

INTERNATIONAL STANDARD



**Household and similar electrical appliances – Safety –
Part 2-95: Particular requirements for drives for vertically moving garage doors
for residential use**



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2019 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22,000 terminological entries in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary

67 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

IECNORM.COM : Click to view the full text of IEC 60352-95:2019 RLV



IEC 60335-2-95

Edition 4.0 2019-12
REDLINE VERSION

INTERNATIONAL STANDARD



**Household and similar electrical appliances – Safety –
Part 2-95: Particular requirements for drives for vertically moving garage doors
for residential use**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 13.120; 29.120.01; 91.090

ISBN 978-2-8322-7723-2

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD	3
INTRODUCTION	6
1 Scope	7
2 Normative references	7
3 Terms and definitions	7
4 General requirement	8
5 General conditions for the tests	8
6 Classification	9
7 Marking and instructions	9
8 Protection against access to live parts	11
9 Starting of motor-operated appliances	11
10 Power input and current	11
11 Heating	12
12 Void	12
13 Leakage current and electric strength at operating temperature	12
14 Transient overvoltages	12
15 Moisture resistance	12
16 Leakage current and electric strength	12
17 Overload protection of transformers and associated circuits	13
18 Endurance	13
19 Abnormal operation	13
20 Stability and mechanical hazards	13
21 Mechanical strength	18
22 Construction	18
23 Internal wiring	19
24 Components	20
25 Supply connection and external flexible cords	20
26 Terminals for external conductors	20
27 Provision for earthing	20
28 Screws and connections	20
29 Clearances, creepage distances and solid insulation	20
30 Resistance to heat and fire	21
31 Resistance to rusting	21
32 Radiation, toxicity and similar hazards	21
Annexes	24
Annex R (normative) Software evaluation	25
Bibliography	26
Figure 101 – Examples of types of garage doors	22
Figure 102 – Example of pictogram warning against child entrapment	23

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES –
SAFETY –****Part 2-95: Particular requirements for drives for vertically
moving garage doors for residential use**

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

International Standard IEC 60335-2-95 has been prepared by IEC technical committee 61: Safety of household and similar electrical appliances.

This fourth edition cancels and replaces the third edition published in 2011, Amendment 1: 2015 and Amendment 2:2017. This edition constitutes a technical revision.

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

- a) the text has been aligned with edition 5.2 of Part 1;
- b) reference to IEC 60335-2-97 and IEC 60335-2-103 has been revised to correctly state their titles (Clause 1);
- c) specific instruction statements have been revised to separate them from information to be provided (7.12);
- d) the compliance criteria for the tests of 19.11.2 and 19.11.3 has been modified (19.13);
- e) the tests for class III appliances and parts of class III constructions have been modified (25.8, 25.15).

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

FDIS	Report on voting
61/5937/FDIS	61/5946/RVD

Full information on the voting for the approval of this International 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.

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

This part 2 is to be used in conjunction with the latest edition of IEC 60335-1 and its amendments. It was established on the basis of the fifth edition (2010) of that standard.

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

This part 2 supplements or modifies the corresponding clauses in IEC 60335-1, so as to convert that publication into the IEC standard: Safety requirements for drives for vertically moving garage doors for residential use.

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

NOTE 2 The following numbering system is used:

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

NOTE 3 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.

The committee has decided that the contents of the base publication and its amendments 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 4 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 following differences exist in the countries indicated below.

- 6.1: Class 0I appliances are allowed (Japan).
- 7.1: Additional markings are required (USA).
- 7.12.1: Additional warnings and instructions are required (USA).
- 11.7: The test conditions are different (USA).
- 19.9: A running overload test is carried out (USA).
- 20.101: The test is not carried out (USA).

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 persons.

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 and generic standards 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. For example, in the case of temperature requirements for surfaces on many appliances, generic standards, such as ISO 13732-1 for hot surfaces, are not applicable in addition to Part 1 or part 2 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.

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-95: Particular requirements for drives for vertically moving garage doors for residential use

1 Scope

This clause of Part 1 is replaced by the following.

This part of IEC 60335 deals with the safety of electric **drives** for garage doors for residential use that open and close in a vertical direction, the **rated voltage** of the **drives** being not more than 250 V for single-phase appliances and 480 V for other appliances. It also covers the hazards associated with the movement of these electrically driven garage doors.

NOTE 101 Examples of garage doors are shown in Figure 101.

NOTE 102 The **drive** may be supplied with a garage door.

NOTE 103 This standard also applies to **entrapment protection devices** for use with **drives**. It does not cover hazards related to the mechanisms of the door itself.

As far as is practicable, this standard deals with the common hazards presented by appliances that are encountered by all persons in and around the home. However, in general, it does not take into account playing with the appliance by young children, but recognizes that children may be in the vicinity of the garage door.

NOTE 104 Attention is drawn to the fact that in many countries additional requirements are specified by the national authorities responsible for the protection of labour and similar authorities.

NOTE 105 This standard does not apply to **drives**

- for **rolling** shutters, awnings, blinds and similar equipment (IEC 60335-2-97);
- for **garage doors for use by more than one household** gates, doors and windows (IEC 60335-2-103);
- for commercial and industrial purposes;
- intended to be used in locations where special conditions prevail, such as the presence of a corrosive or explosive atmosphere (dust, vapour or gas).

2 Normative references

This clause of Part 1 is applicable except as follows.

Addition:

IEC 60068-2-52:2017, *Environmental testing – Part 2-52: Tests – Test Kb: Salt mist, cyclic (sodium chloride solution)*

3 Terms and definitions

This clause of Part 1 is applicable except as follows.

3.1 Definitions relating to physical characteristics

3.1.9 Replacement:

normal operation

operation of the **drive** under the following conditions:

Drives supplied without a door are operated with their **rated load**.

Drives supplied with a door are operated with the door installed in accordance with the instructions.

~~3.105~~ 3.1.101

rated load

force or torque assigned to the **drive** by the manufacturer

3.5 Definitions relating to types of appliances

3.5.101

drive

motor and other components that control the movement of the door

Note 1 to entry: Examples of components are gears, controls, brakes and **entrapment protection systems**.

~~3.103~~ 3.5.102

automatic drive

drive that operates the door in at least one direction without intentional activation by the user

3.7 Definitions relating to safety components

~~3.104~~ 3.7.101

biased-off switch

switch that automatically returns to the **off position** when its actuating member is released

3.7.102

entrapment protection system

part of the **drive** that protects against trapping which could result in the human body being squeezed or crushed by the door

Note 1 to entry: Trapping in the garage is covered by the manual release of 20.109.

Note 2 to entry: An **entrapment protection system** may be incorporated in the motor assembly or may be installed separately. It may consist of one or more devices, such as pressure sensitive edges, passive infrared, active light sensing devices or a **biased-off switch**.

4 General requirement

This clause of Part 1 is applicable.

5 General conditions for the tests

This clause of Part 1 is applicable except as follows.

5.2 Addition:

*When a test has to be carried out with a door, the door specified for installation with the **drive** that gives the most unfavourable conditions for the test is used. An artificial load may be used to simulate the door for some of the tests. The **drive** is adjusted in accordance with the instructions.*

5.5 Addition:

Wicket doors are kept closed during the tests.

6 Classification

This clause of Part 1 is applicable except as follows.

6.1 Modification:

Drives shall be **class I, class II** or **class III**.

6.2 Addition:

Drives intended to be exposed to outdoor conditions shall be at least IPX4.

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.1 Modification:

Drives shall be marked with the **rated power input**.

Addition:

Drives supplied without a door shall be marked with the **rated load** in N or in Nm.

7.12 Addition:

The instructions shall state the substance of the following:

WARNING: Important safety instructions. It is important for the safety of persons to follow all instructions. Save these instructions.

The instructions shall include the substance of the following:

- do not allow children to play with door controls. Keep remote controls away from children;
- watch the moving door and keep people away until the door is completely opened or closed (not necessary for **automatic drives**);
- take care when operating the manual release since an open door may fall rapidly due to weak or broken springs, or being out of balance;
- frequently examine the installation, in particular check cables, springs and mountings for signs of wear, damage or imbalance. Do not use if repair or adjustment is needed since a fault in the installation or an incorrectly balanced door may cause injury;
- each month check that the drive reverses when the door contacts a 40 mm high object placed on the floor. Adjust if necessary and recheck since an incorrect adjustment may present a hazard;
- disconnect the supply when cleaning or carrying out other maintenance.

The instructions shall include the following information:

- details on how to use the manual release;
- information concerning the adjustment of the door and **drive** (when applicable).

Instructions for **automatic drives** shall state the substance of the following:

WARNING: Automatic door – The door may operate unexpectedly, therefore do not allow anything to stay in the path of the door.

7.12.1 Addition:

The installation instructions shall state the substance of the following:

WARNING: Important safety instructions. Follow all instructions since incorrect installation can lead to severe injury.

The installation instructions shall include details for the installation of the **drive** and its associated components.

For **drives** supplied without a door, the installation instructions shall indicate the type, size and mass of doors for which the **drive** is intended to be used.

The installation instructions shall include the substance of the following:

- before installing the drive, remove all unnecessary ropes or chains and disable any equipment, such as locks, not needed for powered operation;
- before installing the drive, check that the door is in good mechanical condition, correctly balanced and opens and closes properly;
- install the actuating member for the manual release at a height less than 1,8 m;
- install any fixed control at a height of at least 1,5 m and within sight of the door but away from moving parts;

NOTE 101 It is not required to specify a minimum height for key-operated switches.

- permanently fix the labels warning against entrapment in a prominent place or near any fixed controls;
- permanently fix the label concerning the manual release adjacent to its actuating member;
- after installation, ensure that the mechanism is properly adjusted and that the drive reverses when the door contacts a 40 mm high object placed on the floor.
- ~~– necessary information for the safe handling of a drive weighing more than 20 kg. This information shall describe how to use the handling means, such as hooks and ropes;~~
- the drive must not be used with a door incorporating a wicket door (unless the drive cannot be operated with the wicket door open);
- after installation, ensure that parts of the door do not extend over public footpaths or roads.

The instructions shall include necessary information for the safe handling of a **drive** weighing more than 20 kg. This information shall describe how to use the handling means, such as hooks and ropes.

7.15 Addition:

The markings shall also be provided with the instructions. In addition, the marking relevant to name, trademark or identification mark, of the manufacturer or responsible vendor and the model or type reference can also be retrieved from a label, such as a matrix barcode, visible on the appliance after installation.

7.101 Drives shall be supplied with a label suitable for permanent fixing. For **automatic drives**, the label shall state the substance of the following:

WARNING: Automatic drive – Keep away from the area of the door since it may operate unexpectedly.

For other **drives**, the label shall include a warning sign having a height of at least 60 mm. The label shall also include the substance of the following:

WARNING: Keep children away when the door is moving.

NOTE An example of a suitable warning sign is shown in Figure 102.

Compliance is checked by inspection and measurement.

7.102 Drives that use contact sensing as an **entrapment protection system** shall be supplied with a label that states the substance of the following:

WARNING: Risk of entrapment – Regularly check and, if necessary, adjust to ensure that, when the door contacts a 40 mm high object placed on the floor, the door reverses or the object can be freed.

Compliance is checked by inspection.

7.103 Drives shall be supplied with a label suitable for permanent fixing that describes how to use the manual release.

Compliance is checked by inspection.

7.104 If the **drive** is intended to be installed by the user, the packaging shall indicate the type of door, including its size and mass, that the **drive** is intended to operate and, if applicable, that the **drive**

- is intended to be installed at least 2,5 m above the floor or other access level;
- can be used with doors having openings greater than 50 mm in diameter;
- is intended for automatic operation.

Compliance is checked by inspection.

8 Protection against access to live parts

This clause of Part 1 is applicable except as follows.

8.2 Modification:

Basic insulation and parts separated from **live parts** by **basic insulation** may be touched during adjustment, if a **tool** is needed to gain access to the adjustment means.

9 Starting of motor-operated appliances

This clause of Part 1 is not applicable.

10 Power input and current

This clause of Part 1 is applicable except as follows.

