



BSI Standards Publication

Electric toys - Safety

National foreword

This British Standard is the UK implementation of EN IEC 62115:2020+A11:2020. It is derived from IEC 62115:2017. It supersedes BS EN 62115:2005+A12:2015, which will be withdrawn on 7 February 2023.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to text carry the number of the amendment. For example, text altered by CENELEC amendment A11 is indicated by A11 A11.

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

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Amendments/corrigenda issued since publication

Date	Text affected
31 May 2020	Original Subclauses 5.1 and 5.3 to 5.8 added after being mistakenly omitted in previous version

English Version

Electric toys - Safety
(IEC 62115:2017 + COR1:2019)

Jouets électriques - Sécurité
(IEC 62115:2017 + COR1:2019)

Elektrische Spielzeuge - Sicherheit
(IEC 62115:2017 + COR1:2019)

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European foreword

The text of document 61/5319/FDIS, future edition 2 of IEC 62115, prepared by IEC/TC 61 "Safety of household and similar electrical appliances" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 62115:2020.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2020-08-21
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2022-02-21

This document supersedes EN 62115:2005 and all of its amendments and corrigenda (if any).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For the relationship with EU Directive(s) see informative Annex ZZ, which is an integral part of EN 62115:2020/A11:2020.

Endorsement notice

The text of the International Standard IEC 62115:2017+COR1:2019 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60086-1	NOTE	Harmonized as EN 60086-1
IEC 60086-2	NOTE	Harmonized as EN 60086-2
IEC 60335-2-82	NOTE	Harmonized as EN 60335-2-82
IEC 60598-2-10	NOTE	Harmonized as EN 60598-2-10

Foreword to amendment A11

This European Standard (EN IEC 62115:2020/A11:2020) has been prepared by CLC/TC 61, "Safety of household and similar electrical appliances".

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identical national standard or by endorsement
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withdrawn

This document supersedes EN 62115:2005.

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and supports essential safety requirements of EC Directive 2009/48/EC.

For the relationship with EU Directive(s) see informative Annex ZZ, which is an integral part of this document.

NOTE The following print types are used:

- requirements: in roman type;
- test specifications: in italic type;
- notes: in small roman type.

Words in bold in the text are defined in Clause 3. When a definition concerns an adjective, the adjective and the associated noun are also in bold.

There are no special national conditions causing a deviation from this European Standard.

There are no national deviations from this European Standard.

Annexes ZA, ZB and ZZ have been added by CLC/TC 61.

Endorsement notice

The text of the International Standard IEC 62115:2017/COR1:2019 was approved by CENELEC as a European Standard with agreed common modifications.

Annex ZA (normative)

Normative references to International publications with their corresponding European publications

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60068-2-75	2014	<i>Environmental testing – Part 2-75: Tests – Test Eh: Hammer tests</i>	EN 60068-2-75	2014
IEC/TR 60083		<i>Plugs and socket-outlets for domestic and similar general use standardized in member countries of IEC</i>		
IEC 60086-2	2015	<i>Primary batteries – Part 2: Physical and electrical specifications</i>	EN 60086-2	2016
IEC 60086 (all parts)		<i>Primary batteries</i>	EN 60086	
IEC 60335-1	2010 + A1:2013 + A2:2016 ¹	<i>Household and similar electrical appliances – Safety – Part 1: General requirements</i>	EN 60335-1	2012 + AC:2014 + A11:2014 + A13:2017
IEC 60335-2-29	2016	<i>Household and similar electrical appliances – Safety – Part 2-29: Particular requirements for battery chargers</i>	EN 60335-2-29	2004 + A2:2010
IEC 60384-14	2013	<i>Fixed capacitors for use in electronic equipment – Part 14: Sectional specification – Fixed capacitors for electromagnetic interference suppression and connection to the supply mains</i>	EN 60384-14	2013 +A1:2016
IEC 60417	Database	<i>Graphical symbols for use on equipment</i>		

¹ There exists a consolidated edition 5.2 (2016) that includes edition 5 and its Amendment 1 and Amendment 2.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60529	1989	<i>Degrees of protection provided by enclosures (IP Code)</i>	EN 60529	1991 + A1:2000 + A2:2013 ²
IEC 60695-2-11	2014	<i>Fire hazard testing – Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test method for end-products (GWEPT)</i>	EN 60695-2-11	2014
IEC 60695-2-13	2010 +A1:2014	<i>Fire hazard testing – Part 2-13: Glowing/hot-wire based test methods – Glow-wire ignition temperature (GWIT) test method for materials:</i>	EN 60695-2-13	2010 +A1:2014
IEC 60695-10-2	2014	<i>Fire hazard testing – Part 10-2: Abnormal heat – Ball pressure test method</i>	EN 60695-10-2	2014
IEC 60695-11-5	2004	<i>Fire hazard testing – Part 11-5: Test flames – Needle-flame test method – Apparatus, confirmatory test arrangement and guidance</i>	EN 60695-11-5	2017
IEC 60695-11-10	2013 Cor1:2014	<i>Fire hazard testing – Part 11-10: Test flames – 50 W horizontal and vertical flame test methods +Cor1:2014</i>	EN 60695-11-10	2013 +AC:2014
IEC 60730 (all parts)		<i>Automatic electrical controls</i>	EN 60730	
IEC 60730-1	2013 + A1:2015 ³	<i>Automatic electrical controls – Part 1: General requirements</i>	EN 60730-1	2016 +A1:2016
IEC 60738-1	2006 + A1:2009	<i>Thermistors – Directly heated positive temperature coefficient – Part 1: Generic specification</i>	EN 60738-1	2006 +A1:2009
IEC 60990	2016	<i>Methods of measurement of touch current and protective conductor current</i>	EN 60990	2016
IEC 61000-4-2	2008	<i>Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test</i>	EN 61000-4-2	2009

² There exists a consolidated edition 2.2 (2013) that includes edition 2 and its Amendment 1 and Amendment 2.

³ There exists a consolidated edition 5.1 (2015) that includes edition 5 and its Amendment 1.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61000-4-3	2006 AMD1:2007 ⁴ + AMD2:2010 ⁴	<i>Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test</i>	EN 61000-4-3	2006 + A1:2008 + IS1:2009 + A2:2010
IEC 61000-4-4	2012	<i>Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test</i>	EN 61000-4-4	2012
IEC 61000-4-5	2014	<i>Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test</i>	EN 61000-4-5	2014
IEC 61000-4-6	2013	<i>Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields</i>	EN 61000-4-6	2014 + AC:2015
IEC 61000-4-11	2004	<i>Electromagnetic compatibility (EMC) – Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests</i>	EN 61000-4-11	2004 + A1:2017
IEC 61000-4-13	2002 + A1:2009 + A2:2015 ⁵	<i>Electromagnetic compatibility (EMC) – Part 4-13: Testing and measurement techniques – Harmonics and interharmonics including mains signalling at a.c. power port, low frequency immunity tests</i>	EN 61000-4-13	2002 + A1:2009 + A2:2016
IEC 61032	1997 + COR1:2003	<i>Protection of persons and equipment by enclosures – Probes for verification</i>	EN 61032	1998
IEC 61058-1	2016	<i>Switches for appliances – Part 1: General requirements</i>	EN 61058-1	2002 + A2:2008
IEC 61058-1-1	2016	<i>Switches for appliances – Part 1-1: Requirements for mechanical switches</i>	EN 81058-1-1	2016

⁴ There exists a consolidated edition 3.2 (2010) that includes edition 3 and its Amendment 1 and Amendment 2.

