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Interested committees:

Title: BS EN 60335-2-123 Household and similar electrical appliances - Safety

Part 2-123: Particular requirements for robots

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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

UK Vote

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

Submission of Comments

- **Annotated drafts are not acceptable and will be rejected.**
- All comments should be submitted online at <https://standardsdevelopment.bsigroup.com/>. You will need to register in order to comment.

Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/Figure/ Table/Note	Type of comment	Commend (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



61/7091/CD

COMMITTEE DRAFT (CD)

PROJECT NUMBER:
IEC 60335-2-123 ED1

DATE OF CIRCULATION:
2023-12-22

CLOSING DATE FOR COMMENTS:
2024-03-15

SUPERSEDES DOCUMENTS:
61/6508/NP, 61/6539A/RVN

IEC TC 61 : SAFETY OF HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES

SECRETARIAT:
United States of America

SECRETARY:
Ms Randi Myers

OF INTEREST TO THE FOLLOWING COMMITTEES:

PROPOSED HORIZONTAL STANDARD:



Other TC/SCs are requested to indicate their interest, if any, in this CD to the secretary.

FUNCTIONS CONCERNED:

☐ EMC

☐ ENVIRONMENT

☐ QUALITY ASSURANCE

☒ SAFETY

This document is still under study and subject to change. It should not be used for reference purposes.

Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Recipients of this document are invited to submit, with their comments, notification of any local regulations or technical reasons that may exist and should be considered should this proposal proceed, recognizing that failure to address such requirements could result in the need for new or existing "In Some Countries" clauses. (SEE AC/22/2007 OR NEW GUIDANCE DOC).

TITLE:

Household and similar electrical appliances - Safety - Part 2-123: Particular requirements for robots

NOTE FROM TC/SC OFFICERS:

This document is circulated according to the decisions taken at the TC 61 meetings at the 2022 Web Series-I – see 61/6665/RM

61/6508/NP and 61/6539A/RVN in 61/6665/RM, item 18

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –**Part 2-123: Particular requirements for robots****FOREWORD**

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IEC 60335-2-123 has been prepared by IEC technical committee 61: Safety of household and similar electrical appliances. It is an International Standard.

The text of this International Standard is based on the following documents:

Draft	Report on voting
61/XX/FDIS	61/XX/RVD

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

The language used for the development of this International Standard is English.

This standard has been drafted in accordance with the ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

95 A list of all parts in the IEC 60335 series, published under the general title Household and
96 similar electrical appliances – Safety, can be found on the IEC website.

97 This part 2 is to be used in conjunction with the latest edition of IEC 60335-1 and its amendments unless that edition
98 precludes it; in that case, the latest edition that does not preclude it is used. It was established on the basis of the
99 sixth edition (2020) of that standard.

100 NOTE 1 When “Part 1” is mentioned in this standard, it refers to IEC 60335-1.

101 This part 2 supplements or modifies the corresponding clauses in IEC 60335-1, so as to convert that
102 publication into the IEC standard: Particular requirements for robots.

103 When a particular subclause of Part 1 is not mentioned in this part 2, that subclause applies as far as is
104 reasonable. When this standard states “*addition*”, “*modification*” or “*replacement*”, the relevant text in
105 Part 1 is to be adapted accordingly.

106 NOTE 2 The following numbering system is used:

- 107 – subclauses, tables and figures that are numbered starting from 101 are additional to those in Part 1;
- 108 – unless notes are in a new subclause or involve notes in Part 1, they are numbered starting from 101, including
109 those in a replaced clause or subclause;
- 110 – additional annexes are lettered AA, BB, etc.

111 NOTE 3 The following print types are used:

- 112 – requirements: in roman type;
- 113 – *test specifications: in italic type;*
- 114 – notes: in small roman type.

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

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

- 120 • reconfirmed,
- 121 • withdrawn,
- 122 • replaced by a revised edition, or
- 123 • amended.

124 The National Committees are requested to note that for this standard the stability date
125 is 202x.

126 THIS TEXT IS INCLUDED FOR THE INFORMATION OF THE NATIONAL COMMITTEES AND WILL BE DELETED
127 AT THE PUBLICATION STAGE.

128 NOTE 4 The attention of National Committees is drawn to the fact that equipment manufacturers and testing
129 organizations may need a transitional period following publication of a new, amended or revised IEC publication in
130 which to make products in accordance with the new requirements and to equip themselves for conducting new or
131 revised tests.

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

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 persons.

Guidance documents concerning the application of the safety requirements for appliances can be accessed via TC 61 supporting documents on the IEC website

<https://www.iec.ch/tc61/supportingdocuments>

This information is given for the convenience of users of this International Standard and does not constitute a replacement for the normative text in this standard.