10.1 Modification:

Instead of determining the mean value, the maximum value of power input is determined, the effect of inrush currents being ignored.

10.2 Modification:

Instead of determining the mean value, the maximum value of the current is determined, inrush currents being ignored.

11 Heating

This clause of Part 1 is applicable except as follows.

11.7 Replacement:

Drives for continuous operation are operated for consecutive cycles until steady conditions are established.

Automatic drives are operated without rest periods for 3 cycles based on the maximum size of door the **drive** is intended to operate or 4 min, whichever is longer.

Other **drives** are operated as follows:

- **drives** supplied without a door are operated without rest periods for a minimum of 2 min unless the rated operating time is longer;
- **drives** supplied with a door are operated without rest periods for 3 cycles.

12 Void

13 Leakage current and electric strength at operating temperature

This clause of Part 1 is applicable.

14 Transient overvoltages

This clause of Part 1 is applicable.

15 Moisture resistance

This clause of Part 1 is applicable except as follows.

15.1.1 Addition:

Parts of **drives** intended to be exposed to outdoor conditions are subjected to the tests specified for IPX4 appliances.

15.1.2 Addition:

IPX4 tubular **drives** are installed in a tube that is open at both ends and has the largest diameter specified in the instructions. The tube has a length twice that of the motor and is mounted on a support as in normal use. The support is rotated at a speed of 1 r/min.

16 Leakage current and electric strength

This clause of Part 1 is applicable.

17 Overload protection of transformers and associated circuits

This clause of Part 1 is applicable.

18 Endurance

This clause of Part 1 is not applicable.

19 Abnormal operation

This clause of Part 1 is applicable except as follows.

19.1 Addition:

Drives are also subjected to the test of 19.101.

19.9 Not applicable.

19.10 Addition:

For **drives** having a manual release, the test is repeated with the **drive** released.

The test is carried out for one cycle of operation if this is longer than 1 min.

19.13 Addition:

~~For each fault condition in 19.11.2, if the appliance is still operating, it shall comply with 20.102 to 20.106.~~

*If for the tests in 19.11.2 and 19.11.3, the **drive** can be operated when any of the fault conditions are simulated, the tests of 20.101 to 20.106 are carried out, the **drive**, however, being supplied at **rated voltage**.*

*After each test it shall stop with the **driven part** in a safe position after a maximum of one cycle of operation, or if the **drive** can still be operated normally it shall comply with the requirements of 20.101 to 20.104.*

19.101 Drives, other than those for continuous operation, are supplied at **rated voltage** and operated continuously under **normal operation**.

20 Stability and mechanical hazards

This clause of Part 1 is applicable except as follows.

20.2 Addition:

Moving parts of **drives** intended to be installed at a height of at least 2,5 m above the ground are considered to be positioned so that adequate protection is provided.

Addition:

Chains moving at less than 0,2 m/s are not considered to be dangerous moving parts.

20.101 Drives shall prevent doors from closing unexpectedly during normal use.

Compliance is checked by the following test.

*The **drive** is supplied at **rated voltage** but is not operated. It is loaded with 1,2 times the **rated load** applied for 30 min. If the **drive** is supplied with a door, the load is applied to the door and is equal to the highest force exerted by it. The highest force is determined with the door in the most unfavourable position, the **drive** not being energized. Automatic operation of **automatic drives** is rendered inoperative.*

There shall be no movement except for removal of any play in the system.

*The test is repeated with the **drive** supplied at 0,85 times **rated voltage** and with the supply disconnected.*

20.102 Drives controlled by a **biased-off switch** shall stop when the actuating member of the switch is released.

Compliance is checked by the following test.

*The **drive** is installed with a door and supplied at the most unfavourable voltage between 0,94 times and 1,06 times the **rated voltage**. It is operated to close the door. When the actuating member of the switch is released,*

- if the closing force exerted by the door does not exceeds 150 N, as measured in 20.104.1, the bottom edge of the door shall stop;*
- if the closing force exerted by the door exceeds 150 N, as measured in 20.104.1, the bottom edge of the door shall stop before it has travelled more than 50 mm vertically.*

The test is repeated during the opening movement of the door.

20.103 Drives incorporating an **entrapment protection system** with sensing devices which prevent the door coming into contact with an obstacle shall not cause injury resulting from a moving door.

Compliance is checked by the following test.

*The **drive** is installed with a door, the force exerted by the **drive** is set at the maximum value according to the instructions and the **drive** is supplied at the most unfavourable voltage between 0,94 times and 1,06 times the **rated voltage**.*

*An obstacle having dimensions of approximately 80 mm × 300 mm and a height of 100 mm is placed on the ground and centrally along its 300 mm length across the door opening. The **drive** is operated to close the door from heights of 100 mm, 1 000 mm and the fully open position of the door. The door shall not move or only move in the opening direction.*

NOTE The obstacle is normally made of rough wood and painted white but other materials and colors ~~may~~ can be used to simulate the most unfavourable conditions.

*The obstacle is positioned centrally in the door opening and is then raised in increments up to 300 mm from the height of the door, but not higher than 2,5 m. At each increment, the **drive** is operated to close the door. The door shall stop within 50 mm or reverse its movement without contacting the obstacle.*

A cylindrical obstacle, having a diameter of 50 mm and a length of 850 mm, is suspended centrally in the door opening. It is suspended vertically with the upper end at a height of 900 mm above the ground.

The **drive** is operated to close the door and the cylinder is swung across the door opening from an angle of 45°. The **entrapment protection system** shall cause the door to reverse its movement.

The test is repeated from the fully open position with the obstacle positioned at 100 mm from each end of the door opening in turn.

During the tests, any **biased-off switch** is held closed.

20.104 Drives incorporating an **entrapment protection system** with sensing devices which rely on the door contacting an obstacle shall not cause injury resulting from a moving door.

Compliance is checked by the test of 20.104.1. ~~For automatic drives~~ If the **drive** is an **automatic drive**, or a **drive** that operates the **driven part** in at least one direction by a command that can be initiated via a telecommunication or communication network, and for **drives** with a closing force exceeding 400 N, compliance is also checked by the test of 20.104.2 for a closing movement.

The **drive** is installed with a door, the force exerted by the **drive** is set at the maximum value according to the instructions and the **drive** is supplied at the most unfavorable voltage between 0,94 times and 1,06 times the **rated voltage**.

During the tests, any **biased-off switch** is held closed.

20.104.1 Any non-contact **entrapment protection system** is rendered inoperative.

The **drive** is operated to close the door from the fully open position and the **entrapment protection system** shall limit the vertical component of the average closing force to

- 150 N during the first 5 s after the force has exceeded 25 N and
- 25 N thereafter;

or

- 400 N during the first 0,75 s after the force has exceeded 150 N,
- 150 N during a further period of 4,25 s and
- 25 N thereafter;

or

- 800 N during the first 2 s after the force has exceeded 150 N for doors that do not swing outward,
- 600 N during the first 2 s after the force has exceeded 150 N for doors that swing outward,
- 150 N during a further period of 3 s and
- 25 N thereafter.

The force is measured by means of an instrument that incorporates a rigid plate having a diameter of 80 mm and a spring having a ratio of 500 N/mm $\pm$ 50 N/mm. The spring acts on a sensing element that is connected to an amplifier having a rise and fall time not exceeding 5 ms. The measuring instrument shall be accurate to within 5 %.

The force is measured on the bottom edge of the door at the following heights above the ground:

- 50 mm;
- 300 mm;

- 500 mm;
- 2 500 mm, or 300 mm below the maximum opening height of the door if this is less than 2 800 mm.

At each height, the force is measured at the following locations:

- in the centre of the bottom edge of the door;
- 200 mm from each end of the bottom edge of the door.

The test is carried out three times and the arithmetic average closing force is calculated for each location.

NOTE The door ~~may~~ can reverse its movement after contacting the obstacle.

20.104.2 An obstacle having dimensions of approximately 80 mm × 300 mm and a height of 100 mm is placed on the ground and centrally along its 300 mm length across the door opening. The **drive** is operated to close the door from heights of 100 mm, 1 000 mm and the fully open position of the door. The door shall not move or only move in the opening direction.

The test is repeated from the fully open position with the obstacle positioned at 100 mm from each end of the door opening in turn.

A cylindrical obstacle, having a diameter of 50 mm and a length of 850 mm, is suspended centrally in the door opening. It is suspended vertically with the upper end at a height of 900 mm above the ground.

The **drive** is operated to close the door and the cylinder is swung across the door opening from an angle of 45°. The **entrapment protection system** shall cause the door to reverse its movement.

20.105 Drives shall prevent entrapment in the opening direction.

Compliance is checked by the following test.

The force exerted by the **drive** is set at the maximum value according to the instructions. A test piece having dimensions of approximately 200 mm × 300 mm, a height of 700 mm and a mass of 20 kg ± 0,5 kg is fixed centrally to the outside of the door, with the 300 mm edge adjacent to the bottom edge of the door.

The **drive** is supplied at the most unfavorable voltage between 0,94 times and 1,06 times the **rated voltage** and operated to open the door. The movement of the door shall stop before the test piece comes into contact with the lintel.

20.106 Entrapment protection systems shall provide an adequate level of protection in the event of a failure within the system installation wiring.

Compliance is checked by the following test, unless the **entrapment protection system** is a **biased-off switch**.

The **drive** is installed with a door and supplied at **rated voltage**. The **drive** is operated to close the door. During the movement, a short circuit or open circuit is simulated in the system installation wiring.

Unless the **entrapment protection system** continues to operate normally, the door shall stop moving or reverse and stop at the fully open position. After completing its movement, the door may be controlled by a supplementary **biased-off switch**.

*If the **entrapment protection system** continues to operate normally, the test is repeated with one additional fault simulated.*

The test is repeated during the opening movement of the door.

20.107 A mechanical fault in the **drive** shall not result in a hazardous condition.

Compliance is checked by inspection and if necessary by test.

*The inspection shall evaluate which parts can affect the safety of operation and whether they are likely to break or become loose. These parts may be within the **drive** or used for connecting the **drive** to the door.*

NOTE Examples of parts which are evaluated are screws, pins, shafts, wheels, chains and supporting parts.

*If the inspection cannot determine whether the **drive** will continue to operate normally or stop its movement when the part has failed, the following test is carried out.*

*The **drive** is installed with a door, the force exerted by the **drive** is set at the maximum value according to the instructions and the **drive** is supplied at the most unfavourable voltage between 0,94 times and 1,06 times the **rated voltage**.*

*The faults are introduced one at a time and the **drive** is operated as in normal use.*

*Unless the **drive** and the door continue to operate normally,*

- the **drive** shall stop operating by the end of the cycle, and*
- further operation shall not be possible, and*
- the speed of the door shall not increase by more than 20 %.*

20.108 During the movement of the **drive** in either direction, the actuation of a manual control shall stop the movement if there is no separate button for the stop function.

If the control has a single button for controlling the movement, further actuation shall reverse the direction of movement.

If the control has three buttons for controlling the movement, one button shall be a stop button.

Compliance is checked by a manual test.

NOTE The test ~~may~~ can be carried out without a door.

20.109 The appliance shall incorporate a manual release so that the door can be operated manually. Operation of the manual release shall not give rise to a hazard, such as kickback or unexpected operation of the **drive**.

Compliance is checked by operating the manual release with the door blocked by an obstacle placed at different heights during closing. The release shall be operable with a force not exceeding 220 N or a torque not exceeding 1,6 Nm.

*The test is carried out with the entrapment protection devices rendered inoperative and then without the **drive** being energized.*

20.110 Drives shall not restart automatically after the movement has stopped unintentionally.

NOTE 1 Unintentional stopping ~~may~~ can be caused by interruption of the power supply or by operation of a **thermal cut-out**.

Compliance is checked by the following test.

*The appliance is supplied at **rated voltage** and operated under **normal operation**. The supply is then interrupted for at least 2 s. After the supply is restored, the **drive** shall not restart. However, **automatic drives** may restart, provided they function as in normal use.*

*The appliance is operated again and operation of a **thermal cut-out** is simulated. After the fault condition has been removed, the **drive** shall not restart. However, **automatic drives** may restart, provided they function as in normal use.*

NOTE 2 The test ~~may~~ can be carried out without a door.