⁵ There exists a consolidated edition 1.2 (2015) that includes edition 1 and its Amendment 1 and Amendment 2.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61058-1-2	2016	<i>Switches for appliances – Part 1-2: Requirements for electronic switches</i>	EN 651058-1-2	2016
IEC 61180	2016	<i>High-voltage test techniques for low-voltage equipment – Definitions, test and procedure requirements, test equipment</i>	EN 61180	2016
IEC 61558-2-7	2007	<i>Safety of power transformers, power supplies, reactors and similar products – Part 2-7: Particular requirements and tests for transformers and power supplies for toys</i>	EN 61558-2-7	2007
IEC 61558-2-16	2009	<i>Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1 100 V – Part 2-16: Particular requirements and tests for switch mode power supply units and transformers for switch mode power supply units</i>	EN 61558-2-7	2009
IEC 62133	2012	<i>Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications</i>	EN 62133	2013
IEC 62233	2005	<i>Measurement methods for electromagnetic fields of household appliances and similar apparatus with regard to human exposure</i>	EN 62232	2008 + Corr:2008
IEC 62471	2006	<i>Photobiological safety of lamps and lamp systems</i>	EN 62471	2008
ISO 3864-1		<i>Graphical symbols – Safety colours and safety signs – Part 1: Design principles for safety signs and safety markings</i>		
ISO 7000		<i>Graphical symbols for use on equipment – Registered symbols</i>		
ISO 8124-1	2014	<i>Safety of toys – Part 1: Safety aspects related to mechanical and physical properties</i>		
ISO 9772	2012	<i>Cellular plastics – Determination of horizontal burning characteristics of small specimens subjected to a small flame</i>		
		<i>Safety of Toys – Physical and Mechanical Properties</i>	EN 71-1:2014+A1	2018

Annex ZB (informative)

Background and rationale for this European Standard

NOTE For correct application of the standard, the normative text takes precedence over the rationale and guidance given in Annex ZB.

ZB.1 General

This European Standard seeks as far as possible to apply a hazard approach instead of design restrictions for electric toys. The following definitions should be kept in mind when reading the standard:

- hazard is a potential source of harm;
- risk is the probable rate of occurrence of a hazard causing harm and the degree of severity of the harm;
- harm means physical injury or any other damage to health, including long-term health effects.

For most of the requirements, the hazards addressed are explained in Annex ZB.2 together with a background and justification.

ZB.2 Rationale

1. Scope

The scope of this European Standard has been aligned with the safety of toys Directive 2009/48/EC and as far as possible with IEC 62115:2017.

5. General conditions for tests

This clause sets a series of standardised conditions under which all tests should be carried out, unless otherwise specified. The conditions are designed to simulate as far as possible normal use conditions. This clause also gives instruction on the number of samples to be used and the order in which the tests are to be carried out. Tests are carried out on a single electric toy in the order of clauses specified in the standard unless otherwise stated in this clause. Furthermore, this clause requires that testing be carried out under certain abuse conditions which are foreseeable such as the reversal of the polarity of the primary batteries.

This clause also describes a set of pre-conditioning treatments which should be carried out prior to the tests specified in this European Standard. Furthermore, this clause describes the condition in which the electric toy needs to be when the tests are carried out, requiring that the most unfavourable conditions are used for each test.

A tension of 70 N was selected which is in line with the force used in ISO 8124-1 for all ages. This force was considered sufficient for the pre-conditioning of electric toy samples.

If a toy stops functioning after preconditioning in such that it cannot be tested and a further two, additional samples stop functioning in the same way, it is then acceptable to test a further sample without preconditioning for compliance with this standard. If the product can continue with the testing, then the requirements can be applied as normal.

If it is evident from the construction of the electric toy that a particular test is not applicable, this test is not carried out. An example would be that the Norwegian hammer (mechanical strength) test does not need to be carried out on a concrete encapsulated electric toy.

6. Criteria for reduced testing

This clause foresees certain situations where reduced testing is justified. It allows certain tests on electrical insulation to be disregarded for electric toys that can function safely should the insulation break down.

Sub clause **6.2** requires a test to be carried out where parts of different polarity are short-circuited. If the electric toy can withstand this fault condition and continue to comply with certain of the compliance criteria of Clause 9, the electric toy is considered to have reduced potential to present a hazard should the insulation between parts of different polarity break down.

Sub clause **6.3** addresses electric toys that are supplied with low power (less than 15W) and have suitable over-temperature or over-current protection are considered to have reduced potential to present a hazard should the insulation between parts of different polarity break down.

Sub-clause **6.4** addresses electric toys that use 3 or less of the designated batteries. Such toys are considered to have reduced potential to present a hazard should the insulation between parts of different polarity break down.

Consequently, electric toys covered by these sub-clauses are then considered to comply automatically with various requirements that are specified in the sub-clauses.

7. Marking and Instructions

Certain symbols may be used to replace instructional text but, where used, they are required to comply with IEC 60417-1 and should not conflict with the symbols of this European Standard. All warnings and instructions required by this standard are required to be written in the official language of the country of which the electric toy is sold to ensure users can understand the instructions. When important information appears on the packaging or instructions, the consumers' attention is drawn to the importance of retaining this information. When placed on the electric toy, markings need to be durable and comply with the test of **7.2.7**.

The information in note 7.2 about the marking requirements in Directive 2009/48/EC does not reference any requirement of this European Standard. The information is not exhaustive and Directive 2009/48/EC and the associated guidance documents should be consulted for further details. The manufacturer's¹ name, registered trade name or registered trade mark and the address at which the manufacturer can be contacted shall be indicated on the electric toy or, where that is not possible, on its packaging or in a document accompanying the electric toy. This requirement applies also to the name and address etc. of any importer².

This clause contains a note explaining that the Toy Safety Directive (2009/48/EC) requires that electric toys or their packaging are to be marked with the name and address of the manufacturer or responsible entity.

Furthermore, there are requirements to ensure the toy is accompanied by sufficient information to enable their safe operation. This includes warnings on packaging and instructions. It should be noted that for most requirements, only the substance of this information is required and some of the statements may not be applicable or may be reworded as appropriate.

There are requirements for the marking of battery boxes for electric toys, transformers for electric toys and replaceable bulbs to reduce the possibility of the user employing such components with an incorrect specification.

There are requirements for the marking of battery compartments to ensure users insert the correct type of battery with the correct polarity.

¹ A manufacturer is any natural or legal person who manufactures a toy or has a toy designed or manufactured, and markets that toy under his name or trademark.

² An importer is any natural or legal person established within the Community who places a toy from a third country on the Community market.

Button batteries have been associated with injuries and fatalities caused by accidental swallowing. This is particularly the case with coin cells, where serious injury can occur within hours. Electric toys using those batteries should carry warnings on the packaging and in the instructions to indicate this danger to consumers.

Sub clause 7.4 requires that electric toys that do not provide protection from faults when connected to Class I equipment, specify the type of equipment that are allowed to be connected to. This information should be indicated in the instructions.

Surface temperature limits are different for different age groups due to reaction time and other factors. Electric toys that attain surface temperatures that are unsuitable for children of certain ages require a warning visible at point of sale. This is required in 7.6.

8. Power input

This clause is intended to determine if the transformer supplied with the electric toy corresponds to the rated power of the electric toy. This is important, as the rated power input is the value which is used in the subsequent tests. This requirement is also intended to address the hazards associated with the situation where a transformer toy will draw more power than the supplied or recommended transformer is able to deliver.

9. Heating and abnormal operation

The tests of Clause 9 are intended to address the hazards associated with electric toys becoming excessively hot or operating in an unexpected hazardous way. This clause requires that electric toys do not reach temperatures which might pose a risk of causing burns to the skin, do not catch fire, cause battery leakage or present other similar hazardous conditions. It also requires that electric toys do not operate in an unexpected hazardous way and that electric toys are adequately protected should a malfunction impair safety. The test conditions simulate normal use as well as most likely foreseeable conditions.

9.2 explains how the electric toy should be positioned and what supply voltage is to be used during the tests. Electric toys that are mobile, such as electric toy cars or electric ride-on toys are tested in the most onerous use condition to create the highest temperature rise as can be expected owing to the normal behaviour of children.

For electric toys, when non-self-resetting thermal cut-outs operate, they are re-set a maximum of three times. Electric toys with self-resetting thermal cut-outs are tested until steady-state conditions are established.

9.3 requires that the electric toy is operated under normal operation and requires that the electric toy does not exceed the temperature limits or present other related hazards as described in 9.10.

The tests of 9.4 assess the safety of the electric toy when subjected to an accidental short-circuit. The tests attempt to short circuit parts of different polarity by using a straight steel pin of diameter 0,5 mm of any suitable length between 25mm and 100mm or by inserting a rod with a diameter of 1,0 mm through the casing of the electric toy, up to a depth of 100 mm. The dimensions of the rod are representative of the antenna of a typical radio controlled electric toy. The dimensions of the pin are representative of an 'unfolded paper clip' and other similar pins which may be found around the home. Should it be possible to short circuit the electric toy in this fashion, this clause requires that the electric toy does not exceed the temperature limits or present other related hazards as described in 9.10.

