



IEC 60335-2-103

Edition 4.0 2023-12
COMMENTED VERSION

INTERNATIONAL STANDARD



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

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

INTERNATIONAL
ELECTROTECHNICAL
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-103: Particular requirements for drives for gates, doors and windows

FOREWORD

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- 9) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at <https://patents.iec.ch>. IEC shall not be held responsible for identifying any or all such patent rights.

This commented version (CMV) of the official standard IEC 60335-2-103:2023 edition 4.0 allows the user to identify the changes made to the previous IEC 60335-2-103:2015+AMD1:2017+AMD2:2019 CSV edition 3.2. Furthermore, comments from IEC TC 61 experts are provided to explain the reasons of the most relevant changes, or to clarify any part of the content.

A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text. Experts' comments are identified by a blue-background number. Mouse over a number to display a pop-up note with the comment.

This publication contains the CMV and the official standard. The full list of comments is available at the end of the CMV.

IEC 60335-2-103 has been prepared by IEC technical committee 61: Safety of household and similar electrical appliances. It is an International Standard.

This fourth edition cancels and replaces the third edition published in 2015, Amendment 1:2017 and Amendment 2:2019. 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 IEC 60335-1:2020;
- b) scope includes DC-supplied appliances and battery-operated appliances (Clause 1);
- c) some notes have been converted to normative text (Clause 1);
- d) additional requirements for installation instructions have been incorporated (7.12);
- e) application of test probe 18 and test probe 19 have been introduced (8.1.1, 20.2, Annexes BB, CC and DD);
- f) addition of surface temperatures for external accessible surfaces (11.3, 11.8);
- g) requirements for loading accessible appliance outlets and socket outlets have been added (11.7);
- h) requirements for appliances incorporating integral batteries or separable batteries have been added (11.7);
- i) requirements have been added for drives intended for permanent connection delivered with a connector to ease the installation (22.108, 24.101, 25.3).

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

Draft	Report on voting
61/7017/FDIS	61/7082/RVD

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

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

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

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 unless that edition precludes it; in that case, the latest edition that does not preclude it is used. It was established on the basis of the sixth edition (2020) 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: Particular requirements for drives for gates, doors and windows.

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 this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

NOTE 4 The attention of National Committees is drawn to the fact that equipment manufacturers and testing organizations can 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.

IMPORTANT – The "colour inside" logo on the cover page of this document 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.

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

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

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

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

This standard takes into account the requirements of IEC 60364 as far as possible so that there is compatibility with the wiring rules when the appliance is connected to the supply mains. However, national wiring rules ~~may~~ can 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~~ Horizontal publications, basic safety publications and group safety publications covering a hazard are not applicable since they have been taken into consideration when developing the general and particular requirements for the IEC 60335 series of standards. ~~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.~~ 1

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

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

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

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

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-103: Particular requirements for drives for gates, doors and windows

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 horizontally and vertically moving gates, doors, garage doors and **windows** for household and similar purposes, their **rated voltage** being not more than 250 V for single-phase **drives** and 600 V for other **drives** including direct current (DC) supplied appliances and **battery-operated appliances** **3**. It also covers the hazards associated with the movement of the **driven part**.

~~Battery-operated drives and other d.c. supplied drives are within the scope of this standard. Dual supply drives, either mains-supplied or battery-operated, are regarded as battery-operated drives when operated in the battery mode.~~

Drives not intended for normal household use but which nevertheless ~~may~~ can be a source of danger to the public, such as **drives** intended to be used by laymen in shops, offices, hotels, restaurants, hospitals, in industry and on farms, are within the scope of this standard.

Requirements for **drives** for doors that ~~may~~ can be used in emergency routes and exits are given in **normative** Annex AA.

~~NOTE 101~~ Examples of **drives** within the scope of this standard are **drives** for

- folding doors;
- revolving doors;
- rolling doors;
- roof **windows**;
- sectional overhead doors;
- swinging and sliding gates or doors.

NOTE 101 Examples are shown in Figure 101.

NOTE 102 **Drives** ~~may~~ can be supplied with a **driven part**.

As far as is practicable, this standard deals with the common hazards presented by **drives** that are encountered by all persons in and around the home. However, in general, it does not take into account

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

~~NOTE 103~~ For appliances intended to be used in vehicles or on board ships or aircraft, additional requirements can be necessary. ~~Attention is drawn to the fact that~~ In many countries, additional

requirements are specified by the national health authorities, the national authorities responsible for the protection of labour, the national water supply authorities **4** and similar authorities.

~~NOTE 104~~—This standard does not apply to **drives**

- for vertically moving garage doors for residential use (60335-2-95);
- for shutters covering doors and **windows** (including locations where the door is set back from the shutter), awnings, blinds and similar equipment (60335-2-97);
- intended exclusively to be used by trained persons in commercial and industrial premises;
- for specific purposes, such as fire doors;
- for natural smoke exhaust ventilators not used as **windows** (ISO 21927-2);
- intended to be used in locations where special conditions prevail, such as the presence of a corrosive or explosive atmosphere (dust, vapour or gas).

~~NOTE 105~~—This standard does not apply to movement of a pedestrian door where such movement is based solely on stored energy.

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)*

IEC 60584-1, *Thermocouples – Part 1: EMF specifications and tolerances*

IEC 60825-1:2014, *Safety of laser products – Part 1: Equipment classification and requirements*

IEC 61496-3:2008/2018, *Safety of machinery – Electro-sensitive protective equipment – Part 3: Particular requirements for active opto-electronic protective devices responsive to diffuse reflection (AOPDDR)*

IEC 61984:2008, *Connectors – Safety requirements and tests*

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~~ Modification:

Replace the first paragraph with the following: **5**

~~normal operation~~

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

- **drives** supplied without a **driven part** are operated with their **rated load**;
- **drives** supplied with a **driven part** are operated with the **driven part** installed in accordance with the instructions

3.1041.101

rated load

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

3.1051.102

rated operating time

duration of continuous operation assigned to the **drive** by the manufacturer

Note 1 to entry: During continuous operation, the **drive** may reverse its direction.

3.1061.103

rated number of operating cycles

number of uninterrupted **cycles** 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 **driven part**

Note 1 to entry: Examples of components are gears, controls, brakes, components for power transmission from the **drive** to the **driven part** and **entrapment protection systems**.

3.1105.102

automatic drive

drive that operates the **driven part** in at least one direction without intentional activation by the user

3.1125.103

reversible drive

drive that can be manually operated with or without power in both directions by manual action on the **driven part**

3.7 Definitions relating to safety components

3.1087.101

entrapment protection system

part of the **drive** that protects against crushing

Note 1 to entry: An **entrapment protection system** may consist of one or more devices, such as pressure sensitive edges, passive infrared and active light sensing devices, **biased-off switches** or motor current monitoring devices.

Note 2 to entry: An **entrapment protection system** may be incorporated in the motor assembly or installed separately.

3.1097.102

biased-off switch

hold to run device that initiates and maintains the **drive** movement only as long as the manual control is actuated by the user

3.8 Definitions relating to miscellaneous matters

3.1028.101

driven part

part of a gate, door, garage door or **window** that is intended to be moved by the **drive**

3.1038.102

window

part in a building that opens and closes in order to regulate the air and light and that is not intended for passage

3.1078.103

cycle

complete opening and closing movement of the **driven part**

Note 1 to entry: For revolving doors, a **cycle** means the necessary rotation to allow a person to pass through it.

3.1118.104

horizontally moving pedestrian door

swinging, sliding or rotating door designed for pedestrian use

3.1138.105

main closing edge

edge(s) of a pedestrian door leaf, whose distance from a parallel **opposing closing edge** or surface determines the usable pathway

3.1148.106

opposing closing edge

edge(s) of a pedestrian door leaf formed by the **main closing edge** and a fixed edge or a surface against which the pedestrian door leaf is moving

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 **driven part**, the **driven part** specified for installation with the **drive** that gives the most unfavourable conditions for the test is used. The **drive** is adjusted in accordance with the instructions.*

*The **driven part** may be simulated by an artificial load.*

5.5 Addition:

A wicket door is kept:

- *in the fully closed position if it travels together with the door during the tests, or*
- *in the fully open position or completely removed position if it does not travel with the door during the tests.*

5.7 Addition:

*If the **drive** is marked with an ambient temperature beyond the range of +5 °C to +40 °C, the tests of Clauses 11, 13, BB.20.10110, BB.20.1055, BB.20.1066, BB.20.1077, BB.20.1099, CC.20.1033, CC.20.1044, CC.20.1055, CC.20.1066, DD.20.1055, DD.20.1066, DD.20.1077, DD.20.1088, and Clause 21 are carried out at the most unfavourable marked temperature.*

5.101 Drives shall be tested for compliance with this standard for any of the following modes of operation as intended by the manufacturer:

- *automatic operation (operation in at least one direction without intentional activation by the user);*

- *impulse activation (operation in either direction with an intentional activation by the user);*
- *biased-off (hold to run) operation.*

Whenever required by the instructions, components shall be added or changed to perform the tests.

6 Classification

This clause of Part 1 is applicable except as follows.

6.1 Modification:

Replace the first paragraph with the following:

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

6.2 Addition:

Drives, or parts of **drives**, that are intended for exposure to outdoor conditions shall be at least IPX4.

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.1 Addition:

Drives shall be marked with their ambient temperature range.

Drives supplied without a **driven part** shall be marked with the **rated load**, in newtons (N) or in newton-metres (Nm).

Unless the **drive** is intended for continuous operation, **drives** supplied without a **driven part** shall be marked with the **rated operating time** in minutes, or the number of **cycles** per hour, or the **rated number of operating cycles**.

Drives supplied with a **driven part** shall be marked with the **rated number of operating cycles** or the **cycles** per hour, unless the **drive** is intended for continuous operation.

7.6 Addition:



[symbol ISO 7000-0533
(2004-01)]

upper limit of temperature



[symbol ISO 7000-0534
(2004-01)]

lower limit of temperature

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 these instructions. Save these instructions.

The instructions shall ~~state~~ include the substance of the following:

- do not allow children to play with fixed controls. Keep remote controls away from children;
- activation of the manual release may cause uncontrolled movement of the driven part due to mechanical failures or an out-of-balance condition; ~~(if applicable);~~
- when operating a biased-off switch, make sure that other persons are kept away;
- when closing a window that has been opened by a smoke control system, make sure that other persons are kept away;
- frequently examine the installation for imbalance where applicable and signs of wear or damage to cables, springs and mounting. Do not use if repair or adjustment is necessary;
- disconnect the supply(s) when cleaning or other maintenance is being carried out.

The instructions shall include the following information:

- explanation of mode indicators;
- details on how to use any manual release, or **reversible drive** used as a manual release;
- details on how to re-adjust controls, (if applicable);
- where the operation of the **drive** is specified in **cycles** per hour, the rest period required between **cycles**.

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 specify the type, size and mass of the **driven part**, locations where the **drive** can be installed and shall include details of whether the **drive** is suitable only for balanced vertical **driven parts**.

They shall state that the installer shall check that the temperature range marked on the **drive** is suitable for the location.

They shall state that the **drive**

- cannot be used when the wicket door is open (for **drives** that are constructed so the **drive** can only operate when the wicket door is closed); or
- cannot be used when the wicket door is closed (for **drives** that are constructed so the **drive** can only operate when the wicket door is open or removed).

For **drives** intended for permanent connection to fixed wiring, delivered with a separate connector to ease the installation and establish the supply connection, the instructions shall state the substance of the following: Only use the supplied connector when installing the **drive**. **6**

The instructions shall include the ~~substance of the~~ following information:

- the necessary information for 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;
- details of the maximum allowed distance from the wall that is parallel to the sliding movement to the outside of horizontally sliding **driven parts**;
- details for the installation of the **drive** and its associated components, including details of relevant accessories required for alternate modes of operation;

- that the actuating member of a **biased-off switch** is to be located within direct sight of the **driven part** but away from moving parts. Unless it is key operated, it is to be installed at a minimum height of 1,5 m and not accessible to the public;
- details on how to set controls;
- the minimum height for installation of parts of the **drive** intended to be mounted more than 850 mm, 1,8 m or 2,3 m or at least 2,5 m above the floor in accordance with 8.1.1. Table 101, 20.2, B.22.3 or B.22.4. **7**

The installation instructions shall include the substance of the following:

- vertical doors and gates need an anti-drop feature or device;
- before installing the **drive**, check that the **driven part** is in good mechanical condition, opens and closes properly and correctly balanced where applicable;
- ~~– information if a hazardous part of the **drive** is intended to be installed at a height of at least 2,5 m above floor level or other access level;~~
- except for **horizontally moving pedestrian doors**, ensure that entrapment between the **driven part** and the surrounding fixed parts due to the opening movement of the **driven part** is avoided;
- for **horizontally moving pedestrian doors**, ensure that entrapment between the **driven part** and the surrounding fixed parts due to the movement of the **driven part** is avoided. This can be achieved if the relevant distance does not exceed 8 mm. However, the following distances are considered sufficient to avoid entrapments for the parts of the body identified:
 - for fingers, a distance greater than 25 mm;
 - for feet, a distance greater than 50 mm;
 - for heads, a distance greater than 200 mm; and
 - for the whole body, a distance greater than 500 mm.

If these distances cannot be achieved, safeguarding devices shall be provided;

- ~~– details of the maximum allowed distance from the wall that is parallel to the sliding movement to the outside of horizontally sliding **driven parts**;~~
- ~~– details for the installation of the **drive** and its associated components, including details of relevant accessories required for alternate modes of operation;~~
- ~~– that the actuating member of a **biased-off switch** is to be located within direct sight of the **driven part** but away from moving parts. Unless it is key operated, it is to be installed at a minimum height of 1,5 m and not accessible to the public;~~
- ~~– details on how to set controls; **8**~~
- after installation, ensure that the mechanism is properly adjusted and that the protection system and any manual release function correctly;
- permanently fix the label concerning the manual release, adjacent to its actuating member.

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 having a manual release shall be supplied with a label describing how to use the release unless the information is already marked on the **drive**.

Compliance is checked by inspection.

8 Protection against access to live parts

This clause of Part 1 is applicable except as follows.

8.1.1 Replacement:

The requirement of 8.1 applies for all positions of the appliance when it is operated as in normal use.

Test probe B, test probe 18 and test probe 19 of IEC 61032 are applied with a force not exceeding 1 N, the appliance being in every possible position. Through openings, the test probe is applied to any depth that the probe will permit and is rotated or angled before, during and after insertion to any position. If the opening does not allow the entry of the probe, the force on the probe in the straight position is increased to 20 N when probe B is used or 10 N when test probe 18 or test probe 19 are used. If the test probe then enters the opening, the test is repeated with the probe in the angled position.

*During the tests with test probe B, all **detachable parts** are removed except lamps. However, during insertion or removal of lamps, protection against contact with **live parts** of the lamp cap shall be ensured.*

During the tests with test probe 18 and test probe 19 of IEC 61032, the appliance shall be fully assembled as in normal use without any parts removed.

*Test probe 19 of IEC 61032 is not applied to parts of **drives** that are located at a height of more than 850 mm above the floor or other access level in normal use. **9***

*Test probe 18 of IEC 61032 is not applied to parts of **drives** that according to the instructions are required to be mounted at a height of more than 1,8 m above the floor or other access level. **10***

Test probe 18 and test probe 19 of IEC 61032 are not applied to appliances for commercial use unless they are intended to be installed in an area open to the public.

*It shall not be possible to touch **live parts** or **live parts** protected only by lacquer, enamel, ordinary paper, cotton, oxide film, beads, or sealing compound except self-hardening resins, with test probe B, test probe 18 or test probe 19, as applicable.*

8.2 Addition:

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.

11 Heating

This clause of Part 1 is applicable except as follows.

11.3 Addition:

Where the external **accessible surfaces** are suitably flat and access permits, then the test probe of Figure 103 is used to measure the temperature rises of external **accessible surfaces** specified in Table 101. The probe is applied with a force of $4\text{ N} \pm 1\text{ N}$ to the surface in such a way that the best possible contact between the probe and the surface is ensured. The measurement is performed after a contact period of 30 s.

The probe may be held in place using a laboratory stand clamp or similar device. Any measuring instrument giving the same results as the probe may be used. **11**

11.7 Replacement:

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

Drives not for continuous operation are operated as follows:

- **drives** for gates for one household and horizontally moving garage doors for one household are operated without rest periods for three **cycles** or the **rated operating time** or the **rated number of operating cycles**, whichever is longer;
- **drives** for **windows** are operated without rest periods for the **rated number of operating cycles** or the **rated operating time** in minutes;
- other **drives** are operated without rest periods for four minutes or the **rated operating time** or the **rated number of operating cycles** but for not less than five **cycles** of operation, whichever is longer.
- **drives** rated in **cycles** per hour are operated for 20 % more than the rated number of **cycles** per hour and with the relevant rest period(s) declared by the manufacturer.

Appliance outlets accessible to the user and socket-outlets accessible to the user are loaded with a resistive load that gives the marked **outlet load**. **12**

For appliances incorporating **integral batteries** or **separable batteries** not disconnected from the appliance for charging purposes:

- the **battery** that has been **fully discharged** is charged for 1 h, while the appliance is operated as specified performing its intended function, if allowed by the construction of the appliance;
- the **battery** that has been **fully discharged** is charged, for a duration of 24 h or until it is **fully charged** whichever is shorter, without the **battery-operated appliance** performing its intended function. **13**

11.8 Modification:

Replace the first paragraph with the following text:

During the test, the temperature rises are monitored continuously and shall not exceed the values shown in Table 3 and Table 101. **14**

Addition:

**Table 101 – Maximum temperature rises
for specified external accessible surfaces under normal operating conditions**

Surface	Temperature rise of external accessible surfaces ^a	
	K	
	Surfaces of appliances not more than 850 mm above the floor or other access level after installation	Surfaces of appliances between 850 mm and 2,3 m above the floor or other access level after installation
Bare metal	38	42
Coated metal ^b	42	49
Glass and ceramic	51	56
Plastic and plastic coating > 0,4 mm ^{c, d}	58	62

NOTE The temperature rise limits of handles, knobs, grips, keyboards, keypads and similar parts are specified in Table 3.

^a Temperature rises are not measured on surfaces of appliances which, according to the instructions, shall be fixed to a wall or ceiling and where these surfaces are inaccessible to a 75 mm diameter probe having a hemispherical end.

^b Metal is considered coated when a coating having a minimum thickness of 90 µm made of enamel, powder or non-substantially plastic coating is used.

^c The temperature rise limit of plastic also applies for plastic material having a metal finish of thickness less than 0,1 mm.

^d When the thickness of the plastic coating does not exceed 0,4 mm, the temperature rise limits of coated metal for underlying metal apply or the temperature rise limits for glass or ceramic material for underlying glass or ceramic material apply.

12 ~~Void~~ Charging of metal-ion batteries

This clause of Part 1 is applicable. 15

13 Leakage current and electric strength at operating temperature

This clause of Part 1 is applicable except as follows.

13.3 Addition:

In Table 4, add the following to table footnote a:

The test voltage for 600 V multi-phase appliances is that specified for a **working voltage** > 250 V, where U is taken as the **rated voltage**.

14 Transient overvoltages

This clause of Part 1 is applicable.

15 Moisture resistance

This clause of Part 1 is applicable except as follows.

15.1.2 Addition:

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 as follows.

16.3 *In Table 7, add the following to table footnote a:*

*The test voltage for 600 V multi-phase appliances is that specified for a **working voltage** > 250 V, where U is taken as the **rated voltage**.*

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:

Compliance is also checked by the test of 19.101.

~~**19.13 Addition:**~~

~~*If the drive can be operated when any of the fault conditions are simulated, the applicable tests of BB.20.104, BB.20.107, CC.20.105, DD.20.104 and DD.20.107 are carried out, the drive, however, being supplied at rated voltage.*~~

~~*Either the drive continues to fulfil the requirements, or, after a maximum of one cycle of operation, it shall stop with the driven part in a safe position or the drive shall change to a biased-off switch mode of operation.*~~

19.11.2 Addition:

*If the drive can be operated when any of the fault conditions are simulated, the applicable tests of BB.20.1044, BB.20.1077, CC.20.1055, DD.20.1044 and DD.20.1077 are carried out, the drive, however, being supplied at **rated voltage**.*

*Either the drive continues to fulfil the requirements, or, after a maximum of one cycle of operation, it shall stop with the driven part in a safe position, or the drive shall change to a **biased-off switch** mode of operation.*

19.11.4.8 Replacement:

The **drive** is supplied at **rated voltage** and operated under **normal operation**. After approximately 60 s, the power supply voltage is reduced to a level such that the **drive** ceases to respond to user inputs or parts controlled by the programmable component cease to operate, whichever occurs first. This value of supply voltage is recorded. The **drive** is supplied at **rated voltage** and operated under **normal operation**. The voltage is then reduced to a value of approximately 10 % less than the recorded voltage. It is held at this value for approximately 60 s and then increased to **rated voltage**. The rate of decrease and increase of the power supply voltage is to be approximately 10 V/s.

The **drive** shall either continue to move in the same direction of movement in its operating cycle at which the voltage decrease occurred or a manual operation shall be required to restart it.

19.13 Addition:

~~During the test of 19.101, the winding temperature shall not exceed the values specified in 19.9.~~

If the **drive** can be operated when any of the fault conditions are simulated, the applicable tests of BB.20.4, BB.20.7, CC.20.5, DD.20.4 and DD.20.7 are carried out, the **drive**, however, being supplied at **rated voltage**.

Either the **drive** continues to fulfil the requirements, or, after a maximum of one cycle of operation, it shall stop with the **driven part** in a safe position or the **drive** shall change to a **biased-off switch** mode of operation. **16**

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 replaced by the following annexes.~~

~~Annex BB Drives for windows.~~

~~Annex CC Drives for pedestrian doors.~~

~~Annex DD Drives for horizontally and vertically moving doors, horizontally moving garage doors and gates.~~

This clause of Part 1 is applicable except as follows and as modified in the normative Annexes AA, BB, CC and DD.

20.1 Not applicable.

20.2 Addition:

Test probe 18 of IEC 61032 is not applied to parts of **drives** that according to the installation instructions are required to be mounted at a height of more than 1,8 m above the floor or other access level. **17**

The test probe that is similar to test probe B of IEC 61032 but having a circular stop face with a diameter of 50 mm, instead of the non-circular face, is not applied to parts of **drives** that according to the instructions are required to be mounted at a height of more than 2,5 m above the floor or other access level. **18**

NOTE 101 Stairs and terraces are examples of access levels. Surfaces not normally used for standing on, such as window-sills, and movable equipment such as ladders, are not considered to be access levels. **19**

Test probe 19 of IEC 61032 is applied to parts of the appliance placed at a height not more than 850 mm above the floor or other access level in normal use under the conditions specified for test probe 18. **20**

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 **Drives** weighing more than 20 kg shall incorporate suitable means for handling, such as hooks.

Compliance is checked by inspection.

22.102 All controls supplied with the **drive** shall be marked to indicate the functions in the same way.

When the **drive** is provided with a dedicated stop button, that stop button shall be clearly identifiable.

Compliance is checked by inspection.

22.103 When several modes of operation can be selected by the user, the selected mode shall be clearly indicated.

Compliance is checked by inspection.

22.104 It shall only be possible to make adjustments that could affect compliance with this standard by means of a **tool** or by use of a code.

Compliance is checked by inspection.

22.105 A **drive** for a door or gate incorporating a wicket door shall be constructed so that the **drive**

- cannot be operated when the wicket door is open (for **drives** that are constructed so the **drive** can only operate when the wicket door is closed); or
- cannot be operated when the wicket door is closed (for **drives** that are constructed so the **drive** can only operate when the wicket door is open or removed).

Compliance is checked by inspection.

22.106 Drives shall be supplied with all associated components necessary for compliance with this standard for the defined mode of operation. Components required for alternative modes of operation may be delivered separately provided they are listed in the instructions.

Compliance is checked by inspection.

22.107 Controls shall not be capable of overriding an **entrapment protection system** unless they can only activate the **drive** in sight of the **driven part**.

Compliance is checked by test.

22.108 Drives intended for permanent connection to fixed wiring may be delivered with a separate connector, to ease the installation and establish the supply connection. Such a connector shall be a **non-detachable part** once engaged. **21**

Such connector shall not be interchangeable with plugs and socket outlets listed in IEC TR 60083 or IEC 60906-1 or with appliance couplers complying with the standard sheets of IEC 60320-3. **22**

Compliance is checked by test.

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.*

24.1.5 Addition:

Connectors that are **non-detachable parts**, once engaged, are not considered to be part of an appliance coupler. **23**

24.1.101 *The relevant standard for a connector as referenced in 22.108 is IEC 61984:2008. Classification and ratings used for the tests of IEC 61984:2008 shall correspond to the ratings of the **drive** and its intended use.*

*The following clauses of IEC 61984:2008 and the corresponding test requirements in Clause 7, are not applicable: 5.2 a), 5.4 d), 6.2.1, 6.2.2, 6.4.1, 6.4.2, 6.4.3, 6.10, 6.14.2, 6.14.3, 6.17, 6.19 and 6.20. Subclause 6.5.1 is also applicable for connectors without breaking capacity (COC). Subclauses 6.15 and 6.16 are applicable but are modified to the **drive** temperature ratings. The tests in 7.3.6, 7.3.7 are performed when the connector referenced in this clause is engaged. **24***

25 Supply connection and external flexible cords

This clause of Part 1 is applicable except as follows.

25.3 Add the following note under the first dashed item:

NOTE 101 The set of terminals can be located in a separate connector complying with 24.1.101. **25**

25.5 ~~Modification~~ Addition:

Type Z attachment is allowed for separate power supplies for indoor use for **drives** having a **rated power input** not exceeding 100 W.

25.7 Addition:

The **supply cord** of **drives** for outdoor use shall be polychloroprene sheathed and not be lighter than ordinary polychloroprene sheathed flexible 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.