21 Mechanical strength

This clause of Part 1 is applicable.

22 Construction

This clause of Part 1 is applicable except as follows.

22.40 Not applicable.

22.46 *Addition:*

*If compliance with the requirements in Clause 20 relies on the operation of a **programmable electronic circuit**, the software shall contain measures to control the fault/error conditions specified in Table R.1.*

22.101 It shall not be possible to adjust the **drive** without the use of a **tool**.

Compliance is checked by inspection.

22.102 Drives shall be supplied with all associated components necessary for compliance with this standard.

Compliance is checked by inspection.

22.103 If the **entrapment protection system** is a **biased-off switch**, it shall only be possible to activate the **drive** when operating the switch within sight of the door.

Compliance is checked by inspection and test.

22.104 Drives shall not be provided with a control that renders the **entrapment protection system** inoperative. A malfunctioning **entrapment protection system** shall only be overridden by a **biased-off switch** in sight of the door but not on its first activation.

NOTE 1 The **biased-off switch** can be the control used to operate the **drive** as in normal use.

Compliance is checked by inspection and the following test.

*Each **entrapment protection system** is tested for proper operation and that it is not overridden when the **entrapment protection system** is fully functional. For each test, a fault is introduced in the **entrapment protection system**. The **biased-off switch** shall not override the malfunctioning **entrapment protection system** on its first activation.*

*Portable remote controls shall be checked to ensure that they do not override a malfunctioning **entrapment protection system** unless they can only activate the **drive** in sight of the door.*

NOTE 2 Releasing the **biased-off switch** is the same as introducing an obstruction.

NOTE 3 It is acceptable for the activation of a **biased-off switch** to override a malfunctioning **entrapment protection system** on the second activation but not on the first activation which will act as an obstruction.

22.105 The actuating member of the manual release shall be coloured red.

Compliance is checked by inspection.

22.106 All manual controls that operate the door shall have the same markings to indicate the functions.

Compliance is checked by inspection.

NOTE The control ~~may~~ can be for remote operation or for wall mounting.

22.107 It shall only be possible to open and close the door by use of a manual control unless an **automatic drive** is provided.

Compliance is checked by inspection and test.

22.108 A **drive** for a door incorporating a wicket door shall be constructed so that the **drive** cannot be operated when the wicket door is open.

Compliance is checked by inspection and by the following test.

*The **drive** is installed with a door incorporating a wicket door and is supplied at **rated voltage**. The wicket door is opened and the **drive** is operated so as to open the door. The door shall not open.*

22.109 **Drives** shall incorporate

- a **biased-off switch**; or
- an **entrapment protection system** with sensing devices which prevent the door coming into contact with an obstacle; or
- an **entrapment protection system** with sensing devices which rely on the door contacting an obstacle.

Compliance is checked by inspection.

23 Internal wiring

This clause of Part 1 is applicable.

24 Components

This clause of Part 1 is applicable except as follows.

24.1.3 Addition:

*If a switch is used to disconnect the **drive** when the manual release is operated, the switch is tested for 300 cycles of operation.*

25 Supply connection and external flexible cords

This clause of Part 1 is applicable except as follows.

25.7 Addition:

The **supply cord** of **drives** for outdoor use shall be polychloroprene sheathed and not be lighter than ordinary polychloroprene sheathed cord (code designation 60245 IEC 57).

25.8 Addition:

Supply cords of **class III appliances** need not comply with Table 11 if the temperature rises of the cord insulation specified in Table 3 and Table 9 are not exceeded during the tests of Clause 11 and Clause 19, respectively.

25.15 Addition:

*For **class III appliances** and parts of **class III construction** that have a **rated power input** higher than 15 W, the pull force is 30 N. The test is not carried out on **class III appliances** or parts of a **class III construction** that have a **rated power input** less than or equal to 15 W.*

26 Terminals for external conductors

This clause of Part 1 is applicable.

27 Provision for earthing

This clause of Part 1 is applicable.

28 Screws and connections

This clause of Part 1 is applicable.

29 Clearances, creepage distances and solid insulation

This clause of Part 1 is applicable except as follows.

29.2 Addition:

The microenvironment is pollution degree 3 unless the insulation is enclosed or located so that it is unlikely to be exposed to pollution during normal use of the appliance.

30 Resistance to heat and fire

This clause of Part 1 is applicable except as follows.

30.2.2 Not applicable.

31 Resistance to rusting

This clause of Part 1 is applicable except as follows.

Addition:

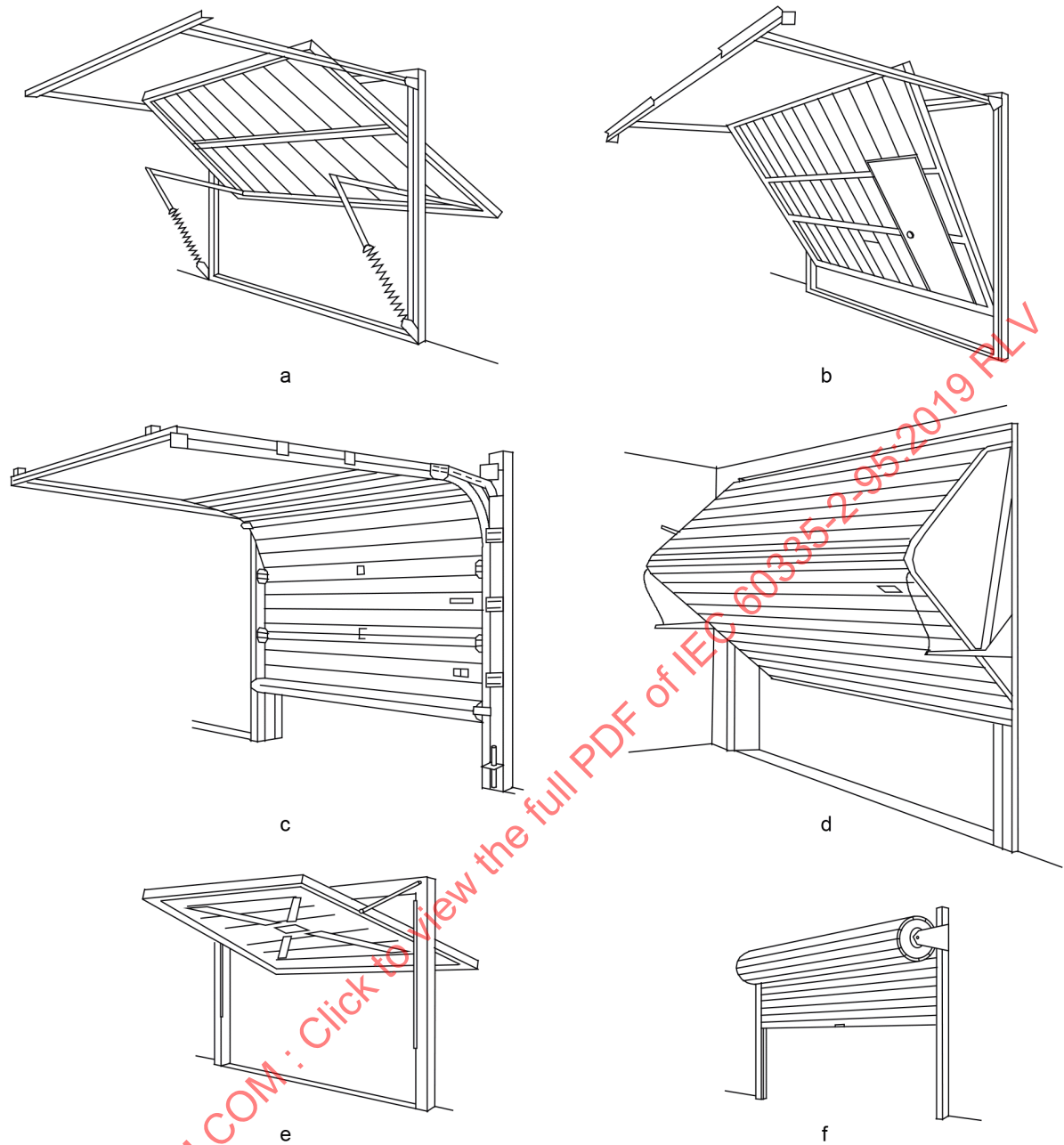
For parts intended to be installed outdoors, compliance is checked by the salt mist test of IEC 60068-2-52, ~~severity~~ test method 2 being applicable.

Before the test, coatings are scratched by means of a hardened steel pin, the end of which has the form of a cone with an angle of 40°. Its tip is rounded with a radius of 0,25 mm ± 0,02 mm. The pin is loaded so that the force exerted along its axis is 10 N ± 0,5 N. The scratches are made by drawing the pin along the surface of the coating at a speed of approximately 20 mm/s. Five scratches are made at least 5 mm apart and at least 5 mm from the edges.

After the test, the appliance shall not have deteriorated to such an extent that compliance with this standard, in particular with Clauses 8 and 27, is impaired. The coating shall not be broken and shall not have loosened from the metal surface.

32 Radiation, toxicity and similar hazards

This clause of Part 1 is applicable.



IEC

Types

- a One-piece door with horizontal track
- b One-piece door, with vertical and horizontal tracks, containing a wicket door
- c Sectional door with horizontal and vertical track
- d Sectional door with horizontal folding
- e Vertical tracked canopy door
- f Rolling door

Figure 101 – Examples of types of garage doors



IEC

NOTE Form and colours are in accordance with ISO 3864-1.

Figure 102 – Example of pictogram warning against child entrapment

IECNORM.COM : Click to view the full PDF of IEC 60335-2-95:2019 RLV

Annexes

The annexes of Part 1 are applicable **except as follows:**

IECNORM.COM : Click to view the full PDF of IEC 60335-2-95:2019 RLV

Annex R (normative)

Software evaluation

This annex of Part 1 is applicable except as follows:

R.2.2.5 *Addition:*

For other **programmable electronic circuits** with functions requiring software incorporating measures to control the fault/error conditions specified in Table R.1, detection of a fault/error shall occur within one cycle of operation if compliance with Clause 20 is impaired.

R.2.2.9 *Addition:*

For other **programmable electronic circuits**, the software and safety-related hardware under its control shall be initialized and shall terminate within one cycle of operation if compliance Clause 20 is impaired.

IECNORM.COM : Click to view the full PDF of IEC 60335-2-95:2019 RLV

Bibliography

The bibliography of Part 1 is applicable except as follows.

Addition:

IEC 60335-2-97, *Household and similar electrical appliances – Safety – Part 2-97: Particular requirements for drives for ~~rolling~~ shutters, awnings, blinds and similar equipment*

IEC 60335-2-103, *Household and similar electrical appliances – Safety – Part 2-103: Particular requirements for drives for gates, doors and windows*

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

IECNORM.COM : Click to view the full PDF of IEC 60335-2-95:2019 RLV

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Household and similar electrical appliances – Safety –
Part 2-95: Particular requirements for drives for vertically moving garage doors
for residential use**

**Appareils électrodomestiques et analogues – Sécurité –
Partie 2-95: Exigences particulières pour les motorisations de portes de garage
à ouverture verticale, pour usage résidentiel**

CONTENTS

FOREWORD	3
INTRODUCTION	6
1 Scope	7
2 Normative references	7
3 Terms and definitions	7
4 General requirement	8
5 General conditions for the tests	8
6 Classification	9
7 Marking and instructions	9
8 Protection against access to live parts	11
9 Starting of motor-operated appliances	11
10 Power input and current	11
11 Heating	12
12 Void	12
13 Leakage current and electric strength at operating temperature	12
14 Transient overvoltages	12
15 Moisture resistance	12
16 Leakage current and electric strength	12
17 Overload protection of transformers and associated circuits	13
18 Endurance	13
19 Abnormal operation	13
20 Stability and mechanical hazards	13
21 Mechanical strength	18
22 Construction	18
23 Internal wiring	19
24 Components	19
25 Supply connection and external flexible cords	20
26 Terminals for external conductors	20
27 Provision for earthing	20
28 Screws and connections	20
29 Clearances, creepage distances and solid insulation	20
30 Resistance to heat and fire	20
31 Resistance to rusting	20
32 Radiation, toxicity and similar hazards	21
Annexes	24
Annex R (normative) Software evaluation	25
Bibliography	26
Figure 101 – Examples of types of garage doors	22
Figure 102 – Example of pictogram warning against child entrapment	23

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES –
SAFETY –****Part 2-95: Particular requirements for drives for vertically
moving garage doors for residential use**

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60335-2-95 has been prepared by IEC technical committee 61: Safety of household and similar electrical appliances.