Clause 9.5 is designed to simulate the failure of temperature limiting devices (e.g. thermostat) by applying a short circuit across such components or making them otherwise inoperable. In the event that an electric toy contains more than one such device, each device is made inoperable in turn as it is unlikely that two components will fail at the same time. When the fault condition is in place, this clause requires that the electric toy does not exceed the temperature limits or present other related hazards as described in 9.10.

9.6 is designed to simulate moving parts, such as the wheels of an electric toy car, being locked. The test is carried out until steady-state conditions are reached except for those electric toys where a switch needs to be operated by the user in order to activate the moving parts. For such electric toys, the test is carried out for 30 s as it is considered that children will not hold the switch for longer periods if the electric toy does not operate.

When the fault condition is in place, this clause requires that the electric toy does not exceed the temperature limits or present other related hazards as described in 9.10.

9.7 is designed to simulate the abuse condition whereby the electric toy is modified to be connected to a power supply additional to that recommended by the instructions for use. This is to minimise the hazards presented when electric toys are deliberately connected to an additional power supply in order to make them operate differently, for example, connecting two power supplies to speed up an electric toy train. The test is only applied where the modification is easily made by the child from parts used from another identical electric toy, without using other components or tools. When this condition is in place, this clause requires that the electric toy does not exceed the temperature limits or present other related hazards as described in 9.10.

9.8 is intended to address the hazards of electric toys using a USB connection as power source being subjected to too high a voltage. Typically, USB power sources are rated at 5V but some power sources on the market have shown to have higher voltages.. A value of 42 V was selected as a test voltage since this aligns with voltages used in other EN standards such as EN 62368.

9.9 is designed to simulate the failure of electronic components in order to minimise the risk of hazardous conditions being presented should an electronic component or its connections fail.

This test does not apply to those circuits that meet the definition of a low power circuit and where the protection against fire hazard or dangerous malfunction in other parts of the electric toy does not rely on the correct functioning of the electronic circuit. A low power point is a point where the power across the variable resistor specified is less than 15 W, measured after 5 s. Components that are further away from the power supply than the measured low power point are considered to be part of a low power circuit and do not require testing according to the fault conditions a) to f).

For those circuits which are not a low power circuit, and the protection against fire hazard or dangerous malfunction in other parts of the electric toy does not rely on the correct functioning of the electronic circuit, the fault conditions are applied to each electronic component in turn. Annex K.2 provides information for determining if the electronic circuit is exempt from the fault conditions in 9.9.

When each fault condition is in place, this clause requires that the electric toy does not exceed the temperature limits or present other related hazards as described in 9.10.

If it is evident from the construction of the electric toy that a particular test is not applicable, this test is not carried out. An example would be a that test of 9.9 would not need to be carried out to a circuit that has a fuse. If in doubt, the test should be carried out.

9.10 is the compliance criteria for normal operation (heating) and abnormal operation. It addresses the hazards associated with high temperatures by setting the temperature rise limits for the **accessible parts** of electric toys. The limits have been drawn up in accordance with CENELEC Guide 29 and IEC Guide 117. The guidance gives details of the reaction time of children, stating that those children below the age of 2 year have a slower reaction time and greater susceptibility to skin damage. A lower temperature threshold is therefore specified. To align with the age limits in European Directive 2009/48/EC, these values calculated for children of 2 years of age and under have been applied for children of 3 years of age and under. This sub clause specifies further limits for children aged 8 years and older which are also calculated from the guidance documents.

The guide includes limits for different types of materials due to the differing thermal conductivity properties of materials. For ease of testing, the limit values are presented as temperature rises based on the absolute temperatures given in the guide and calculated from the highest allowed ambient temperature.

For the assessment of fault conditions, the temperature rise limits for normal operation apply as it is considered unlikely that children will recognise such faults when the electric toy is in use.

This sub clause further requires that hazardous conditions associated with high temperatures do not occur during the tests of Clause 9; such as: sealing compounds should not flow out, batteries shall not leak, the electric toy should not emit flames, vapour should not accumulate in the electric toy and dangerous substances should not become accessible as well as requiring compliance with the rest of this European Standard.

10 Electric Strength

10.1 addresses the hazards associated with weak insulation between conductive parts and accessible parts, such as electric shock. The electric toy is operated until steady-state temperature conditions are reached and then the insulation of the electric toy is assessed by applying a voltage of 250 V at a frequency of 50 Hz or 60 Hz with a substantially sinusoidal waveform on to the insulation between conductive parts and accessible parts, for a period of one minute.. The insulation should not break down under this condition.

10.2 addresses the same hazard with the same test under conditions of high humidity as in 10.1.

Safety of the operator should be considered when performing this test. The test should be performed immediately after removing the toy from the chamber. If it is safe to test the product in the chamber, this can be performed inside the chamber.

11 Electric toys used in water, electric toys used with liquid and electric toys cleaned with liquid

Clause 11 addresses the hazards associated with toy's resistance to water penetration. Hazards can be high temperatures caused by short circuits.

The first part of this clause deals with electric toys intended to be used in water. The test requires that the electric toy is immersed in a salt water solution and operated for 15 min. The test requires that the electric toy is held at a depth of 150 mm to provide a standardised water pressure and the salt content of the water is intended to provide reproducible water conductivity. These requirements have been developed from similar requirements in the horizontal standard EN 60529. This test is designed to represent the electric toy being immersed in water.

The second part of this clause addresses electric toys used with liquid where the test requires that the reservoir is overfilled by 15% (or 250 ml, whichever of the two is greater) of a salt water solution. This test is designed to represent overfilling or accidental spillage.

The final part of this clause deals with electric toys likely to be cleaned with water or other liquids. Such electric toys are subjected to the tests of EN 60529:1991 + A2: 2013, 14.2.4, to assess the electric toys resistance to water ingress. Toys likely to be cleaned with a damp cloth are not subjected to this clause.

In each case, the electric toy should withstand the electric strength test of 10.1. Electric toys that are intended to be filled from the tap should be considered to be electric toys used in water.

12 Mechanical strength

Clause 12 is intended to address the hazards associated with children getting access to hazardous elements such as electrical parts, moving parts or parts with high temperatures. Firstly, the abuse test is carried out using the spring hammer (Test Ehb) of EN 60068-2-75:1997, Clause 5. Secondly, parts of electric toys preventing access to such hazards are also subject to a tension test. If the enclosure of the electric toy is weak, it could break during foreseeable use and thus allow children access to hazardous elements.

The impact force of the spring hammer has been reduced from 0,7 J in the previous edition to 0,5 J in this standard. The number of impacts has also been reduced from 6 blows to 3 blows. These parameters are in line with those in EN 60335-1 and similar standards addressing mains powered appliances where the associated hazards are much greater.

13 Construction

13.1 is intended to address the hazards associated with electric toys being supplied with a source of electricity that could cause electric shock, burns, fire or other hazardous conditions. It is intended to address the Particular Safety Requirement of Annex II, Section IV, paragraph 1 of Toy Safety Directive 2009/48/EC. The requirement states that electric toys should not be supplied with a voltage greater than 24 V and that voltages internal to the electric toy shall not pose a hazard should they be greater than 24 V.

Internal voltages higher than 24 V and inaccessible to the user are allowed and are required to comply with 13.8.

13.2 is intended to address the hazards associated with children playing with, and using, parts carrying mains voltage such as transformers for electric toys, supply cord sets and mains sockets.

In **13.2.1** exposure to potential hazards of this nature are reduced by requiring that transformers are not an integral part of the electric toy and thus being separated from the electric toy when played with and by requiring in **13.2.3** that electric toys using transformers and power supplies are not intended for children under the age of 3 years.

To reduce the risk of harmful electric shock, **13.2.2** requires that transformer toys are not intended for use in water, to minimize the risks of parts carrying mains voltage coming into direct contact with water.

13.3 is intended to address the hazards associated with children resetting or replacing “cutout” components, before electric toys have sufficiently cooled, normal operation has been achieved or necessary repairs have been carried out. This risk is minimized by requiring that non-self-resetting thermal cut outs cannot be reset without the aid of a tool, and thus it is expected that any resetting or replacement be carried out by an adult.