29.1 Addition:

For a rated voltage > 300 V and ≤ 346 V, the rated impulse voltage is for

- *overvoltage category I: 2 500 V;*
- *overvoltage category II: 4 000 V;*
- *overvoltage category III: 6 000 V.*

29.3.4 Addition:

For a **rated voltage** $> 300\text{ V}$ and $\leq 346\text{ V}$, the minimum thickness for accessible parts of **reinforced insulation** consisting of a single layer is for

- overvoltage category I: 0,6 mm;
- overvoltage category II: 1,2 mm;
- overvoltage category III: 2,0 mm.

30 Resistance to heat and fire

This clause of Part 1 is applicable except as follows.

30.2 Addition:

For **drives** only operated by a **biased-off switch**, 30.2.2 is applicable.

For other **drives**, 30.2.3 is 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 60068-2-52:2017, ~~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 $0,25\text{ mm} \pm 0,02\text{ mm}$. The pin is loaded so that the force exerted along its axis is $10\text{ N} \pm 0,5\text{ N}$. The scratches are made by drawing the pin along the surfaces 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 **drive** 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 except as follows.

32.101 Drives incorporating a laser shall be constructed so that they provide adequate protection from laser radiation.

Compliance is checked by the following test.

Detachable parts are removed. Any **accessible controls** are adjusted to give the highest laser radiation even if a tool is required to make the adjustment. If the control is inaccessible, it is also adjusted to give the highest laser radiation unless its actuating member is adequately locked in position.

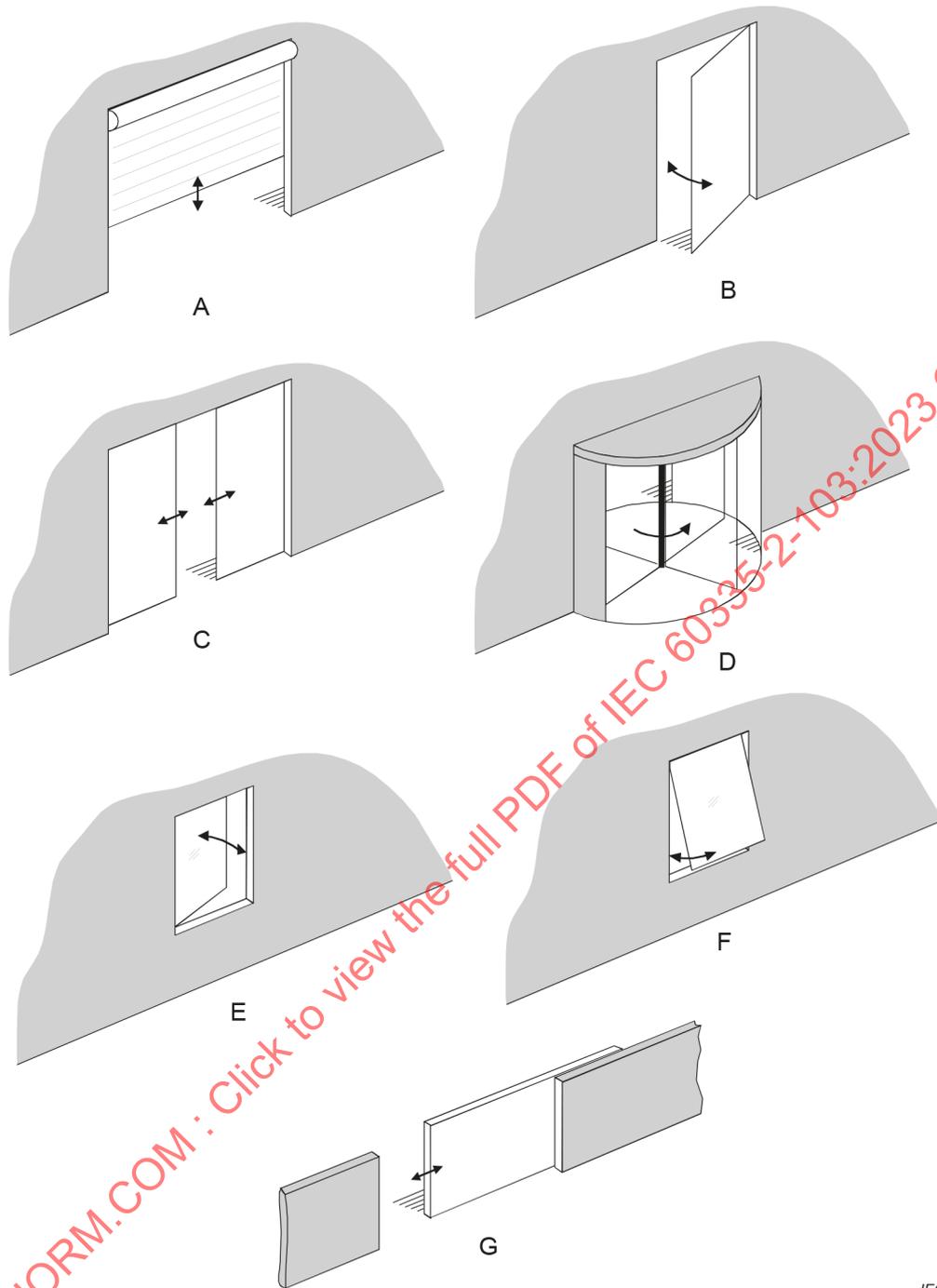
NOTE Solder or sealing compound is considered to provide adequate locking.

The **drive** is supplied at **rated voltage** and operated under **normal operation**. The laser radiation is measured in accordance with IEC 60825-1:2014, 5.2 and the accessible emission level shall not exceed the limits for a Class 1 laser product specified in Table 3 of that standard for an emission duration of 100 s.

The test is repeated but under the conditions specified in Clause 19 and the laser radiation measured again. The accessible emission level shall not exceed five times the limits specified for Class I for wavelengths of 400 nm to 700 nm. For other wavelengths, it shall not exceed the limits for a Class 3R laser product as specified in IEC 60825-1:2014, Table 6.

If compliance with IEC 60825-1:2014 relies on the operation of an interlock, this interlock shall be of the fail-safe type or be tested for 30 000 cycles of operation under the conditions of 24.1.4.

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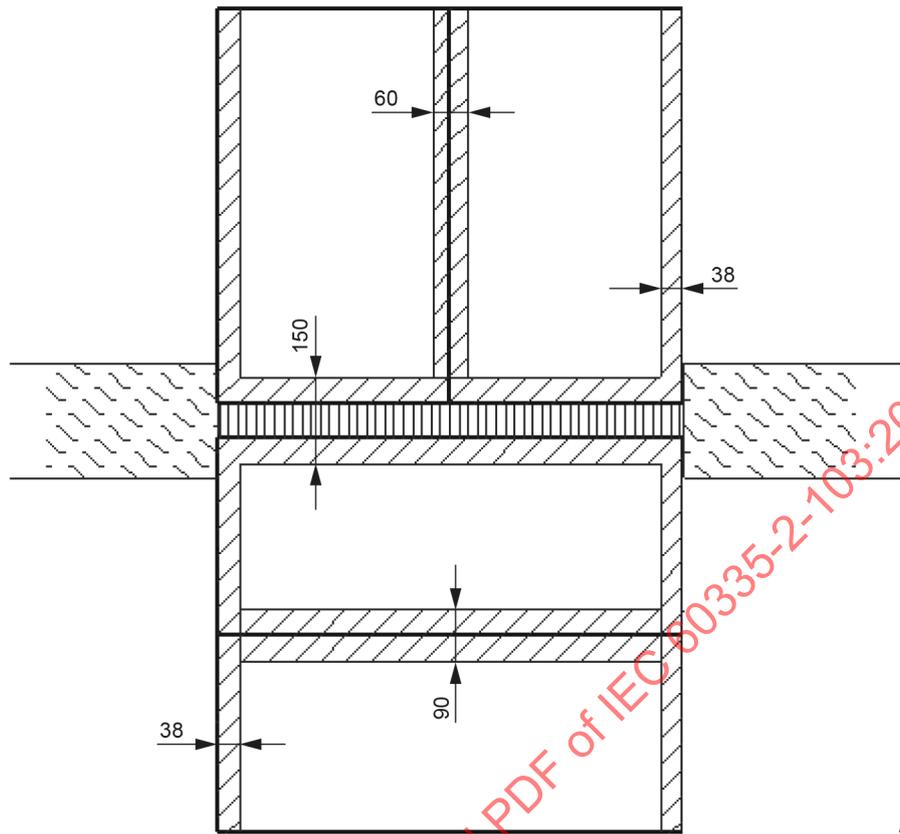
Key

- A rolling door
- B horizontally swinging door
- C horizontally sliding door
- D revolving door
- E vertically hinged **window** (horizontally moving)
- F horizontally hinged **window** (vertically moving)
- G horizontally sliding gate

IEC

Figure 101 – Examples of driven parts

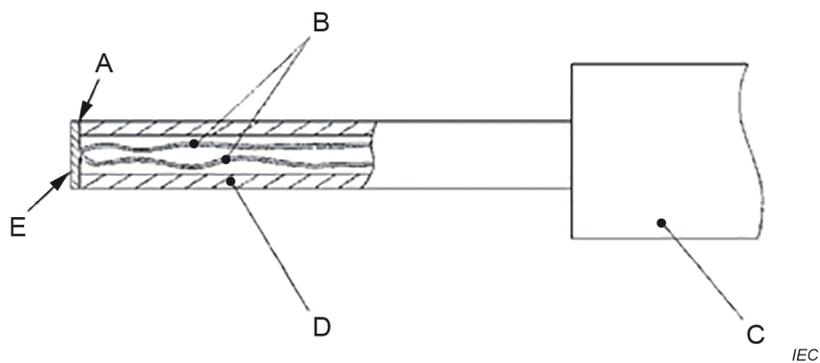
Dimensions in millimetres



- Key**
-  threshold
 -  inactive area
 -  wall

Figure 102 – Inactive floor areas of pressure-sensitive pads

IEC



Key

- A adhesive
- B thermocouple wires 0,3 mm diameter to IEC 60584-1 Type K
- C handle arrangement permitting a contact force of $4\text{ N} \pm 1\text{ N}$
- D polycarbonate tube: inside diameter 3 mm, outside diameter 5 mm
- E tinned copper disc: 5 mm diameter, 0,5 mm thick with a flat contact face

Figure 103 – Probe for measuring surface temperatures

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Annexes

The annexes of Part 1 are applicable except as follows.

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Annex B (normative)

Battery-operated appliances, separable batteries and detachable batteries for battery-operated appliances

11 Heating

11.1 Replacement:

Battery-operated appliances, their surroundings, and **batteries** shall not attain excessive temperatures in normal use.

Compliance is checked by determining the temperature rise of the various parts under the conditions specified in B.11.1, 11.2, 11.3, 11.7, and 11.8.

For drives for continuous operation, B.11.1 is applicable.

For other drives, B.11.1 is not applicable. Instead, other drives are tested according to 11.7 started with battery that is fully charged.

Any batteries shall not be depleted before the end of the rated operating time or rated number of operating cycles defined in 11.7. 26

NOTE The temperature rising of the motor and surroundings parts are checked according to 11.7.

B.22.3 Addition:

Test probe 19 of IEC 61032 is also applied as specified for test probe 18.

Test probe 19 of IEC 61032 is not applied to parts of drives that are located at a height of more than 850 mm above the floor or other access level in normal use.

Test probe 18 of IEC 61032 is not applied to parts of drives that according to the instructions are required to be mounted at a height of more than 1,8 m above the floor or other access level. 27

B.22.4 Addition:

Test probe 19 of IEC 61032 is also applied as specified for test probe 18.

Test probe 19 of IEC 61032 is not applied to parts of drives that are located at a height of more than 850 mm above the floor or other access level in normal use.

Test probe 18 of IEC 61032 is not applied to parts of drives that according to the instructions are required to be mounted at a height of more than 1,8 m above the floor or other access level. 28

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 with Clause 20 is impaired.

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Annex AA (normative)

Drives for powered pedestrian doors used in emergency routes and emergency exits

The following additions to this standard are applicable for **drives** for doors used in emergency routes and emergency exits.

NOTE In many countries, additional requirements are specified by national authorities.

The clause numbers in this annex refer to the clause numbers in the main part of this standard that are modified. Clauses that are additional to the clauses in the main part of this standard are identified by adding the annex letters as a prefix with the numbering starting at 1.

7 Marking and instructions

7.7 Where terminals for connection to a fire alarm system are provided, these shall be identified.

7.12 The instructions shall include the substance of the following:

Ensure that controls that can be set for a locked position are only activated when there are no other persons in the room.

7.12.1 The instructions shall include the substance of the following:

Unless the system allows break out in the escape direction, drives are to be connected so that doors either open in the escape direction or provide a clear escape path.

NOTE 101 Sliding doors are considered to provide a clear escape path.

20 Stability and mechanical hazards

This clause of Part 1 is ~~replaced by the requirements and tests~~ modified as specified in normative Annex CC.

22 Construction

AA.22.1081 **Drives** shall be constructed so that they cannot be put into a locked mode that prevents the door from being opened from the inside unless a night security position is selected by a key, code system or similar means.

Compliance is checked by inspection.

AA.22.1092 **Drives** shall be constructed so that they operate break-out doors or automatic-opening doors.

Compliance is checked by inspection.

AA.22.1103 **Drives** for break-out doors shall be constructed so that they release the door in the event of an emergency.

Compliance is checked by the following test.

The **drive** is installed with a door and supplied at **rated voltage**. A force of 220 N is applied at a height of $1\text{ m} \pm 10\text{ mm}$ to the leading edge of the door in the break-out direction. The door shall become released from the **drive**.

AA.22.4144 Drives for automatic-opening doors shall be constructed so that the door opens automatically if the power supply fails and the system has not been deliberately selected to be in the security position.

Compliance is checked by the test of AA.22.4144.1, and if a **battery** is required, also with AA.22.4144.2 and AA.22.4144.3.

AA.22.4144.1 The **drive** is installed with a door and supplied at **rated voltage**, any **battery** being **fully charged**. The supply is disconnected and the door shall start to open immediately at a speed of at least 200 mm/s. It shall then remain open.

AA.22.4144.2 The **drive** is installed with a door and supplied at **rated voltage**, the **battery** being **fully charged**. The **battery** is discharged at a rate of approximately 25 % of its rated capacity per hour. The door shall start to open within 4 h, the opening speed being at least 200 mm/s. It shall then remain open.

AA.22.4144.3 The **drive** is installed with a door and supplied at **rated voltage**. The **battery** is disconnected. The door shall start to open within 30 min, the opening speed being at least 200 mm/s. It shall then remain open.

Annex BB (normative)

Drives for windows

20 Stability and mechanical hazards

This clause of Part 1 is applicable except as follows.

~~20.1 Not applicable~~

~~20.2 Addition:~~

~~Moving parts of drives intended to be installed at a height of at least 2,5 m above the ground or other access level are considered to be positioned so to provide adequate protection against personal injury in normal use.~~

~~NOTE 101—Stairs and terraces are examples of access levels. Surfaces not normally used for standing on, such as window sills, and movable equipment such as ladders, are not considered to be access levels.~~ 29

BB.20.1041 Drives for windows shall operate so that the movement of the window is not likely to cause an injury.

Compliance is checked as follows:

- drives controlled by a **biased-off switch**, by the requirement and test of BB.20.1044;
- drives incorporating an **entrapment protection system**, by the relevant requirement and tests of BB.20.1077 and BB.20.1099.

Other drives are subjected to the following test.

The drive is installed with a window and supplied at the most unfavourable voltage between 0,94 and 1,06 times **rated voltage**. The drive is adjusted for the highest opening and closing forces, if the adjustment is mentioned in the instructions.

The drive is operated to open the window. The speed of the leading edge shall not exceed 50 mm/s.

When fully open, the gap between counter opposing edges shall not exceed 200 mm, unless the opening movement is controlled by a smoke control system. The drive is then operated to close the window and the speed of the leading edge shall not exceed 15 mm/s.

If the drive is controlled by a programmable **electronic circuit**, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of normative Annex R.

BB.20.1022 Where a manual release or **reversible drive** is provided, it shall be easy to operate. Operation of the release shall not give rise to a hazard such as kickback or unexpected operation of the drive.

The drive shall not create any hazard when the manual release is activated.

Operation of a **reversible drive** used as a means for a manual release shall not give rise to a hazard.

Compliance is checked by the following test.

Automatic operation of **automatic drives** is disabled.

The **drive** is installed with a **window** and supplied at the most unfavourable voltage between 0,94 and 1,06 times **rated voltage**. The **drive** is adjusted for the highest opening and closing forces, if such adjustment is mentioned in the instructions. The manual release is operated when the **window** has stopped at each terminal position, in turn. The release or **reversible drive** shall be operable with a force not exceeding 220 N or a torque not exceeding 1,6 Nm. The force is applied as stated in the instructions.

The test is repeated with the power supply interrupted.

When the manual release has been activated, the power supply is then restored and the **drive** activated. The **drive** shall not move, or if the **drive** moves, all requirements of this standard shall be met.

BB.20.1033 A mechanical fault in the **drive** shall not result in a hazardous operation.

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 part of the **drive** or used for connecting the **drive** to the **window**.

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

If 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 **window**, the force exerted by the **drive** being adjusted to its highest value in accordance with the instructions. The **drive** is supplied at the most unfavourable voltage between 0,94 and 1,06 times **rated voltage**.

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

Unless the **drive** and the **window** continue to operate normally, all of the following conditions shall be fulfilled:

- the **drive** shall stop operating at least by the end of the **cycle** of movement;
- further operation shall not be possible;
- the speed of the **window** shall not increase by more than 20 %.

BB.20.1044 **Drives** controlled by a **biased-off switch** shall stop when its actuating member is released.

Compliance is checked by the following test.

The **drive** is installed with a **window** and supplied at the most unfavourable voltage between 0,94 and 1,06 times **rated voltage**. It is operated to close the **window**.

When the actuating member is released, the leading edge of the **window** shall stop within a distance of 20 mm.

The test is repeated during the opening movement of the **window**.

The requirement for the **window** to stop within the specified distance only applies if the closing force exerted by the **window** exceeds 150 N, as measured in BB.20.1077.2.

If the **drive** is controlled by a programmable **electronic circuit**, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of *normative Annex R*.

BB.20.1055 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 **drive** has a single button for controlling the movement, further actuation shall reverse the direction of movement.

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

These requirements do not apply to controls affecting automatic modes of operation.

Any button that has a stop function shall not require a key to stop the **drive**.

Compliance is checked by a manual test.

NOTE The test can be carried out without a **window**.

BB.20.1066 **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 tests.

*The **drive** is supplied at **rated voltage** and operated under **normal operation**. The supply is then interrupted. After the supply is restored, the **drive** shall not restart automatically. However, **automatic drives** may re-start, provided that they function as in normal use.*

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

NOTE 2 The test can be carried out without a **window**.

*If the ~~drive is~~ **drive** is controlled by a programmable **electronic circuit**, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of *normative Annex R*.*

BB.20.1077 An **entrapment protection system** in a **drive** for **windows** shall be operated to reduce the likely hood of injury to the user.

*For **drives** incorporating an **entrapment protection system** with sensing devices that prevent the **window** from coming into contact with a person, compliance is checked by the test specified in BB.20.1077.1.*

Obstacles used in the following tests shall be made of materials and colours to simulate the most unfavourable conditions. In case of doubt, the obstacles shall be made of un-planed wood and painted white.

*For **drives** incorporating an **entrapment protection system** that allows the **window** to contact a person, compliance is checked by the relevant tests specified in BB.20.1077.2.*

NOTE 3 In one direction of travel of the **window**, BB.20.1077.1 can be met and BB.20.1077.2 can be met in the opposite direction of travel.

If the **drive** is controlled by a programmable **electronic circuit**, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of *normative Annex R*.

BB.20.1077.1 The **drive** is installed with a **window**, the force exerted by the **drive** being adjusted to its highest value in accordance with the instructions. The **drive** is supplied at the most unfavourable voltage between 0,94 and 1,06 times **rated voltage**.

For horizontally moving **windows**, the test of BB.20.1077.1.1 is carried out.

For vertically moving **windows**, the test of BB.20.1077.1.2 is carried out.

BB.20.1077.1.1 An obstacle having dimensions of approximately 25 mm × 100 mm × 300 mm, with three sides (one in each dimension) having a reflective surface, obtained by use of mirrors, fine grained stainless steel or white-gloss paint, and the other three sides being non-reflective surfaces painted dull-black, is placed at any place in the path of the leading edge and plane of the **window** and in the most unfavourable dimension. The tests with this obstacle shall be made using the non-reflective and reflective sides in turn.

The **drive** is operated to close the **window** from the fully open position and from a 300 mm gap. If the **window** moves, it shall stop or reverse its movement without contacting the obstacle.

BB.20.1077.1.2 An obstacle having dimensions of approximately 25 mm × 100 mm × 300 mm is placed at any place in the path of the leading edge along its 300 mm length across the **window** opening.

The **drive** is operated to close the **window** from heights of 100 mm, 1 000 mm and the fully open position of the **window**. The **window** shall not move or shall only move in the opening direction.

BB.20.1077.2 The **drive** is installed with a **window**. The force exerted by the **drive** is adjusted to the highest value if the force can be adjusted by the user during use or **user maintenance**. Otherwise, the force should be adjusted according to the installation instructions. The **drive** is supplied at the most unfavourable voltage between 0,94 and 1,06 times **rated voltage**.

The **drive** is operated to close the **window** from the fully open position. The forces between the leading edge and counter opposing edges shall not exceed

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

However, after 0,75 s, peaks lower than 400 N are allowed, if

- they are decreasing from one to the other, and
- the period of oscillation is ≤ 1 s, and
- the average force calculated over the remaining period of 4,25 s is ≤ 150 N.

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.

For vertically moving **windows**, the force is measured on the leading edge of the **windows** when the dimension of the gap is

- 50 mm;
- 300 mm;
- 500 mm.

The force is measured at the following locations:

- in the centre of the leading edge;
- 200 mm from each end of the leading edge if this edge is longer than 800 mm.

For horizontally moving **windows**, the force is measured on the leading edge of the **window**, at the following heights, when the dimension of the gap is 50 mm and 500 mm:

- 50 mm;
- 300 mm from the top, for **windows** between 1,2 m and 2,5 m in height;
- 2 500 mm, for **windows** more than 2,8 m in height;
- in the centre, for **windows** not more than 2,8 m in height.

BB.20.1088 **Drives** shall prevent vertically moving **windows** from closing unexpectedly.

Compliance is checked by the following test.

The **drive** is supplied at the most unfavourable voltage between 0,94 and 1,06 times **rated voltage** but is not operated. Automatic operation of **automatic drives** is disabled. It is loaded with 1,2 times the **rated load** applied for 30 min. If the **drive** is supplied with a **window**, the load is applied to the **window** and is equal to the highest force exerted by it.

There shall be no movement except for initial removal of any play in the system. If there is creepage in the **drive**, the **window** shall not move faster than 1 mm/s.

NOTE 1 The highest force is determined with the **window** in the most unfavourable position, the **drive** not being energized.

NOTE 2 It is to be noted that compliance with BB.20.1088 does not necessarily cover risks due to operation of the **window**. Anti-drop or equivalent safety devices might be necessary.

The test is repeated with the supply disconnected.

If the **drive** is controlled by a programmable **electronic circuit**, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of *normative Annex R*.

BB.20.1099 **Entrapment protection systems** shall provide an adequate level of protection in the event of a failure within the system installation wiring.

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

Unless the system continues to operate normally, the **window** shall stop moving within one **cycle** of operation or the movement of the **window** shall only be controlled by a **biased-off switch** by the time it has completed its movement.

Annex CC (normative)

Drives for pedestrian doors

The clause numbers in this annex refer to the clause numbers in the main part of this standard that are modified. Clauses that are additional to the clauses in the main part of this standard are identified by adding the annex letters as a prefix with the numbering starting at 1.

20 Stability and mechanical hazards

This clause of Part 1 is applicable except as follows.

~~20.1 Not applicable.~~

20.2 Addition:

~~Moving parts of drives intended to be installed at a height of at least 2,5 m above the ground or other access level are considered to be positioned so to provide adequate protection against personal injury in normal use.~~

~~NOTE 101 Stairs and terraces are examples of access levels. Surfaces not normally used for standing on, such as window sills, and movable equipment such as ladders, are not considered to be access levels.~~ 30

For **horizontally moving pedestrian doors**, moving parts including interconnecting parts of their **drives** need not be guarded if the gap between fixed and moving parts is below 8 mm, or above 25 mm, or it is at least 2 m above the ~~ground~~ floor. This also applies to the gap between parts that ~~may~~ can move at different speeds.

~~CC.20.101~~ Where manual release or **reversible drive** is provided, it shall be easy to operate. Operation of the release shall not give rise to a hazard such as kickback or unexpected operation of the **drive**.

The **drive** shall not create any hazard when the manual release is activated.

Operation of a **reversible drive** used as a means for a manual release shall not give rise to a hazard.

~~Compliance is checked by the following test.~~

~~Automatic operation of **automatic drives** is disabled.~~

~~The **drive** is installed with a pedestrian door and supplied at the most unfavourable voltage between 0,94 and 1,06 times **rated voltage**. The **drive** is adjusted for the highest opening and closing forces, if such adjustment is mentioned in the instructions. The manual release is operated when the pedestrian door has stopped at each terminal position, in turn. The release or **reversible drive** shall be operable with a force not exceeding 220 N or a torque not exceeding 1,6 Nm. The force is applied as stated in the instructions.~~

~~The test is repeated with the power supply disconnected.~~

~~When the manual release has been activated, the power supply is then restored and the **drive** activated. The **drive** shall not move, or if the **drive** moves, all requirements of this standard shall be met.~~

CC.20.1022 A mechanical fault in the **drive** shall not result in a hazardous operation.

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 part of the **drive** or used for connecting the **drive** to the pedestrian door.*

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

*If 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 pedestrian door, the force exerted by the **drive** being adjusted to its highest value in accordance with the instructions. The **drive** is supplied at the most unfavourable voltage between 0,94 and 1,06 times **rated voltage**.*

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

*Unless the **drive** and the pedestrian door continue to operate normally, all of the following conditions shall be fulfilled:*

- the **drive** shall stop operating at least by the end of the **cycle** of movement;*
- further operation shall not be possible;*
- the speed of the pedestrian door shall not increase by more than 20 %.*

CC.20.1033 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 **drive** has a single button for controlling the movement, further actuation shall reverse the direction of movement.

