than the values in Table 18 of IEC 60335-1:2010 for pollution degree 2 except when the **electric toy** meets Clause 9 with this distance short-circuited.

For guidance, the pollution degrees as defined in IEC 60335-1 are as follows:

Degrees of pollution in the microenvironment:

For the purpose of evaluating **creepage distances**, the following four degrees of pollution in the microenvironment are established

– pollution degree 1: no pollution or only dry, non-conductive pollution occurs. The pollution has no influence;

– pollution degree 2: only non-conductive pollution occurs, except that occasionally a temporary conductivity caused by condensation is to be expected;

– pollution degree 3: conductive pollution occurs or dry non-conductive pollution occurs that becomes conductive due to condensation that is to be expected;

– pollution degree 4: the pollution generates persistent conductivity caused by conductive dust or by rain or snow.

NOTE Pollution degree 4 is not applicable to **electric toys**.

For **electric toys** that can be connected to class I equipment both the **creepage distance** and **clearance** between **accessible parts** and conductive parts shall be at least 1,5 mm (see 13.9 b)).

Compliance is checked by measurement.

18 Resistance to heat and fire

18.1 Resistance to heat

External parts of non-metallic material enclosing electric parts, and parts of insulating material supporting electric parts, shall be sufficiently resistant to heat if the **electric toy** has a **working voltage** exceeding 12 V and a current exceeding 3 A.

A11 The voltage and current are measured during the test of 9.3.

Electric toys having a lower **working voltage** or current are not considered to generate sufficient heat to create a hazard. A11

Compliance is checked by subjecting the relevant part to the ball pressure test of IEC 60695-10-2.

The test is carried out at a temperature of 40 °C ± 2 °C plus the maximum temperature rise determined during the tests of Clause 9 but it shall be at least 75 °C ± 2 °C.

A11 *The test is only carried out on parts that could deteriorate to the extent that compliance with this standard is impaired.* A11

NOTE 1 For coil formers, only those parts that support or retain terminals in position are subjected to the test.

NOTE 2 The test is not carried out on parts of ceramic material.

18.2 Resistance to fire

18.2.1 General

Parts of non-metallic material enclosing electric parts, and parts of insulating material supporting electric parts, shall be resistant to ignition and spread of fire.

This requirement does not apply to decorative trims, knobs and other parts unlikely to be ignited or to propagate flames that originate from inside the **electric toy**.

Compliance is checked by the tests of 18.2.2 and 18.2.3.

*The tests are carried out on parts of non-metallic material that have been removed from the **electric toy**. When the glow-wire test is carried out, they are placed in the same orientation as they would be in normal use.*

These tests are not carried out on the insulation of cords and wires.

18.2.2 Non-metallic parts

Parts of non-metallic material are subjected to the glow-wire test of IEC 60695-2-11, which is carried out at 550 °C.

The glow-wire test is not carried out on parts of material classified at least HB40 according to IEC 60695-11-10, provided that the test sample was no thicker than the relevant part.

Parts for which the glow-wire test cannot be carried out, such as those made of soft or foamy material, shall meet the requirements specified in ISO 9772 for category HBF material, the test sample being no thicker than the relevant part.

18.2.3 Insulating material

*Parts of insulating material supporting connections carrying a current exceeding 3A and having a **working voltage** exceeding 12 V, and parts of insulating material within a distance*