13.4 is intended to reduce the risks associated with batteries.

The requirement of **13.4.1** is designed to minimise the risk of swallowing by requiring that access to small part batteries is reduced. The risk is minimised by requiring that small part components containing batteries are not able to be removed without the aid of a tool, unless the same part prevents access to the batteries under the test conditions of this clause. Also, for batteries that are small parts, the battery cover should only be able to be removed with the aid of a tool.

For larger batteries, **13.4.2** sets requirements that limit access. Batteries should not become removable unless it takes at least two independent movements, applied simultaneously. The actions that constitute two independent simultaneous movements applied by the user do not constitute actions due to gravity or the weight of the electric toy. Furthermore, 13.4.2 requires that battery compartment covers have sufficient strength by requiring them to withstand an impact from a 1 kg mass when dropped from a height of 100 mm without the batteries becoming removable.

13.4.3 is intended to address the hazards associated with electrolyte leakage by rechargeable batteries. Children are unlikely to recognise the hazard associated with leaking electrolyte. Therefore, batteries are required not to leak electrolyte when the electric toy is placed in any position.

13.4.4 is intended to address the risks associated with electrolyte leakage which could cause burns. The risk is minimised by requiring that electric toys that have a battery compartment with a fixed position that is above a child be designed such that liquids are prevented from leaking from the battery compartment. Portable electric toys, such as jewellery and headwear, are not covered by this requirement.

This requirement applies to electric toys where the leakage of electrolyte is liable to cause burns, such as cot electric toys or baby gyms where the battery compartment is positioned directly above the child’s play or sleeping position. Therefore, it does not apply for example to cot electric toys where the battery compartment is positioned away from the child or to electric toys where the child is not directly under the toy for extended periods, for example, helicopter electric toys suspended from a ceiling. In these cases, it is considered unlikely that children will be exposed to the electrolyte.

13.4.5 minimises the potential hazards, for example, of fire, explosion and leakage, by requiring that batteries do not have parallel configurations. A parallel configuration of batteries may only be used if inserting batteries with the polarity reversed, unbalanced charging and discharging do not impair compliance with the rest of this European Standard.

In **13.4.6** it is tested that screws or similar fasteners used for covers providing access to the battery compartment is captive so they do not get lost under replacement of batteries.

13.5 is intended to address the electrical shock hazard associated with children inserting plugs, connectors and wires into mains sockets.

The risk is reduced by requiring that plugs and socket-outlets of electric toys are not interchangeable with plugs and socket-outlets listed in IEC 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 mains supply as such plugs pose a reduced risk.

Therefore, connectors of certain dimensions (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.

Furthermore, electric toys intended for children under the age of 3 years should not include wires or cords without end connectors in order to avoid them being inserted into the mains socket outlets.

13.6 is intended to address the hazards associated with children charging rechargeable batteries inside the electric toy. Such hazards include recharging of primary batteries and charging of batteries that are not intended to be used with the electric toy which could lead to overheating, leakage or eruption. It also addresses the hazards of children playing with electric toys that are normally able to move freely while the electric toy is connected to the mains via a battery charger, which could lead to electric shock. This subclause also addresses additional hazards associated with the charging of batteries in heavy electric toys.

The risk of injury due to charging of primary batteries is reduced by requiring either that they cannot be charged from or inserted in the electric toy. Furthermore, electric toys may not charge other batteries from the electric toy or provide power to other electric toys.

If rechargeable batteries are used, they are required to be designed such that the battery polarity cannot be reversed when inserted in the electric toy. The exposure to the hazards associated with playing with electric toys that are plugged into the mains is minimised by ensuring electric toys intended for children under 3 cannot be operated while the electric toy is being charged. Electric toys for older children may be operated if they meet the requirements for toys using a transformer for electric toys or using a power supply.

Mobile electric toys may not operate while in charge to avoid damage to a mains socket outlet.

13.7 is intended to address the hazards associated with the use of series motors. The speed of series motors can only be controlled by the load. Series motors that do not have the appropriate load can reach excessive speeds. Since the load on electric toy motors is likely to be dependent on the actions of the child, the use of series motors has been limited to electric toys where the power input does not exceed 20 W.

13.8 is intended to address the risks associated with electric toys that have internal voltages exceeding 24 V. Voltages exceeding 24 V that are internal to the electric toy are required to be inaccessible to the user. In addition, the combination of current and voltage should not cause harmful electric shock as stated in the requirements. The potential to cause harmful electric shock is minimised by requiring that the voltage does not exceed 5 kV and by limiting the current capacitance and discharge. These limitations on the energy delivered are taken from the household appliance requirements of EN 60335-1 and are considered to minimise any electric shock hazard.

Electric toys which can connect to class I equipment need to have adequate protection in the event of a fault occurring in the connected equipment.

It is noted that Class I equipment rely on the earth connection for protection of users from hazardous voltages (mains). It has also been noted by the IEC and CLC that products or parts, which are gripped by the hand, and which are connected to class I appliances, require at least the same protection that might be expected in that appliance.

13.9 therefore sets requirements for insulation and for creepage and clearances in order to ensure that electric toys connecting to other equipment have adequate protection for users in the event of voltages up to 230 V being transferred to the electric toy under a single fault condition in the appliance.

If electric toys are connected to a Class II or Class III appliance, no further protection is required for the electric toy. Therefore, an instruction to users explaining that electric toys are only to be connected to Class II or Class III equipment will minimise this risk.

In order to reduce injuries caused by the hazard associated with high speed such as falls or crashes, **13.10** limits the speed of electrical electric ride-on toys.

14 Protection of cords and wires

14.1 is designed to minimise the hazards associated with cords and wires short-circuiting due to poor protection from moving parts or potential sharp edges. The associated risks are minimised by requiring that casing, wire ways and holes are free from sharp edges and that cords and wires are protected from moving parts. In addition, uninsulated elements, such as heating elements or LED connectors are required to be rigidly held so that the necessary creepage and clearance distances are not reduced.

Additionally, **14.2** reduces the risk of short circuits with bare wires and heating elements by requiring that they are rigid and fixed in place.

15 Components

This clause is intended to address the hazards associated with components not having the correct specification or components of the incorrect rating being used in the electric toy.

The risks associated with components being incorrectly specified are addressed by requiring compliance with relevant standards for each component (**15.1**). Components not complying with the correct standards might not function correctly or safely when used in the electric toy.

The risks associated with components employed in the electric toy being of an incorrect specification are addressed by the requirements of **15.1.1** and **15.1.2**. If the component is not marked, not used in accordance with its markings or no IEC standard exists then the component is tested in the electric toy under the conditions specified in this European Standard.

15.2 prohibits the use of thermal cut-outs that can be reset by a soldering operation. When such cut outs are reset by soldering, there is a significant risk that the soldering operation will alter the properties of the component and as such allow the electric toy to achieve hazardous high temperatures before the cut-out operates.

This subclause forbids the use of mercury switches in electric toys as mercury is restricted by various legislation.

Although power supplies and transformers for electric toys are not toys **15.3** is requiring that transformers for electric toys and power supplies for electric toys are required to comply with EN 61558-2-7 for linear types. Switched mode power supplies for electric toys are required to comply with EN 61558-2-7 and EN 61558-2-16. These requirements provide the necessary protection for transformers for the electric toy and for the user. Transformers not complying with these standards do not provide the necessary additional protection required for use with electric toys (such as those transformers complying with EN 61558-2-6).

15.4 requires that battery chargers supplied with an electric toy comply with EN 60335-2-29 and its Annex AA.

Battery chargers not complying with the requirements for battery chargers for children as given in EN 60335-2-29:2004 and its Annex AA do not provide the necessary additional protection required for them to be used by children.

15.5 requires that batteries supplied with electric toys comply with the relevant standard in order to minimise the hazards associated with faulty batteries (e.g. leaking, explosion, fire).

16 Screws and connections

This clause is intended to address the hazards associated with the failure of screws and connections, being part of electrical connections or giving access to moving parts or access to hot surfaces. The risks associated with failure are minimised by

- setting requirements for the integrity of standard connections,

- setting requirements that ensure the continued integrity of screws that are intended to be loosened and tightened by the consumer, and
- setting further requirements for those connections carrying electrical current.