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

These requirements do not apply to controls affecting automatic modes of operation.

Any button that has a stop function shall not require a key to stop the **drive**.

Compliance is checked by a manual test.

CC.20.1044 **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 tests.

*The **drive** is supplied at **rated voltage** and operated under **normal operation**. The supply is then interrupted. After the supply is restored, the **drive** shall not restart automatically. However, **automatic drives** may re-start, provided that they function as in normal use.*

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

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

If the **drive** is controlled by a programmable **electronic circuit**, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of *normative Annex R*.

CC.20.4055 Drives shall incorporate an **entrapment protection system** that reduces the risk of injury when the pedestrian door moves or shall be adjustable to control the energy of the movement of the pedestrian door.

NOTE In one direction of travel of the pedestrian door, CC.20.4055.1 can be met and CC.20.4055.2 can be met in the opposite direction of travel.

For **drives** incorporating an **entrapment protection system** that allows the pedestrian door to contact a person, compliance is checked by the relevant tests specified in CC.20.4055.2.

If the **drive** is controlled by a programmable **electronic circuit**, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of *normative Annex R*.

CC.20.4055.1 For **drives** incorporating an **entrapment protection system** with sensing devices that prevent the pedestrian door from coming into contact with a person, compliance is checked by the following relevant tests.

The **drive** is installed with a pedestrian door, the force exerted by the **drive** being adjusted to its highest value in accordance with the instructions. The **drive** is supplied at the most unfavourable voltage between 0,94 and 1,06 times **rated voltage**.

If the sensing devices are other than pressure sensitive pads, the test specified in CC.20.4055.1.1 is applied.

If the sensing devices are pressure sensitive pads, the test specified in CC.20.4055.1.2 is applied.

For pedestrian doors, an **entrapment protection system** with sensing devices that continuously adapt to environmental changes shall detect a stationary obstacle for at least 30 s.

CC.20.4055.1.1 The reference bodies for the tests shall be in accordance with *normative Annex FF*.

For **horizontally moving pedestrian doors**, the **drive** is operated to open or close the **door**. For **drives** for **horizontally moving pedestrian doors** other than revolving doors, tests are carried out using the reference body positioned in the moving plane of the pedestrian door as shown in Figure EE.1 to Figure EE.5 of *normative Annex EE*.

The reference body CA is detected in all positions of the travel area of the doorset leaves.

For **drives** for revolving doors, tests are carried out in accordance with *normative Annex GG* using the reference body positioned as shown in Figure EE.6 to Figure EE.8 of *normative Annex EE*.

CC.20.4055.1.2 If the **entrapment protection system** incorporates a pressure-sensitive floor pad, a mass of 15 kg ± 0,5 kg having a diameter of approximately 60 mm is used.

The following inactive floor pad areas are excluded from this requirement:

- the last 38 mm on each side of the pedestrian door opening width;
- 60 mm along the junction of floor pads joined together side-by-side with the longest dimension perpendicular to the pedestrian door opening;

- 90 mm along the junction of floor pads joined together side-by-side with the longest dimension parallel to the pedestrian door opening;
- 150 mm across the junction of floor pads meeting at the threshold.

NOTE The inactive floor areas of pressure sensitive pads are shown in Figure 102.

CC.20.105.2 **Entrapment protection systems** that allow the pedestrian door to contact a person shall only be used to reduce the risk of injury for:

- the opening movement of a sliding door with the leave(s) moving along a plain part and the distance between the front surface of the leave and the fixed side screen or wall is more than 100 mm and less or equal to 150 mm;
- the opening and closing movement of a balanced door;
- the opening movement of a folding door;
- the closing movement of a folding door only in combination with an **entrapment protection system** with sensing devices that prevent the pedestrian door from coming into contact with a person installed at the outer side of the door;
- the movement of revolving doors in combination with the peripheral speed which shall not exceed 1 000 mm/s for a door with a diameter up to 3 000 mm and shall not exceed 750 mm/s for a door with a diameter over 3 000 mm.

For **drives** incorporating an **entrapment protection system** that allows the pedestrian door to contact a person, compliance is checked by the following relevant tests.

The **drive** is installed with a pedestrian door. The force exerted by the **drive** is adjusted to the highest value if the force can be adjusted by the user during use or **user maintenance**. Otherwise, the force is adjusted according to the installation instructions. The **drive** is supplied at the most unfavourable voltage between 0,94 and 1,06 times **rated voltage**.

The **drive** is operated to close and open the pedestrian door from the fully open and fully closed positions. The forces between the leading edge and counter opposing edges shall not exceed the values stated in *normative Annex HH* when measured at points (F) according to *normative Annex II*.

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 ± 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.

CC.20.105.3 **Drives** adjustable to control the energy of the movement of a pedestrian door shall be in compliance with *normative Annex JJ* or *normative Annex LL*.

Drives adjustable to control the energy of the movement of a pedestrian door shall only be used to reduce the risk of injury for:

- the opening and closing movement of a sliding door when the movement is in accordance with *normative Annex JJ*;
- the opening and closing movement of a swing door when the movement is in accordance with *normative Annex JJ*;
- the opening and closing movement of a revolving door when the movement is in accordance with *normative Annex JJ*;
- the opening movement of a swing door when the movement is in accordance with *normative Annex LL* and sufficient safety distances are provided (see Figure CC.1);
- the closing movement of a swing door when the movement is in accordance with *normative Annex LL*.

CC.20.1066 **Entrapment protection systems** shall provide an adequate level of protection in the event of a failure within the system installation wiring.

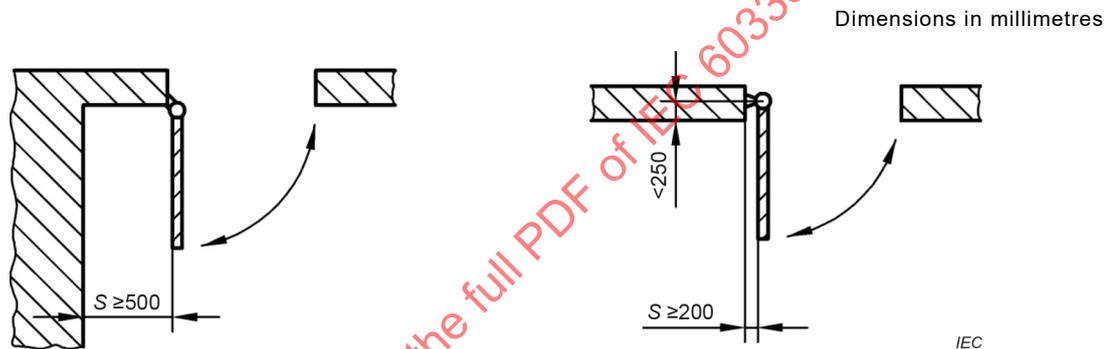
Compliance is checked by the following test.

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

Unless the system continues to operate normally, the pedestrian door shall stop moving within one **cycle** of operation or the movement of the pedestrian door shall only be controlled by a **biased-off switch** by the time it has completed its movement.

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

If the **drive** is controlled by a programmable **electronic circuit**, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of **normative Annex R**.



Key

S safety distance

Figure CC.1 – Safety distances for opening movement of swing door

Annex DD (normative)

Drives for horizontally and vertically moving doors and gates

NOTE Pedestrian doors are covered in normative Annex CC.

20 Stability and mechanical hazards

This clause of Part 1 is applicable except as follows.

~~20.1 Not applicable.~~

~~20.2 Addition:~~

~~Moving parts of drives intended to be installed at a height of at least 2,5 m above the ground or other access level are considered to be positioned so to provide adequate protection against personal injury in normal use.~~

~~NOTE 101 Stairs and terraces are examples of access levels. Surfaces not normally used for standing on, such as window sills, and movable equipment such as ladders, are not considered to be access levels.~~ 31

~~DD.20.1011~~ **DD.20.1011** Drives shall prevent vertically moving **driven parts** from closing unexpectedly.

Compliance is checked by the following test.

*The drive is supplied at the most unfavourable voltage between 0,94 and 1,06 times **rated voltage** but is not operated. Automatic operation of **automatic drives** is disabled. It is loaded with 1,2 times the **rated load** applied for 30 min. If the drive is supplied with a **driven part**, the load is applied to the **driven part** and is equal to the highest force exerted by it.*

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

NOTE 1 The highest force is determined with the **driven part** in the most unfavourable position, the **drive** not being energized.

The test is repeated with the supply disconnected.

*If the drive is controlled by a programmable **electronic circuit**, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of *normative Annex R*.*

~~DD.20.1022~~ Where a manual release or **reversible drive** is provided, it shall be easy to operate. Operation of the release shall not give rise to a hazard such as kickback or unexpected operation of the **drive**.

The **drive** shall not create any hazard when the manual release is activated.

Operation of a **reversible drive** used as a means for a manual release shall not give rise to a hazard.

Compliance is checked by the following test.

*Automatic operation of **automatic drives** is disabled.*

The **drive** is installed with a **driven part** and supplied at the most unfavourable voltage between 0,94 and 1,06 times **rated voltage**. The **drive** is adjusted for the highest opening and closing forces, if such adjustment is mentioned in the instructions. The manual release is operated when the **driven part** has stopped at each terminal position, in turn. The release or **reversible drive** shall be operable with a force not exceeding 220 N or a torque not exceeding 1,6 Nm. The force is applied as stated in the instructions.

The test is repeated with the power supply interrupted.

When the manual release has been activated, the power supply is then restored and the **drive** activated. The **drive** shall not move, or if the **drive** moves, all requirements of this standard shall be met.

DD.20.1033 A mechanical fault in the **drive** shall not result in a hazardous operation.

Compliance is checked by inspection and, if necessary, by test.

Drives for balanced vertically **driven parts** are not tested.

NOTE 1 Balanced vertically **driven parts** can utilise springs, counterweights or other means to support the mass of the **driven part**.

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 part of the **drive** or used for connecting the **drive** to the **driven part**.

NOTE 2 Examples of parts that are evaluated are screws, pins, shafts, wheels, chains and supporting parts.

If 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 **driven part**, the force exerted by the **drive** being adjusted to its highest value in accordance with the instructions. The **drive** is supplied at the most unfavourable voltage between 0,94 and 1,06 times **rated voltage**.

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

Unless the **drive** and the **driven part** continue to operate normally, all of the following conditions shall be fulfilled:

- the **drive** shall stop operating at least by the end of the **cycle** of movement;
- further operation shall not be possible;
- the speed of the **driven part** shall not increase by more than 20 % or it shall stop within 300 mm.

NOTE 3 For vertically moving doors, anti-drop or equivalent safety devices might be necessary.

DD.20.1044 **Drives** controlled by a **biased-off switch** shall stop when the actuating member is released.

Compliance is checked by the following test.

The **drive** is installed with a **driven part** and supplied at the most unfavourable voltage between 0,94 and 1,06 times **rated voltage**. It is operated to close the **driven part**.

When the actuating member is released, the leading edge of the **driven part** shall stop within a distance of

- for door or gate other than swing type, 50 mm when the opening gap does not exceed 500 mm except for horizontally swinging **driven parts** which shall stop within 100 mm;
- for swing type door or gate, 100 mm when the opening gap does not exceed 500 mm;
- for any type of door or gate, 100 mm when the opening gap exceeds 500 mm. The test is repeated during the opening movement of the **driven part**.

The requirement for the **driven part** to stop within the specified distance only applies if the closing force exerted by the **driven part** exceeds 150 N, as measured in DD.20.1077.2.1.

If the **drive** is controlled by a programmable **electronic circuit**, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of *normative Annex R*.

DD.20.1055 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 **drive** has a single button for controlling the movement, further actuation shall reverse the direction of movement.

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

These requirements do not apply to controls operating **automatic drives**.

Any button that has a stop function shall not require a key to stop the **drive**.

Compliance is checked by a manual test.

NOTE The test can be carried out without a **driven part**.

If the **drive** is controlled by a programmable **electronic circuit**, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of *normative Annex R*.

DD.20.1066 **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 tests.

The **drive** is supplied at **rated voltage** and operated under **normal operation**. The supply is then interrupted. After the supply is restored, the **drive** shall not restart automatically. However, **automatic drives** may re-start, provided that they function as in normal use.

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

NOTE 2 The test can be carried out without a **driven part**.

DD.20.1077 Drives not controlled by a **biased off switch** shall incorporate an **entrapment protection system** that reduces the risk of injury when the **driven part** moves.

*If the **drive** is controlled by a programmable **electronic circuit**, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of **normative Annex R**.*

*For **drives** incorporating an **entrapment protection system** with sensing devices that prevent the **driven part** from coming into contact with a person, compliance is checked by the relevant tests specified in DD.20.1077.1.*

*For **drives** incorporating an **entrapment protection system** that allows the **driven part** to contact a person, compliance is checked by the tests specified in DD.20.1077.2.*

*For **drives** incorporating an **entrapment protection system** with a non-contact sensing device that moves with the leading edge of a **driven part**, compliance is checked by the tests specified in DD.20.1077.2.*

NOTE In one direction of travel of the **driven part**, DD.20.1077.1 can be met and DD.20.1077.2 can be met in the opposite direction of travel.

DD.20.1077.1 The **drive** is installed with a **driven part**, the force exerted by the **drive** being adjusted to its highest value in accordance with the instructions. The **drive** is supplied at the most unfavourable voltage between 0,94 and 1,06 times **rated voltage**.

If the sensing devices are other than pressure sensitive pads, the tests specified in DD.20.1077.1.1 to DD.20.1077.1.3 are applied.

If the sensing devices are pressure sensitive pads, the test specified in DD.20.1077.1.4 is applied.

DD.20.1077.1.1 An obstacle having dimensions of approximately 200 mm × 300 mm × 700 mm with three sides (one in each dimension) having a reflective surface, obtained by use of mirrors, fine grained stainless steel or white-gloss paint, and the other three sides being non reflective surfaces painted dull-black, is placed on the **ground floor** at any place in the path of the leading edges and planes of the **driven part** and in the most unfavourable **position orientation**. The tests with this obstacle shall be made using the non-reflective and reflective sides in turn.

NOTE The leading edge is the edge of the **driven part** in the direction of travel, either opening or closing.

*For horizontally moving **driven parts**, the **drive** is operated to open or close the **driven part**. If the **driven part** moves, it shall stop or reverse its movement without contacting the obstacle.*

*The obstacle is then located with the 700 mm dimension positioned vertically and raised off the **ground floor** in the worst position between the **ground floor** and 300 mm below the **driven part** height or 2 500 mm, whichever is lower.*

*The **drive** is operated to close the **driven part**. If the **driven part** moves, it shall stop or reverse its movement without contacting the obstacle.*

DD.20.1077.1.2 For vertically moving **driven parts**, an obstacle having dimensions of approximately 80 mm × 300 mm and a height of 100 mm with 3 sides (one in each dimension) having a reflective surface, obtained by use of mirrors, fine grained stainless steel or white-gloss paint, and the other three sides being non reflective surfaces painted dull-black, is placed on the **ground floor** and centrally along its 300 mm length at any place in the path of the leading edge across the **driven part** opening.

For vertically moving **driven parts**, the **drive** is operated to close the **driven part** from heights of 100 mm, 1 000 mm and the fully open position of the **driven part**. The **driven part** shall not move or shall only move in the opening direction.

DD.20.1077.1.3 For horizontally and vertically moving **driven parts**, the obstacle used in DD.20.1077.1.1 is located with the 700 mm dimension positioned vertically and is moved at a speed of 3 m/s \pm 0,6 m/s.

For both horizontally and vertically moving **driven parts**, the obstacle is moved in a straight line through the plane of the **driven part** opening at the most unfavourable angle.

The **drive** is operated to close the **driven part**. The **driven part** shall stop or reverse its movement without contacting the obstacle.

DD.20.1077.1.4 If the **entrapment protection system** incorporates a pressure-sensitive floor pad, a mass of 15 kg \pm 0,5 kg having a diameter of approximately 60 mm is used instead of the wooden obstacle.

The mass is placed in the path of the **driven part** and the **drive** is operated, the **driven part** shall stop or reverse its movement before contacting the mass.

The following inactive floor pad areas are excluded from this requirement:

- the last 38 mm on each side of the **driven part** opening width;
- 60 mm along the junction of floor pads joined together side-by-side with the longest dimension perpendicular to the **driven part** opening;
- 90 mm along the junction of floor pads joined together side-by-side with the longest dimension parallel to the **driven part** opening;
- 150 mm across the junction of floor pads meeting at the threshold.

NOTE 1 The inactive floor areas of pressure sensitive pads are shown in Figure 102.

DD.20.1077.2 The **drive** is installed with a **driven part**. The force exerted by the **drive** is adjusted to the highest value if the force can be adjusted by the user during use or **user maintenance**. Otherwise, the force is adjusted according to the installation instructions. The **drive** is supplied at the most unfavourable voltage between 0,94 and 1,06 times **rated voltage**.

The test of DD.20.1077.2.1 is applied and

- if the **drive** is intended to be used with vertically moving **driven parts** having openings in which a 50 mm tube can be inserted, the test of DD.20.1077.2.2 is applied for an opening movement;
- 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 connection to a telecommunication or communication network, the test of DD.20.1077.2.3 is applied.

DD.20.1077.2.1 The **drive** is operated to close and open the **driven part** from the fully open and fully closed positions. The forces between the leading edge and counter opposing edges shall not exceed

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

or for vertically moving **driven parts** used as a door

- 600 N during the first 2 s after the force has exceeded 150 N for **driven parts** that do not swing outward and meet DD.20.1077.2.3;
- 400 N during the first 2 s after the force has exceeded 150 N for **driven parts** that swing outward;
- 150 N during a further period of 3 s;
- 25 N thereafter.

However, after 0,75 s, peaks lower than 400 N are allowed, if

- they are decreasing from one to the other, and
- the period of oscillation is ≤ 1 s, and
- the average force calculated over the remaining period of 4,25 s is ≤ 150 N.

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.

For vertically moving **driven parts**, the values apply to the vertical component of the closing and opening forces and between any counter opposing edges of moving parts.

For vertically moving **driven parts**, the force is measured on the leading edge of the **driven part** when the dimension of the gap is

- 50 mm;
- 300 mm;
- 500 mm;
- 2 500 mm or 300 mm below the maximum if this is less.

For vertically moving **driven parts**, the force is measured at the following locations:

- in the centre of the leading edge;
- 200 mm from each end of the leading edge if this edge is longer than 800 mm.

For horizontally moving **driven parts**, the force is measured on the leading edge of the **driven part**, at the following heights, when the dimension of the gap is 50 mm and 500 mm:

- 50 mm;
- 300 mm from the top, for **driven parts** between 1,2 m and 2,5 m in height;
- 2 500 mm, for **driven parts** more than 2,8 m in height;
- in the centre, for **driven parts** not more than 2,8 m in height.

DD.20.1077.2.2 Drives intended to be used with a vertically moving **driven part** having openings in which a 50 mm diameter cylinder can be inserted are subjected to an opening test with the **driven part** loaded with a mass of 20 kg \pm 0,5 kg. The mass, having dimensions of approximately 200 mm \times 200 mm \times 200 mm, is fixed to the **driven part** in the most unfavourable place, with one edge adjacent to the bottom edge of the **driven part**.

The **drive** is operated to open the **driven part**. If the bottom edge of the **driven part** moves more than 500 mm, the movement of the **driven part** shall stop before the test piece comes into contact with the lintel.

DD.20.1077.2.3 An obstacle as described in DD.20.1077.1.1 except having dimensions of approximately 80 mm × 300 mm and a height of 100 mm is placed on the ~~ground~~ floor and centrally along its 300 mm length across the plane of the **driven part** opening. The **drive** is operated to close the **driven part** from opening gaps of 100 mm, 1 000 mm and the fully open position of the **driven part**. The **driven part** shall not move or only move in the opening direction. The tests with this obstacle shall be made using the non-reflective and reflective sides in turn.

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

A cylindrical obstacle, having a diameter of 50 mm and a length of 850 mm, is suspended by one end at a height of 900 mm above the ~~ground~~ floor and centrally in the **driven part** opening.

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

DD.20.1088 **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 **driven part** and supplied at **rated voltage**. The **drive** is operated to close the **driven part**. 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 **driven part** shall stop moving within one **cycle** of operation or the movement of the **driven part** shall only be controlled by a **biased-off switch** by the time it has completed its movement.

The test is repeated during the opening movement of the **driven part**.

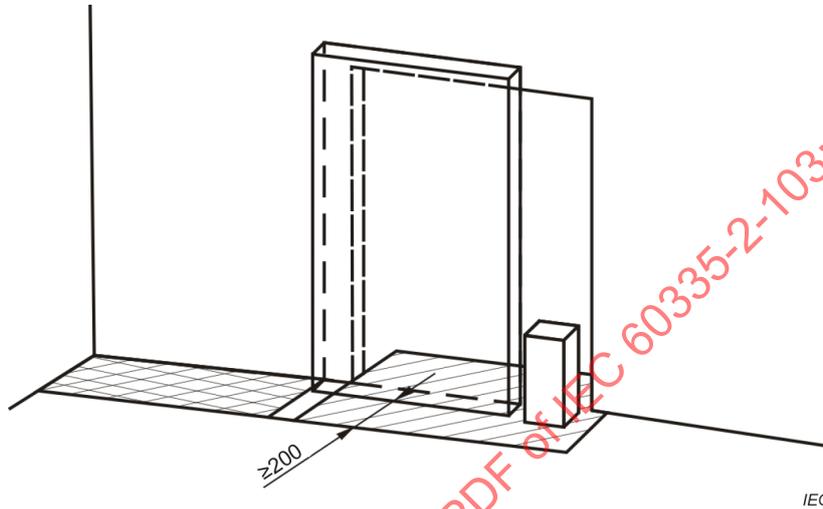
If the **drive** is controlled by a programmable **electronic circuit**, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of *normative Annex R*.

Annex EE
(normative)

**Measuring point for protective devices of
horizontally moving pedestrian doors**

The figures of Annex EE are referenced in normative Annex CC and normative Annex GG.