This fourth edition cancels and replaces the third edition published in 2011, Amendment 1: 2015 and Amendment 2:2017. This edition constitutes a technical revision.

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

- a) the text has been aligned with edition 5.2 of Part 1;
- b) reference to IEC 60335-2-97 and IEC 60335-2-103 has been revised to correctly state their titles (Clause 1);

- c) specific instruction statements have been revised to separate them from information to be provided (7.12);
- d) the compliance criteria for the tests of 19.11.2 and 19.11.3 has been modified (19.13);
- e) the tests for class III appliances and parts of class III constructions have been modified (25.8, 25.15).

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

FDIS	Report on voting
61/5937/FDIS	61/5946/RVD

Full information on the voting for the approval of this International 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.

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

This part 2 is to be used in conjunction with the latest edition of IEC 60335-1 and its amendments. It was established on the basis of the fifth edition (2010) of that standard.

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

This part 2 supplements or modifies the corresponding clauses in IEC 60335-1, so as to convert that publication into the IEC standard: Safety requirements for drives for vertically moving garage doors for residential use.

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

NOTE 2 The following numbering system is used:

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

NOTE 3 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.

The committee has decided that the contents of the base publication and its amendments 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 4 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 following differences exist in the countries indicated below.

- 6.1: Class 0I appliances are allowed (Japan).
- 7.1: Additional markings are required (USA).
- 7.12.1: Additional warnings and instructions are required (USA).
- 11.7: The test conditions are different (USA).
- 19.9: A running overload test is carried out (USA).
- 20.101: The test is not carried out (USA).

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.

IECNORM.COM : Click to view the full PDF of IEC 60335-2-95:2019 RLV

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.

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 and generic standards 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. For example, in the case of temperature requirements for surfaces on many appliances, generic standards, such as ISO 13732-1 for hot surfaces, are not applicable in addition to Part 1 or part 2 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.

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-95: Particular requirements for drives for vertically moving garage doors for residential use

1 Scope

This clause of Part 1 is replaced by the following.

This part of IEC 60335 deals with the safety of electric **drives** for garage doors for residential use that open and close in a vertical direction, the **rated voltage** of the **drives** being not more than 250 V for single-phase appliances and 480 V for other appliances. It also covers the hazards associated with the movement of these electrically driven garage doors.

NOTE 101 Examples of garage doors are shown in Figure 101.

NOTE 102 The **drive** can be supplied with a garage door.

NOTE 103 This standard also applies to **entrapment protection devices** for use with **drives**. It does not cover hazards related to the mechanisms of the door itself.

As far as is practicable, this standard deals with the common hazards presented by appliances that are encountered by all persons in and around the home. However, in general, it does not take into account playing with the appliance by young children, but recognizes that children may be in the vicinity of the garage door.

NOTE 104 Attention is drawn to the fact that in many countries additional requirements are specified by the national authorities responsible for the protection of labour and similar authorities.

NOTE 105 This standard does not apply to **drives**

- for shutters, awnings, blinds and similar equipment (IEC 60335-2-97);
- for gates, doors and windows (IEC 60335-2-103);
- for commercial and industrial purposes;
- intended to be used in locations where special conditions prevail, such as the presence of a corrosive or explosive atmosphere (dust, vapour or gas).

2 Normative references

This clause of Part 1 is applicable except as follows.

Addition:

IEC 60068-2-52:2017, *Environmental testing – Part 2-52: Tests – Test Kb: Salt mist, cyclic (sodium chloride solution)*

3 Terms and definitions

This clause of Part 1 is applicable except as follows.

3.1 Definitions relating to physical characteristics

3.1.9 *Replacement:*

normal operation

operation of the **drive** under the following conditions:

Drives supplied without a door are operated with their **rated load**.

Drives supplied with a door are operated with the door installed in accordance with the instructions.

3.1.101

rated load

force or torque assigned to the **drive** by the manufacturer

3.5 Definitions relating to types of appliances

3.5.101

drive

motor and other components that control the movement of the door

Note 1 to entry: Examples of components are gears, controls, brakes and **entrapment protection systems**.

3.5.102

automatic drive

drive that operates the door in at least one direction without intentional activation by the user

3.7 Definitions relating to safety components

3.7.101

biased-off switch

switch that automatically returns to the **off position** when its actuating member is released

3.7.102

entrapment protection system

part of the **drive** that protects against trapping which could result in the human body being squeezed or crushed by the door

Note 1 to entry: Trapping in the garage is covered by the manual release of 20.109.

Note 2 to entry: An **entrapment protection system** may be incorporated in the motor assembly or may be installed separately. It may consist of one or more devices, such as pressure sensitive edges, passive infrared, active light sensing devices or a **biased-off switch**.

4 General requirement

This clause of Part 1 is applicable.

5 General conditions for the tests

This clause of Part 1 is applicable except as follows.

5.2 *Addition:*

*When a test has to be carried out with a door, the door specified for installation with the **drive** that gives the most unfavourable conditions for the test is used. An artificial load may be used to simulate the door for some of the tests. The **drive** is adjusted in accordance with the instructions.*

5.5 Addition:

Wicket doors are kept closed during the tests.

6 Classification

This clause of Part 1 is applicable except as follows.

6.1 Modification:

Drives shall be **class I, class II** or **class III**.

6.2 Addition:

Drives intended to be exposed to outdoor conditions shall be at least IPX4.

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.1 Modification:

Drives shall be marked with the **rated power input**.

Addition:

Drives supplied without a door shall be marked with the **rated load** in N or in Nm.

7.12 Addition:

The instructions shall state the substance of the following:

WARNING: Important safety instructions. It is important for the safety of persons to follow all instructions. Save these instructions.

The instructions shall include the substance of the following:

- do not allow children to play with door controls. Keep remote controls away from children;
- watch the moving door and keep people away until the door is completely opened or closed (not necessary for **automatic drives**);
- take care when operating the manual release since an open door may fall rapidly due to weak or broken springs, or being out of balance;
- frequently examine the installation, in particular check cables, springs and mountings for signs of wear, damage or imbalance. Do not use if repair or adjustment is needed since a fault in the installation or an incorrectly balanced door may cause injury;
- each month check that the drive reverses when the door contacts a 40 mm high object placed on the floor. Adjust if necessary and recheck since an incorrect adjustment may present a hazard;
- disconnect the supply when cleaning or carrying out other maintenance.

The instructions shall include the following information:

- details on how to use the manual release;
- information concerning the adjustment of the door and **drive** (when applicable).

Instructions for **automatic drives** shall state the substance of the following:

WARNING: Automatic door – The door may operate unexpectedly, therefore do not allow anything to stay in the path of the door.

7.12.1 Addition:

The installation instructions shall state the substance of the following:

WARNING: Important safety instructions. Follow all instructions since incorrect installation can lead to severe injury.

The installation instructions shall include details for the installation of the **drive** and its associated components.

For **drives** supplied without a door, the installation instructions shall indicate the type, size and mass of doors for which the **drive** is intended to be used.

The installation instructions shall include the substance of the following:

- before installing the drive, remove all unnecessary ropes or chains and disable any equipment, such as locks, not needed for powered operation;
- before installing the drive, check that the door is in good mechanical condition, correctly balanced and opens and closes properly;
- install the actuating member for the manual release at a height less than 1,8 m;
- install any fixed control at a height of at least 1,5 m and within sight of the door but away from moving parts;

NOTE 101 It is not required to specify a minimum height for key-operated switches.

- permanently fix the labels warning against entrapment in a prominent place or near any fixed controls;
- permanently fix the label concerning the manual release adjacent to its actuating member;
- after installation, ensure that the mechanism is properly adjusted and that the drive reverses when the door contacts a 40 mm high object placed on the floor.
- the drive must not be used with a door incorporating a wicket door (unless the drive cannot be operated with the wicket door open);
- after installation, ensure that parts of the door do not extend over public footpaths or roads.

The instructions shall include necessary information for the safe handling of a **drive** weighing more than 20 kg. This information shall describe how to use the handling means, such as hooks and ropes.

7.15 Addition:

The markings shall also be provided with the instructions. In addition, the marking relevant to name, trademark or identification mark, of the manufacturer or responsible vendor and the model or type reference can also be retrieved from a label, such as a matrix barcode, visible on the appliance after installation.

7.101 Drives shall be supplied with a label suitable for permanent fixing. For **automatic drives**, the label shall state the substance of the following:

WARNING: Automatic drive – Keep away from the area of the door since it may operate unexpectedly.

For other **drives**, the label shall include a warning sign having a height of at least 60 mm. The label shall also include the substance of the following:

WARNING: Keep children away when the door is moving.

NOTE An example of a suitable warning sign is shown in Figure 102.

Compliance is checked by inspection and measurement.

7.102 Drives that use contact sensing as an **entrapment protection system** shall be supplied with a label that states the substance of the following:

WARNING: Risk of entrapment – Regularly check and, if necessary, adjust to ensure that, when the door contacts a 40 mm high object placed on the floor, the door reverses or the object can be freed.

Compliance is checked by inspection.

7.103 Drives shall be supplied with a label suitable for permanent fixing that describes how to use the manual release.

Compliance is checked by inspection.

7.104 If the **drive** is intended to be installed by the user, the packaging shall indicate the type of door, including its size and mass, that the **drive** is intended to operate and, if applicable, that the **drive**

- is intended to be installed at least 2,5 m above the floor or other access level;
- can be used with doors having openings greater than 50 mm in diameter;
- is intended for automatic operation.

Compliance is checked by inspection.

8 Protection against access to live parts

This clause of Part 1 is applicable except as follows.

8.2 Modification:

Basic insulation and parts separated from **live parts** by **basic insulation** may be touched during adjustment, if a **tool** is needed to gain access to the adjustment means.

9 Starting of motor-operated appliances

This clause of Part 1 is not applicable.

10 Power input and current

This clause of Part 1 is applicable except as follows.

10.1 Modification:

Instead of determining the mean value, the maximum value of power input is determined, the effect of inrush currents being ignored.

10.2 Modification:

Instead of determining the mean value, the maximum value of the current is determined, inrush currents being ignored.

11 Heating

This clause of Part 1 is applicable except as follows.

11.7 Replacement:

Drives for continuous operation are operated for consecutive cycles until steady conditions are established.

Automatic drives are operated without rest periods for 3 cycles based on the maximum size of door the **drive** is intended to operate or 4 min, whichever is longer.

Other **drives** are operated as follows:

- **drives** supplied without a door are operated without rest periods for a minimum of 2 min unless the rated operating time is longer;
- **drives** supplied with a door are operated without rest periods for 3 cycles.

12 Void

13 Leakage current and electric strength at operating temperature

This clause of Part 1 is applicable.

14 Transient overvoltages

This clause of Part 1 is applicable.

15 Moisture resistance

This clause of Part 1 is applicable except as follows.

15.1.1 Addition:

Parts of **drives** intended to be exposed to outdoor conditions are subjected to the tests specified for IPX4 appliances.

15.1.2 Addition:

IPX4 tubular **drives** are installed in a tube that is open at both ends and has the largest diameter specified in the instructions. The tube has a length twice that of the motor and is mounted on a support as in normal use. The support is rotated at a speed of 1 r/min.

16 Leakage current and electric strength

This clause of Part 1 is applicable.

17 Overload protection of transformers and associated circuits

This clause of Part 1 is applicable.

18 Endurance

This clause of Part 1 is not applicable.

19 Abnormal operation

This clause of Part 1 is applicable except as follows.

19.1 Addition:

Drives are also subjected to the test of 19.101.

19.9 Not applicable.

19.10 Addition:

For **drives** having a manual release, the test is repeated with the **drive** released.