17 Clearance and creepage distances

This requirement is intended to address the hazards associated with accidental short circuit of parts of different polarity. Such hazards include high temperatures or fires.

The risk is minimised by requiring a minimum creepage distance and a minimum clearance. This clause also allows printed circuit boards to have a lower minimum creepage and clearance distance if the expected pollution (e.g. dust) degree is suitably low. The degree of pollution in the microenvironment of where the insulation is situated should be equal to or less than pollution degree 2 as stated in EN 60335-1. Pollution in excess of this degree requires larger creepage and clearance distances to reduce the risk of short circuit.

For products that have internal voltages greater than 24 V, as allowed in **13.8**, the creepage and clearance distances should be increased to distances as stated in EN 60335-1.

18 Resistance to heat and fire

This requirement is intended to address the hazards associated with non-metallic parts melting or catching fire in the event that electrical components fail and cause high temperatures inside the electric toy. This clause also deals with the hazards associated with non-metallic parts softening or distorting, such that casings or insulation no longer provide sufficient protection.

For electric toys that operate at a voltage exceeding 12 V and a current exceeding 3 A, there are requirements to ensure that non-metallic parts do not soften under high temperature operating conditions. If insulation or casings soften, they could no longer provide adequate protection. Electric toys that operate at lower voltage current combinations are considered to present a lower risk of attaining temperatures that could soften or distort non-metallic materials, including accessible insulation.

The clause also has requirements for non-metallic materials to minimise the risk of ignition and spread of flames to neighbouring parts should materials catch fire. Parts of non-metallic material enclosing electric parts are subjected to the glow wire test to determine if they can catch fire. If such parts catch fire under this test, the risk of flame spreading to neighbouring parts is assessed during the needle flame test, which simulates ignition and distinguishing of non-metallic parts.

19 Radiation, toxicity and similar hazards

This clause contains a general requirement to address optical and electromagnetic radiations. Requirements are given in Annex E and Annex I respectively.

Annex A Experimental sets (normative)

This annex addresses electric toys that allow for “experimental play” with simple electrical circuits, such as designing a car, alarm, resistor, switch circuit. Such electric toys cannot comply with some of the requirements set out in the standard, but are designed for older children, and have been used safely for a number of years. The modifications to the main standard made by Annex A allow for experimental sets to comply with the standard provided they carry appropriate warnings, detailed instructions for each experiment and information that the electric toy is intended for the correct age group, nominally children of 8 years of age, but older age groups can be specified by the manufacturer.

Annex B Needle flame test (normative)

This annex sets out the modifications to EN 60695-11-5 which makes the test appropriate for electric toys. Annex B is referred to in clause 18.2.3.

Annex C Automatic controls and switches (normative)

Automatic controls such as thermostats and thermal cut-outs are required to comply with the requirements of EN 60730-1:2000 + A1:2004 + A2:2008, Clause 17. The number of cycles of operation stated in the annex are selected from the values in EN 60730-1. Switches are required to comply with the requirements of EN 61058-1 with the modifications indicated in C.2. The temperature rise requirement of EN 61058-1:2002, Clause 17, has been reduced to add an increased level of safety for children. The temperature rise limits is set higher for this requirement as it is recognised that it is an overuse test. Annex C is referred to in clause 15.1.2.

Annex D Electric toys with protective electronic circuits (normative)

The requirements in this annex (referred to in clause 9.1) ensure that electric toys remain safe when under the influence of electromagnetic phenomena (EMP). EMP is present under normal use conditions because of radio communication etc found in the typical consumer environment (e.g. due to Wi-Fi systems and mobile phones).

Electric toys with a protective electronic circuit are subject to the additional testing of Annex ZB to ensure that they do not malfunction under the influence of electromagnetic phenomena.

Furthermore, electric toys that have an electronic off switch, a “standby mode” or a “sleep mode” that could malfunction in such a way as to cause any unintended operation that might impair safety are also subjected to this test. Examples of electric toys which could malfunction in such a way as to cause an unintended operation that might impair safety are electric ride-on toys which could unexpectedly move, change direction or gain speed, or functional electric toys such as an electric toy sewing machine which could unexpectedly start. Electric toys which operate and do not create a hazard (i.e. a motor runs or a light illuminates) are not considered to be covered by this requirement.

Electric ride-on toys and functional electric toys can present unavoidable hazards due to their function. These types of mechanical hazards are covered by EN 71-1. This annex covers the hazard due to unexpected behaviour of the electric toy caused by a malfunction of an electronic control system.

If the tests of 9.9 cause a protective electronic circuit to operate, the tests of the annex are applied while the fault conditions of sub-clause 9.9 are in place, after steady state conditions have been reached.

Circuits comprising only passive electronic components such as positive temperature co-efficient (PTC) resistors, negative temperature co-efficient (NTC) resistors or voltage dependent resistors (VDRs) are exempt from the tests as they are unlikely to malfunction under the influence of EMP.

Annex E Safety of Electric Toys incorporating Optical Radiation Sources (normative)

Electric toys that comprise lasers, light-emitting diodes (LEDs) or UV lamps are additionally required to comply with the requirements of Annex E. The requirements are intended to address the risk of damage to the sight of the user under normal, and abuse, conditions.

LEDs are required to meet certain limits specified in the standard which were derived from exposure values given by ICNIRP³. The compliance with these limits may be assessed based on the data provided on a data sheet prepared in accordance with CIE 127. Alternatively, compliance may be checked by measurement. The measurements should be made on the total emission from an electric toy (within a field of vision), however, to simplify the measurement procedure it is also acceptable to take measurements from the LED device itself, provided it is supplied under the same conditions and fault conditions as if it were in the electric toy. UV

³ The International Commission on Non-Ionizing Radiation Protection, <http://www.icnirp.org/>.

emissions of LEDs are also limited. For further information on the development of the requirements for LEDs see Annex H.

The hazards associated with lasers are addressed by the requirement that they are classified as Class 1 according to EN 60825-1. By being classified as a class 1 device of EN 60825-1, toys with lasers are considered to be safe under all viewing conditions.

The hazards associated with UV lamps are addressed by limiting the UV emissions. The limits are identical to those of the LED requirements. The effects of UV exposure are cumulative and so if there is a lamp and an LED in the same electric toy (and field of view), the total emission of both devices needs to comply with the accessible emission limits.

Photosensitive epilepsy is where someone has seizures that are triggered by flashing or flickering lights, or patterns. Lights that flash or flicker between 16 and 25 times a second are the most likely to trigger seizures. But some people are sensitive to rates as low as 4 or as high as 60 a second. A warning needs to be given to inform people with photosensitive epilepsy.

The definition of modulated output should be kept in mind when considering this clause. The measurement should be made on light output once steady conditions have been reached. This applies if the light is switched on and off, it flickers from high power to low power or if the accessible emission is modulated by mechanical means. Change of colour with similar light intensity, for example, is not considered in the requirements of this clause.

An array of light sources or colour changing LEDs are not regarded as modulated output unless their modulation is synchronised in a way that fits the definition of modulated output.

Annex I Electric toys generating electromagnetic fields (normative)

Annex I addresses hazards posed by electric toys emitting electromagnetic fields.

Electric toys should not emit EMF that pose a hazard to the user or that unduly affect other products. The risk is reduced by compliance with the limit values.

The requirements were selected from the table in EN 62233 by comparing the values and conditions for similar equipment.

Electric toys that are electromagnetically benign such as those without motors, inductors or which only comprise passive electronic components are considered to comply with the requirement without testing. Furthermore, electric toys that operate at low currents (less than 3A) are considered incapable of generating EMF at levels that could pose a hazard.

Annex J Safety of remote-controls for electric ride-on toys

The annex specifies some functional and safety system requirements, necessary to prevent major safety hazards that otherwise exist in remote controlled electric ride-on toys.

There are also remote-controls in the market that are sold separately, as add-on for electric ride-on types.

The requirements of this annex are applicable in addition to the rest of the standard, as it is not the intention to deviate from the existing requirement.

The annex does not define the minimum reception range of the remote-control system. As the electric ride-on toy stops automatically upon leaving the reception range (see sub-clause 9.J.101.1), there is no safety value for the reception range and it is subject to the manufacturer's discretion.