Dimensions in millimetres



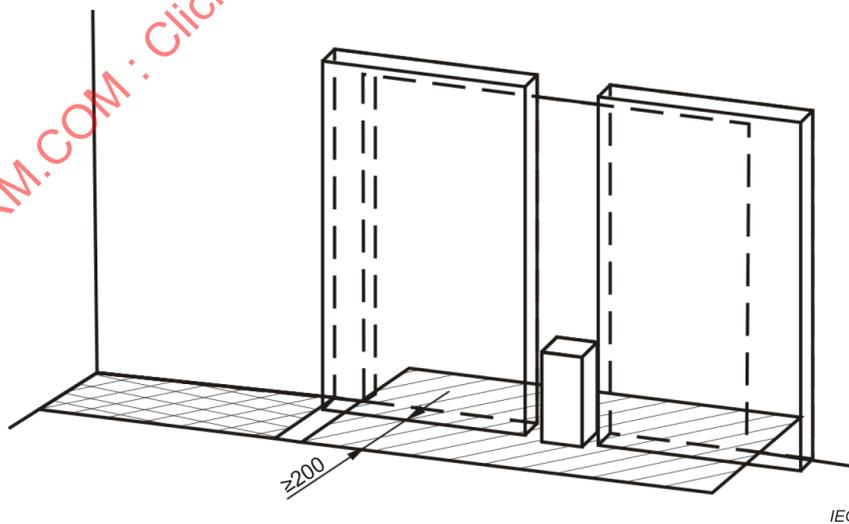
Key



protected area

Figure EE.1 – Single-leaf sliding doorset

Dimensions in millimetres



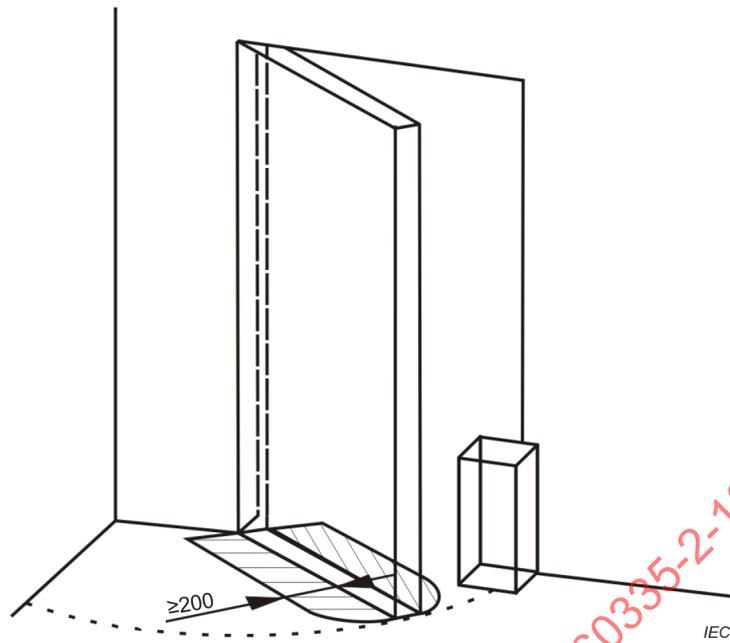
Key



protected area

Figure EE.2 – Double-leaf sliding doorset

Dimensions in millimetres



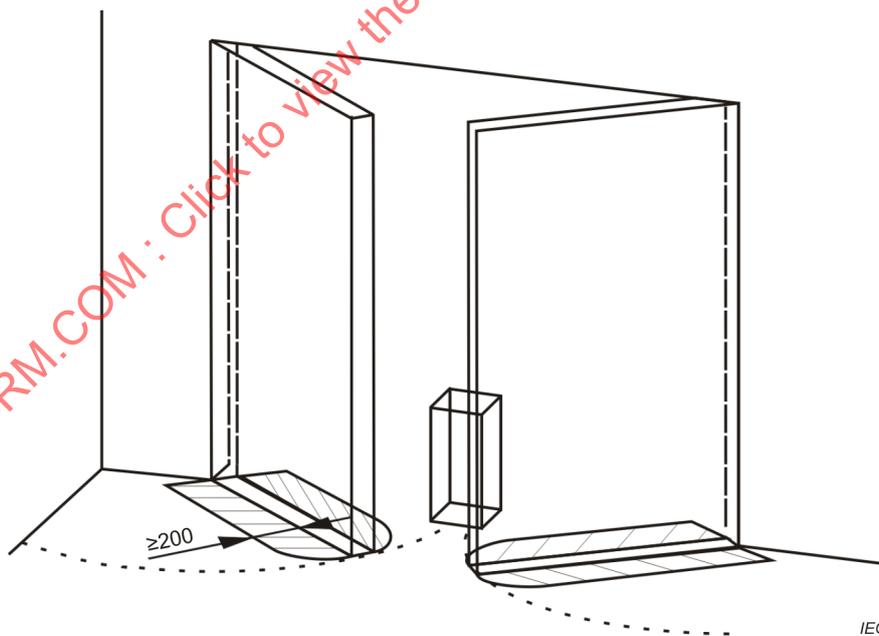
Key



protected area

Figure EE.3 – Single-leaf swing doorset

Dimensions in millimetres



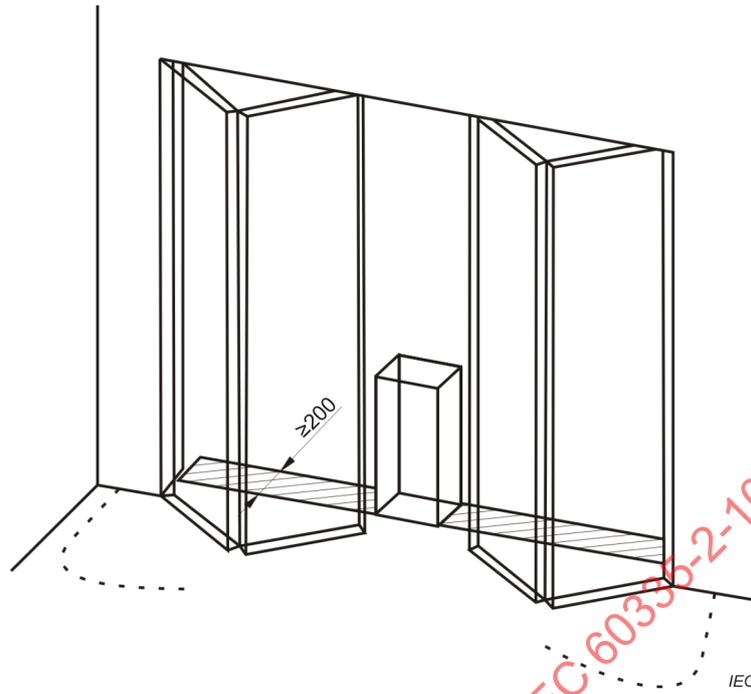
Key



protected area

Figure EE.4 – Double-leaf swing doorset

Dimensions in millimetres



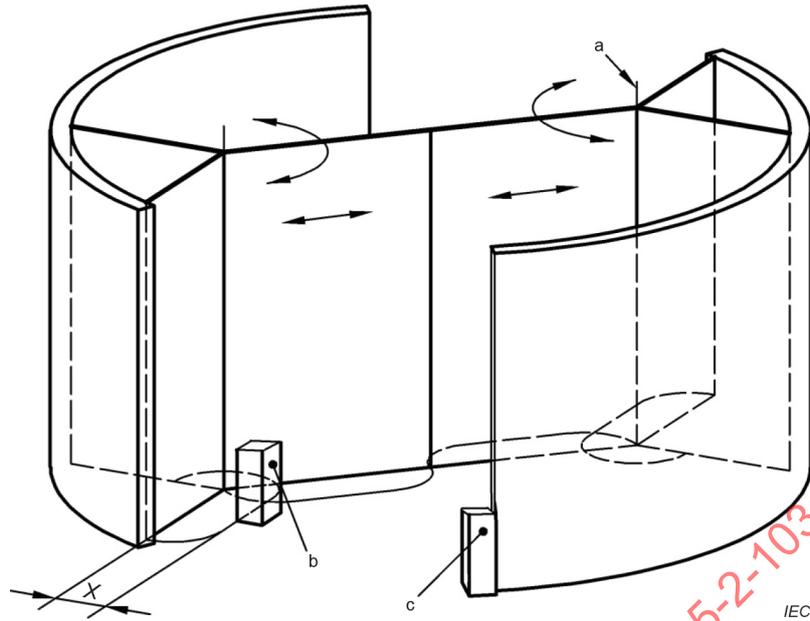
Key



protected area

Figure EE.5 – Folding doorset

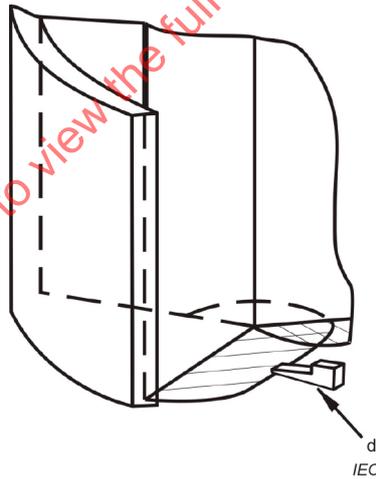
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Key

- a pivot point for doorsets with a break-out system
- b test 1 (with CA) for doorset diameters greater than 3 000 mm
- c test 2 (with CA) for all doorset diameters, see also Clause GG.1 in normative Annex GG
- X protected area

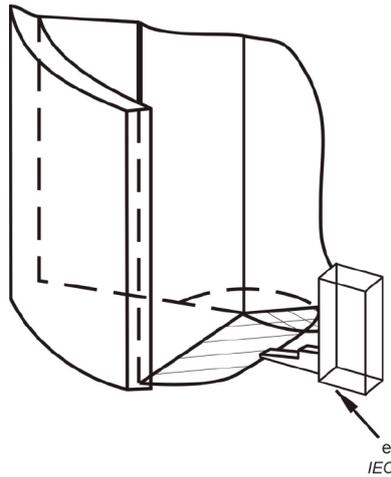
a) Reference body positions for test 1 and test 2



Key

- d test 3 (with CB) in centre of doorset leaf

b) Reference body position for test 3

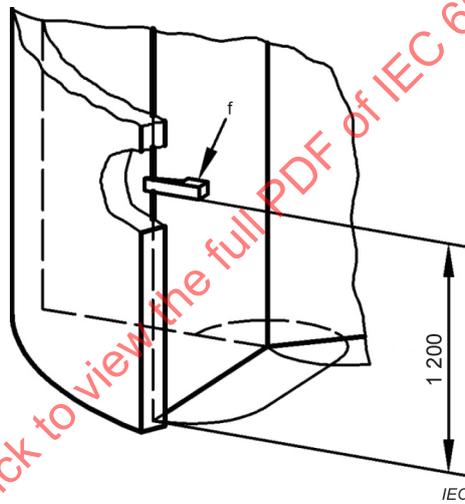


Key

e test 4 (with the combination of CB and CA) for all doorset diameters, in centre of doorset leaf

c) Reference body position for test 4

Dimensions in millimetres



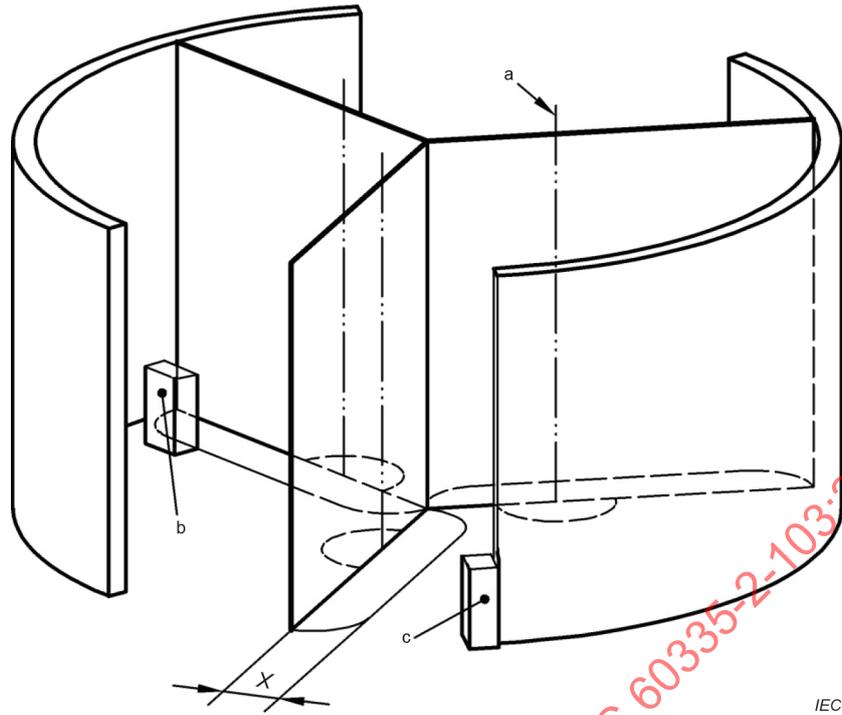
Key

f test 5 (with CB) for all doorset diameters

d) Reference body position for test 5

Figure EE.6 – Revolving doorset, two leaves

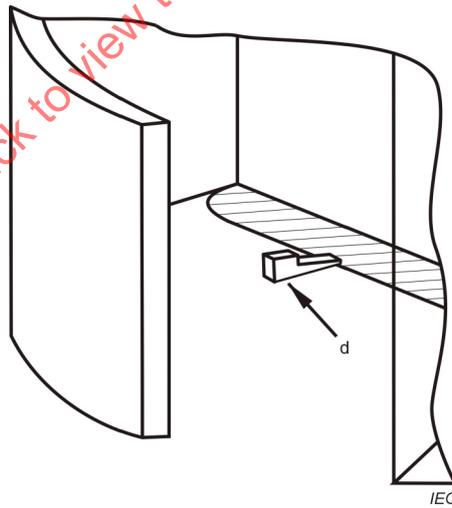
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Key

- a pivot point for doorsets with a break-out system
- b test 1 (with CA) for doorset diameters greater than 3 000 mm, see also Clause GG.1 in normative Annex GG
- c test 2 (with CA) for all doorset diameters, see also Clause GG.1 in normative Annex GG
- X protection area

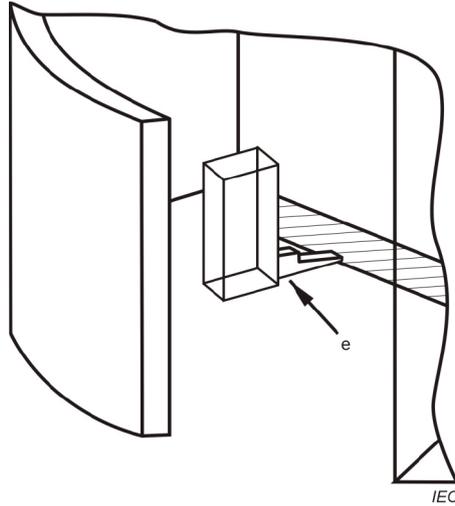
a) Reference body positions for test 1 and test 2



Key

- d test 3 (with CB) in centre of doorset leaf

b) Reference body position for test 3

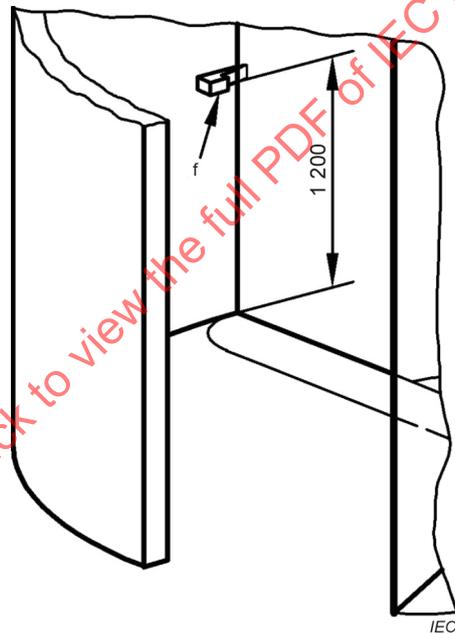


Key

e test 4 (with the combination of CB and CA) for all doorset diameters, in centre of doorset leaf

c) Reference body position for test 4

Dimensions in millimetres

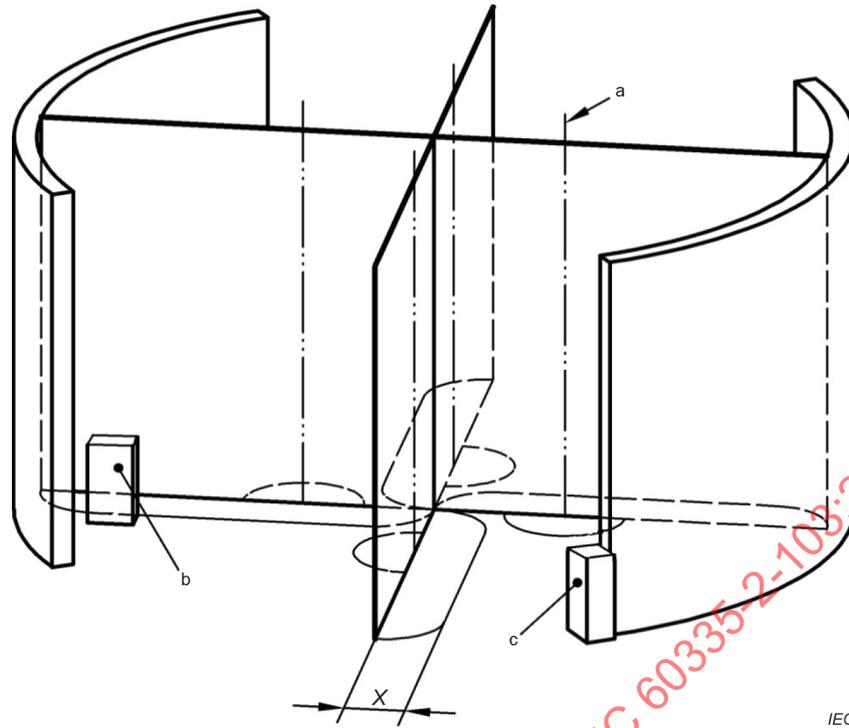


Key

f test 5 (with CB) for all doorset diameters

d) Reference body position for test 5

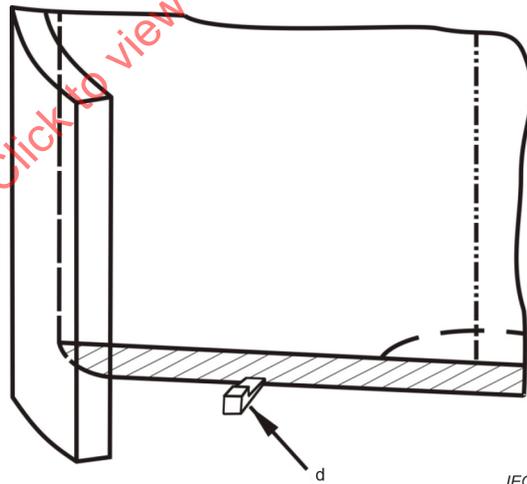
Figure EE.7 – Revolving doorset, three leaves



Key

- a pivot point for doorsets with a break-out system
- b test 1 (with CA) for doorset diameters greater than 3 000 mm
- c test 2 (with CA) for all doorset diameters, see also Clause GG.1 in normative Annex GG
- X protection area

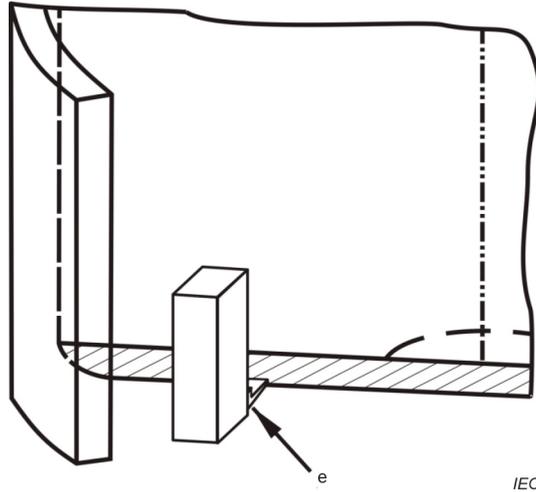
a) Reference body positions for test 1 and test 2



Key

- d test 3 (with CB) in centre of doorset leaf

b) Reference body position for test 3

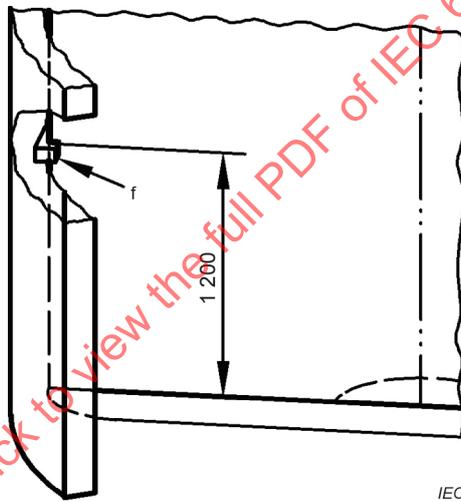


Key

e test 4 (with the combination of CB and CA) for all doorset diameters, in centre of doorset leaf

c) Reference body position for test 4

Dimensions in millimetres



Key

f test 5 (with CB) for all doorset diameters

d) Reference body position for test 5

Figure EE.8 – Revolving doorset, four leaves

Annex FF (normative)

Reference bodies

This annex is applicable to **entrapment protection system** sensing devices based on active optoelectronic protective devices responsive to diffuse reflection (AOPDDRs) using a radiation wavelength in the range 820 nm to 946 nm. For sensing devices using other technologies, this annex may be used as a guide.

An **entrapment protection system** shall always be tested on a complete power operated doorset assembly.

The CA reference body (see Figure FF.1a)) is a box with the dimensions 0,7 m × 0,3 m × 0,2 m. Both the top side and two sides that meet are made of a material with a diffuse reflectance value in the range of 2 % to 5 % of the wavelength of the **entrapment protection system** transmitter (e.g. IC antistatic foam; see also IEC 61496-3:2008/2018, Figure 5 for further materials) while the other two sides are made of a material with a diffuse reflectance value in the range of 80 % to 90 % of the wavelength of the **entrapment protection system** transmitter (e.g. white paper). The base of the reference body is not defined as it does not serve any purpose in the test.

The CB reference body (see Figure FF.1b)) is made of a matt-black elastomer with a Shore-A hardness of 70 ± 5 and a diffuse reflectance value in the range of 10 % to 90 % of the wavelength of the **entrapment protection system** transmitter.

Tests for **entrapment protection system** using the background as a reference shall be performed with a background with a diffuse reflectance value of (20 ± 5) % of the **entrapment protection system** wavelength (e.g. carpet). **32**

The reference body shall be detected and the doorset shall then either stop before it touches the reference body, or reverse or switch over to low-speed motion as described in the product documentation.

Entrapment protection systems which do not move with the doorset leave(s) shall be tested using all relevant sides of the CA reference body.

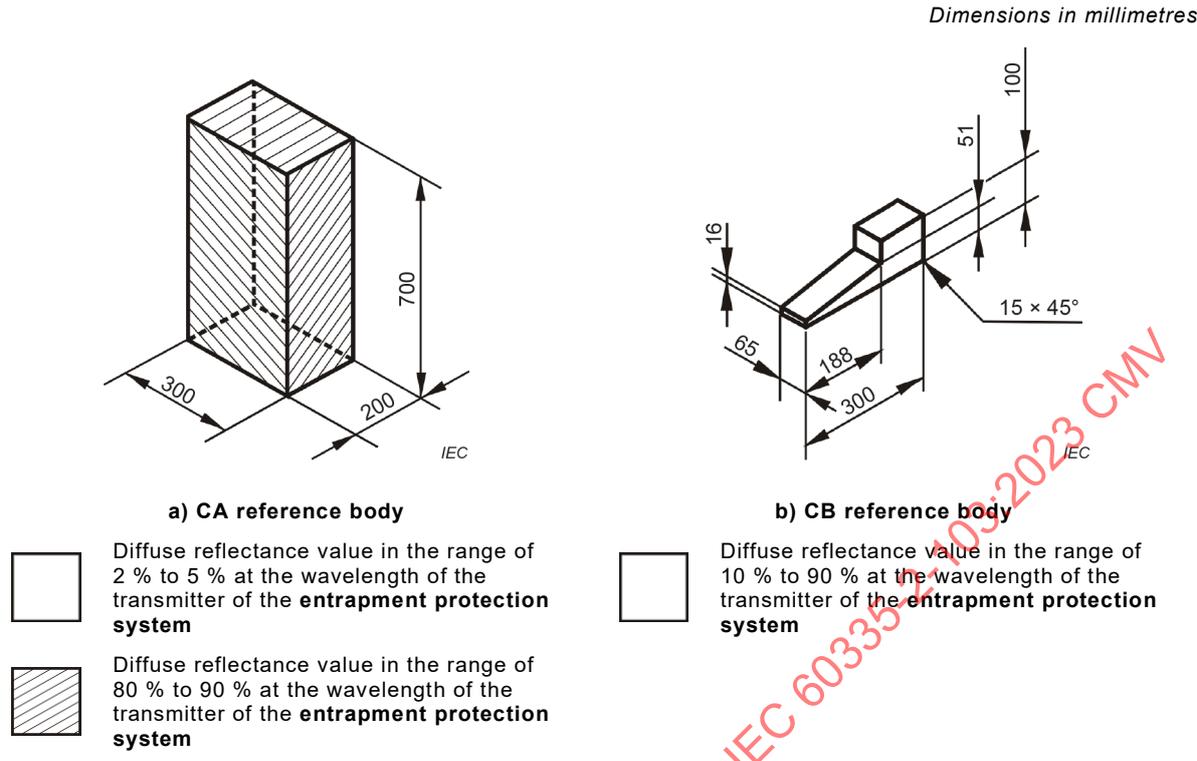


Figure FF.1 – Reference bodies

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Annex GG (normative)

Test method of entrapment protection system of drives for revolving doors

GG.1 Main closing edge/opposing closing edge – no contact protection

If the hazard between the **main closing edge** and **opposing closing edge** is protected by an **entrapment protection system** not allowing contact with the doorset, it shall be tested using a CA reference body (see **normative Annex FF**). The CA reference body shall be located next to the **opposing closing edge** and shall not be touched by the doorset leaf (see test 2 in Figure EE.6a), Figure EE.7a) and Figure EE.8a) of **normative Annex EE**).

For doorsets diameters greater than 3 000 mm, the CA reference body shall additionally be located next to the edge of the doorset moving leaf and shall not be touched by the doorset leaf itself (see test 1 in Figure EE.6a), Figure EE.7a) and Figure EE.8a) of **normative Annex EE**).

GG.2 Main closing edge/opposing closing edge – contact protection

If the hazard between the **main closing edge** and **opposing closing edge** is protected by a device or combination of devices allowing contact with the doorset, it shall be tested by a force measurement according to **normative Annex HH** at an opening width as specified in Figure II.4 or Figure II.5 or Figure II.6. If electro-sensitive protective equipment (ESPE) is used for speed reduction, the test shall be carried out at the speed after activation of the ESPE.

GG.3 Secondary closing edge/floor

The **entrapment protection system** protecting the hazard between the secondary closing edge and the floor shall be tested using the CB reference body.

The CB reference body is positioned on the floor so that it cannot be pushed away. The doorset shall come to a stop without completely passing over the reference body or the reference body being touched by the doorset leaf in the slanted areas. Contact with the flexible parts of the protective equipment is accepted (see test 3 in Figure EE.6b), Figure EE.7b) and Figure EE.8b) of **normative Annex EE**). If an **entrapment protection system** is used for speed reduction, the test shall be carried out with the combination of test bodies CB and CA (see test 4 in Figure EE.6c), Figure EE.7c) and Figure EE.8c) of **normative Annex EE**).

The test need not be performed if this hazard is safeguarded by safety distances.

GG.4 Main closing edge/inside wall

The **entrapment protection system** protecting the hazard between **main closing edge** and the inside wall shall be tested by means of the CB reference body.

The reference body is positioned at a height of 1 200 mm above the floor on the drum wall as shown in test 5 in Figure EE.6d), Figure EE.7d) and Figure EE.8d) of **normative Annex EE**. During the test, the reference body shall not come into contact with the doorset leaf. Contact with the flexible parts of the protective equipment is accepted.

Annex HH (normative)

Limitation of impact forces of pedestrian doors

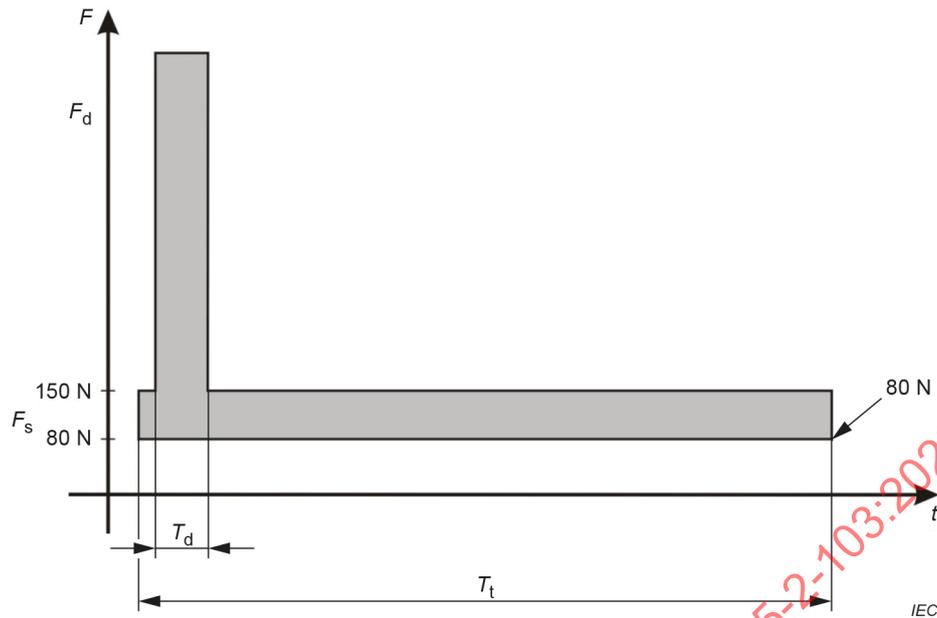
HH.1 Permissible dynamic forces

The values of dynamic force generated by the doorset leaf when impacting a person or an obstacle shall be considered to be safe if the limits specified in Table HH.1 are not exceeded, when measured according to normative Annex II with an instrument complying with Clause HH.3 or Clause HH.4.