The test is carried out for one cycle of operation if this is longer than 1 min.

19.13 Addition:

If for the tests in 19.11.2 and 19.11.3, the **drive** can be operated when any of the fault conditions are simulated, the tests of 20.101 to 20.106 are carried out, the **drive**, however, being supplied at **rated voltage**.

After each test it shall stop with the **driven part** in a safe position after a maximum of one cycle of operation, or if the **drive** can still be operated normally it shall comply with the requirements of 20.101 to 20.104.

19.101 Drives, other than those for continuous operation, are supplied at **rated voltage** and operated continuously under **normal operation**.

20 Stability and mechanical hazards

This clause of Part 1 is applicable except as follows.

20.2 Addition:

Moving parts of **drives** intended to be installed at a height of at least 2,5 m above the ground are considered to be positioned so that adequate protection is provided.

Addition:

Chains moving at less than 0,2 m/s are not considered to be dangerous moving parts.

20.101 Drives shall prevent doors from closing unexpectedly during normal use.

Compliance is checked by the following test.

The **drive** is supplied at **rated voltage** but is not operated. It is loaded with 1,2 times the **rated load** applied for 30 min. If the **drive** is supplied with a door, the load is applied to the door and is equal to the highest force exerted by it. The highest force is determined with the door in the most unfavourable position, the **drive** not being energized. Automatic operation of **automatic drives** is rendered inoperative.

There shall be no movement except for removal of any play in the system.

The test is repeated with the **drive** supplied at 0,85 times **rated voltage** and with the supply disconnected.

20.102 Drives controlled by a **biased-off switch** shall stop when the actuating member of the switch is released.

Compliance is checked by the following test.

The **drive** is installed with a door and supplied at the most unfavourable voltage between 0,94 times and 1,06 times the **rated voltage**. It is operated to close the door. When the actuating member of the switch is released,

- if the closing force exerted by the door does not exceeds 150 N, as measured in 20.104.1, the bottom edge of the door shall stop;
- if the closing force exerted by the door exceeds 150 N, as measured in 20.104.1, the bottom edge of the door shall stop before it has travelled more than 50 mm vertically.

The test is repeated during the opening movement of the door.

20.103 Drives incorporating an **entrapment protection system** with sensing devices which prevent the door coming into contact with an obstacle shall not cause injury resulting from a moving door.

Compliance is checked by the following test.

The **drive** is installed with a door, the force exerted by the **drive** is set at the maximum value according to the instructions and the **drive** is supplied at the most unfavourable voltage between 0,94 times and 1,06 times the **rated voltage**.

An obstacle having dimensions of approximately 80 mm × 300 mm and a height of 100 mm is placed on the ground and centrally along its 300 mm length across the door opening. The **drive** is operated to close the door from heights of 100 mm, 1 000 mm and the fully open position of the door. The door shall not move or only move in the opening direction.

NOTE The obstacle is normally made of rough wood and painted white but other materials and colors can be used to simulate the most unfavourable conditions.

The obstacle is positioned centrally in the door opening and is then raised in increments up to 300 mm from the height of the door, but not higher than 2,5 m. At each increment, the **drive** is operated to close the door. The door shall stop within 50 mm or reverse its movement without contacting the obstacle.

A cylindrical obstacle, having a diameter of 50 mm and a length of 850 mm, is suspended centrally in the door opening. It is suspended vertically with the upper end at a height of 900 mm above the ground.

The **drive** is operated to close the door and the cylinder is swung across the door opening from an angle of 45°. The **entrapment protection system** shall cause the door to reverse its movement.

The test is repeated from the fully open position with the obstacle positioned at 100 mm from each end of the door opening in turn.

During the tests, any **biased-off switch** is held closed.

20.104 Drives incorporating an **entrapment protection system** with sensing devices which rely on the door contacting an obstacle shall not cause injury resulting from a moving door.

Compliance is checked by the test of 20.104.1. If the **drive** is an **automatic drive**, or a **drive** that operates the **driven part** in at least one direction by a command that can be initiated via a telecommunication or communication network, and for **drives** with a closing force exceeding 400 N, compliance is also checked by the test of 20.104.2 for a closing movement.

The **drive** is installed with a door, the force exerted by the **drive** is set at the maximum value according to the instructions and the **drive** is supplied at the most unfavorable voltage between 0,94 times and 1,06 times the **rated voltage**.

During the tests, any **biased-off switch** is held closed.

20.104.1 Any non-contact **entrapment protection system** is rendered inoperative.

The **drive** is operated to close the door from the fully open position and the **entrapment protection system** shall limit the vertical component of the average closing force to

- 150 N during the first 5 s after the force has exceeded 25 N and
- 25 N thereafter;

or

- 400 N during the first 0,75 s after the force has exceeded 150 N,
- 150 N during a further period of 4,25 s and
- 25 N thereafter;

or

- 800 N during the first 2 s after the force has exceeded 150 N for doors that do not swing outward,
- 600 N during the first 2 s after the force has exceeded 150 N for doors that swing outward,
- 150 N during a further period of 3 s and
- 25 N thereafter.

The force is measured by means of an instrument that incorporates a rigid plate having a diameter of 80 mm and a spring having a ratio of 500 N/mm $\pm$ 50 N/mm. The spring acts on a sensing element that is connected to an amplifier having a rise and fall time not exceeding 5 ms. The measuring instrument shall be accurate to within 5 %.

The force is measured on the bottom edge of the door at the following heights above the ground:

- 50 mm;
- 300 mm;
- 500 mm;
- 2 500 mm, or 300 mm below the maximum opening height of the door if this is less than 2 800 mm.

At each height, the force is measured at the following locations:

- in the centre of the bottom edge of the door;
- 200 mm from each end of the bottom edge of the door.

The test is carried out three times and the arithmetic average closing force is calculated for each location.

NOTE The door can reverse its movement after contacting the obstacle.

20.104.2 An obstacle having dimensions of approximately 80 mm × 300 mm and a height of 100 mm is placed on the ground and centrally along its 300 mm length across the door opening. The **drive** is operated to close the door from heights of 100 mm, 1 000 mm and the fully open position of the door. The door shall not move or only move in the opening direction.

The test is repeated from the fully open position with the obstacle positioned at 100 mm from each end of the door opening in turn.

A cylindrical obstacle, having a diameter of 50 mm and a length of 850 mm, is suspended centrally in the door opening. It is suspended vertically with the upper end at a height of 900 mm above the ground.

The **drive** is operated to close the door and the cylinder is swung across the door opening from an angle of 45°. The **entrapment protection system** shall cause the door to reverse its movement.

20.105 Drives shall prevent entrapment in the opening direction.

Compliance is checked by the following test.

The force exerted by the **drive** is set at the maximum value according to the instructions. A test piece having dimensions of approximately 200 mm × 300 mm, a height of 700 mm and a mass of 20 kg ± 0,5 kg is fixed centrally to the outside of the door, with the 300 mm edge adjacent to the bottom edge of the door.

The **drive** is supplied at the most unfavorable voltage between 0,94 times and 1,06 times the **rated voltage** and operated to open the door. The movement of the door shall stop before the test piece comes into contact with the lintel.

20.106 Entrapment protection systems shall provide an adequate level of protection in the event of a failure within the system installation wiring.

Compliance is checked by the following test, unless the **entrapment protection system** is a **biased-off switch**.

The **drive** is installed with a door and supplied at **rated voltage**. The **drive** is operated to close the door. During the movement, a short circuit or open circuit is simulated in the system installation wiring.

Unless the **entrapment protection system** continues to operate normally, the door shall stop moving or reverse and stop at the fully open position. After completing its movement, the door may be controlled by a supplementary **biased-off switch**.

If the **entrapment protection system** continues to operate normally, the test is repeated with one additional fault simulated.

The test is repeated during the opening movement of the door.

20.107 A mechanical fault in the **drive** shall not result in a hazardous condition.

Compliance is checked by inspection and if necessary by test.

*The inspection shall evaluate which parts can affect the safety of operation and whether they are likely to break or become loose. These parts may be within the **drive** or used for connecting the **drive** to the door.*

NOTE Examples of parts which are evaluated are screws, pins, shafts, wheels, chains and supporting parts.

*If the inspection cannot determine whether the **drive** will continue to operate normally or stop its movement when the part has failed, the following test is carried out.*

*The **drive** is installed with a door, the force exerted by the **drive** is set at the maximum value according to the instructions and the **drive** is supplied at the most unfavourable voltage between 0,94 times and 1,06 times the **rated voltage**.*

*The faults are introduced one at a time and the **drive** is operated as in normal use.*

*Unless the **drive** and the door continue to operate normally,*

- the **drive** shall stop operating by the end of the cycle, and*
- further operation shall not be possible, and*
- the speed of the door shall not increase by more than 20 %.*

20.108 During the movement of the **drive** in either direction, the actuation of a manual control shall stop the movement if there is no separate button for the stop function.

If the control has a single button for controlling the movement, further actuation shall reverse the direction of movement.

If the control has three buttons for controlling the movement, one button shall be a stop button.

Compliance is checked by a manual test.

NOTE The test can be carried out without a door.

20.109 The appliance shall incorporate a manual release so that the door can be operated manually. Operation of the manual release shall not give rise to a hazard, such as kickback or unexpected operation of the **drive**.

Compliance is checked by operating the manual release with the door blocked by an obstacle placed at different heights during closing. The release shall be operable with a force not exceeding 220 N or a torque not exceeding 1,6 Nm.

*The test is carried out with the entrapment protection devices rendered inoperative and then without the **drive** being energized.*

20.110 Drives shall not restart automatically after the movement has stopped unintentionally.

NOTE 1 Unintentional stopping can be caused by interruption of the power supply or by operation of a **thermal cut-out**.

Compliance is checked by the following test.

The appliance is supplied at **rated voltage** and operated under **normal operation**. The supply is then interrupted for at least 2 s. After the supply is restored, the **drive** shall not restart. However, **automatic drives** may restart, provided they function as in normal use.

The appliance is operated again and operation of a **thermal cut-out** is simulated. After the fault condition has been removed, the **drive** shall not restart. However, **automatic drives** may restart, provided they function as in normal use.

NOTE 2 The test can be carried out without a door.

21 Mechanical strength

This clause of Part 1 is applicable.

22 Construction

This clause of Part 1 is applicable except as follows.

22.40 Not applicable.

22.46 Addition:

If compliance with the requirements in Clause 20 relies on the operation of a **programmable electronic circuit**, the software shall contain measures to control the fault/error conditions specified in Table R.1.

22.101 It shall not be possible to adjust the **drive** without the use of a **tool**.

Compliance is checked by inspection.

22.102 Drives shall be supplied with all associated components necessary for compliance with this standard.

Compliance is checked by inspection.

22.103 If the **entrapment protection system** is a **biased-off switch**, it shall only be possible to activate the **drive** when operating the switch within sight of the door.

Compliance is checked by inspection and test.

22.104 Drives shall not be provided with a control that renders the **entrapment protection system** inoperative. A malfunctioning **entrapment protection system** shall only be overridden by a **biased-off switch** in sight of the door but not on its first activation.

NOTE 1 The **biased-off switch** can be the control used to operate the **drive** as in normal use.

Compliance is checked by inspection and the following test.

*Each **entrapment protection system** is tested for proper operation and that it is not overridden when the **entrapment protection system** is fully functional. For each test, a fault is introduced in the **entrapment protection system**. The **biased-off switch** shall not override the malfunctioning **entrapment protection system** on its first activation.*

*Portable remote controls shall be checked to ensure that they do not override a malfunctioning **entrapment protection system** unless they can only activate the **drive** in sight of the door.*

NOTE 2 Releasing the **biased-off switch** is the same as introducing an obstruction.

NOTE 3 It is acceptable for the activation of a **biased-off switch** to override a malfunctioning **entrapment protection system** on the second activation but not on the first activation which will act as an obstruction.

22.105 The actuating member of the manual release shall be coloured red.

Compliance is checked by inspection.

22.106 All manual controls that operate the door shall have the same markings to indicate the functions.

Compliance is checked by inspection.