This standard recognizes the internationally accepted level of protection against hazards such as electrical, mechanical, thermal, fire and radiation of appliances when operated as in normal use taking into account the manufacturer's instructions. It also covers abnormal situations that can be expected in practice and takes into account the way in which electromagnetic phenomena can affect the safe operation of appliances.

This standard takes into account the requirements of IEC 60364 as far as possible so that there is compatibility with the wiring rules when the appliance is connected to the supply mains. However, national wiring rules may differ.

If an appliance within the scope of this standard also incorporates functions that are covered by another part 2 of IEC 60335, the relevant part 2 is applied to each function separately, as far as is reasonable. If applicable, the influence of one function on the other is taken into account.

When a part 2 standard does not include additional requirements to cover hazards dealt with in Part 1, Part 1 applies.

NOTE 1 This means that the technical committees responsible for the part 2 standards have determined that it is not necessary to specify particular requirements for the appliance in question over and above the general requirements.

This standard is a product family standard dealing with the safety of appliances and takes precedence over horizontal and generic standards covering the same subject.

NOTE 2 Horizontal publications, basic safety publications and group safety publications covering a hazard are not applicable since they have been taken into consideration when developing the general and particular requirements for the IEC 60335 series of standards.

An appliance that complies with the text of this standard will not necessarily be considered 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.

An appliance employing materials or having forms of construction differing from those detailed in the requirements of this standard may be examined and tested according to the intent of the requirements and, if found to be substantially equivalent, may be considered to comply with the standard.

NOTE 3 Standards dealing with non-safety aspects of household appliances are:

- IEC standards published by TC 59 concerning methods of measuring performance;
- CISPR 11, CISPR 14-1 and relevant IEC 61000-3 series standards concerning electromagnetic emissions;
- CISPR 14-2 concerning electromagnetic immunity;
- IEC standards published by TC 111 concerning environmental matters.

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY – Part 2-123: Particular requirements for robots

1 Scope

This clause of Part 1 is replaced by the following.

This part of IEC 60335 deals with the reasonably foreseeable hazards and safety presented by the application of robotic technology to appliances for household and similar purposes under IEC TC 61 that are encountered by all persons.

These resulting **robots** and **mobile robots** intended for household and similar purposes, have a **rated voltage** being not more than 250 V for single-phase appliances and 480 V for other appliances, including direct current (DC) supplied appliances and **battery-operated appliances**. This standard covers appliances for indoor use.

However, in general, it does not take into account:

- persons (including children) whose
 - physical, sensory or mental capabilities; or
 - lack of experience and knowledge
- prevents them from using the appliance safely without supervision or instruction;
- children playing with the appliance.

The Part 2s of the series IEC 60335 may include additional requirements due to the specific function performed by the appliance.

NOTE 101 Other standards can be applicable for some functions such as audio/video functions.

This standard does not apply to

- vacuum cleaners and water-suction cleaning appliances and automatic battery-operated cleaners for household use (IEC 60335-2-2);
- battery chargers (IEC 60335-2-29);
- particular requirements for robotic battery powered electrical lawnmowers (IEC 60335-2-107);
- appliances for medical purposes (IEC 60601-1);
- electric toys (IEC 62115);
- automatic floor treatment machines for commercial use (IEC 63327);
- driverless industrial trucks (ISO 3691-4);
- robots and robotic devices: Safety requirements of personal care robots (ISO 13482);
- electric motor-operated hand-held tools, transportable tools and lawn and garden machinery (IEC 60745 series, IEC 61029 series, IEC 62841 series);
- machines designed for use in corrosive or explosive environments (dust, vapour or gas; IEC 60079).

2 Normative references

This clause of Part 1 is applicable except as follows.

Addition:

IEC 63327, *Automatic floor treatment machines for commercial use – Particular requirements*

IEC 62849, *Performance evaluation methods of mobile household robots*

220 ISO 8373, *Robots and robotic devices – Vocabulary*

221 ISO 13482, *Robots and robotic devices – Safety requirements for personal care robots*

222 ISO 13856-3, *Safety of machinery — Pressure-sensitive protective devices — Part 3: General*
223 *principles for design and testing of pressure-sensitive bumpers, plates, wires and similar*
224 *devices.*

225 ISO 13857:15, *Safety of machinery — Safety distances to prevent hazard zones being reached*
226 *by upper and lower limbs*

227 ISO 18646-1:2016, *Robotics – Performance criteria and related test methods for service robots*
228 *– Part 1: Locomotion for wheeled robots*

229 3 Terms and definitions

230 This clause of Part 1 is applicable except as follows.

231 3.1 Definitions relating to physical characteristics

232

233 3.1.9

234 normal operation

235 operation of the **docking station** under the following conditions:

236 The **type 3 mobile robot** is in direct contact / connected / docked onto the **docking station**,
237 all possible functions of the **docking station** that can be operated at the same time running in
238 accordance with the manufacturer's instructions.