Table HH.1 – Permissible dynamic forces

Doorset type	Permissible dynamic forces			Measuring points
	Between main closing edges and opposing closing edges in gaps of ^a			
	< 200 mm	200 mm to 500 mm	> 500 mm	
Sliding doorset and sliding/swing (balanced) doorset	400 N	700 N	1 400 N	Figure II.1 and Figure II.2
Folding doorset	400 N	700 N	1 400 N	Figure II.3
Revolving doorset	400 N	700 N	1 400 N	Figure II.4 to Figure II.6
Flat areas are areas other than closing edges > 0,1 m ² and with no side < 100 mm. The above values shall be the maximum allowed within a maximum period of time of 0,75 s ($T_d < 0,75$ s).				
^a The opposing closing edge may also be a second main closing edge or flat areas around the opening doorset.				

The leaf force measurements shall not exceed the profile shown in Figure HH.1.

**Key**

F_d maximum force measured during the dynamic period T_d (dynamic force) — see Table HH.1 for permitted values

T_d period of time of max. 0,75 s starting from the first measured force exceeding 150 N

F_s maximum force measured outside the dynamic period T_d (static force)

T_t period of 5 s starting from the first measured force exceeding 80 N and including T_d

Figure HH.1 – Force versus time

HH.2 Permissible static forces

After T_d has elapsed, no static force >150 N is allowed. This static force shall come down to < 80 N after a total time T_t of maximum 5 s.

However, after T_d , peaks exceeding 150 N but lower than the admissible dynamic forces shown in Table HH.1 are accepted if:

- they are decreasing from one to the other; and
- the period of oscillation is ≤ 1 s; and
- the average force calculated over the period of $T_t - T_d$ is ≤ 150 N.

HH.3 Impact force measuring equipment

The test equipment for measuring forces shall consist of the following parts:

- two contact areas with a diameter of 80 mm. The contact areas shall be made of a hard material with sufficient strength, e.g. steel;
- spring that gives the contact area a spring ratio of $500 \text{ N/mm} \pm 50 \text{ N/mm}$;
- load cell;
- time measuring device;
- measuring value display/measuring value output device.

The measuring equipment shall comply with the following specification:

- rising/falling time of the load cell amplifier < 5 ms;
- the equipment shall be able to give measured values with an accuracy of at least $\pm 5\%$ or $\pm 10\text{ N}$, whichever is the maximum deviation;
- measurements to be given in graphical form or by displaying the values.

HH.4 Field impact force measuring equipment

Field measuring equipment need not display the values and accuracy shall at least be $\pm 10\%$ or $\pm 20\text{ N}$ of measured values, whichever is the maximum deviation. Calibration shall be performed at least once per year.

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Annex II (normative)

Measuring points for limitation of impact forces of pedestrian doors

Forces (see Table HH.1) shall be measured at the measuring points (F) shown in Figure II.1 to Figure II.6 with the instrument of Clause HH.3 or Clause HH.4.

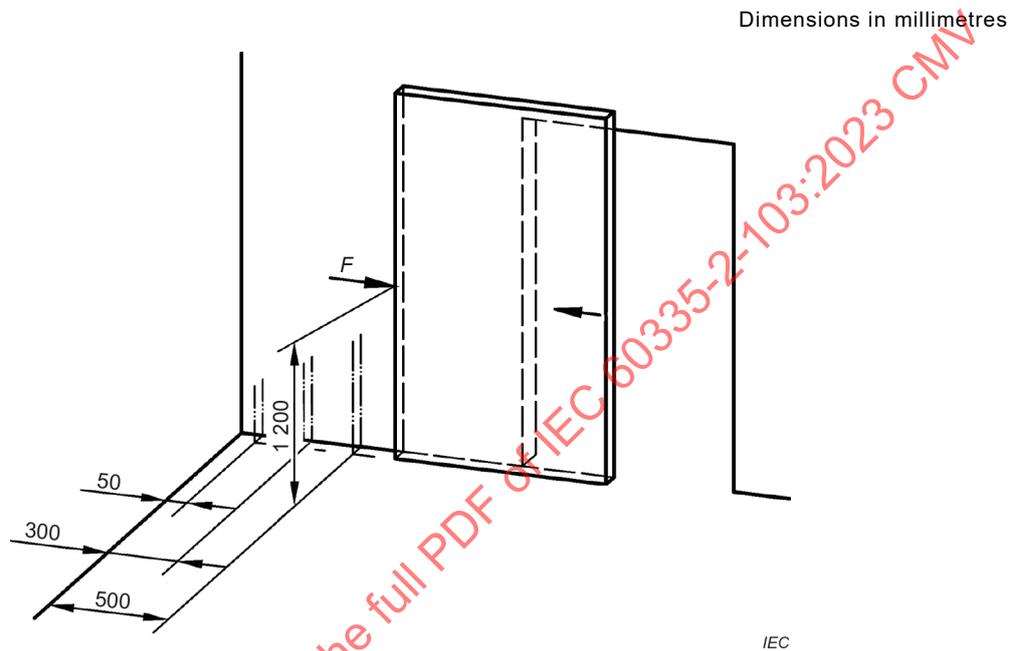


Figure II.1 – Single-leaf sliding doorset

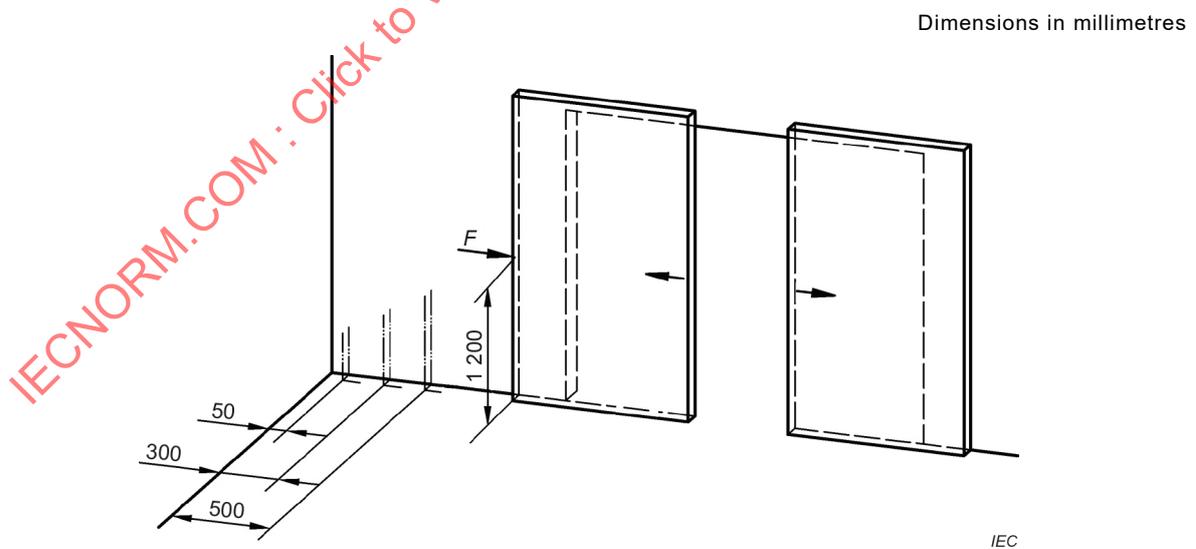


Figure II.2 – Double-leaf sliding doorset

Dimensions in millimetres

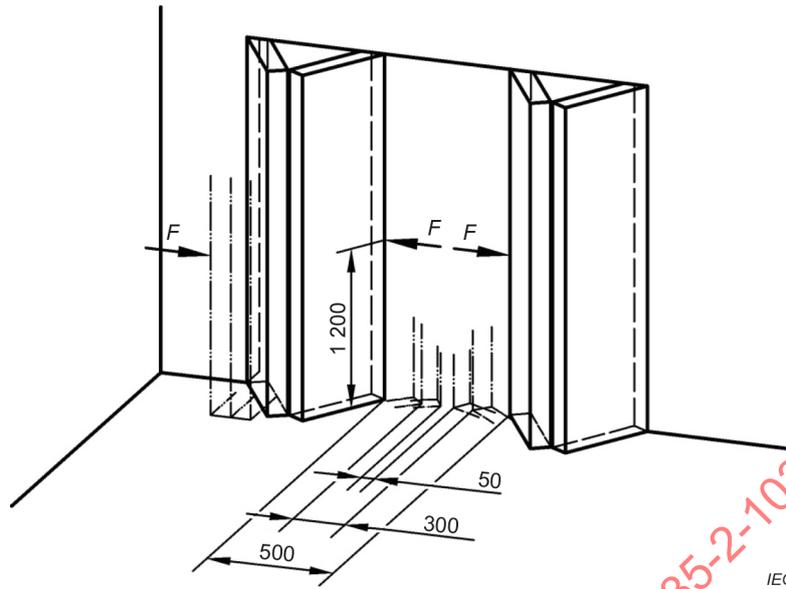


Figure II.3 – Folding doorset

Dimensions in millimetres

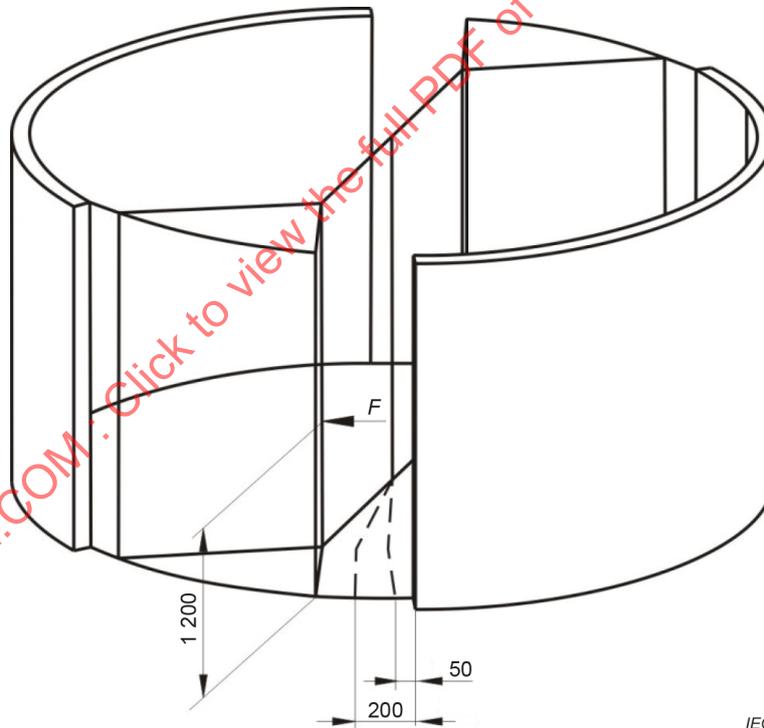
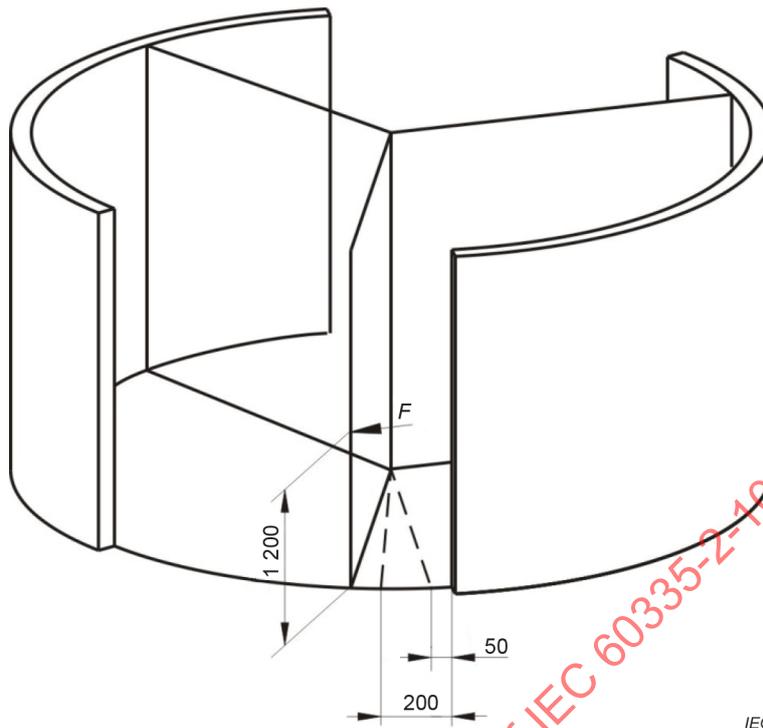


Figure II.4 – Revolving doorset, 2-leaf

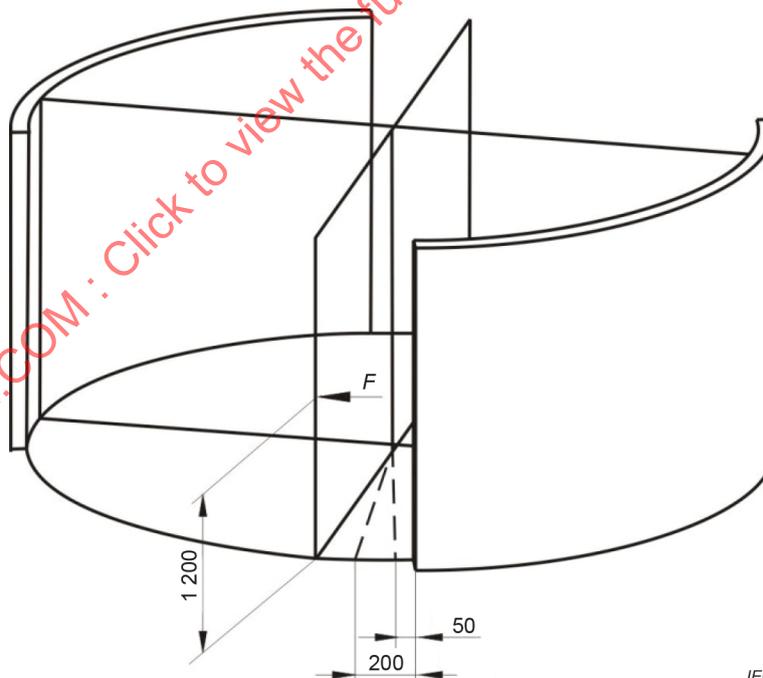
Dimensions in millimetres



IEC

Figure II.5 – Revolving doorset, 3-leaf

Dimensions in millimetres



IEC

Figure II.6 – Revolving doorset, 4-leaf

Annex JJ (normative)

Low energy movement of pedestrian doors

~~JJ.1~~ Low energy movement

~~JJ.1.1~~ General

The force required to prevent a stopped doorset from opening or closing any further – measured at the **main closing edge** in the direction of travel – shall not exceed 67 N at any point in the opening or closing **cycle**.

The kinetic energy of a doorset in motion shall not exceed 1,69 J. Normative Annex KK states the speed settings for various widths and masses of doorsets required to obtain results conforming to this requirement.

In the event of any interruption of mains power or failure of the **drive**, it shall be possible to open the doorset with a manual force not exceeding 67 N to release a latch and 90 N to open the doorset, when the force is applied to the **main closing edge** in the direction of travel.

Low energy movement of the doorset is generally not protected with additional protective devices because the kinetic energy levels are not considered to be hazardous. However, use of low energy doorset movement should only be considered when the risk assessment has taken account of elderly, frail and disabled users and indicates that the risk to these users is low.

A static closing force up to 150 N is allowed:

- when the gap between the **main closing edge** and the counter-closing edge is ≤ 8 mm for swing doorsets; or
- during the last 50 mm for any type of sliding and folding doorsets.

~~JJ.1.2~~ Additional requirements for low-energy movement of hinged and swing doorsets

~~JJ.1.2.1~~ Opening time

Doorsets shall open from closed to back check, or 80° whichever occurs first, in 3 s or longer as required in Table KK.1. Back check shall not occur before 60° opening. If the doorset opens more than 90°, it shall continue at the same rate as back check speed.

NOTE Back check – Back check is the checking or slowing down of the speed of doorset opening before being fully opened (also called open check).

~~JJ.1.2.2~~ Closing time

It shall be possible to adjust the doorset on site to close from 90° to 10° in not less than 3 s and from 10° to fully closed in not less than 1,5 s as required in Table KK.1.

Annex KK (normative)

Speed setting for low energy movement of pedestrian doors

KK.1 Speed settings for low energy power operated swing doorsets

Table KK.1 shows the minimum opening time (in seconds) to back-check or to 80° open or minimum closing time (in seconds) from 90° to 10° open for most common doorset widths and masses.

Table KK.1 – Speed settings

Width of doorset leaf m	Mass of doorset leaf kg				
	50	60	70	80	90
	Time s				
0,75	3,0	3,0	3,0	3,0	3,2
0,85	3,0	3,0	3,2	3,4	3,6
1,00	3,2	3,4	3,7	4,0	4,2
1,20	3,8	4,1	4,5	4,8	5,0

NOTE Calculated with an energy 1,69 J and values for time rounded up to nearest one decimal place.

The minimum opening time for doorsets of other widths and/or masses shall be calculated using the following formula:

$$t = \frac{D\sqrt{m}}{2,26}$$

where

- t is the time, in s;
- D is the doorset width, in m;
- m is the mass of the doorset leaf, in kg;
- 2,26 is the conversion factor (units $\text{mKg}^{1/2} \text{s}^{-1}$).

KK.2 Speed settings for low energy sliding doorsets

Table KK.2 shows the minimum travelling time per doorset leaf referred to the doorset mass and the travelling distance per doorset leaf.

Table KK.2 – Minimum travelling time per doorset leaf vs. mass of door leaf

90 % travelling distance per leaf <i>D</i> m	Mass of doorset leaf <i>m</i> kg														
	150	140	130	120	110	100	90	80	70	60	50	40	30	20	10
	Maximum travelling speed <i>v</i> m/s														
	0,15	0,16	0,16	0,17	0,18	0,18	0,19	0,21	0,22	0,24	0,26	0,29	0,34	0,41	0,58
Minimum travelling time <i>t</i> s															
0,7	4,7	4,6	4,4	4,2	4,0	3,9	3,7	3,5	3,2	3,0	2,7	2,5	2,1	1,8	1,3
0,8	5,4	5,2	5,0	4,8	4,6	4,4	4,2	3,9	3,7	3,4	3,1	2,8	2,4	2,0	1,4
0,9	6,0	5,8	5,6	5,4	5,2	4,9	4,7	4,4	4,1	3,8	3,5	3,1	2,7	2,2	1,6
1,0	6,7	6,5	6,3	6,0	5,8	5,5	5,2	4,9	4,6	4,3	3,9	3,5	3,0	2,5	1,8
1,1	7,4	7,1	6,9	6,6	6,3	6,0	5,7	5,4	5,1	4,7	4,3	3,8	3,3	2,7	1,9
1,2	8,0	7,8	7,5	7,2	6,9	6,6	6,2	5,9	5,5	5,1	4,7	4,2	3,6	3,0	2,1
1,3	8,7	8,4	8,1	7,8	7,5	7,1	6,8	6,4	6,0	5,5	5,0	4,5	3,9	3,2	2,3
1,4	9,4	9,1	8,7	8,4	8,0	7,7	7,3	6,9	6,4	5,9	5,4	4,9	4,2	3,5	2,5
1,5	10,0	9,7	9,4	9,0	8,6	8,2	7,8	7,3	6,9	6,4	5,8	5,2	4,5	3,7	2,6

NOTE For telescopic sliding doorsets, the travelling distance applies to the fast moving leaf.

The maximum speed for doorsets of other masses shall be calculated using the kinetic energy formula, considering that the maximum admitted energy is 1,69 J:

$$E_c = \frac{1}{2} m v^2 = 1,69 \text{ (J)}$$

By knowing the leaf weight, it is possible to calculate the maximum allowed speed as follows:

$$v = \sqrt{\frac{2E_c}{m}} \text{ (m/s)}$$

where

v is the speed, in m/s;

E_c is the kinetic energy, in J (always 1,69 J);

m is the mass of the doorset leaf, in kg.

Time settings for other travelling distances per leaf and masses shall be calculated using the following formula:

$$t = \frac{D}{v}$$

where

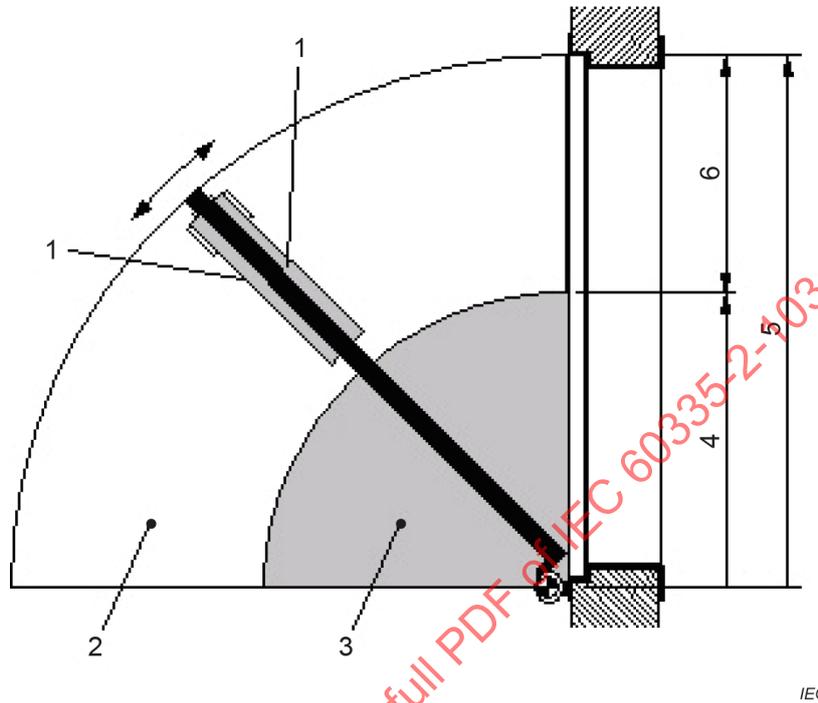
t is the travelling time for opening or closing, in s;

D is 90 % of the travelling distance of the leaf, in m;

v is the doorset speed, in (m/s).

Annex LL
(normative)

Safeguarding of swing pedestrian doors



Key

- 1 protective device
- 2 fast area requiring protection
- 3 slow area
- 4 radius of slow area ($r_{\text{slow area}}$)
- 5 radius of the door (r_{doorset})
- 6 radius of the protected area ($d_{\text{protected}}$)

Figure LL.1 – Areas of the door sweep

Figure LL.1 shows the areas of the door sweep.

Table LL.1 shows the minimum distance from the leading edge to be protected.

Table LL.1 – Minimum width of door leaf to be protected vs. radius of doorset and doorset travelling time

r_{doorset} m	Time s										
	1	1,5	2	2,5	3	3,5	4	4,5	5	5,5	6
	$r_{\text{slow area}}$ m										
	0,16	0,24	0,32	0,4	0,48	0,56	0,64	0,72	0,8	0,88	0,95
$d_{\text{protected}}$ m											
0,7	0,54	0,46	0,38	0,30	0,22	0,14	0,06	–	–	–	–
0,8	0,64	0,56	0,48	0,40	0,32	0,24	0,16	0,08	–	–	–
0,9	0,74	0,66	0,58	0,50	0,42	0,34	0,26	0,18	0,10	0,02	–
1,0	0,84	0,76	0,68	0,60	0,52	0,44	0,36	0,28	0,20	0,12	0,05
1,1	0,94	0,86	0,78	0,70	0,62	0,54	0,46	0,38	0,30	0,22	0,15
1,2	1,04	0,96	0,88	0,80	0,72	0,64	0,56	0,48	0,40	0,32	0,25
1,3	1,14	1,06	0,98	0,90	0,82	0,74	0,66	0,58	0,50	0,42	0,35
1,4	1,24	1,16	1,08	1,00	0,92	0,84	0,76	0,68	0,60	0,52	0,45
1,5	1,34	1,26	1,18	1,10	1,02	0,94	0,86	0,78	0,70	0,62	0,55
1,6	1,44	1,36	1,28	1,20	1,12	1,04	0,96	0,88	0,80	0,72	0,65
1,7	1,54	1,46	1,38	1,30	1,22	1,14	1,06	0,98	0,90	0,82	0,75
1,8	1,64	1,56	1,48	1,40	1,32	1,24	1,16	1,08	1,00	0,92	0,85

The opening time is measured from 0° to 80° and the closing time from 90° to 10°.

$r_{\text{slow area}}$ and the width of the doorset which needs to be protected ($d_{\text{protected}}$) by protective devices for doorsets with other opening and closing times shall be calculated using the following formulas:

$$r_{\text{slow area}} = \frac{2}{\pi} \cdot v \cdot t = 0,16 \cdot t$$

$$d_{\text{protected}} = r_{\text{doorset}} - r_{\text{slow area}}$$

where

t is the time, in s;

$r_{\text{slow area}}$ is the radius of the slow area, in m;

v is the maximum allowed collision speed of 0,25 m/s;

0,16 is the conversion factor, in m/s;

$d_{\text{protected}}$ is the width of the doorset which needs to be protected.

Bibliography

The bibliography of Part 1 is applicable except as follows.