NOTE The control can be for remote operation or for wall mounting.

22.107 It shall only be possible to open and close the door by use of a manual control unless an **automatic drive** is provided.

Compliance is checked by inspection and test.

22.108 A **drive** for a door incorporating a wicket door shall be constructed so that the **drive** cannot be operated when the wicket door is open.

Compliance is checked by inspection and by the following test.

*The **drive** is installed with a door incorporating a wicket door and is supplied at **rated voltage**. The wicket door is opened and the **drive** is operated so as to open the door. The door shall not open.*

22.109 **Drives** shall incorporate

- a **biased-off switch**; or
- an **entrapment protection system** with sensing devices which prevent the door coming into contact with an obstacle; or
- an **entrapment protection system** with sensing devices which rely on the door contacting an obstacle.

Compliance is checked by inspection.

23 Internal wiring

This clause of Part 1 is applicable.

24 Components

This clause of Part 1 is applicable except as follows.

24.1.3 *Addition:*

*If a switch is used to disconnect the **drive** when the manual release is operated, the switch is tested for 300 cycles of operation.*

25 Supply connection and external flexible cords

This clause of Part 1 is applicable except as follows.

25.7 Addition:

The **supply cord** of **drives** for outdoor use shall be polychloroprene sheathed and not be lighter than ordinary polychloroprene sheathed cord (code designation 60245 IEC 57).

25.8 Addition:

Supply cords of **class III appliances** need not comply with Table 11 if the temperature rises of the cord insulation specified in Table 3 and Table 9 are not exceeded during the tests of Clause 11 and Clause 19, respectively.

25.15 Addition:

*For **class III appliances** and parts of **class III construction** that have a **rated power input** higher than 15 W, the pull force is 30 N. The test is not carried out on **class III appliances** or parts of a **class III construction** that have a **rated power input** less than or equal to 15 W.*

26 Terminals for external conductors

This clause of Part 1 is applicable.

27 Provision for earthing

This clause of Part 1 is applicable.

28 Screws and connections

This clause of Part 1 is applicable.

29 Clearances, creepage distances and solid insulation

This clause of Part 1 is applicable except as follows.

29.2 Addition:

The microenvironment is pollution degree 3 unless the insulation is enclosed or located so that it is unlikely to be exposed to pollution during normal use of the appliance.

30 Resistance to heat and fire

This clause of Part 1 is applicable except as follows.

30.2.2 Not applicable.

31 Resistance to rusting

This clause of Part 1 is applicable except as follows.

Addition:

For parts intended to be installed outdoors, compliance is checked by the salt mist test of IEC 60068-2-52, test method 2 being applicable.

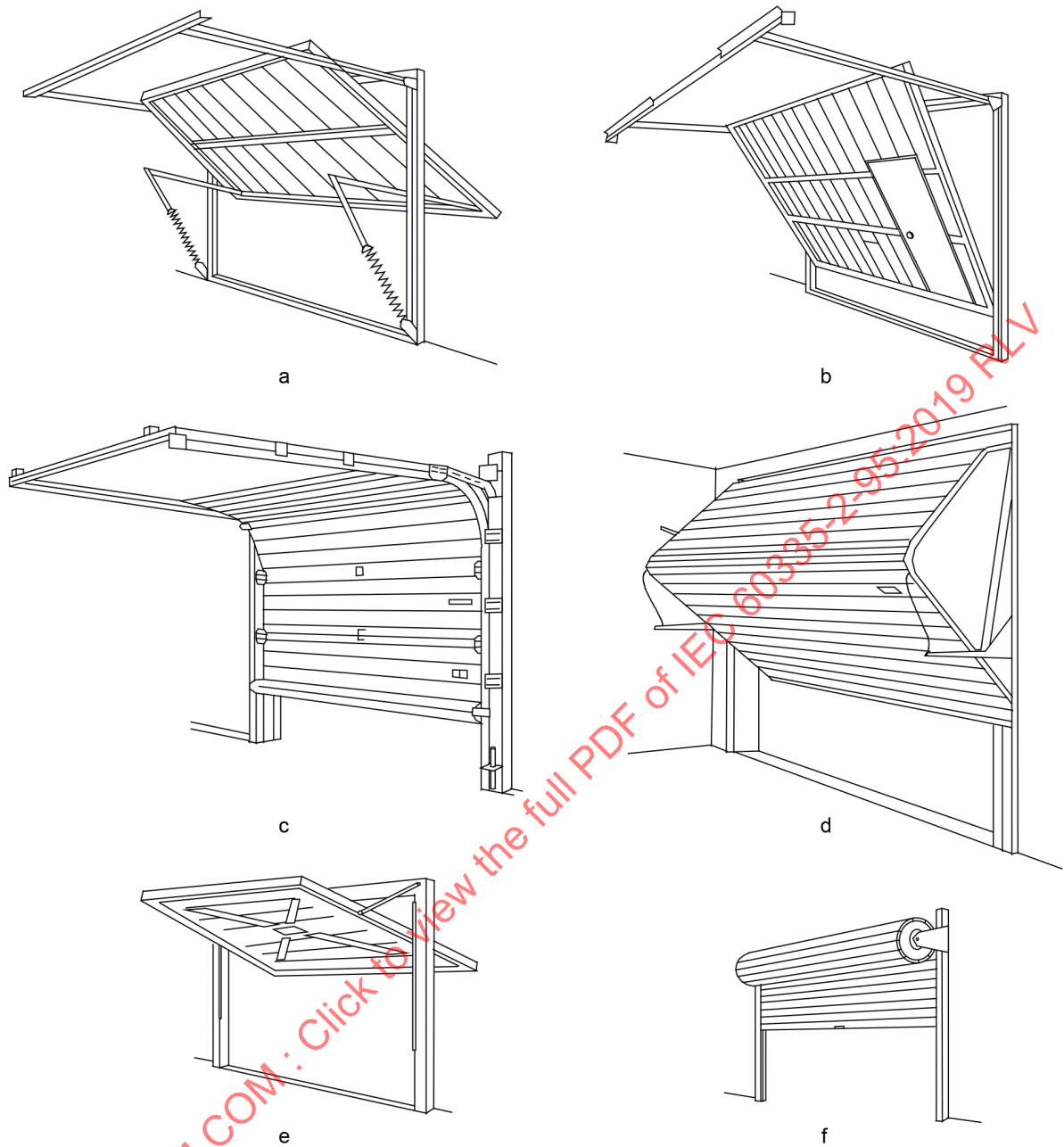
Before the test, coatings are scratched by means of a hardened steel pin, the end of which has the form of a cone with an angle of 40°. Its tip is rounded with a radius of 0,25 mm ± 0,02 mm. The pin is loaded so that the force exerted along its axis is 10 N ± 0,5 N. The scratches are made by drawing the pin along the surface of the coating at a speed of approximately 20 mm/s. Five scratches are made at least 5 mm apart and at least 5 mm from the edges.

After the test, the appliance shall not have deteriorated to such an extent that compliance with this standard, in particular with Clauses 8 and 27, is impaired. The coating shall not be broken and shall not have loosened from the metal surface.

32 Radiation, toxicity and similar hazards

This clause of Part 1 is applicable.

IECNORM.COM : Click to view the full PDF of IEC 60335-2-95:2019 PLV



IEC

Types

- a One-piece door with horizontal track
- b One-piece door, with vertical and horizontal tracks, containing a wicket door
- c Sectional door with horizontal and vertical track
- d Sectional door with horizontal folding
- e Vertical tracked canopy door
- f Rolling door

Figure 101 – Examples of types of garage doors



IEC

NOTE Form and colours are in accordance with ISO 3864-1.

Figure 102 – Example of pictogram warning against child entrapment

IECNORM.COM : Click to view the full PDF of IEC 60335-2-95:2019 RLV

Annexes

The annexes of Part 1 are applicable except as follows:

IECNORM.COM : Click to view the full PDF of IEC 60335-2-95:2019 RLV

Annex R (normative)

Software evaluation

This annex of Part 1 is applicable except as follows:

R.2.2.5 *Addition:*

For other **programmable electronic circuits** with functions requiring software incorporating measures to control the fault/error conditions specified in Table R.1, detection of a fault/error shall occur within one cycle of operation if compliance with Clause 20 is impaired.

R.2.2.9 *Addition:*

For other **programmable electronic circuits**, the software and safety-related hardware under its control shall be initialized and shall terminate within one cycle of operation if compliance Clause 20 is impaired.

IECNORM.COM : Click to view the full PDF of IEC 60335-2-95:2019 REV1

Bibliography

The bibliography of Part 1 is applicable except as follows.

Addition:

IEC 60335-2-97, *Household and similar electrical appliances – Safety – Part 2-97: Particular requirements for drives for shutters, awnings, blinds and similar equipment*

IEC 60335-2-103, *Household and similar electrical appliances – Safety – Part 2-103: Particular requirements for drives for gates, doors and windows*

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

IECNORM.COM : Click to view the full PDF of IEC 60335-2-95:2019 RLV

IECNORM.COM : Click to view the full PDF of IEC 60335-2-95:2019 RLV

SOMMAIRE

AVANT-PROPOS	29
INTRODUCTION	32
1 Domaine d'application	33
2 Références normatives	33
3 Termes et définitions	33
4 Exigences générales	34
5 Conditions générales d'essais	34
6 Classification	35
7 Marquage et instructions	35
8 Protection contre l'accès aux parties actives	37
9 Démarrage des appareils à moteur	38
10 Puissance et courant	38
11 Échauffements	38
12 Vacant	38
13 Courant de fuite et rigidité diélectrique à la température de régime	38
14 Surtensions transitoires	39
15 Résistance à l'humidité	39
16 Courant de fuite et rigidité diélectrique	39
17 Protection contre la surcharge des transformateurs et des circuits associés	39
18 Endurance	39
19 Fonctionnement anormal	39
20 Stabilité et dangers mécaniques	40
21 Résistance mécanique	45
22 Construction	45
23 Conducteurs internes	46
24 Composants	47
25 Raccordement au réseau et câbles souples extérieurs	47
26 Bornes pour conducteurs externes	47
27 Dispositions en vue de la mise à la terre	47
28 Vis et connexions	47
29 Distances dans l'air, lignes de fuite et isolation solide	47
30 Résistance à la chaleur et au feu	48
31 Protection contre la rouille	48
32 Rayonnement, toxicité et dangers analogues	48
Annexes	51
Annexe R (normative) Évaluation des logiciels	52
Bibliographie	53
Figure 101 – Exemples de types de portes de garage	49
Figure 102 – Exemple de pictogramme de mise en garde contre l'écrasement des enfants	50

COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

**APPAREILS ÉLECTRODOMESTIQUES ET ANALOGUES –
SÉCURITÉ –****Partie 2-95: Exigences particulières pour les motorisations de portes
de garage à ouverture verticale, pour usage résidentiel**