239 [Source: Adapted from IEC 63327, normative Annex GG, 3.1.9]

240

241 NOTE OF THE SECRETARY: IEC General Secretariat asks that definitions in an Annex are transferred
242 to the main body of the standard unless the annex refers to a different standard in which the definitions
243 need to be modified.

244 3.1.101

245 rated manual speed

246 maximum speed of the appliance during operation in **manual mode**

247 [Source: Adapted from IEC 63327, 3.208, modified – "machine" has been changed to
248 "appliance"]

249 3.1.102

250 rated automatic speed

251 maximum speed of the appliance during operation in **automatic mode** in **open space**

252 [Source: Adapted from IEC 63327, 3.209, modified – "machine" has been changed to "appliance"]

253 3.1.103

254 stopping distance

255 maximum distance travelled by the appliance between the initiation of the stop and the complete
256 standstill

257 Note 1 to entry: The stopping distance in 20.103 includes appliance reaction time.

258 [SOURCE: ISO 18646-1:2016, 3.10, modified – "mobile platform" has been changed to "appliance" and
259 "full stop of the mobile platform" has been changed to "complete standstill"]

260 3.1.104

261 stopping zone

262 fixed or variable-sized zone in which the appliance has the capabilities to avoid an object

263 Note 1 to entry: See Figure 102.

[Source: Adapted from IEC 63327, 3.215, modified – "machine" has been changed to "appliance"]

3.1.105

contact zone

boundary in which the appliance is assumed to be in contact with the object, and the allowable motion of the appliance could be hazardous at that boundary.

Note 1 to entry: See Figure 102.

Note 2 to entry: Hazardous exposed moving parts are included in the **contact zone**.

[Source: Adapted from IEC 63327, 3.216, modified – "machine" has been changed to "appliance", and "side brushes" modified to "parts"]

3.1.106

confined space

area in which the distance from the nearest continuous wall or obstacle is less than 0,5 m from the **appliance travel width** parallel to the direction of motion

Note 1 to entry: See Figure 101.

[Source: Adapted from IEC 63327, 3.218]

3.1.107

open space

area that is not considered to be a **confined space**

[Source: Adapted from IEC 63327, 3.217]

3.1.108

appliance travel width

the minimum width the appliance can pass through to indicate the maneuverability of the appliance during travel

Note 1 to entry: It does not indicate the effective width of the appliance.

[SOURCE: Adapted from IEC 62885-9:2019, Clause 7, modified – Note to entry has been added and "transport" changed to "travel".]

3.1.109

gross vehicle weight

GVW

maximum allowable fully laden weight of the appliance and its payload, as ready for use

[Source: Adapted from IEC 60335-2-72, 3.114, modified – "machine" has been changed to "appliance"]

3.5 Definitions relating to types of appliances

3.5.101

robot

appliances for household and similar purposes with a degree of autonomy, necessary to perform its intended tasks

Note 1 to entry: Operating includes robot body movement in two or more axis. This appliance is not foreseen to travel by itself in the space, i.e. it is static.

Note 2 to entry: Appliances which perform their intended function automatically inside their enclosure without traveling, such as automatic coffee maker and automatic washing machine, are not considered **robots**.

[Source: Adapted from IEC 62849, 3.1 (ISO 13482, 3.2)]

3.5.102

mobile robot

robot able to travel by itself.

[Source: Adapted from ISO 13482, 3.5]

3.5.102.1

type 0 mobile robot

mobile robot having

- a maximum height not exceeding 200 mm and
- a maximum **rated automatic speed** not exceeding 1,5 km/h and
- a mass during **normal operation** not exceeding 5 kg.

Note 1 to entry: Only 20.105 for **type 1 mobile robots** applies to **type 0 mobile robots**.

3.5.102.2

type 1 mobile robot

mobile robot having

- a maximum **rated automatic speed** not exceeding 1,5 km/h and
- a mass during **normal operation** not exceeding 20 kg.

[Source: Adapted from IEC 63327, 3.202+3.203]

3.5.102.3

type 2 mobile robot

mobile robot having

- a maximum **rated automatic speed** of more than 1,5 km/h however not exceeding 3 km/h and
- a mass during **normal operation** not exceeding 20 kg.

[Source: Adapted from IEC 63327, 3.202+3.203]

3.5.102.4

type 3 mobile robot

mobile robot other than **type 1** and **type 2 mobile robots**

[Source: Adapted from IEC 63327, 3.202+3.203]

3.6 Definitions relating to parts of an appliance

3.6.101

access control

security measure enabling the user to gain access to the control of the appliance

Note 1 to entry: It includes, but is not limited to, a key-protected control device.