Addition:

IEC 60335-2-95, *Household and similar electrical appliances – Safety – Part 2-95: Particular requirements for drives for vertically moving garage doors for residential use*

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*

ISO 21927-2, *Smoke and heat control systems – Part 2: Specifications for natural smoke and heat exhaust ventilators*

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List of comments

- 1 This revision is for alignment with IEC 60335-1:2020.
- 2 This revision is for alignment with IEC 60335-1:2020.
- 3 This revision is for alignment with IEC 60335-1:2020.
- 4 This revision is for alignment with IEC 60335-1:2020.
- 5 This revision maintains the normal operation while charging as specified in IEC 60335-1:2020.
- 6 This additional instruction is related to the allowance of a separate connector in Subclause 22.108. The instruction is intended to avoid the mating of male and female parts of connectors not tested with the drive.
- 7 Because the minimum height of installation determines the appropriate accessibility probes and surface temperature limits, the installation instructions must include the minimum height of installation.
- 8 The instructions are separated into a list of information to be provided and a list of the substance of the text to be included in the instructions.
- 9 Parts of drives can be located on or near the floor where they would be accessible to children up to 3 years in age. However, parts of drives located above 850 mm are not considered to be within reach of these children, so test probe 19 is not applied.
- 10 Parts of drives located above 1,8 m are not considered to be within reach of children up to 14 years in age according to IEC Guide 117, so test probe 18 is not applied.
- 11 Limits on the temperature rise of external accessible surfaces are introduced to address the risk of thermal injury from contact with external accessible surfaces based on IEC Guide 117 for Temperatures of touchable hot surfaces.
- 12 This revision is for alignment with IEC 60335-1:2020.
- 13 This revision is for alignment with IEC 60335-1:2020 taking into account the cyclical operation of drives.
- 14 Limits on the temperature rise of external accessible surfaces are introduced to address the risk of thermal injury from contact with external accessible surfaces based on IEC Guide 117 for Temperatures of touchable hot surfaces.
- 15 This revision is for alignment with IEC 60335-1:2020.
- 16 Subclause 19.13 is relocated in the document.
- 17 Parts of drives located above 1,8 m are not considered to be within reach of children up to 14 years in age according to IEC Guide 117, so test probe 18 is not applied.
- 18 Parts of drives located above 2,5 m are not considered to be within reach of adults according to IEC Guide 117, so test probe B is not applied.
- 19 This is added to clarify what is meant by access levels.
- 20 Parts of drives can be located on or near the floor where they would be accessible to children up to 3 years in age. However, parts of drives located above 850 mm are not considered to be within reach of these children, so test probe 19 is not applied.
- 21 This addition allows use of a separate connector for the supply connection. Since fixed drives are connected to the power cord, the length is often adapted. Some flexibility during installation is required.

- 22 This is to avoid the separate connector for installation purposes that can mate with standardised plug systems.
 - 23 This note clarifies that the separate connector referenced in Subclause 22.108 should not be confused with an appliance coupler because it cannot be disconnected “at will” (IEC ref 442-07-01).
 - 24 Subclause 24.1.101 sets the requirements for the separate connector referenced in Subclause 22.108 and the conditions under which it must comply with selected parts of IEC 61984:2008. Requirements in clauses made not applicable are already part of 60335 elsewhere or not relevant for this type of connector.
 - 25 This is a clarification that a supply connection utilising a separate connector as referenced in Subclause 22.108, will be allowed under the first dashed item (see Subclause 25.3 in IEC 60335-1:2020)
 - 26 This revision is for alignment with IEC 60335-1:2020 taking into consideration the cyclical operation of drives.
 - 27 This text is introduced to specify where test probes 18 and 19 are applied to align with the requirements in Subclause 8.1.1.
 - 28 This text is introduced to specify where test probes 18 and 19 are applied to align with the requirements in Subclause 8.1.1.
 - 29 These general requirements are relocated to Subclause 20.2 of the main body of the standard.
 - 30 These general requirements are relocated to Subclause 20.2 of the main body of the standard.
 - 31 These general requirements are relocated to Subclause 20.2 of the main body of the standard.
 - 32 Additional information for the test conditions to improve repeatability and reproducibility.
-

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

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

**Appareils électrodomestiques et analogues – Sécurité –
Partie 2-103: Exigences particulières pour les motorisations de portails, portes
et fenêtres**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-103: Particular requirements for drives for gates, doors and windows

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.
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- 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) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at <https://patents.iec.ch>. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 60335-2-103 has been prepared by IEC technical committee 61: Safety of household and similar electrical appliances. It is an International Standard.

This fourth edition cancels and replaces the third edition published in 2015, Amendment 1:2017 and Amendment 2:2019. 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 IEC 60335-1:2020;
- b) scope includes DC-supplied appliances and battery-operated appliances (Clause 1);
- c) some notes have been converted to normative text (Clause 1);

- d) additional requirements for installation instructions have been incorporated (7.12);
- e) application of test probe 18 and test probe 19 have been introduced (8.1.1, 20.2, Annexes BB, CC and DD);
- f) addition of surface temperatures for external accessible surfaces (11.3, 11.8);
- g) requirements for loading accessible appliance outlets and socket outlets have been added (11.7);
- h) requirements for appliances incorporating integral batteries or separable batteries have been added (11.7);
- i) requirements have been added for drives intended for permanent connection delivered with a connector to ease the installation (22.108, 24.101, 25.3).

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

Draft	Report on voting
61/7017/FDIS	61/7082/RVD

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

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

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

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 unless that edition precludes it; in that case, the latest edition that does not preclude it is used. It was established on the basis of the sixth edition (2020) 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: Particular requirements for drives for gates, doors and windows.

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 this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

NOTE 4 The attention of National Committees is drawn to the fact that equipment manufacturers and testing organizations can 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.

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INTRODUCTION

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-103: Particular requirements for drives for gates, doors and windows

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 horizontally and vertically moving gates, doors, garage doors and **windows** for household and similar purposes, their **rated voltage** being not more than 250 V for single-phase **drives** and 600 V for other **drives** including direct current (DC) supplied appliances and **battery-operated appliances**. It also covers the hazards associated with the movement of the **driven part**.

Drives not intended for normal household use but which nevertheless can be a source of danger to the public, such as **drives** intended to be used by laymen in shops, offices, hotels, restaurants, hospitals, in industry and on farms, are within the scope of this standard.

Requirements for **drives** for doors that can be used in emergency routes and exits are given in normative Annex AA.

Examples of **drives** within the scope of this standard are **drives** for

- folding doors;
- revolving doors;
- rolling doors;
- roof **windows**;
- sectional overhead doors;
- swinging and sliding gates or doors.

NOTE 101 Examples are shown in Figure 101.

NOTE 102 **Drives** can be supplied with a **driven part**.

As far as is practicable, this standard deals with the common hazards presented by **drives** that are encountered by all persons in and around the home. However, in general, it does not take into account

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

For appliances intended to be used in vehicles or on board ships or aircraft, additional requirements can be necessary. In many countries, additional requirements are specified by the national health authorities, the national authorities responsible for the protection of labour, the national water supply authorities and similar authorities.

This standard does not apply to **drives**

- for vertically moving garage doors for residential use (60335-2-95);
- for shutters covering doors and **windows** (including locations where the door is set back from the shutter), awnings, blinds and similar equipment (60335-2-97);
- intended exclusively to be used by trained persons in commercial and industrial premises;
- for specific purposes, such as fire doors;
- for natural smoke exhaust ventilators not used as **windows** (ISO 21927-2);
- intended to be used in locations where special conditions prevail, such as the presence of a corrosive or explosive atmosphere (dust, vapour or gas).

This standard does not apply to movement of a pedestrian door where such movement is based solely on stored energy.

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)*

IEC 60584-1, *Thermocouples – Part 1: EMF specifications and tolerances*

IEC 60825-1:2014, *Safety of laser products – Part 1: Equipment classification and requirements*

IEC 61496-3:2018, *Safety of machinery – Electro-sensitive protective equipment – Part 3: Particular requirements for active opto-electronic protective devices responsive to diffuse reflection (AOPDDR)*

IEC 61984:2008, *Connectors – Safety requirements and tests*

3 Terms and definitions

This clause of Part 1 is applicable except as follows.

3.1 Definitions relating to physical characteristics

3.1.9 *Modification:*

Replace the first paragraph with the following:

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

- **drives** supplied without a **driven part** are operated with their **rated load**;
- **drives** supplied with a **driven part** are operated with the **driven part** installed in accordance with the instructions

3.1.101

rated load

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

3.1.102

rated operating time

duration of continuous operation assigned to the **drive** by the manufacturer

Note 1 to entry: During continuous operation, the **drive** may reverse its direction.

3.1.103

rated number of operating cycles

number of uninterrupted **cycles** 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 **driven part**

Note 1 to entry: Examples of components are gears, controls, brakes, components for power transmission from the **drive** to the **driven part** and **entrapment protection systems**.

3.5.102

automatic drive

drive that operates the **driven part** in at least one direction without intentional activation by the user

3.5.103

reversible drive

drive that can be manually operated with or without power in both directions by manual action on the **driven part**

3.7 Definitions relating to safety components

3.7.101

entrapment protection system

part of the **drive** that protects against crushing

Note 1 to entry: An **entrapment protection system** may consist of one or more devices, such as pressure sensitive edges, passive infrared and active light sensing devices, **biased-off switches** or motor current monitoring devices.

Note 2 to entry: An **entrapment protection system** may be incorporated in the motor assembly or installed separately.

3.7.102

biased-off switch

hold to run device that initiates and maintains the **drive** movement only as long as the manual control is actuated by the user

3.8 Definitions relating to miscellaneous matters

3.8.101

driven part

part of a gate, door, garage door or **window** that is intended to be moved by the **drive**

3.8.102

window

part in a building that opens and closes in order to regulate the air and light and that is not intended for passage

3.8.103

cycle

complete opening and closing movement of the **driven part**

Note 1 to entry: For revolving doors, a **cycle** means the necessary rotation to allow a person to pass through it.

3.8.104

horizontally moving pedestrian door

swinging, sliding or rotating door designed for pedestrian use

3.8.105**main closing edge**

edge(s) of a pedestrian door leaf, whose distance from a parallel **opposing closing edge** or surface determines the usable pathway

3.8.106**opposing closing edge**

edge(s) of a pedestrian door leaf formed by the **main closing edge** and a fixed edge or a surface against which the pedestrian door leaf is moving

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 **driven part**, the **driven part** specified for installation with the **drive** that gives the most unfavourable conditions for the test is used. The **drive** is adjusted in accordance with the instructions.*

*The **driven part** may be simulated by an artificial load.*

5.5 Addition:

A wicket door is kept:

- *in the fully closed position if it travels together with the door during the tests, or*
- *in the fully open position or completely removed position if it does not travel with the door during the tests.*

5.7 Addition:

*If the **drive** is marked with an ambient temperature beyond the range of +5 °C to +40 °C, the tests of Clauses 11, 13, BB.20.10, BB.20.5, BB.20.6, BB.20.7, BB.20.9, CC.20.3, CC.20.4, CC.20.5, CC.20.6, DD.20.5, DD.20.6, DD.20.7, DD.20.8, and Clause 21 are carried out at the most unfavourable marked temperature.*

5.101 Drives shall be tested for compliance with this standard for any of the following modes of operation as intended by the manufacturer:

- *automatic operation (operation in at least one direction without intentional activation by the user);*
- *impulse activation (operation in either direction with an intentional activation by the user);*
- *biased-off (hold to run) operation.*

Whenever required by the instructions, components shall be added or changed to perform the tests.

6 Classification

This clause of Part 1 is applicable except as follows.

6.1 Modification:

Replace the first paragraph with the following:

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

6.2 Addition:

Drives, or parts of **drives**, that are intended for exposure to outdoor conditions shall be at least IPX4.

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.1 Addition:

Drives shall be marked with their ambient temperature range.

Drives supplied without a **driven part** shall be marked with the **rated load**, in newtons (N) or in newton-metres (Nm).

Unless the **drive** is intended for continuous operation, **drives** supplied without a **driven part** shall be marked with the **rated operating time** in minutes, or the number of **cycles** per hour, or the **rated number of operating cycles**.

Drives supplied with a **driven part** shall be marked with the **rated number of operating cycles** or the **cycles** per hour, unless the **drive** is intended for continuous operation.

7.6 Addition:



[symbol ISO 7000-0533 (2004-01)]

upper limit of temperature



[symbol ISO 7000-0534 (2004-01)]

lower limit of temperature

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 these instructions. Save these instructions.

The instructions shall include the substance of the following:

- do not allow children to play with fixed controls. Keep remote controls away from children;
- activation of the manual release may cause uncontrolled movement of the driven part due to mechanical failures or an out-of-balance condition;
- when operating a biased-off switch, make sure that other persons are kept away;

- when closing a window that has been opened by a smoke control system, make sure that other persons are kept away;
- frequently examine the installation for imbalance where applicable and signs of wear or damage to cables, springs and mounting. Do not use if repair or adjustment is necessary;
- disconnect the supply(s) when cleaning or other maintenance is being carried out.

The instructions shall include the following information:

- explanation of mode indicators;
- details on how to use any manual release, or **reversible drive** used as a manual release;
- details on how to re-adjust controls, (if applicable);
- where the operation of the **drive** is specified in **cycles** per hour, the rest period required between **cycles**.

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 specify the type, size and mass of the **driven part**, locations where the **drive** can be installed and shall include details of whether the **drive** is suitable only for balanced vertical **driven parts**.

They shall state that the installer shall check that the temperature range marked on the **drive** is suitable for the location.

They shall state that the **drive**

- cannot be used when the wicket door is open (for **drives** that are constructed so the **drive** can only operate when the wicket door is closed); or
- cannot be used when the wicket door is closed (for **drives** that are constructed so the **drive** can only operate when the wicket door is open or removed).

For **drives** intended for permanent connection to fixed wiring, delivered with a separate connector to ease the installation and establish the supply connection, the instructions shall state the substance of the following: Only use the supplied connector when installing the **drive**.

The instructions shall include the following information:

- the necessary information for 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;
- details of the maximum allowed distance from the wall that is parallel to the sliding movement to the outside of horizontally sliding **driven parts**;
- details for the installation of the **drive** and its associated components, including details of relevant accessories required for alternate modes of operation;
- that the actuating member of a **biased-off switch** is to be located within direct sight of the **driven part** but away from moving parts. Unless it is key operated, it is to be installed at a minimum height of 1,5 m and not accessible to the public;
- details on how to set controls;
- the minimum height for installation of parts of the **drive** intended to be mounted more than 850 mm, 1,8 m or 2,3 m or at least 2,5 m above the floor in accordance with 8.1.1. Table 101, 20.2, B.22.3 or B.22.4.

The installation instructions shall include the substance of the following:

- vertical doors and gates need an anti-drop feature or device;
- before installing the **drive**, check that the **driven part** is in good mechanical condition, opens and closes properly and correctly balanced where applicable;
- except for **horizontally moving pedestrian doors**, ensure that entrapment between the **driven part** and the surrounding fixed parts due to the opening movement of the **driven part** is avoided;
- for **horizontally moving pedestrian doors**, ensure that entrapment between the **driven part** and the surrounding fixed parts due to the movement of the **driven part** is avoided. This can be achieved if the relevant distance does not exceed 8 mm. However, the following distances are considered sufficient to avoid entrapments for the parts of the body identified:
 - for fingers, a distance greater than 25 mm;
 - for feet, a distance greater than 50 mm;
 - for heads, a distance greater than 200 mm; and
 - for the whole body, a distance greater than 500 mm.
 If these distances cannot be achieved, safeguarding devices shall be provided;
- after installation, ensure that the mechanism is properly adjusted and that the protection system and any manual release function correctly;
- permanently fix the label concerning the manual release, adjacent to its actuating member.

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 having a manual release shall be supplied with a label describing how to use the release unless the information is already marked on the **drive**.

Compliance is checked by inspection.

8 Protection against access to live parts

This clause of Part 1 is applicable except as follows.

8.1.1 Replacement:

The requirement of 8.1 applies for all positions of the appliance when it is operated as in normal use.

Test probe B, test probe 18 and test probe 19 of IEC 61032 are applied with a force not exceeding 1 N, the appliance being in every possible position. Through openings, the test probe is applied to any depth that the probe will permit and is rotated or angled before, during and after insertion to any position. If the opening does not allow the entry of the probe, the force on the probe in the straight position is increased to 20 N when probe B is used or 10 N when test probe 18 or test probe 19 are used. If the test probe then enters the opening, the test is repeated with the probe in the angled position.

*During the tests with test probe B, all **detachable parts** are removed except lamps. However, during insertion or removal of lamps, protection against contact with **live parts** of the lamp cap shall be ensured.*

During the tests with test probe 18 and test probe 19 of IEC 61032, the appliance shall be fully assembled as in normal use without any parts removed.

*Test probe 19 of IEC 61032 is not applied to parts of **drives** that are located at a height of more than 850 mm above the floor or other access level in normal use.*

*Test probe 18 of IEC 61032 is not applied to parts of **drives** that according to the instructions are required to be mounted at a height of more than 1,8 m above the floor or other access level.*

Test probe 18 and test probe 19 of IEC 61032 are not applied to appliances for commercial use unless they are intended to be installed in an area open to the public.

*It shall not be possible to touch **live parts** or **live parts** protected only by lacquer, enamel, ordinary paper, cotton, oxide film, beads, or sealing compound except self-hardening resins, with test probe B, test probe 18 or test probe 19, as applicable.*

8.2 Addition:

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.

11 Heating

This clause of Part 1 is applicable except as follows.

11.3 Addition:

*Where the external **accessible surfaces** are suitably flat and access permits, then the test probe of Figure 103 is used to measure the temperature rises of external **accessible surfaces** specified in Table 101. The probe is applied with a force of $4\text{ N} \pm 1\text{ N}$ to the surface in such a way that the best possible contact between the probe and the surface is ensured. The measurement is performed after a contact period of 30 s.*

The probe may be held in place using a laboratory stand clamp or similar device. Any measuring instrument giving the same results as the probe may be used.

11.7 Replacement:

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

Drives not for continuous operation are operated as follows:

- **drives** for gates for one household and horizontally moving garage doors for one household are operated without rest periods for three **cycles** or the **rated operating time** or the **rated number of operating cycles**, whichever is longer;
- **drives** for **windows** are operated without rest periods for the **rated number of operating cycles** or the **rated operating time** in minutes;
- other **drives** are operated without rest periods for four minutes or the **rated operating time** or the **rated number of operating cycles** but for not less than five **cycles** of operation, whichever is longer.
- **drives** rated in **cycles** per hour are operated for 20 % more than the rated number of **cycles** per hour and with the relevant rest period(s) declared by the manufacturer.

Appliance outlets accessible to the user and socket-outlets accessible to the user are loaded with a resistive load that gives the marked **outlet load**.

For appliances incorporating **integral batteries** or **separable batteries** not disconnected from the appliance for charging purposes:

- the **battery** that has been **fully discharged** is charged for 1 h, while the appliance is operated as specified performing its intended function, if allowed by the construction of the appliance;
- the **battery** that has been **fully discharged** is charged, for a duration of 24 h or until it is **fully charged** whichever is shorter, without the **battery-operated appliance** performing its intended function.

11.8 Modification:

Replace the first paragraph with the following text:

During the test, the temperature rises are monitored continuously and shall not exceed the values shown in Table 3 and Table 101.

Addition:

**Table 101 – Maximum temperature rises
for specified external accessible surfaces under normal operating conditions**

Surface	Temperature rise of external accessible surfaces ^a	
	K	
	Surfaces of appliances not more than 850 mm above the floor or other access level after installation	Surfaces of appliances between 850 mm and 2,3 m above the floor or other access level after installation
Bare metal	38	42
Coated metal ^b	42	49
Glass and ceramic	51	56
Plastic and plastic coating > 0,4 mm ^{c, d}	58	62

NOTE The temperature rise limits of handles, knobs, grips, keyboards, keypads and similar parts are specified in Table 3.

^a Temperature rises are not measured on surfaces of appliances which, according to the instructions, shall be fixed to a wall or ceiling and where these surfaces are inaccessible to a 75 mm diameter probe having a hemispherical end.

^b Metal is considered coated when a coating having a minimum thickness of 90 µm made of enamel, powder or non-substantially plastic coating is used.

^c The temperature rise limit of plastic also applies for plastic material having a metal finish of thickness less than 0,1 mm.

^d When the thickness of the plastic coating does not exceed 0,4 mm, the temperature rise limits of coated metal for underlying metal apply or the temperature rise limits for glass or ceramic material for underlying glass or ceramic material apply.

12 Charging of metal-ion batteries

This clause of Part 1 is applicable.

13 Leakage current and electric strength at operating temperature

This clause of Part 1 is applicable except as follows.

13.3 Addition:

In Table 4, add the following to table footnote a:

The test voltage for 600 V multi-phase appliances is that specified for a **working voltage** > 250 V, where U is taken as the **rated voltage**.

14 Transient overvoltages

This clause of Part 1 is applicable.

15 Moisture resistance

This clause of Part 1 is applicable except as follows.

15.1.2 Addition:

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 as follows.

16.3 In Table 7, add the following to table footnote a:

*The test voltage for 600 V multi-phase appliances is that specified for a **working voltage** > 250 V, where U is taken as the **rated voltage**.*

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:

Compliance is also checked by the test of 19.101.

19.11.2 Addition:

*If the **drive** can be operated when any of the fault conditions are simulated, the applicable tests of BB.20.4, BB.20.7, CC.20.5, DD.20.4 and DD.20.7 are carried out, the **drive**, however, being supplied at **rated voltage**.*

*Either the **drive** continues to fulfil the requirements, or, after a maximum of one **cycle** of operation, it shall stop with the **driven part** in a safe position, or the **drive** shall change to a **biased-off switch** mode of operation.*

19.11.4.8 Replacement:

*The **drive** is supplied at **rated voltage** and operated under **normal operation**. After approximately 60 s, the power supply voltage is reduced to a level such that the **drive** ceases to respond to user inputs or parts controlled by the programmable component cease to operate, whichever occurs first. This value of supply voltage is recorded. The **drive** is supplied at **rated voltage** and operated under **normal operation**. The voltage is then reduced to a value of approximately 10 % less than the recorded voltage. It is held at this value for approximately 60 s and then increased to **rated voltage**. The rate of decrease and increase of the power supply voltage is to be approximately 10 V/s.*

*The **drive** shall either continue to move in the same direction of movement in its operating cycle at which the voltage decrease occurred or a manual operation shall be required to restart it.*

19.13 Addition:

If the **drive** can be operated when any of the fault conditions are simulated, the applicable tests of BB.20.4, BB.20.7, CC.20.5, DD.20.4 and DD.20.7 are carried out, the **drive**, however, being supplied at **rated voltage**.

Either the **drive** continues to fulfil the requirements, or, after a maximum of one **cycle** of operation, it shall stop with the **driven part** in a safe position or the **drive** shall change to a **biased-off switch** mode of operation.

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 and as modified in the normative Annexes AA, BB, CC and DD.

20.1 Not applicable.

20.2 Addition:

Test probe 18 of IEC 61032 is not applied to parts of **drives** that according to the installation instructions are required to be mounted at a height of more than 1,8 m above the floor or other access level.

The test probe that is similar to test probe B of IEC 61032 but having a circular stop face with a diameter of 50 mm, instead of the non-circular face, is not applied to parts of **drives** that according to the instructions are required to be mounted at a height of more than 2,5 m above the floor or other access level.

NOTE 101 Stairs and terraces are examples of access levels. Surfaces not normally used for standing on, such as window-sills, and movable equipment such as ladders, are not considered to be access levels.

Test probe 19 of IEC 61032 is applied to parts of the appliance placed at a height not more than 850 mm above the floor or other access level in normal use under the conditions specified for test probe 18.

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 Drives weighing more than 20 kg shall incorporate suitable means for handling, such as hooks.

Compliance is checked by inspection.

22.102 All controls supplied with the **drive** shall be marked to indicate the functions in the same way.

When the **drive** is provided with a dedicated stop button, that stop button shall be clearly identifiable.

Compliance is checked by inspection.

22.103 When several modes of operation can be selected by the user, the selected mode shall be clearly indicated.

Compliance is checked by inspection.

22.104 It shall only be possible to make adjustments that could affect compliance with this standard by means of a **tool** or by use of a code.

Compliance is checked by inspection.

22.105 A **drive** for a door or gate incorporating a wicket door shall be constructed so that the **drive**

- cannot be operated when the wicket door is open (for **drives** that are constructed so the **drive** can only operate when the wicket door is closed); or
- cannot be operated when the wicket door is closed (for **drives** that are constructed so the **drive** can only operate when the wicket door is open or removed).

Compliance is checked by inspection.

22.106 Drives shall be supplied with all associated components necessary for compliance with this standard for the defined mode of operation. Components required for alternative modes of operation may be delivered separately provided they are listed in the instructions.

Compliance is checked by inspection.

22.107 Controls shall not be capable of overriding an **entrapment protection system** unless they can only activate the **drive** in sight of the **driven part**.

Compliance is checked by test.

22.108 Drives intended for permanent connection to fixed wiring may be delivered with a separate connector, to ease the installation and establish the supply connection. Such a connector shall be a **non-detachable part** once engaged.

Such connector shall not be interchangeable with plugs and socket-outlets listed in IEC TR 60083 or IEC 60906-1 or with appliance couplers complying with the standard sheets of IEC 60320-3.

Compliance is checked by test.

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.*

24.1.5 Addition:

Connectors that are **non-detachable parts**, once engaged, are not considered to be part of an appliance coupler.

24.1.101 *The relevant standard for a connector as referenced in 22.108 is IEC 61984:2008. Classification and ratings used for the tests of IEC 61984:2008 shall correspond to the ratings of the **drive** and its intended use.*

*The following clauses of IEC 61984:2008 and the corresponding test requirements in Clause 7, are not applicable: 5.2 a), 5.4 d), 6.2.1, 6.2.2, 6.4.1, 6.4.2, 6.4.3, 6.10, 6.14.2, 6.14.3, 6.17, 6.19 and 6.20. Subclause 6.5.1 is also applicable for connectors without breaking capacity (COC). Subclauses 6.15 and 6.16 are applicable but are modified to the **drive** temperature ratings. The tests in 7.3.6, 7.3.7 are performed when the connector referenced in this clause is engaged.*

25 Supply connection and external flexible cords

This clause of Part 1 is applicable except as follows.

25.3 Add the following note under the first dashed item:

NOTE 101 The set of terminals can be located in a separate connector complying with 24.1.101.