Annex J Clause 7 Marking and Instructions

The required warning in 7.J.1.2 relates to the remote-control only. The required warning related to the electric ride-on toy in general, is defined in 7.5 of the main body of the standard.

The manufacturer declaration of 7.J.1.4 is essential for the use of testing laboratories and market surveillance authorities. Since it is not intended for the user, it can use very small print, as long as it is readable. It includes

description about prevention of mutual operation, for inspection of the requirement specified in sub-clause 9.J.101.2. This information is required to avoid the need for several product samples (which would not be practical for surveillance) for testing of prevention of mutual operation.

Annex J Clause 9 Heating and Abnormal Operation

This requirement is designed to prevent the parent unexpectedly losing control of the toy.

Under normal conditions the remote control can stop the driving child. Therefore, parents may learn by experience to rely on the remote control to stop the electric ride-on toy. However, if the electric ride-on toy could leave the remote control reception range, then the child could continue drive away, and the parents could not stop them. This unexpected loss of control may of course be dangerous, as the child could drive into an unsafe area.

In addition to leaving the reception range, losing wireless communication may also happen due to other reasons, such as: weak battery or interference from external sources. This can also cause unexpected loss of control, and driving into an unsafe area.

To minimise this hazard, clause **9.J.1.1** requires that in any case of communication cut-off, electric ride-on toy will stop automatically. This will help parents to keep control, and make sure the child stays within the safe driving area.

9.J.1.2 is designed to prevent control of one electric ride-on toy by a remote-control of another electric ride-on toy. Otherwise, a remote-control of one electric ride-on toy may drive a different electric ride-on toy, unintentionally. To minimise this hazard, clause 9.J.1.2 requires that each remote-control can control its related electric ride-on toy, but cannot control another electric ride-on toy.

Annex J Clause 13 Construction

The aim of the functional part of Annex J is to check that the required minimum safety for relying on and using the remote control is complied with.

In **13.J.1.1** a test is carried out to check if the remote control can stop the electric ride-on toy under specified conditions in all modes. This is necessary as the adult person is trusting the remote control as a means to ensure that the child is not entering a dangerous area like roads, swimming pool etc.

The requirement of **13.J.1.2** is designed to prevent the child from switching the electric ride-on toy to un-controlled mode. Some electric ride-on toys are equipped with a selector switch selecting between “controlled” driving mode and “un-controlled” driving mode. If the child can access this switch and operate it, then he may switch the electric ride-on toy to “un-controlled” mode, disabling the parent’s control. To prevent this hazard, clause 13.J.1.2 requires that such selection can only be done by an adult, using a tool.

Finally the requirement of **13.J.1.3** is designed to prevent any parent’s experience of re-gaining control during un-controlled mode. This will assure that switching the electric ride-on toy to un-controlled mode means complete disabling of any function of the remote-control until the adult intentionally switches the electric ride-on toy to controlled mode again.

Annex ZZ (informative)

Relationship between this European Standard and the essential requirements of Directive 2009/48/EC aimed to be covered

This European Standard has been prepared under a Commission's standardization request M/448 to provide one voluntary means of conforming to essential requirements of Directive 2009/48/EC on the safety of toys.

Once this standard is cited in the Official Journal of the European Union under that Directive compliance with the normative clauses of this standard given in Table ZZ.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding essential requirements of that Directive, and associated EFTA regulations.

Table ZZ.1 — Correspondence between this European Standard and Directive 2009/48/EC

Essential Requirements of Directive 2009/48/EC	Clause(s)/sub-clause(s) of this EN	Remarks/Notes
Article 2	Clause 1	
Article 10	Clause 7, Clause 8, Clause 9, Clause 10, Clause 11, Clause 12, Clause 13, Clause 14, Clause 15, Clause 16, Clause 17, Clause 18, Clause 19, Annex A, Annex B, Annex C, Annex D, Annex E, Annex J	
Article 11	Clause 7, Annex A, Annex E, Annex J	
Annex II. I, 3	13.7, Annex D	
Annex II. I, 7	7.5, 13.10	
Annex II. I, 9 a)	Clause 9, Annex C, Annex D	
Annex II. I, 9 b)	Clause 9, Clause 11, 13.4.3, Annex C, Annex D	
Annex II. II, 1 a), b), c) and d)	Clause 9, Clause 18, Annex A, Annex B, Annex C, Annex D	
Annex II. III, 1	Clause 9, 13.4.3, 13.4.4	
Annex II. IV, 1	13.1, 13.8	
Annex II. IV, 2	Clause 7, Clause 10, Clause 11, Clause 12, 13.1, 13.2, 13.5, 13.6, 13.8, 13.9, Clause 14, 15.1 15.3, 15.4, 16.1, Clause 17, Annex A, Annex C	
Annex II. IV, 3	7.1, 7.2, 7.3, 7.6, Clause 8, Clause 9, 13.3, 13.4.5, Clause 14, 15.1, 15.2, 15.5, Clause 16, Clause 17, Annex A, Annex C, Annex D.	

Essential Requirements of Directive 2009/48/EC	Clause(s)/sub-clause(s) of this EN	Remarks/Notes
Annex II. IV, 4	Clause 4, 9.1, 9.2, 9.4, 9.5, 9.6, 9.8, 9.9, 9.10, Clause 10, Clause 11, Clause 12, 13.3, 13.4, 13.5, 13.6, 13.9, Clause 15, Clause 16, Clause 18, Annex A, Annex B, Annex C, Annex D	
Annex II. IV, 5	Clause 9, Clause 12, 13.3, 13.4.5, 13.6, 13.9, Clause 14, Clause 15, Clause 16, Clause 17, Clause 18, Annex B, Annex C, Annex D	
Annex II. IV, 6	Clause 19, Annex E, Annex I	
Annex II. IV, 7	9.9, Annex D	
Annex II, IV, 8	Clause 19, Annex E	

NOTE 1 The requirements in Clauses 3, 5 and 6 are to be used in addition to the above clauses and sub-clauses.

WARNING 1 — Presumption of conformity stays valid only as long as a reference to this European Standard is maintained in the list published in the Official Journal of the European Union. Users of this standard should consult frequently the latest list published in the Official Journal of the European Union.

WARNING 2 — Other Union legislation may be applicable to the product(s) falling within the scope of this standard.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRIC TOYS – SAFETY

FOREWORD

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International Standard IEC 62115 has been prepared by subcommittee IEC technical committee 61: Safety of household and similar electrical appliances.

This second edition cancels and replaces the first edition published in 2003, Amendment 1 (2004) and Amendment 2 (2010). This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- the general conditions for tests has been rewritten and modified (Clause 5);
- the criteria for reduced testing has been modified (Clause 6);
- warnings for toys using button batteries or coin batteries have been added (7.3.3.2, 7.3.3.3);
- warnings on ride-on toys have been added (7.5);
- the requirements concerning accessibility of batteries have been updated (13.4.1 and 13.4.2);
- added requirements to cover toys placed above a child (13.4.4);

- added requirements to cover toys connected to other equipment (13.9);
- modified the requirements for safety of toys incorporating optical radiation sources (Annex E), to include requirements for using the technical LED data sheet for checking compliance with the specified accessible emission limits (AEL);
- updated the details for measurements of the optical radiation from the toy (Annex E);
- introduced an informative Annex I concerning measurement methods for toys with an integrated field source generating EMF;
- included a normative Annex J concerning safety of remote controls for electric ride-on toys.

The text of this standard is based on the following documents:

FDIS	Report on voting
61/5319/FDIS	61/5371/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

NOTE 1 The following print types are used:

- requirements: in roman type;
- *test specifications: in italic type;*
- notes: in small roman type.

Words in **bold** in the text are defined in Clause 3. When a definition concerns an adjective, the adjective and associated noun are also in bold.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

NOTE 2 The attention of National Committees is drawn to the fact that equipment manufacturers and testing organizations may need a transitional period following publication of a new, amended or revised IEC publication in which to make products in accordance with the new requirements and to equip themselves for conducting new or revised tests.

It is the recommendation of the committee that the content of this publication be adopted for implementation nationally not earlier than 12 months or later than 36 months from the date of publication.

The contents of the corrigendum of August 2019 have been included in this copy.

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

It has been assumed in the drafting of this International Standard that the execution of its provisions is entrusted to appropriately qualified and experienced people.