AVANT-PROPOS

- 1) La Commission Électrotechnique Internationale (IEC) est une organisation mondiale de normalisation composée de l'ensemble des comités électrotechniques nationaux (Comités nationaux de l'IEC). L'IEC a pour objet de favoriser la coopération internationale pour toutes les questions de normalisation dans les domaines de l'électricité et de l'électronique. À cet effet, l'IEC – entre autres activités – publie des Normes internationales, des Spécifications techniques, des Rapports techniques, des Spécifications accessibles au public (PAS) et des Guides (ci-après dénommés "Publication(s) de l'IEC"). Leur élaboration est confiée à des comités d'études, aux travaux desquels tout Comité national intéressé par le sujet traité peut participer. Les organisations internationales, gouvernementales et non gouvernementales, en liaison avec l'IEC, participent également aux travaux. L'IEC collabore étroitement avec l'Organisation Internationale de Normalisation (ISO), selon des conditions fixées par accord entre les deux organisations.
- 2) Les décisions ou accords officiels de l'IEC concernant les questions techniques représentent, dans la mesure du possible, un accord international sur les sujets étudiés, étant donné que les Comités nationaux de l'IEC intéressés sont représentés dans chaque comité d'études.
- 3) Les Publications de l'IEC se présentent sous la forme de recommandations internationales et sont agréées comme telles par les Comités nationaux de l'IEC. Tous les efforts raisonnables sont entrepris afin que l'IEC s'assure de l'exactitude du contenu technique de ses publications; l'IEC ne peut pas être tenue responsable de l'éventuelle mauvaise utilisation ou interprétation qui en est faite par un quelconque utilisateur final.
- 4) Dans le but d'encourager l'uniformité internationale, les Comités nationaux de l'IEC s'engagent, dans toute la mesure possible, à appliquer de façon transparente les Publications de l'IEC dans leurs publications nationales et régionales. Toutes divergences entre toutes Publications de l'IEC et toutes publications nationales ou régionales correspondantes doivent être indiquées en termes clairs dans ces dernières.
- 5) L'IEC elle-même ne fournit aucune attestation de conformité. Des organismes de certification indépendants fournissent des services d'évaluation de conformité et, dans certains secteurs, accèdent aux marques de conformité de l'IEC. L'IEC n'est responsable d'aucun des services effectués par les organismes de certification indépendants.
- 6) Tous les utilisateurs doivent s'assurer qu'ils sont en possession de la dernière édition de cette publication.
- 7) Aucune responsabilité ne doit être imputée à l'IEC, à ses administrateurs, employés, auxiliaires ou mandataires, y compris ses experts particuliers et les membres de ses comités d'études et des Comités nationaux de l'IEC, pour tout préjudice causé en cas de dommages corporels et matériels, ou de tout autre dommage de quelque nature que ce soit, directe ou indirecte, ou pour supporter les coûts (y compris les frais de justice) et les dépenses découlant de la publication ou de l'utilisation de cette Publication de l'IEC ou de toute autre Publication de l'IEC, ou au crédit qui lui est accordé.
- 8) L'attention est attirée sur les références normatives citées dans cette publication. L'utilisation de publications référencées est obligatoire pour une application correcte de la présente publication.
- 9) L'attention est attirée sur le fait que certains des éléments de la présente Publication de l'IEC peuvent faire l'objet de droits de brevet. L'IEC ne saurait être tenue pour responsable de ne pas avoir identifié de tels droits de brevets et de ne pas avoir signalé leur existence.

La Norme internationale IEC 60335-2-95 a été établie par le comité d'études 61 de l'IEC: Sécurité des appareils électrodomestiques et analogues.

Cette quatrième édition annule et remplace la troisième édition parue en 2011, l'Amendement 1:2015 et l'Amendement 2:2017. Cette édition constitue une révision technique.

Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

- a) le texte a été aligné sur l'édition 5.2 de la Partie 1;

- b) les titres des références IEC 60335-2-97 et IEC 60335-2-103 ont été revus et corrigés (Article 1);
- c) des instructions spécifiques ont été revues afin de les séparer des informations à fournir (7.12);
- d) les critères de conformité pour les essais de 19.11.2 et 19.11.3 ont été modifiés (19.13);
- e) les essais relatifs aux appareils de la classe III et aux parties des constructions de la classe III ont été modifiés (25.8, 25.15).

Le texte de cette Norme internationale est issu des documents suivants:

FDIS	Rapport de vote
61/5937/FDIS	61/5946/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à l'approbation de cette Norme internationale.

Cette publication a été rédigée selon les Directives ISO/IEC, Partie 2.

Une liste de toutes les parties de la série IEC 60335, sous le titre général: *Appareils électrodomestiques et analogues – Sécurité*, peut être consultée sur le site web de l'IEC.

La présente partie 2 doit être utilisée conjointement avec la dernière édition de l'IEC 60335-1 et ses amendements. Elle a été établie sur la base de la cinquième édition (2010) de cette norme.

NOTE 1 L'expression "Partie 1" utilisée dans la présente norme fait référence à l'IEC 60335-1.

La présente partie 2 complète ou modifie les articles correspondants de l'IEC 60335-1 de façon à transformer cette publication en norme IEC: Exigences de sécurité pour les motorisations de portes de garage à ouverture verticale, pour usage résidentiel.

Lorsqu'un paragraphe particulier de la Partie 1 n'est pas mentionné dans cette partie 2, ce paragraphe s'applique pour autant qu'il soit raisonnable. Lorsque la présente norme spécifie "addition", "modification" ou "remplacement", le texte correspondant de la Partie 1 doit être adapté en conséquence.

NOTE 2 Le système de numérotation suivant est utilisé:

- paragraphes, tableaux et figures: ceux qui sont numérotés à partir de 101 sont complémentaires à ceux de la Partie 1;
- notes: à l'exception de celles qui sont dans un nouveau paragraphe ou de celles qui concernent des notes de la Partie 1, les notes sont numérotées à partir de 101, y compris celles des articles ou paragraphes qui sont modifiés ou remplacés;
- annexes: les annexes supplémentaires sont appelées AA, BB, etc.

NOTE 3 Les caractères d'imprimerie suivants sont utilisés:

- exigences: caractères romains;
- *modalités d'essais: caractères italiques;*
- notes: petits caractères romains.

Les mots en **gras** dans le texte sont définis à l'Article 3. Lorsqu'une définition concerne un adjectif, l'adjectif et le nom associé figurent également en gras.

Le comité a décidé que le contenu de la publication de base et de ses amendements ne sera pas modifié avant la date de stabilité indiquée sur le site web de l'IEC sous "http://webstore.iec.ch" dans les données relatives à la publication recherchée. À cette date, la publication sera

- reconduite,
- supprimée,
- remplacée par une édition révisée, ou
- amendée.

NOTE 4 L'attention des Comités nationaux est attirée sur le fait que les fabricants d'appareils et les organismes d'essai peuvent avoir besoin d'une période transitoire après la publication d'une nouvelle publication IEC, ou d'une publication amendée ou révisée, pour fabriquer des produits conformes aux nouvelles exigences et pour adapter leurs équipements aux nouveaux essais ou aux essais révisés.

Le comité recommande que le contenu de la présente publication soit entériné au niveau national au plus tôt 12 mois et au plus tard 36 mois après la date de publication.

Les différences suivantes existent dans les pays indiqués ci-après.

- 6.1: Les appareils de la classe 0I sont autorisés (Japon).
- 7.1: Des marquages complémentaires sont exigés (USA).
- 7.12.1: Des mises en garde et des instructions complémentaires sont exigées (USA).
- 11.7: Les conditions d'essai sont différentes (USA).
- 19.9: Un essai de fonctionnement en surcharge est effectué (USA).
- 20.101: L'essai n'est pas effectué (USA).

IMPORTANT – Le logo "colour inside" qui se trouve sur la page de couverture de cette publication indique qu'elle contient des couleurs qui sont considérées comme utiles à une bonne compréhension de son contenu. Les utilisateurs devraient, par conséquent, imprimer cette publication en utilisant une imprimante couleur.

INTRODUCTION

Il a été considéré en établissant la présente Norme internationale que l'exécution de ses dispositions était confiée à des personnes expérimentées et ayant une qualification appropriée.

La présente reconnaît le niveau de protection internationalement accepté contre les dangers électriques, mécaniques, thermiques, liés au feu et au rayonnement des appareils, lorsqu'ils fonctionnent comme en usage normal en tenant compte des instructions du fabricant. Elle couvre également les situations anormales auxquelles on peut s'attendre dans la pratique et elle tient compte de la façon dont les phénomènes électromagnétiques peuvent affecter le fonctionnement sûr des appareils.

La présente tient compte autant que possible des exigences de l'IEC 60364, de façon à rester compatible avec les règles d'installation quand l'appareil est raccordé au réseau d'alimentation. Cependant, des règles nationales d'installation peuvent être différentes.

Si les fonctions d'un appareil sont couvertes par différentes parties 2 de l'IEC 60335, la partie 2 correspondante est appliquée à chaque fonction séparément, dans la limite du raisonnable. Si cela est applicable, l'influence d'une fonction sur les autres fonctions est prise en compte.

Lorsqu'une partie 2 ne comporte pas d'exigences complémentaires pour couvrir les dangers traités dans la Partie 1, la Partie 1 s'applique.

NOTE 1 Cela signifie que les comités d'études responsables pour les parties 2 ont déterminé qu'il n'était pas nécessaire de spécifier des exigences particulières pour l'appareil en question en plus des exigences générales.

La présente norme est une norme de famille de produits traitant de la sécurité d'appareils et a préséance sur les normes horizontales et génériques couvrant le même sujet.

NOTE 2 Les normes horizontales et génériques couvrant un danger ne sont pas applicables parce qu'elles ont été prises en considération lorsque les exigences générales et particulières ont été étudiées pour la série de normes IEC 60335. Par exemple, dans le cas des exigences de température de surface pour de nombreux appareils, des normes génériques, comme l'ISO 13732-1 pour les surfaces chaudes, ne sont pas applicables en plus de la Partie 1 ou des parties 2.

Un appareil conforme au texte de la présente norme ne sera pas nécessairement jugé conforme aux principes de sécurité de la norme si, lorsqu'il est examiné et soumis aux essais, il apparaît qu'il présente d'autres caractéristiques qui compromettent le niveau de sécurité visé par ces exigences.

Un appareil utilisant des matériaux ou présentant des modes de construction différents de ceux décrits dans les exigences de la présente norme peut être examiné et soumis à l'essai en fonction de l'objectif poursuivi par ces exigences et, s'il est jugé pratiquement équivalent, il peut être estimé conforme aux principes de sécurité de la norme.

APPAREILS ÉLECTRODOMESTIQUES ET ANALOGUES – SÉCURITÉ –

Partie 2-95: Exigences particulières pour les motorisations de portes de garage à ouverture verticale, pour usage résidentiel

1 Domaine d'application

L'article de la Partie 1 est remplacé par l'article ci-après.

La présente partie de l'IEC 60335 traite de la sécurité des **motorisations** électriques des portes de garage pour usage résidentiel, qui ouvrent et ferment la porte verticalement et dont la **tension assignée** n'est pas supérieure à 250 V pour les appareils monophasés et à 480 V pour les autres appareils. Elle couvre également les dangers liés au mouvement de ces portes de garage motorisées.

NOTE 101 Des exemples de portes de garage sont représentés à la Figure 101.

NOTE 102 La **motorisation** peut être livrée avec une porte de garage.

NOTE 103 La présente norme s'applique également aux **dispositifs de protection contre l'écrasement** à utiliser avec les **motorisations**. Elle ne couvre pas les dangers liés au mécanisme de la porte elle-même.

Dans la mesure du possible, la présente norme traite des dangers ordinaires présentés par les appareils et encourus par tous les individus à l'intérieur et autour de l'habitation. Cependant, elle ne tient généralement pas compte de l'utilisation de l'appareil comme jouet par des jeunes enfants mais reconnaît que des enfants peuvent se trouver à proximité de la porte de garage.

NOTE 104 L'attention est attirée sur le fait que, dans de nombreux pays, des exigences supplémentaires sont spécifiées par les organismes nationaux responsables de la protection des travailleurs et par des organismes similaires.

NOTE 105 La présente norme ne s'applique pas aux **motorisations**

- de volets, stores, rideaux et équipements analogues (IEC 60335-2-97);
- motorisations de portails, portes et fenêtres (IEC 60335-2-103);
- pour usages commerciaux et industriels;
- destinées à être utilisées dans des locaux présentant des conditions particulières, telles que la présence d'une atmosphère corrosive ou explosive (poussière, vapeur ou gaz).

2 Références normatives

L'article de la Partie 1 est applicable avec l'exception suivante.

Addition:

IEC 60068-2-52:2017, *Essais d'environnement – Partie 2-52: Essais – Essai Kb: Brouillard salin, essai cyclique (solution de chlorure de sodium)*

3 Termes et définitions

L'article de la Partie 1 est applicable avec les exceptions suivantes.

3.1 Définitions relatives aux caractéristiques physiques

3.1.9 Remplacement:

conditions de fonctionnement normal

fonctionnement de la **motorisation** dans les conditions suivantes:

Les **motorisations** livrées sans porte sont mises en fonctionnement sous la **charge assignée**.

Les **motorisations** livrées avec une porte sont mises en fonctionnement avec la porte installée conformément aux instructions.