25.5 Addition:

Type Z attachment is allowed for separate power supplies for indoor use for **drives** having a **rated power input** not exceeding 100 W.

25.7 Addition:

The **supply cord** of **drives** for outdoor use shall be polychloroprene sheathed and not be lighter than ordinary polychloroprene sheathed flexible 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.

29.1 Addition:

For a rated voltage > 300 V and ≤ 346 V, the rated impulse voltage is for

- *overvoltage category I: 2 500 V;*
- *overvoltage category II: 4 000 V;*
- *overvoltage category III: 6 000 V.*

29.3.4 Addition:

For a rated voltage > 300 V and ≤ 346 V, the minimum thickness for accessible parts of reinforced insulation consisting of a single layer is for

- *overvoltage category I: 0,6 mm;*
- *overvoltage category II: 1,2 mm;*
- *overvoltage category III: 2,0 mm.*

30 Resistance to heat and fire

This clause of Part 1 is applicable except as follows.

30.2 Addition:

For drives only operated by a biased-off switch, 30.2.2 is applicable.

For other drives, 30.2.3 is 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 60068-2-52:2017, 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 surfaces 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 **drive** 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 except as follows.

32.101 Drives incorporating a laser shall be constructed so that they provide adequate protection from laser radiation.

Compliance is checked by the following test.

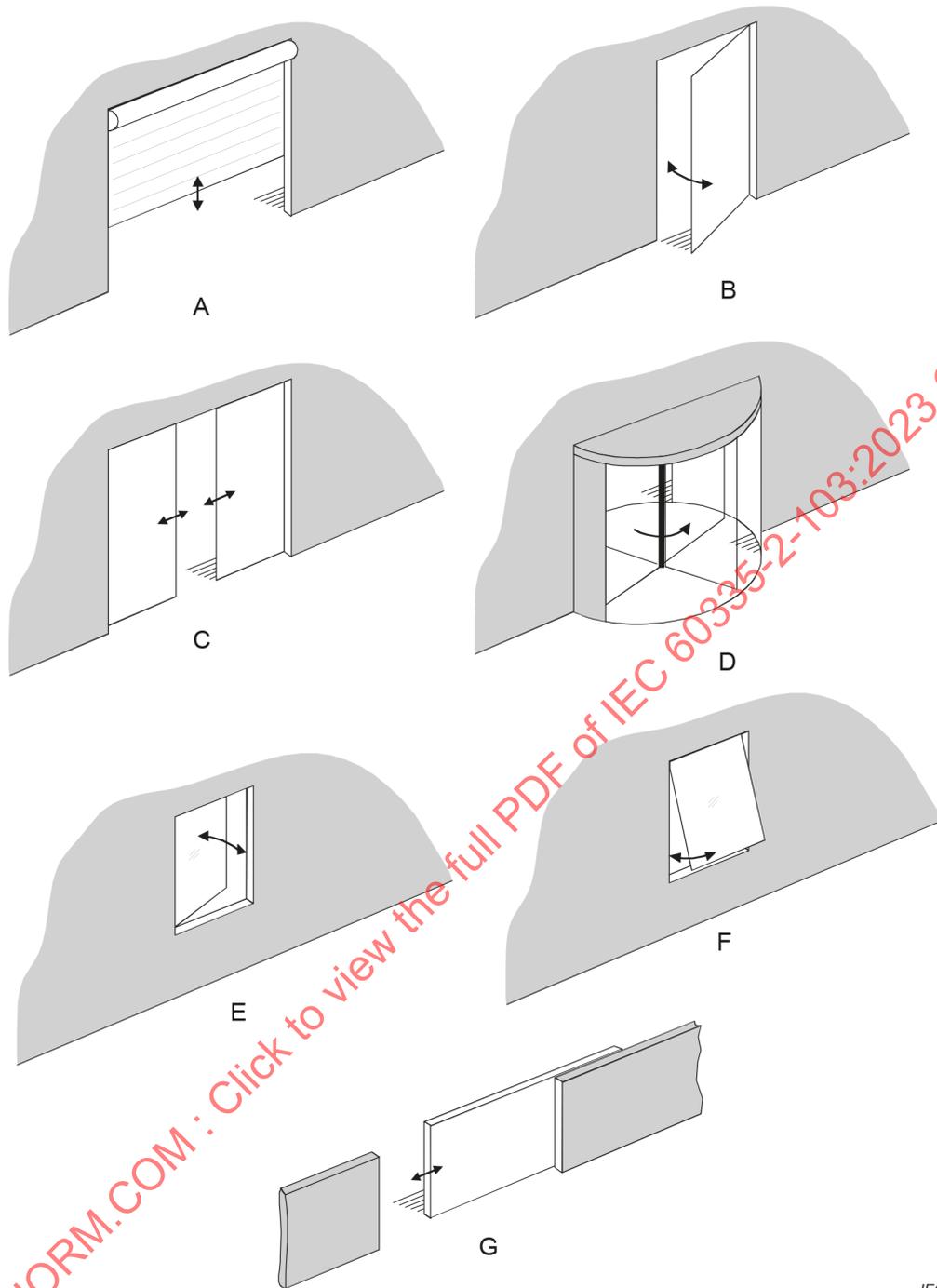
Detachable parts are removed. Any **accessible controls** are adjusted to give the highest laser radiation even if a tool is required to make the adjustment. If the control is inaccessible, it is also adjusted to give the highest laser radiation unless its actuating member is adequately locked in position.

NOTE Solder or sealing compound is considered to provide adequate locking.

The **drive** is supplied at **rated voltage** and operated under **normal operation**. The laser radiation is measured in accordance with IEC 60825-1:2014, 5.2 and the accessible emission level shall not exceed the limits for a Class 1 laser product specified in Table 3 of that standard for an emission duration of 100 s.

The test is repeated but under the conditions specified in Clause 19 and the laser radiation measured again. The accessible emission level shall not exceed five times the limits specified for Class I for wavelengths of 400 nm to 700 nm. For other wavelengths, it shall not exceed the limits for a Class 3R laser product as specified in IEC 60825-1:2014, Table 6.

If compliance with IEC 60825-1:2014 relies on the operation of an interlock, this interlock shall be of the fail-safe type or be tested for 30 000 cycles of operation under the conditions of 24.1.4.



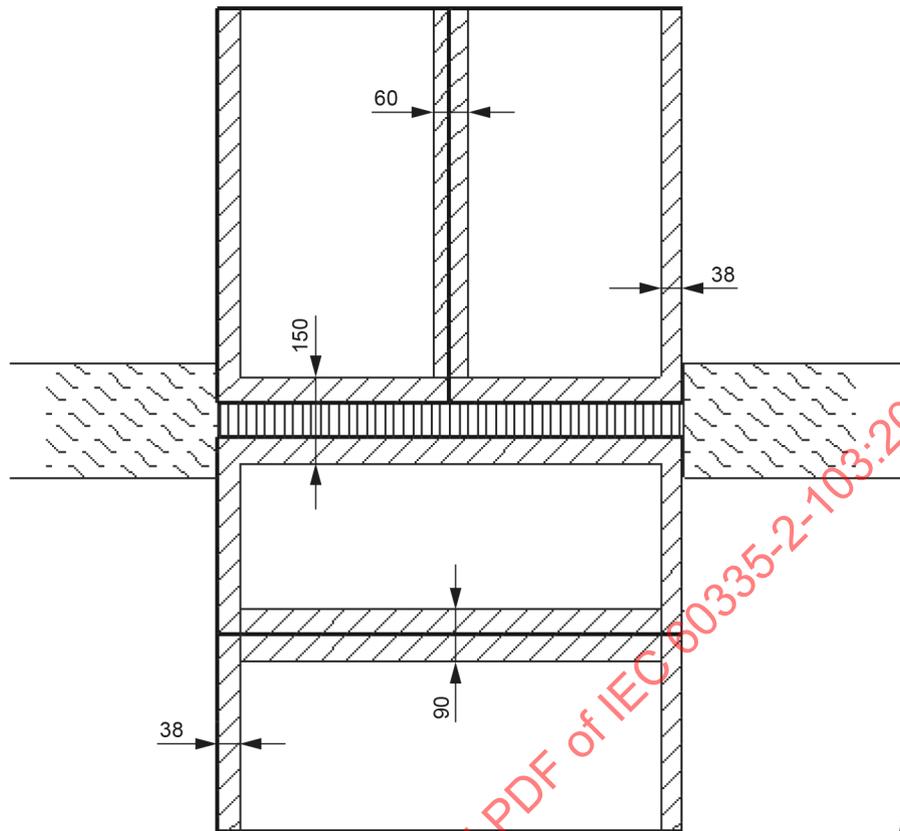
Key

- A rolling door
- B horizontally swinging door
- C horizontally sliding door
- D revolving door
- E vertically hinged **window** (horizontally moving)
- F horizontally hinged **window** (vertically moving)
- G horizontally sliding gate

IEC

Figure 101 – Examples of driven parts

Dimensions in millimetres

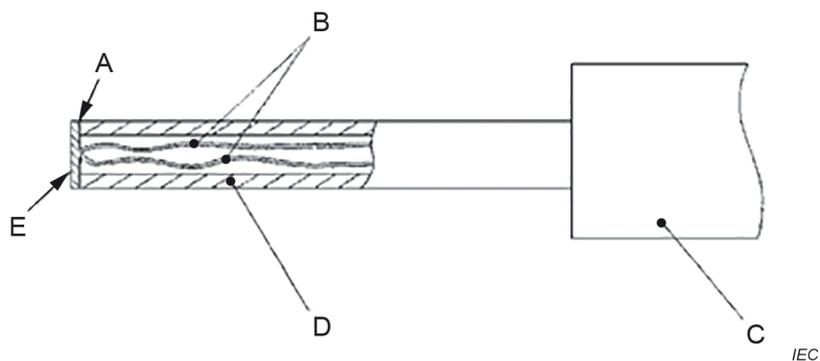


- Key**
-  threshold
 -  inactive area
 -  wall

Figure 102 – Inactive floor areas of pressure-sensitive pads

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Key

- A adhesive
- B thermocouple wires 0,3 mm diameter to IEC 60584-1 Type K
- C handle arrangement permitting a contact force of $4\text{ N} \pm 1\text{ N}$
- D polycarbonate tube: inside diameter 3 mm, outside diameter 5 mm
- E tinned copper disc: 5 mm diameter, 0,5 mm thick with a flat contact face

Figure 103 – Probe for measuring surface temperatures

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Annexes

The annexes of Part 1 are applicable except as follows.

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Annex B (normative)

Battery-operated appliances, separable batteries and detachable batteries for battery-operated appliances

11 Heating

11.1 Replacement:

Battery-operated appliances, their surroundings, and **batteries** shall not attain excessive temperatures in normal use.

Compliance is checked by determining the temperature rise of the various parts under the conditions specified in B.11.1, 11.2, 11.3, 11.7, and 11.8.

*For **drives** for continuous operation, B.11.1 is applicable.*

*For other **drives**, B.11.1 is not applicable. Instead, other **drives** are tested according to 11.7 started with **battery** that is **fully charged**.*

*Any **batteries** shall not be depleted before the end of the **rated operating time** or **rated number of operating cycles** defined in 11.7.*

NOTE The temperature rising of the motor and surroundings parts are checked according to 11.7.

B.22.3 Addition:

Test probe 19 of IEC 61032 is also applied as specified for test probe 18.

*Test probe 19 of IEC 61032 is not applied to parts of **drives** that are located at a height of more than 850 mm above the floor or other access level in normal use.*

*Test probe 18 of IEC 61032 is not applied to parts of **drives** that according to the instructions are required to be mounted at a height of more than 1,8 m above the floor or other access level.*

B.22.4 Addition:

Test probe 19 of IEC 61032 is also applied as specified for test probe 18.

*Test probe 19 of IEC 61032 is not applied to parts of **drives** that are located at a height of more than 850 mm above the floor or other access level in normal use.*

*Test probe 18 of IEC 61032 is not applied to parts of **drives** that according to the instructions are required to be mounted at a height of more than 1,8 m above the floor or other access level.*

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 with Clause 20 is impaired.

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Annex AA (normative)

Drives for powered pedestrian doors used in emergency routes and emergency exits

The following additions to this standard are applicable for **drives** for doors used in emergency routes and emergency exits.

NOTE In many countries, additional requirements are specified by national authorities.

The clause numbers in this annex refer to the clause numbers in the main part of this standard that are modified. Clauses that are additional to the clauses in the main part of this standard are identified by adding the annex letters as a prefix with the numbering starting at 1.

7 Marking and instructions

7.7 Where terminals for connection to a fire alarm system are provided, these shall be identified.

7.12 The instructions shall include the substance of the following:

Ensure that controls that can be set for a locked position are only activated when there are no other persons in the room.

7.12.1 The instructions shall include the substance of the following:

Unless the system allows break out in the escape direction, drives are to be connected so that doors either open in the escape direction or provide a clear escape path.

NOTE 101 Sliding doors are considered to provide a clear escape path.

20 Stability and mechanical hazards

This clause of Part 1 is modified as specified in normative Annex CC.

22 Construction

AA.22.1 **Drives** shall be constructed so that they cannot be put into a locked mode that prevents the door from being opened from the inside unless a night security position is selected by a key, code system or similar means.

Compliance is checked by inspection.

AA.22.2 **Drives** shall be constructed so that they operate break-out doors or automatic-opening doors.

Compliance is checked by inspection.

AA.22.3 **Drives** for break-out doors shall be constructed so that they release the door in the event of an emergency.

Compliance is checked by the following test.

The **drive** is installed with a door and supplied at **rated voltage**. A force of 220 N is applied at a height of 1 m ± 10 mm to the leading edge of the door in the break-out direction. The door shall become released from the **drive**.

AA.22.4 Drives for automatic-opening doors shall be constructed so that the door opens automatically if the power supply fails and the system has not been deliberately selected to be in the security position.

*Compliance is checked by the test of AA.22.4.1, and if a **battery** is required, also with AA.22.4.2 and AA.22.4.3.*

AA.22.4.1 The **drive** is installed with a door and supplied at **rated voltage**, any **battery** being **fully charged**. The supply is disconnected and the door shall start to open immediately at a speed of at least 200 mm/s. It shall then remain open.

AA.22.4.2 The **drive** is installed with a door and supplied at **rated voltage**, the **battery** being **fully charged**. The **battery** is discharged at a rate of approximately 25 % of its rated capacity per hour. The door shall start to open within 4 h, the opening speed being at least 200 mm/s. It shall then remain open.

AA.22.4.3 The **drive** is installed with a door and supplied at **rated voltage**. The **battery** is disconnected. The door shall start to open within 30 min, the opening speed being at least 200 mm/s. It shall then remain open.

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Annex BB (normative)

Drives for windows

20 Stability and mechanical hazards

This clause of Part 1 is applicable except as follows.

BB.20.1 Drives for windows shall operate so that the movement of the **window** is not likely to cause an injury.

Compliance is checked as follows:

- **drives** controlled by a **biased-off switch**, by the requirement and test of BB.20.4;
- **drives** incorporating an **entrapment protection system**, by the relevant requirement and tests of BB.20.7 and BB.20.9.

Other drives are subjected to the following test.

The drive is installed with a window and supplied at the most unfavourable voltage between 0,94 and 1,06 times rated voltage. The drive is adjusted for the highest opening and closing forces, if the adjustment is mentioned in the instructions.

The drive is operated to open the window. The speed of the leading edge shall not exceed 50 mm/s.

When fully open, the gap between counter-opposing edges shall not exceed 200 mm, unless the opening movement is controlled by a smoke control system. The drive is then operated to close the window and the speed of the leading edge shall not exceed 15 mm/s.

If the drive is controlled by a programmable electronic circuit, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of normative Annex R.

BB.20.2 Where a manual release or **reversible drive** is provided, it shall be easy to operate. Operation of the release shall not give rise to a hazard such as kickback or unexpected operation of the **drive**.

The **drive** shall not create any hazard when the manual release is activated.

Operation of a **reversible drive** used as a means for a manual release shall not give rise to a hazard.

Compliance is checked by the following test.

Automatic operation of automatic drives is disabled.

The drive is installed with a window and supplied at the most unfavourable voltage between 0,94 and 1,06 times rated voltage. The drive is adjusted for the highest opening and closing forces, if such adjustment is mentioned in the instructions. The manual release is operated when the window has stopped at each terminal position, in turn. The release or reversible drive shall be operable with a force not exceeding 220 N or a torque not exceeding 1,6 Nm. The force is applied as stated in the instructions.

The test is repeated with the power supply interrupted.

When the manual release has been activated, the power supply is then restored and the **drive** activated. The **drive** shall not move, or if the **drive** moves, all requirements of this standard shall be met.

BB.20.3 A mechanical fault in the **drive** shall not result in a hazardous operation.

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 part of the **drive** or used for connecting the **drive** to the **window**.

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

If 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 **window**, the force exerted by the **drive** being adjusted to its highest value in accordance with the instructions. The **drive** is supplied at the most unfavourable voltage between 0,94 and 1,06 times **rated voltage**.

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

Unless the **drive** and the **window** continue to operate normally, all of the following conditions shall be fulfilled:

- the **drive** shall stop operating at least by the end of the **cycle** of movement;
- further operation shall not be possible;
- the speed of the **window** shall not increase by more than 20 %.

BB.20.4 Drives controlled by a **biased-off switch** shall stop when its actuating member is released.

Compliance is checked by the following test.

The **drive** is installed with a **window** and supplied at the most unfavourable voltage between 0,94 and 1,06 times **rated voltage**. It is operated to close the **window**.

When the actuating member is released, the leading edge of the **window** shall stop within a distance of 20 mm.

The test is repeated during the opening movement of the **window**.

The requirement for the **window** to stop within the specified distance only applies if the closing force exerted by the **window** exceeds 150 N, as measured in BB.20.7.2.

If the **drive** is controlled by a programmable **electronic circuit**, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of normative Annex R.

BB.20.5 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 **drive** has a single button for controlling the movement, further actuation shall reverse the direction of movement.

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

These requirements do not apply to controls affecting automatic modes of operation.

Any button that has a stop function shall not require a key to stop the **drive**.

Compliance is checked by a manual test.

NOTE The test can be carried out without a **window**.

BB.20.6 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 tests.

*The **drive** is supplied at **rated voltage** and operated under **normal operation**. The supply is then interrupted. After the supply is restored, the **drive** shall not restart automatically. However, **automatic drives** may re-start, provided that they function as in normal use.*

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

NOTE 2 The test can be carried out without a **window**.

*If the **drive** is controlled by a programmable **electronic circuit**, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of normative Annex R.*

BB.20.7 An **entrapment protection system** in a **drive** for **windows** shall be operated to reduce the likely hood of injury to the user.

*For **drives** incorporating an **entrapment protection system** with sensing devices that prevent the **window** from coming into contact with a person, compliance is checked by the test specified in BB.20.7.1.*

Obstacles used in the following tests shall be made of materials and colours to simulate the most unfavourable conditions. In case of doubt, the obstacles shall be made of un-planed wood and painted white.

*For **drives** incorporating an **entrapment protection system** that allows the **window** to contact a person, compliance is checked by the relevant tests specified in BB.20.7.2.*

NOTE 3 In one direction of travel of the **window**, BB.20.7.1 can be met and BB.20.7.2 can be met in the opposite direction of travel.

*If the **drive** is controlled by a programmable **electronic circuit**, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of normative Annex R.*

BB.20.7.1 *The **drive** is installed with a **window**, the force exerted by the **drive** being adjusted to its highest value in accordance with the instructions. The **drive** is supplied at the most unfavourable voltage between 0,94 and 1,06 times **rated voltage**.*

*For horizontally moving **windows**, the test of BB.20.7.1.1 is carried out.*

For vertically moving **windows**, the test of BB.20.7.1.2 is carried out.

BB.20.7.1.1 An obstacle having dimensions of approximately 25 mm × 100 mm × 300 mm, with three sides (one in each dimension) having a reflective surface, obtained by use of mirrors, fine grained stainless steel or white-gloss paint, and the other three sides being non-reflective surfaces painted dull-black, is placed at any place in the path of the leading edge and plane of the **window** and in the most unfavourable dimension. The tests with this obstacle shall be made using the non-reflective and reflective sides in turn.

The **drive** is operated to close the **window** from the fully open position and from a 300 mm gap. If the **window** moves, it shall stop or reverse its movement without contacting the obstacle.

BB.20.7.1.2 An obstacle having dimensions of approximately 25 mm × 100 mm × 300 mm is placed at any place in the path of the leading edge along its 300 mm length across the **window** opening.

The **drive** is operated to close the **window** from heights of 100 mm, 1 000 mm and the fully open position of the **window**. The **window** shall not move or shall only move in the opening direction.

BB.20.7.2 The **drive** is installed with a **window**. The force exerted by the **drive** is adjusted to the highest value if the force can be adjusted by the user during use or **user maintenance**. Otherwise, the force should be adjusted according to the installation instructions. The **drive** is supplied at the most unfavourable voltage between 0,94 and 1,06 times **rated voltage**.

The **drive** is operated to close the **window** from the fully open position. The forces between the leading edge and counter opposing edges shall not exceed

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

However, after 0,75 s, peaks lower than 400 N are allowed, if

- they are decreasing from one to the other, and
- the period of oscillation is ≤ 1 s, and
- the average force calculated over the remaining period of 4,25 s is ≤ 150 N.

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.

For vertically moving **windows**, the force is measured on the leading edge of the **windows** when the dimension of the gap is

- 50 mm;
- 300 mm;
- 500 mm.

The force is measured at the following locations:

- in the centre of the leading edge;

- 200 mm from each end of the leading edge if this edge is longer than 800 mm.

For horizontally moving **windows**, the force is measured on the leading edge of the **window**, at the following heights, when the dimension of the gap is 50 mm and 500 mm:

- 50 mm;
- 300 mm from the top, for **windows** between 1,2 m and 2,5 m in height;
- 2 500 mm, for **windows** more than 2,8 m in height;
- in the centre, for **windows** not more than 2,8 m in height.

BB.20.8 Drives shall prevent vertically moving **windows** from closing unexpectedly.

Compliance is checked by the following test.

The **drive** is supplied at the most unfavourable voltage between 0,94 and 1,06 times **rated voltage** but is not operated. Automatic operation of **automatic drives** is disabled. It is loaded with 1,2 times the **rated load** applied for 30 min. If the **drive** is supplied with a **window**, the load is applied to the **window** and is equal to the highest force exerted by it.

There shall be no movement except for initial removal of any play in the system. If there is creepage in the **drive**, the **window** shall not move faster than 1 mm/s.

NOTE 1 The highest force is determined with the **window** in the most unfavourable position, the **drive** not being energized.

NOTE 2 It is to be noted that compliance with BB.20.8 does not necessarily cover risks due to operation of the **window**. Anti-drop or equivalent safety devices might be necessary.

The test is repeated with the supply disconnected.

If the **drive** is controlled by a programmable **electronic circuit**, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of normative Annex R.

BB.20.9 Entrapment protection systems shall provide an adequate level of protection in the event of a failure within the system installation wiring.

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

Unless the system continues to operate normally, the **window** shall stop moving within one **cycle** of operation or the movement of the **window** shall only be controlled by a **biased-off switch** by the time it has completed its movement.

Annex CC (normative)

Drives for pedestrian doors

The clause numbers in this annex refer to the clause numbers in the main part of this standard that are modified. Clauses that are additional to the clauses in the main part of this standard are identified by adding the annex letters as a prefix with the numbering starting at 1.

20 Stability and mechanical hazards

This clause of Part 1 is applicable except as follows.

20.2 Addition:

For **horizontally moving pedestrian doors**, moving parts including interconnecting parts of their **drives** need not be guarded if the gap between fixed and moving parts is below 8 mm, or above 25 mm, or it is at least 2 m above the floor. This also applies to the gap between parts that can move at different speeds.

CC.20.1 Where manual release or **reversible drive** is provided, it shall be easy to operate. Operation of the release shall not give rise to a hazard such as kickback or unexpected operation of the **drive**.

The **drive** shall not create any hazard when the manual release is activated.

Operation of a **reversible drive** used as a means for a manual release shall not give rise to a hazard.

Compliance is checked by the following test.

*Automatic operation of **automatic drives** is disabled.*

*The **drive** is installed with a pedestrian door and supplied at the most unfavourable voltage between 0,94 and 1,06 times **rated voltage**. The **drive** is adjusted for the highest opening and closing forces, if such adjustment is mentioned in the instructions. The manual release is operated when the pedestrian door has stopped at each terminal position, in turn. The release or **reversible drive** shall be operable with a force not exceeding 220 N or a torque not exceeding 1,6 Nm. The force is applied as stated in the instructions.*

The test is repeated with the power supply disconnected.

*When the manual release has been activated, the power supply is then restored and the **drive** activated. The **drive** shall not move, or if the **drive** moves, all requirements of this standard shall be met.*

CC.20.2 A mechanical fault in the **drive** shall not result in a hazardous operation.

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 part of the **drive** or used for connecting the **drive** to the pedestrian door.*

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

*If 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 pedestrian door, the force exerted by the **drive** being adjusted to its highest value in accordance with the instructions. The **drive** is supplied at the most unfavourable voltage between 0,94 and 1,06 times **rated voltage**.*

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

*Unless the **drive** and the pedestrian door continue to operate normally, all of the following conditions shall be fulfilled:*

- the **drive** shall stop operating at least by the end of the **cycle** of movement;*
- further operation shall not be possible;*
- the speed of the pedestrian door shall not increase by more than 20 %.*

CC.20.3 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 **drive** has a single button for controlling the movement, further actuation shall reverse the direction of movement.

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

These requirements do not apply to controls affecting automatic modes of operation.

Any button that has a stop function shall not require a key to stop the **drive**.

Compliance is checked by a manual test.

CC.20.4 **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 tests.

*The **drive** is supplied at **rated voltage** and operated under **normal operation**. The supply is then interrupted. After the supply is restored, the **drive** shall not restart automatically. However, **automatic drives** may re-start, provided that they function as in normal use.*

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

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

*If the **drive** is controlled by a programmable **electronic circuit**, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of normative Annex R.*

CC.20.5 **Drives** shall incorporate an **entrapment protection system** that reduces the risk of injury when the pedestrian door moves or shall be adjustable to control the energy of the movement of the pedestrian door.