As a general rule, electric toys are designed and manufactured for particular categories of children. Their characteristics are related to the age and stage of development of the children and their intended use presupposes certain capabilities.

Accidents are frequently due to an electric toy either being given to a child for whom it is not intended or being used for a purpose other than for which it was designed. This standard does not eliminate parental responsibility for the appropriate selection of electric toys. It is assumed that when choosing an electric toy or a game, account is taken of the physical and mental development of the child who will be playing with it.

The aim of this standard is to reduce risks when playing with electric toys, especially those risks that are not evident to users. However, it has to be recognized that some electric toys have risks inherent in their use that cannot be avoided. Consideration has been given to reasonably foreseeable use, bearing in mind that children are not generally as careful as adults.

While this standard applies to new electric toys, it nevertheless takes into account the wear and tear of electric toys in use.

The fact that an electric toy complies with this standard does not absolve parents and other persons in charge of a child from the responsibility of supervising the child. Supervision is also necessary when children of various ages have access to the same electric toy.

This standard covers the whole range of electric toys from small button battery or coin battery operated lights to large ride-on electric toys powered by rechargeable batteries. This results in different requirements and tests according to the type of electric toy. For some electric toys, testing can be reduced if particular criteria are met (see Clause 6).

Other safety aspects of electric toys are described in the A11 EN 71 A11 series of standards.

An electric toy that complies with the text of this standard will not necessarily be judged to comply with the safety principles of the standard if, when examined and tested, it is found to have other features that impair the level of safety covered by these requirements.

A11 *Text deleted* A11

A11 The European Committee for Electrotechnical Standardization (CLC) A11 draws attention to the fact that it is claimed that compliance with this document may involve the use of a patent.

A11 CLC A11 takes no position concerning the evidence, validity and scope of this patent right.

The holder of this patent right has assured the A11 CLC A11 that they are willing to negotiate licences under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the holder of this patent right is registered with A11 CLC A11. Information may be obtained from:

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Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights other than those identified above.  CLC  shall not be held responsible for identifying any or all such patent rights.

IEC (<http://patents.iec.ch>) maintains an on-line database of patents relevant to its standards. Users are encouraged to consult the database for the most up to date information concerning patents.

ELECTRIC TOYS – SAFETY

1 Scope

A11 This European Standard specifies safety requirements for **electric toys** that have at least one function dependant on electricity, **electric toys** being any product designed or clearly intended, whether or not exclusively, for use in play by children of less than 14 years of age.

NOTE 1 Examples of electric toys also within the scope of this standard are

- constructional sets;
- **experimental sets**;
- functional **electric toys** (an **electric toy** which performs and is used in the same way as a product, appliance or installation intended for use by adults, and which may be a scale model of such product, appliance or installation);
- **electric toy** computers;
- A doll's house having an interior lamp

Additional requirements for **experimental sets** are given in Annex A.

Additional requirements for **electric toys** incorporating optical radiation sources are given in Annex E.

Measurement methods for **electric toys** generating Electromagnetic fields (EMF) are given in Annex I.

Additional requirements for the safety of remote-controls for **electric ride-on toys** are given in Annex J.

If the packaging is intended to have play value, then it is considered to be part of the **electric toy**.

This European Standard only covers the safety aspects of **electric toys** that relate to an electrical function.

NOTE 2 The EN 71 series of standards address other aspects of the safety of toys. Other horizontal product standards may also apply to toys.

This standard covers the safety of **electric toys** taking power from any source, such as batteries, transformers, solar cells and inductive connections.

NOTE 3 **Transformers for toys** (EN 61558-2-7:2007 for linear types or EN 61558-2-7:2007 and EN 61558-2-16:2013 for switch mode types), **battery chargers** (EN 60335-2-29:2010) and **battery chargers** for use by children (EN 60335-2-29:2010, Annex AA) are not considered to be part of an **electric toy** even if supplied with an **electric toy**.

NOTE 4 This standard is not intended to assess the safety of batteries however it does address the safety of the **electric toy** with the batteries inserted.

This European Standard does not apply to the following toys:

- playground equipment intended for public use;
- automatic playing machines, whether coin operated or not, intended for public use;
- **toy** vehicles equipped with combustion engines;
- **toy** steam engines; and
- slings and catapults;

Furthermore, it does not cover the following items, which, for the purposes of this European Standard, are not considered toys:

- decorative objects for festivities and celebrations;
- products for collectors, provided that the product or its packaging bears a visible and legible indication that it is intended for collectors of 14 years of age and above; examples of this category are:
 - detailed and faithful scale models ;
 - kits for the assembly of detailed scale models;

- folk dolls and decorative dolls and other similar articles;
- historical replicas of toys;
- reproductions of real fire arms;
- sports equipment, including roller skates, inline skates, and skateboards intended for children with a body mass of more than 20 kg;
- bicycles with a maximum saddle height of more than 435 mm, measured as the vertical distance from the ground to the top of the seat surface, with the seat in a horizontal position and with the seat pillar set to the minimum insertion mark;
- scooters and other means of transport designed for sport or which are intended to be used for travel on public roads or public pathways;
- electrically driven vehicles which are intended to be used for travel on public roads, public pathways, or the pavement thereof;
- aquatic equipment intended to be used in deep water, and swimming learning devices for children, such as swim seats and swimming aids;
- puzzles with more than 500 pieces;
- guns and pistols using compressed gas, with the exception of water guns and water pistols and bows for archery over 120 cm long;
- fireworks, including percussion caps which are not specifically designed for toys;
- products and games using sharp-pointed missiles, such as sets of darts with metallic points;
- functional educational products, such as electric ovens, irons or other functional products operated at a nominal voltage exceeding 24 V which are sold exclusively for teaching purposes under adult supervision;
- products intended for use for educational purposes in schools and other pedagogical contexts under the surveillance of an adult instructor, such as science equipment;
- electronic equipment, such as personal computers and game consoles, used to access interactive software and their associated peripherals, unless the electronic equipment or the associated peripherals are specifically designed for and targeted at children and have a play value on their own, such as specially designed personal computers, key boards, joy sticks or steering wheels;
- interactive software, intended for leisure and entertainment, such as computer games, and their storage media, such as CDs;
- babies' soothers
- child-appealing luminaires;
- electrical transformers for toys
- fashion accessories for children which are not for use in play;

In addition, this European standard does not apply to the following types of products:

- amusement machines and personal service machines;
- professional **electric toys** installed in public places (such as shopping centres and railway stations);
- products containing heating elements intended for use under the supervision of an adult in a teaching context;
- portable luminaires for children;
- blowers for inflatable activity toys (such as blowers for bouncy castles);
- electric decorative robots
- personal protective equipment including swimming goggles, sunglasses and other eye protectors as well as bicycle and skateboard helmets; 

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 71-1:2014+A1:2018, *Safety of toys — Part 1: Mechanical and physical properties*

EN 50410:2008 *Household and similar electrical appliances — Safety — Particular requirements for decorative robots*

IEC 60068-2-75:2014, *Environmental testing – Part 2-75: Tests – Test Eh: Hammer tests*

IEC TR 60083, *Plugs and socket-outlets for domestic and similar general use standardized in member countries of IEC*

IEC 60086-2: 2015, *Primary batteries – Part 2: Physical and electrical specifications*

IEC 60086 (all parts), *Primary batteries*

IEC 60335-1:2010, *Household and similar electrical appliances – Safety – Part 1: General requirements*

IEC 60335-1:2010/AMD1: 2013

IEC 60335-1:2010/AMD2:2016¹⁾

IEC 60335-2-29:2016, *Household and similar electrical appliances – Safety – Part 2-29: Particular requirements for battery chargers*

IEC 60384-14, *Fixed capacitors for use in electronic equipment – Part 14: Sectional specification – Fixed capacitors for electromagnetic interference suppression and connection to the supply mains*

IEC 60417, *Graphical symbols for use on equipment*

IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code)*

IEC 60529/AMD1:1999

IEC 60529/AMD2:2013²⁾

IEC 60695-2-11, *Fire hazard testing – Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test method for end-products (GWEPT)*

IEC 60695-2-13, *Fire hazard testing – Part 2-13: Glowing/hot-wire based test methods – Glow-wire ignition temperature (GWIT) test method for materials*