3.1.101

charge assignée

charge ou couple attribué à la **motorisation** par le fabricant

3.5 Définitions relatives aux types d'appareils

3.5.101

motorisation

moteur et autres composants qui commandent le mouvement de la porte

Note 1 à l'article: Exemples de composants: les engrenages, les dispositifs de commande, les freins et les **systèmes de protection contre l'écrasement**.

3.5.102

motorisation automatique

motorisation qui fait fonctionner la porte dans au moins une direction sans action intentionnelle de l'utilisateur

3.7 Définitions relatives aux composants de sécurité

3.7.101

interrupteur sans verrouillage

interrupteur qui revient automatiquement en **position arrêt** lorsque son organe de manœuvre est relâché

3.7.102

système de protection contre l'écrasement

partie de la **motorisation** qui assure la protection contre un piégeage pouvant entraîner pour le corps humain d'être écrasé ou coincé par la porte

Note 1 à l'article: Le piégeage dans le garage est couvert par le dispositif de dépannage manuel de 20.109.

Note 2 à l'article: Un **système de protection contre l'écrasement** peut être incorporé dans l'assemblage du moteur ou être installé séparément. Il peut être constitué d'un ou de plusieurs dispositifs, tels que des bords sensibles à la pression, des dispositifs sensibles aux infrarouges, des dispositifs sensibles à la lumière active ou un **interrupteur sans verrouillage**.

4 Exigences générales

L'article de la Partie 1 est applicable.

5 Conditions générales d'essais

L'article de la Partie 1 est applicable avec les exceptions suivantes.

5.2 Addition:

Lorsqu'un essai doit être effectué avec une porte, la porte spécifiée pour l'installation avec cette **motorisation** qui donne les conditions les plus défavorables pour l'essai est utilisée. Pour certains essais, une charge artificielle peut être utilisée pour simuler la porte. La **motorisation** est ajustée conformément aux instructions.

5.5 Addition:

Les portillons sont fermés pendant les essais.

6 Classification

L'article de la Partie 1 est applicable avec les exceptions suivantes.

6.1 Modification:

Les **motorisations** doivent être de la **classe I**, de la **classe II** ou de la **classe III**.

6.2 Addition:

Les **motorisations** destinées à être exposées aux conditions extérieures doivent être au moins IPX4.

7 Marquage et instructions

L'article de la Partie 1 est applicable avec les exceptions suivantes.

7.1 Modification:

Les **motorisations** doivent porter le marquage de la **puissance assignée**.

Addition:

Les **motorisations** livrées sans porte doivent porter le marquage de la **charge assignée** en N ou en Nm.

7.12 Addition:

Les instructions doivent comporter, en substance, la mise en garde suivante:

MISE EN GARDE: Instructions importantes de sécurité. Il est important pour la sécurité des personnes de suivre toutes les instructions. Conserver ces instructions.

Les instructions doivent comporter, en substance, les indications suivantes:

- ne pas laisser les enfants jouer avec les dispositifs de commande de la porte. Mettre les télécommandes hors de portée des enfants;
- surveiller la porte en mouvement et maintenir les personnes éloignées jusqu'à ce que la porte soit complètement ouverte ou fermée (non nécessaire pour les **motorisations automatiques**);
- faire attention en utilisant le dispositif de dépannage manuel car une porte ouverte peut retomber rapidement du fait de ressorts faibles ou cassés, ou être mal équilibrée;

- vérifier fréquemment l'installation, notamment les câbles, les ressorts et les fixations, pour déceler tout signe d'usure, de détérioration ou de mauvais équilibre. Ne pas utiliser le système si une réparation ou un réglage est nécessaire car un défaut dans l'installation ou une porte mal équilibrée peut provoquer des blessures;
- chaque mois, vérifier que la motorisation change de sens lorsque la porte rencontre un objet de 40 mm de haut placé sur le sol. Régler, si nécessaire, et revérifier car un mauvais réglage peut présenter un danger;
- déconnecter l'alimentation lors du nettoyage ou de la réalisation d'un autre entretien.

Les instructions doivent comporter les informations suivantes:

- des détails sur la façon d'utiliser le dispositif de dépannage manuel;
- des informations concernant le réglage de la porte et de la **motorisation** (s'il y a lieu).

Les instructions des **motorisations automatiques** doivent comporter, en substance, la mise en garde suivante:

MISE EN GARDE: Porte automatique – La porte peut fonctionner de manière inattendue, par conséquent ne rien laisser dans la trajectoire de la porte.

7.12.1 Addition:

Les instructions d'installation doivent comporter, en substance, la mise en garde suivante:

MISE EN GARDE: Instructions importantes de sécurité. Suivre toutes les instructions, car une installation incorrecte peut conduire à des blessures graves.

Les instructions d'installation doivent comporter des précisions concernant l'installation de la **motorisation** et de ses composants associés.

Pour les **motorisations** livrées sans porte, les instructions d'installation doivent indiquer le type, les dimensions et la masse des portes pour lesquelles la **motorisation** est destinée à être utilisée.

Les instructions d'installation doivent comporter, en substance, les indications suivantes:

- avant d'installer la motorisation, enlever toutes les cordes ou chaînes inutiles et mettre hors service tous les équipements qui ne sont pas nécessaires pour un fonctionnement motorisé, tels que les verrous;
- avant d'installer la motorisation, vérifier que la porte est en bonne condition mécanique, qu'elle est correctement équilibrée et qu'elle se ferme et s'ouvre convenablement;
- installer l'organe de manœuvre du dispositif de dépannage manuel à moins de 1,8 m du sol;
- installer tout dispositif de commande fixe à une hauteur d'au moins 1,5 m et en vue de la porte mais éloigné des parties mobiles;

NOTE 101 Il n'est pas nécessaire de spécifier une hauteur minimale pour les interrupteurs à clef.

- fixer à demeure les étiquettes de mise en garde contre l'écrasement en un endroit très visible ou près des dispositifs de commande fixes éventuels;
- fixer à demeure l'étiquette concernant le dispositif de dépannage manuel près de son organe de manœuvre;
- après installation, vérifier que le mécanisme est correctement réglé et que la motorisation change de sens lorsque la porte rencontre un objet de 40 mm de hauteur placé sur le sol;
- la motorisation ne doit pas être utilisée avec une porte comprenant un portillon (à moins que la **motorisation** ne puisse pas être mise en fonctionnement avec le portillon ouvert);
- après installation, vérifier que des parties de la porte n'empiètent pas sur les trottoirs ou sur la voie publique.

Les instructions doivent comporter les informations nécessaires pour la manipulation en toute sécurité d'une **motorisation** pesant plus de 20 kg. Ces informations doivent décrire la façon d'utiliser les dispositifs de manipulation tels que les crochets et les câbles.

7.15 Addition:

Les marquages doivent également être fournis avec les instructions. En outre, le marquage relatif au nom, à la marque commerciale ou à la marque d'identification du fabricant ou du fournisseur responsable et la référence du modèle ou du type peuvent également être extraits d'une étiquette, par exemple une étiquette à code à barres, visible lorsque l'appareil est installé.

7.101 Les **motorisations** doivent être fournies avec une étiquette pouvant être fixée à demeure. Pour les **motorisations automatiques**, l'étiquette doit comporter, en substance, la mise en garde suivante:

MISE EN GARDE: Motorisation automatique – Rester éloigné de la porte, celle-ci pouvant fonctionner de manière inattendue.

Pour les autres **motorisations**, l'étiquette doit comporter un symbole de mise en garde d'une hauteur minimale de 60 mm. L'étiquette doit également comporter, en substance, la mise en garde suivante:

MISE EN GARDE: Éloignez les enfants lorsque la porte est en mouvement.

NOTE Un exemple de symbole de mise en garde approprié est représenté à la Figure 102.

La vérification est effectuée par examen et par des mesures.

7.102 Les **motorisations** qui utilisent un dispositif sensible au contact comme **système de protection contre l'écrasement** doivent être livrées avec une étiquette comportant, en substance, la mise en garde suivante:

MISE EN GARDE: Risque d'écrasement – Vérifier régulièrement et régler, si nécessaire, pour assurer que, lorsque la porte rencontre un objet de 40 mm de haut placé sur le sol, la porte inverse son mouvement ou l'objet peut être écarté librement.

La vérification est effectuée par examen.

7.103 Les **motorisations** doivent être fournies avec une étiquette pouvant être fixée à demeure indiquant comment utiliser le dispositif de dépannage manuel.

La vérification est effectuée par examen.

7.104 Pour les **motorisations** destinées à être installées par l'utilisateur, l'emballage doit indiquer le type de porte, dimensions et masse comprises, que la **motorisation** peut entraîner et indiquer, le cas échéant, que la **motorisation**

- est prévue pour être installée à au moins 2,5 m au-dessus du sol ou d'un autre niveau d'accès,
- peut être utilisée avec des portes ayant des ouvertures de diamètre supérieur à 50 mm,
- est prévue pour un fonctionnement automatique.

La vérification est effectuée par examen.

8 Protection contre l'accès aux parties actives

L'article de la Partie 1 est applicable avec l'exception suivante.

8.2 Modification:

L'**isolation principale** et les parties séparées des **parties actives** par une **isolation principale** peuvent être touchées pendant le réglage si un **outil** est nécessaire pour avoir accès aux moyens de réglage.

9 Démarrage des appareils à moteur

L'article de la Partie 1 n'est pas applicable.

10 Puissance et courant

L'article de la Partie 1 est applicable avec les exceptions suivantes.

10.1 Modification:

Au lieu de déterminer la valeur moyenne, la valeur maximale de la puissance est déterminée sans tenir compte de l'effet du courant d'appel.

10.2 Modification:

Au lieu de déterminer la valeur moyenne, la valeur maximale du courant est déterminée sans tenir compte du courant d'appel.

11 Échauffements

L'article de la Partie 1 est applicable avec l'exception suivante.

11.7 Remplacement:

Les **motorisations** pour fonctionnement continu sont soumises à des cycles de fonctionnement consécutifs jusqu'à établissement des conditions de régime.

Les **motorisations automatiques** sont mises en fonctionnement sans période de repos pendant 3 cycles en se basant sur la taille maximale de porte que la **motorisation** est destinée à faire fonctionner ou 4 min, en choisissant la durée la plus longue.

Les autres **motorisations** sont mises en fonctionnement de la façon suivante:

- les **motorisations** livrées sans porte sont mises en fonctionnement sans période de repos pendant au moins 2 min, à moins que la durée de fonctionnement assignée ne soit plus longue;
- les **motorisations** livrées avec une porte sont mises en fonctionnement sans période de repos pendant 3 cycles.

12 Vacant

13 Courant de fuite et rigidité diélectrique à la température de régime

L'article de la Partie 1 est applicable.

14 Surtensions transitoires

L'article de la Partie 1 est applicable.

15 Résistance à l'humidité

L'article de la Partie 1 est applicable avec les exceptions suivantes.

15.1.1 Addition:

*Les parties des **motorisations** destinées à être exposées aux conditions extérieures sont soumises aux essais spécifiés pour les appareils IPX4.*

15.1.2 Addition:

*Les **motorisations** tubulaires IPX4 sont installées à l'intérieur d'un tube ouvert aux deux extrémités et ayant le plus grand diamètre spécifié dans les instructions. Le tube a une longueur double de celle du moteur et est monté sur un support comme en utilisation normale. Le support tourne à une vitesse de 1 r/min.*

16 Courant de fuite et rigidité diélectrique

L'article de la Partie 1 est applicable.

17 Protection contre la surcharge des transformateurs et des circuits associés

L'article de la Partie 1 est applicable.

18 Endurance

L'article de la Partie 1 n'est pas applicable.

19 Fonctionnement anormal

L'article de la Partie 1 est applicable avec les exceptions suivantes.

19.1 Addition:

*Les **motorisations** sont également soumises à l'essai de 19.101.*

19.9 N'est pas applicable.

19.10 Addition:

*Pour les **motorisations** équipées d'un dispositif de dépannage manuel, l'essai est répété avec la **motorisation** relâchée.*

L'essai est effectué sur un cycle de fonctionnement si la durée du cycle est supérieure à 1 min.