[Source: Adapted from IEC 63327, 3.210, modified – "machine" has been changed to "appliance" and "operator" to "user"]

3.6.102

docking station

unit that may provide one or more of the following functions for the **mobile robot**:

- manual or automatic battery charging facilities,
- AC and/or DC power supply,
- filling or emptying containers in the appliance,
- communication connections,
- navigation information

Note 1 to entry: A **docking station** is also known as a base unit.

[Source: Adapted from IEC 63327, 3.220]

3.6.103

traction drive

system used to propel the appliance, e.g., by powered wheels.

Note 1 to entry: Traction by the effect of rotating brushes is not included.

[Source: Adapted from IEC 60335-2-72, 3.101]

3.8 Definitions relating to miscellaneous matters

3.8.101

manual mode

control state that allows for direct control by a human

Note 1 to entry: Sometimes referred to as tech mode when program points and **robot** and **mobile robot** attributes are set.

[SOURCE: ISO 8373:2021, 6.13.1, modified – "mobile robot" has been added to the Note to entry]

3.8.102

automatic mode

operating mode in which the appliance accomplishes its intended tasks without direct human intervention

[Source: Adapted from IEC 63327, 3.206, modified – "machine" has been changed to "appliance" and "assigned mission" to "foreseen function".]

3.8.103

locked state

condition in which the driving system is being prevented from moving with a locking mechanism that can be unlocked by action of the authorized user only

Note 1 to entry: A locking mechanism can be the traction drive or the service brake.

[Source: Adapted from IEC 63327, 3.207, modified – "wheels" has been changed to "system" and "operator" to "user".]

3.8.104

stop category 0

stopping by immediate removal of power to the appliance actuators (i.e., in case of an uncontrolled stop)

Note 1 to entry: It is understood that user action will be required to re-enable power to the actuators.

[SOURCE: IEC 60204-1:2016, 9.2.2, modified – Note to entry has been added, "machine" has been changed to "appliance" and "operator" to "user", and "in case of" is added.]

3.8.105

stop category 1

controlled stop with power available to the appliance actuators to achieve the stop and then removal of power when the stop is achieved

Note 1 to entry: It is understood that user action will be required to re-enable power to the actuators.

[SOURCE: Adapted from IEC 60204-1:2016, 9.2.2, modified – Note to entry has been added, and "machine" has been changed to "appliance" and "operator" to "user"]

3.8.106

stop category 2

controlled stop with power left available to the appliance actuators

Note 1 to entry: It is understood that user action is not required to re-enable power to the actuators.

[SOURCE: Adapted from IEC 60204-1:2016, 9.2.2, modified – "remaining" has been changed to "left" and the note to entry has been added, and "machine" has been changed to "appliance" and "operator" to "user"]

3.8.107

slope

inclined plane with a gradient greater than 2 % but not exceeding 20 %.

[Source: Adapted from IEC 60335-2-72, 3.117]

Note 1 to entry: Window cleaners are not part of the requirements on **slopes**.

3.8.108

maintenance operation

operation performed by the user in the **maintenance area**, such as unloading or reloading the **docking station**, cleaning and setting of controls or similar operations

[Source: Adapted from IEC 63327, normative Annex GG, 3.8.5]

3.8.109

maintenance area

area for maintenance purposes, where access can only be gained by the use of an access key

Note 1 to entry: An access key means a key or other means that gives access to the maintenance area. "Other means" includes a tool or operation by codes or signals produced by optical or electromagnetic sources.

[Source: Adapted from IEC 63327, normative Annex GG, GG.3.203]

3.8.110

override key

key or other means that is used to render an interlock inoperative

[Source: Adapted from IEC 63327, normative Annex GG, GG.3.204]

3.9 Definitions relating to electronic circuits

3.9.101

control system

set of hardware and software components implementing logic and power control, and other functions which allow monitoring and controlling of an appliance and its interaction and communication with other objects and humans in the environment (equipment and users).

[SOURCE: ISO 8373:2021, 3.4 modified – "robot" has been changed to "appliance"]

4 General requirements

This clause of Part 1 is replaced by following.

Robots and mobile robots shall not cause danger to persons or surroundings during normal use, installation, adjusting, maintenance, cleaning, or transportation, even in the event of carelessness.

In general, this principle is achieved by fulfilling the relevant requirements specified in this standard and compliance is checked by carrying out all the relevant tests.

5 General conditions for the tests

This clause of Part 1 is applicable except as follows.

5.1 Addition:

The tests of this standard shall be performed after disabling **remote communication**.

5.101

Test obstacles and lighting conditions for **mobile robots** are given below.

The following test obstacles, taken from ISO 13856-3, shall be covered in black felt or coarse fabric with a reflectance between 5 % and 10%:

- a) Obstacle 1 - a cylinder with a diameter of 200 mm and a length of 600 mm, placed horizontally; and
- b) Obstacle 2 - a cylinder with a diameter of 70 mm and a height of 400 mm, placed vertically