IEC 60695-10-2, *Fire hazard testing – Part 10-2: Abnormal heat – Ball pressure test method*

IEC 60695-11-5:2004, *Fire hazard testing – Part 11-5: Test flames – Needle-flame test method – Apparatus, confirmatory test arrangement and guidance*

IEC 60695-11-10, *Fire hazard testing – Part 11-10: Test flames – 50 W horizontal and vertical flame test methods*

IEC 60730 (all parts), *Automatic electrical controls*

1 There exists a consolidated edition 5.2 (2016) that includes edition 5 and its Amendment 1 and Amendment 2.

2 There exists a consolidated edition 2.2 (2013) that includes edition 2 and its Amendment 1 and Amendment 2.

IEC 60730-1:2013, *Automatic electrical controls – Part 1: General requirements*
IEC 60730-1:2013/AMD1:2015³⁾

IEC 60738-1, *Thermistors – Directly heated positive temperature coefficient – Part 1: Generic specification*

IEC 60990:2016, *Methods of measurement of touch current and protective conductor current*

IEC 61000-4-2: 2008, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test*

IEC 61000-4-3:2006, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*
IEC 61000-4-3/AMD1:2007
IEC 61000-4-3/AMD2:2010⁴⁾

IEC 61000-4-4:2012, *Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test*

IEC 61000-4-5:2014, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*

IEC 61000-4-6:2013, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*

IEC 61000-4-11:2004, *Electromagnetic compatibility (EMC) – Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests*

IEC 61000-4-13:2002, *Electromagnetic compatibility (EMC) – Part 4-13: Testing and measurement techniques – Harmonics and interharmonics including mains signalling at a.c. power port, low frequency immunity tests*
IEC 61000-4-13/AMD1:2009
IEC 61000-4-13/AMD2:2015⁵⁾

IEC 61032, *Protection of persons and equipment by enclosures – Probes for verification*

IEC 61058-1:2016, *Switches for appliances – Part 1: General requirements*

IEC 61058-1-1:2016, *Switches for appliances – Part 1-1: Requirements for mechanical switches*

IEC 61058-1-2:2016, *Switches for appliances – Part 1-2: Requirements for electronic switches*

IEC 61180, *High-voltage test techniques for low-voltage equipment – Definitions, test and procedure requirements, test equipment*

IEC 61558-2-7, *Safety of power transformers, power supplies, reactors and similar products – Part 2-7: Particular requirements and tests for transformers and power supplies for toys*

3 There exists a consolidated edition 5.1 (2015) that includes edition 5 and its Amendment 1.

4 There exists a consolidated edition 3.2 (2010) that includes edition 3 and its Amendment 1 and Amendment 2.

5 There exists a consolidated edition 1.2 (2015) that includes edition 1 and its Amendment 1 and Amendment 2.

IEC 61558-2-16, *Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1 100 V – Part 2-16: Particular requirements and tests for switch mode power supply units and transformers for switch mode power supply units*

IEC 62133, *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications*

IEC 62233:2005, *Measurement methods for electromagnetic fields of household appliances and similar apparatus with regard to human exposure*

IEC 62471:2006, *Photobiological safety of lamps and lamp systems*

ISO 3864-1, *Graphical symbols – Safety colours and safety signs – Part 1: Design principles for safety signs and safety markings*

ISO 8124-1:2014, *Safety of toys – Part 1: Safety aspects related to mechanical and physical properties*

ISO 7000, *Graphical symbols for use on equipment – Registered symbols*

ISO 9772, *Cellular plastics – Determination of horizontal burning characteristics of small specimens subjected to a small flame*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

NOTE 1 An Index of the defined terms and definitions in alphabetic order is provided at the end of this publication.

NOTE 2 When the terms “voltage” and “current” are used, they are root mean square (r.m.s). values unless otherwise specified.

3.1 Definitions relating to physical characteristics

3.1.1

dangerous malfunction

unintended operation of the **electric toy** that may impair safety

3.1.2

normal operation

condition under which the **electric toy** is played with as intended or in a foreseeable way when it is energized

3.1.3

rated current

current assigned to the **electric toy** by the manufacturer

Note 1 to entry: If no current is assigned to the **electric toy**, the **rated current** is the current measured when the **electric toy** is supplied at **rated voltage** and operated under **normal operation**.

3.1.4

rated power input

power input assigned to the **electric toy** by the manufacturer

3.1.5

rated voltage

voltage assigned to the **electric toy** by the manufacturer

3.1.6

working voltage

maximum voltage to which the part under consideration is subjected when the **electric toy** is supplied at its **rated voltage** and operating under **normal operation**

Note 1 to entry: The change of voltage resulting from the operation of a switch or failure of a lamp is taken into account. However, the effect of transient voltages is ignored.

3.2 Definitions relating to means of connection

3.2.1

interconnection cord set

assembly consisting of one cord with one non-rewirable plug connector and one non-rewirable connector, intended for the interconnection of the electrical supply from one electrical appliance or equipment to the **electric toy**

3.3 Definitions relating to protection against electric shock

3.3.1

clearance

shortest distance in air between two conductive parts or between a conductive part and the accessible surface

3.3.2

creepage distance

shortest distance along the surface of insulation between two conductive parts or between a conductive part and the accessible surface

3.3.3

functional insulation

insulation between conductive parts of different potential that is necessary only for the proper functioning of the **electric toy**

3.4 Definitions relating to extra-low voltage

3.4.1

battery charger

equipment supplied by mains voltage, the only purpose of which is to recharge batteries

Note 1 to entry: If the batteries can be charged in the **electric toy**, and if the **electric toy** can be operated while the batteries are being charged, the **battery charger** is also considered to be a **transformer for toys** or a **power supply for toys**.

3.4.2

power supply for toys

 power supply incorporating a **transformer for toys** not fixed to, or incorporated in, **electric toys** designed to 193 have a **rated voltage** not exceeding 24 V direct current (d.c.) or 24 V alternating current (a.c.)

Note 1 to entry: **Power supplies for toys** are hereinafter also referred to as **power supplies**. 

3.4.3

safety isolating transformer

transformer, the input winding of which is electrically separated from the output winding by insulation at least equivalent to double insulation or reinforced insulation, which provides a supply at safety extra-low voltage

3.4.4

transformer for toys

independent **safety isolating transformer** designed to supply **electric toys** not fixed to, or incorporated in, **electric toys** designed to have a **rated voltage** not exceeding 24 V a.c.

Note 1 to entry: **Transformers for toys** are hereinafter also referred to as **transformers**.

3.5 Definitions relating to types of toys

3.5.1

constructional set

collection of electric components, **electronic components** or mechanical parts intended to be assembled as an **electric toy** or various **electric toys**

3.5.2

electric toy

product having at least one function dependant on electricity, designed or intended, whether or not exclusively, for use in play by children under 14 years of age

Note 1 to entry: Transformer toys and power supply toys are types of **electric toys**.

3.5.3

experimental set

collection of electric components, **electronic components** or mechanical parts intended to be assembled by a child to demonstrate physical phenomena or other functions

Note 1 to entry: The assembly is not intended to create an **electric toy** or product for practical use.

3.5.4

large and bulky electric toy

electric toy that has a projected base area of more than 0,26 m² or a volume of more than 0,08 m³ calculated without regard to minor appendages or a mass equal to or greater than 4,5 kg

Note 1 to entry: The base area of an **electric toy** having permanently attached legs is the area enclosed by straight lines connecting the outermost edge of each leg of the perimeter.

3.6 Definitions relating to parts of a toy

3.6.1

accessible part

part or surface that can be touched by means of test probe 18 or 19 of  EN 61032:1998 , depending on the relevant age group

Note 1 to entry: Both probes are relevant for **electric toys** intended for children spanning the two age groups.

3.6.2

battery box

separate compartment for containing the batteries that is detachable from the **electric toy**

3.6.3

button battery

small round battery where the overall height is less than the diameter and having an electrochemical system that does not contain lithium

3.6.4

coin battery

small round battery where the overall height is less than the diameter and having an electrochemical system that contains lithium

3.6.5

detachable part

part that can be removed without the aid of a **tool**, part that can be removed by a **tool** supplied with the **electric toy**, unless the **electric toy** is required to be assembled by an adult, or a part that is removed in accordance with the instructions for use even if a **tool** is needed for removal