NOTE In one direction of travel of the pedestrian door, CC.20.5.1 can be met and CC.20.5.2 can be met in the opposite direction of travel.

For **drives** incorporating an **entrapment protection system** that allows the pedestrian door to contact a person, compliance is checked by the relevant tests specified in CC.20.5.2.

If the **drive** is controlled by a programmable **electronic circuit**, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of normative Annex R.

CC.20.5.1 For **drives** incorporating an **entrapment protection system** with sensing devices that prevent the pedestrian door from coming into contact with a person, compliance is checked by the following relevant tests.

The **drive** is installed with a pedestrian door, the force exerted by the **drive** being adjusted to its highest value in accordance with the instructions. The **drive** is supplied at the most unfavourable voltage between 0,94 and 1,06 times **rated voltage**.

If the sensing devices are other than pressure sensitive pads, the test specified in CC.20.5.1.1 is applied.

If the sensing devices are pressure sensitive pads, the test specified in CC.20.5.1.2 is applied.

For pedestrian doors, an **entrapment protection system** with sensing devices that continuously adapt to environmental changes shall detect a stationary obstacle for at least 30 s.

CC.20.5.1.1 The reference bodies for the tests shall be in accordance with normative Annex FF.

For **horizontally moving pedestrian doors**, the **drive** is operated to open or close the **door**. For **drives** for **horizontally moving pedestrian doors** other than revolving doors, tests are carried out using the reference body positioned in the moving plane of the pedestrian door as shown in Figure EE.1 to Figure EE.5 of normative Annex EE.

The reference body CA is detected in all positions of the travel area of the doorset leaves.

For **drives** for revolving doors, tests are carried out in accordance with normative Annex GG using the reference body positioned as shown in Figure EE.6 to Figure EE.8 of normative Annex EE.

CC.20.5.1.2 If the **entrapment protection system** incorporates a pressure-sensitive floor pad, a mass of 15 kg \pm 0,5 kg having a diameter of approximately 60 mm is used.

The following inactive floor pad areas are excluded from this requirement:

- the last 38 mm on each side of the pedestrian door opening width;
- 60 mm along the junction of floor pads joined together side-by-side with the longest dimension perpendicular to the pedestrian door opening;
- 90 mm along the junction of floor pads joined together side-by-side with the longest dimension parallel to the pedestrian door opening;
- 150 mm across the junction of floor pads meeting at the threshold.

NOTE The inactive floor areas of pressure sensitive pads are shown in Figure 102.

CC.20.5.2 Entrapment protection systems that allow the pedestrian door to contact a person shall only be used to reduce the risk of injury for:

- the opening movement of a sliding door with the leave(s) moving along a plain part and the distance between the front surface of the leave and the fixed side screen or wall is more than 100 mm and less or equal to 150 mm;
- the opening and closing movement of a balanced door;
- the opening movement of a folding door;
- the closing movement of a folding door only in combination with an **entrapment protection system** with sensing devices that prevent the pedestrian door from coming into contact with a person installed at the outer side of the door;
- the movement of revolving doors in combination with the peripheral speed which shall not exceed 1 000 mm/s for a door with a diameter up to 3 000 mm and shall not exceed 750 mm/s for a door with a diameter over 3 000 mm.

For **drives** incorporating an **entrapment protection system** that allows the pedestrian door to contact a person, compliance is checked by the following relevant tests.

The **drive** is installed with a pedestrian door. The force exerted by the **drive** is adjusted to the highest value if the force can be adjusted by the user during use or **user maintenance**. Otherwise, the force is adjusted according to the installation instructions. The **drive** is supplied at the most unfavourable voltage between 0,94 and 1,06 times **rated voltage**.

The **drive** is operated to close and open the pedestrian door from the fully open and fully closed positions. The forces between the leading edge and counter opposing edges shall not exceed the values stated in normative Annex HH when measured at points (F) according to normative Annex II.

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.

CC.20.5.3 Drives adjustable to control the energy of the movement of a pedestrian door shall be in compliance with normative Annex JJ or normative Annex LL.

Drives adjustable to control the energy of the movement of a pedestrian door shall only be used to reduce the risk of injury for:

- the opening and closing movement of a sliding door when the movement is in accordance with normative Annex JJ;
- the opening and closing movement of a swing door when the movement is in accordance with normative Annex JJ;
- the opening and closing movement of a revolving door when the movement is in accordance with normative Annex JJ;
- the opening movement of a swing door when the movement is in accordance with normative Annex LL and sufficient safety distances are provided (see Figure CC.1);
- the closing movement of a swing door when the movement is in accordance with normative Annex LL.

CC.20.6 Entrapment protection systems shall provide an adequate level of protection in the event of a failure within the system installation wiring.

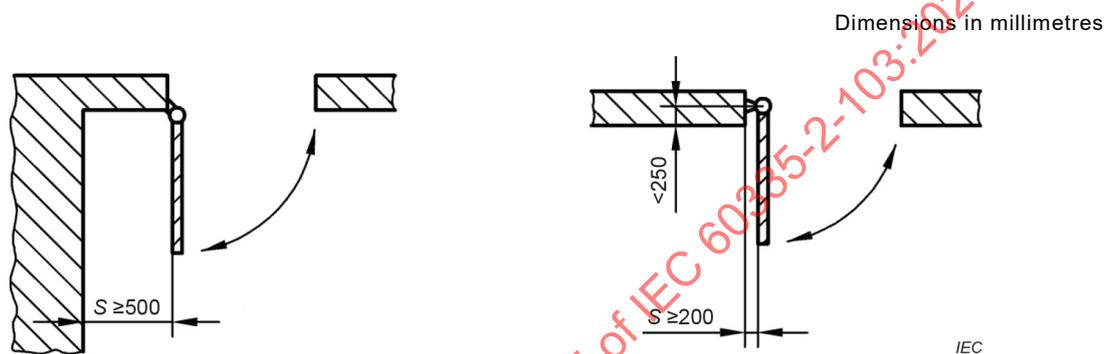
Compliance is checked by the following test.

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

Unless the system continues to operate normally, the pedestrian door shall stop moving within one **cycle** of operation or the movement of the pedestrian door shall only be controlled by a **biased-off switch** by the time it has completed its movement.

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

If the **drive** is controlled by a programmable **electronic circuit**, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of normative Annex R.



Key

S safety distance

Figure CC.1 – Safety distances for opening movement of swing door

Annex DD (normative)

Drives for horizontally and vertically moving doors and gates

NOTE Pedestrian doors are covered in normative Annex CC.

20 Stability and mechanical hazards

This clause of Part 1 is applicable except as follows.

DD.20.1 Drives shall prevent vertically moving **driven parts** from closing unexpectedly.

Compliance is checked by the following test.

*The **drive** is supplied at the most unfavourable voltage between 0,94 and 1,06 times **rated voltage** but is not operated. Automatic operation of **automatic drives** is disabled. It is loaded with 1,2 times the **rated load** applied for 30 min. If the **drive** is supplied with a **driven part**, the load is applied to the **driven part** and is equal to the highest force exerted by it.*

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

NOTE 1 The highest force is determined with the **driven part** in the most unfavourable position, the **drive** not being energized.

The test is repeated with the supply disconnected.

*If the **drive** is controlled by a programmable **electronic circuit**, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of normative Annex R.*

DD.20.2 Where a manual release or **reversible drive** is provided, it shall be easy to operate. Operation of the release shall not give rise to a hazard such as kickback or unexpected operation of the **drive**.

The **drive** shall not create any hazard when the manual release is activated.

Operation of a **reversible drive** used as a means for a manual release shall not give rise to a hazard.

Compliance is checked by the following test.

*Automatic operation of **automatic drives** is disabled.*

*The **drive** is installed with a **driven part** and supplied at the most unfavourable voltage between 0,94 and 1,06 times **rated voltage**. The **drive** is adjusted for the highest opening and closing forces, if such adjustment is mentioned in the instructions. The manual release is operated when the **driven part** has stopped at each terminal position, in turn. The release or **reversible drive** shall be operable with a force not exceeding 220 N or a torque not exceeding 1,6 Nm. The force is applied as stated in the instructions.*

The test is repeated with the power supply interrupted.

When the manual release has been activated, the power supply is then restored and the **drive** activated. The **drive** shall not move, or if the **drive** moves, all requirements of this standard shall be met.

DD.20.3 A mechanical fault in the **drive** shall not result in a hazardous operation.

Compliance is checked by inspection and, if necessary, by test.

Drives for balanced vertically **driven parts** are not tested.

NOTE 1 Balanced vertically **driven parts** can utilise springs, counterweights or other means to support the mass of the **driven part**.

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 part of the **drive** or used for connecting the **drive** to the **driven part**.

NOTE 2 Examples of parts that are evaluated are screws, pins, shafts, wheels, chains and supporting parts.

If 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 **driven part**, the force exerted by the **drive** being adjusted to its highest value in accordance with the instructions. The **drive** is supplied at the most unfavourable voltage between 0,94 and 1,06 times **rated voltage**.

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

Unless the **drive** and the **driven part** continue to operate normally, all of the following conditions shall be fulfilled:

- the **drive** shall stop operating at least by the end of the **cycle** of movement;
- further operation shall not be possible;
- the speed of the **driven part** shall not increase by more than 20 % or it shall stop within 300 mm.

NOTE 3 For vertically moving doors, anti-drop or equivalent safety devices might be necessary.

DD.20.4 **Drives** controlled by a **biased-off switch** shall stop when the actuating member is released.

Compliance is checked by the following test.

The **drive** is installed with a **driven part** and supplied at the most unfavourable voltage between 0,94 and 1,06 times **rated voltage**. It is operated to close the **driven part**.

When the actuating member is released, the leading edge of the **driven part** shall stop within a distance of

- for door or gate other than swing type, 50 mm when the opening gap does not exceed 500 mm except for horizontally swinging **driven parts** which shall stop within 100 mm;
- for swing type door or gate, 100 mm when the opening gap does not exceed 500 mm;
- for any type of door or gate, 100 mm when the opening gap exceeds 500 mm. The test is repeated during the opening movement of the **driven part**.

The requirement for the **driven part** to stop within the specified distance only applies if the closing force exerted by the **driven part** exceeds 150 N, as measured in DD.20.7.2.1.

If the **drive** is controlled by a programmable **electronic circuit**, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of normative Annex R.

DD.20.5 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 **drive** has a single button for controlling the movement, further actuation shall reverse the direction of movement.

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

These requirements do not apply to controls operating **automatic drives**.

Any button that has a stop function shall not require a key to stop the **drive**.

Compliance is checked by a manual test.

NOTE The test can be carried out without a **driven part**.

If the **drive** is controlled by a programmable **electronic circuit**, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of normative Annex R.

DD.20.6 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 tests.

*The **drive** is supplied at **rated voltage** and operated under **normal operation**. The supply is then interrupted. After the supply is restored, the **drive** shall not restart automatically. However, **automatic drives** may re-start, provided that they function as in normal use.*

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

NOTE 2 The test can be carried out without a **driven part**.

DD.20.7 Drives not controlled by a **biased off switch** shall incorporate an **entrapment protection system** that reduces the risk of injury when the **driven part** moves.

If the **drive** is controlled by a programmable **electronic circuit**, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of normative Annex R.

For **drives** incorporating an **entrapment protection system** with sensing devices that prevent the **driven part** from coming into contact with a person, compliance is checked by the relevant tests specified in DD.20.7.1.

For **drives** incorporating an **entrapment protection system** that allows the **driven part** to contact a person, compliance is checked by the tests specified in DD.20.7.2.

For **drives** incorporating an **entrapment protection system** with a non-contact sensing device that moves with the leading edge of a **driven part**, compliance is checked by the tests specified in DD.20.7.2.

NOTE In one direction of travel of the **driven part**, DD.20.7.1 can be met and DD.20.7.2 can be met in the opposite direction of travel.

DD.20.7.1 The **drive** is installed with a **driven part**, the force exerted by the **drive** being adjusted to its highest value in accordance with the instructions. The **drive** is supplied at the most unfavourable voltage between 0,94 and 1,06 times **rated voltage**.

If the sensing devices are other than pressure sensitive pads, the tests specified in DD.20.7.1.1 to DD.20.7.1.3 are applied.

If the sensing devices are pressure sensitive pads, the test specified in DD.20.7.1.4 is applied.

DD.20.7.1.1 An obstacle having dimensions of approximately 200 mm × 300 mm × 700 mm with three sides (one in each dimension) having a reflective surface, obtained by use of mirrors, fine grained stainless steel or white-gloss paint, and the other three sides being non reflective surfaces painted dull-black, is placed on the floor at any place in the path of the leading edges and planes of the **driven part** and in the most unfavourable orientation. The tests with this obstacle shall be made using the non-reflective and reflective sides in turn.

NOTE The leading edge is the edge of the **driven part** in the direction of travel, either opening or closing.

For horizontally moving **driven parts**, the **drive** is operated to open or close the **driven part**. If the **driven part** moves, it shall stop or reverse its movement without contacting the obstacle.

The obstacle is then located with the 700 mm dimension positioned vertically and raised off the floor in the worst position between the floor and 300 mm below the **driven part** height or 2 500 mm, whichever is lower.

The **drive** is operated to close the **driven part**. If the **driven part** moves, it shall stop or reverse its movement without contacting the obstacle.

DD.20.7.1.2 For vertically moving **driven parts**, an obstacle having dimensions of approximately 80 mm × 300 mm and a height of 100 mm with 3 sides (one in each dimension) having a reflective surface, obtained by use of mirrors, fine grained stainless steel or white-gloss paint, and the other three sides being non reflective surfaces painted dull-black, is placed on the floor and centrally along its 300 mm length at any place in the path of the leading edge across the **driven part** opening.

For vertically moving **driven parts**, the **drive** is operated to close the **driven part** from heights of 100 mm, 1 000 mm and the fully open position of the **driven part**. The **driven part** shall not move or shall only move in the opening direction.

DD.20.7.1.3 For horizontally and vertically moving **driven parts**, the obstacle used in DD.20.7.1.1 is located with the 700 mm dimension positioned vertically and is moved at a speed of 3 m/s ± 0,6 m/s.

For both horizontally and vertically moving **driven parts**, the obstacle is moved in a straight line through the plane of the **driven part** opening at the most unfavourable angle.

The **drive** is operated to close the **driven part**. The **driven part** shall stop or reverse its movement without contacting the obstacle.

DD.20.7.1.4 If the **entrapment protection system** incorporates a pressure-sensitive floor pad, a mass of 15 kg ± 0,5 kg having a diameter of approximately 60 mm is used instead of the wooden obstacle.

The mass is placed in the path of the **driven part** and the **drive** is operated, the **driven part** shall stop or reverse its movement before contacting the mass.

The following inactive floor pad areas are excluded from this requirement:

- the last 38 mm on each side of the **driven part** opening width;
- 60 mm along the junction of floor pads joined together side-by-side with the longest dimension perpendicular to the **driven part** opening;
- 90 mm along the junction of floor pads joined together side-by-side with the longest dimension parallel to the **driven part** opening;
- 150 mm across the junction of floor pads meeting at the threshold.

NOTE 1 The inactive floor areas of pressure sensitive pads are shown in Figure 102.

DD.20.7.2 The **drive** is installed with a **driven part**. The force exerted by the **drive** is adjusted to the highest value if the force can be adjusted by the user during use or **user maintenance**. Otherwise, the force is adjusted according to the installation instructions. The **drive** is supplied at the most unfavourable voltage between 0,94 and 1,06 times **rated voltage**.

The test of DD.20.7.2.1 is applied and

- if the **drive** is intended to be used with vertically moving **driven parts** having openings in which a 50 mm tube can be inserted, the test of DD.20.7.2.2 is applied for an opening movement;
- 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 connection to a telecommunication or communication network, the test of DD.20.7.2.3 is applied.

DD.20.7.2.1 The **drive** is operated to close and open the **driven part** from the fully open and fully closed positions. The forces between the leading edge and counter opposing edges shall not exceed

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

or for vertically moving **driven parts** used as a door

- 600 N during the first 2 s after the force has exceeded 150 N for **driven parts** that do not swing outward and meet DD.20.7.2.3;
- 400 N during the first 2 s after the force has exceeded 150 N for **driven parts** that swing outward;
- 150 N during a further period of 3 s;
- 25 N thereafter.

However, after 0,75 s, peaks lower than 400 N are allowed, if

- they are decreasing from one to the other, and
- the period of oscillation is ≤ 1 s, and
- the average force calculated over the remaining period of 4,25 s is ≤ 150 N.

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.

For vertically moving **driven parts**, the values apply to the vertical component of the closing and opening forces and between any counter opposing edges of moving parts.

For vertically moving **driven parts**, the force is measured on the leading edge of the **driven part** when the dimension of the gap is

- 50 mm;
- 300 mm;
- 500 mm;
- 2 500 mm or 300 mm below the maximum if this is less.

For vertically moving **driven parts**, the force is measured at the following locations:

- in the centre of the leading edge;
- 200 mm from each end of the leading edge if this edge is longer than 800 mm.

For horizontally moving **driven parts**, the force is measured on the leading edge of the **driven part**, at the following heights, when the dimension of the gap is 50 mm and 500 mm:

- 50 mm;
- 300 mm from the top, for **driven parts** between 1,2 m and 2,5 m in height;
- 2 500 mm, for **driven parts** more than 2,8 m in height;
- in the centre, for **driven parts** not more than 2,8 m in height.

DD.20.7.2.2 **Drives** intended to be used with a vertically moving **driven part** having openings in which a 50 mm diameter cylinder can be inserted are subjected to an opening test with the **driven part** loaded with a mass of $20\text{ kg} \pm 0,5\text{ kg}$. The mass, having dimensions of approximately $200\text{ mm} \times 200\text{ mm} \times 200\text{ mm}$, is fixed to the **driven part** in the most unfavourable place, with one edge adjacent to the bottom edge of the **driven part**.

The **drive** is operated to open the **driven part**. If the bottom edge of the **driven part** moves more than 500 mm, the movement of the **driven part** shall stop before the test piece comes into contact with the lintel.

DD.20.7.2.3 An obstacle as described in DD.20.7.1.1 except having dimensions of approximately $80\text{ mm} \times 300\text{ mm}$ and a height of 100 mm is placed on the floor and centrally along its 300 mm length across the plane of the **driven part** opening. The **drive** is operated to close the **driven part** from opening gaps of 100 mm, 1 000 mm and the fully open position of the **driven part**. The **driven part** shall not move or only move in the opening direction. The tests with this obstacle shall be made using the non-reflective and reflective sides in turn.

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

A cylindrical obstacle, having a diameter of 50 mm and a length of 850 mm, is suspended by one end at a height of 900 mm above the floor and centrally in the **driven part** opening.

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

DD.20.8 **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 **driven part** and supplied at **rated voltage**. The **drive** is operated to close the **driven part**. 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 **driven part** shall stop moving within one **cycle** of operation or the movement of the **driven part** shall only be controlled by a **biased-off switch** by the time it has completed its movement.

The test is repeated during the opening movement of the **driven part**.

If the **drive** is controlled by a programmable **electronic circuit**, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of normative Annex R.

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Annex EE (normative)

Measuring point for protective devices of horizontally moving pedestrian doors

The figures of Annex EE are referenced in normative Annex CC and normative Annex GG.

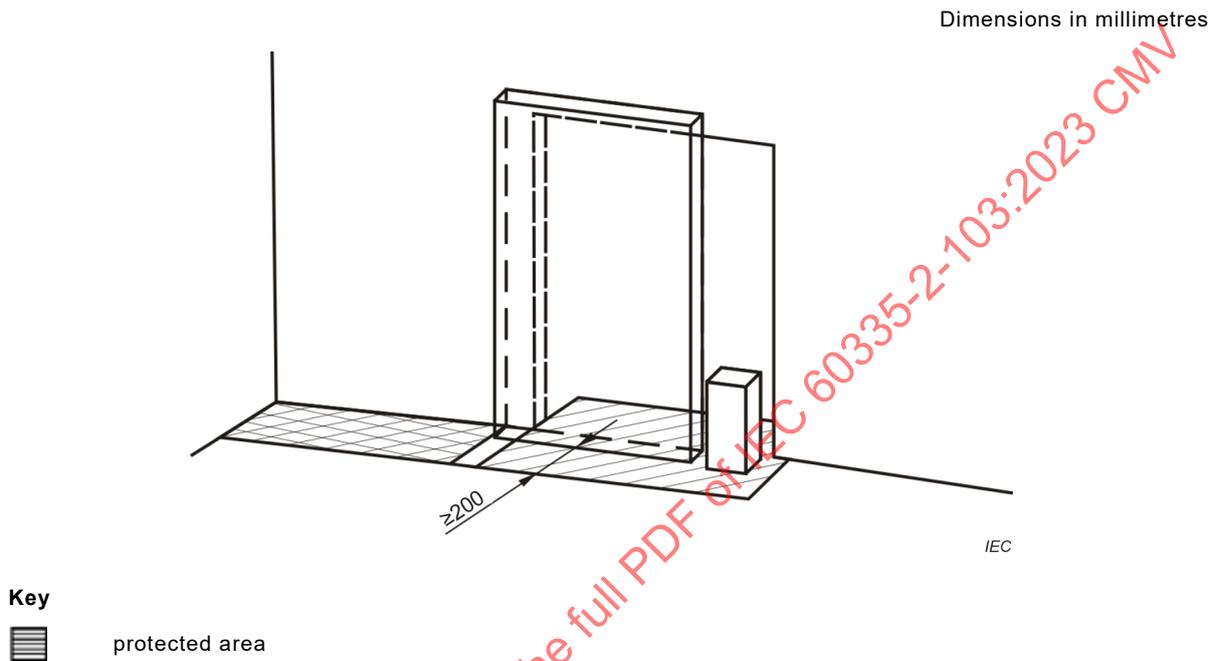


Figure EE.1 – Single-leaf sliding doorset

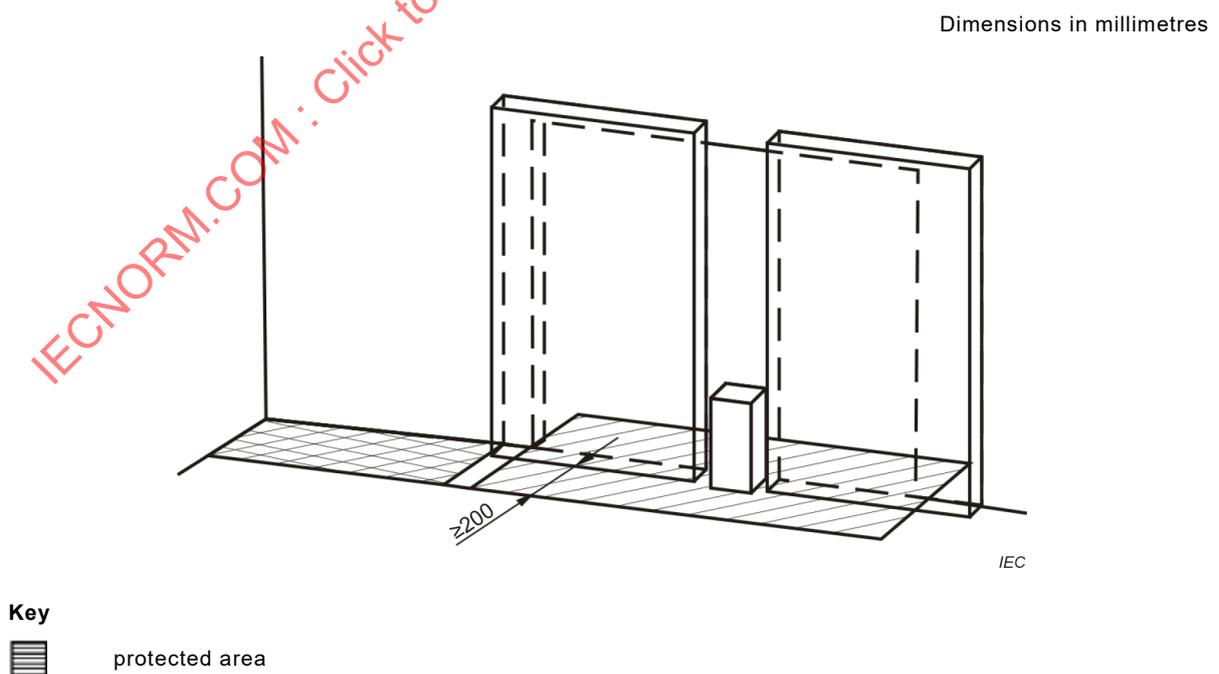
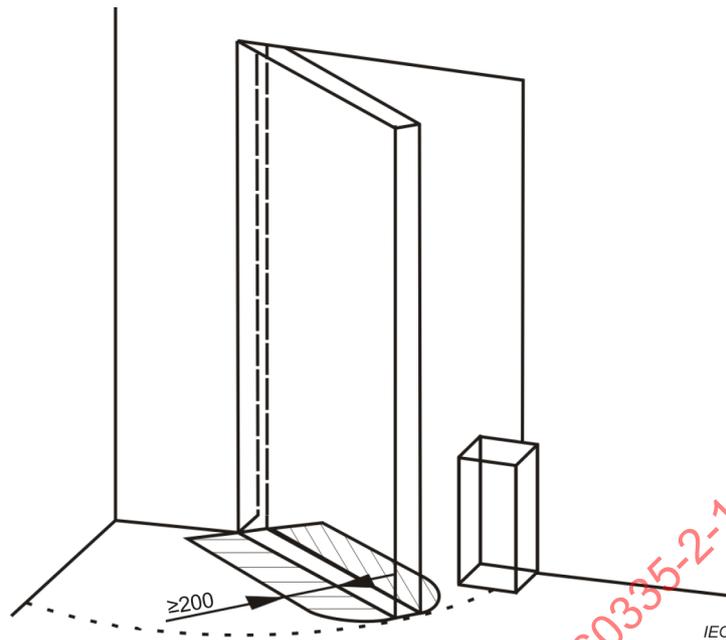


Figure EE.2 – Double-leaf sliding doorset

Dimensions in millimetres



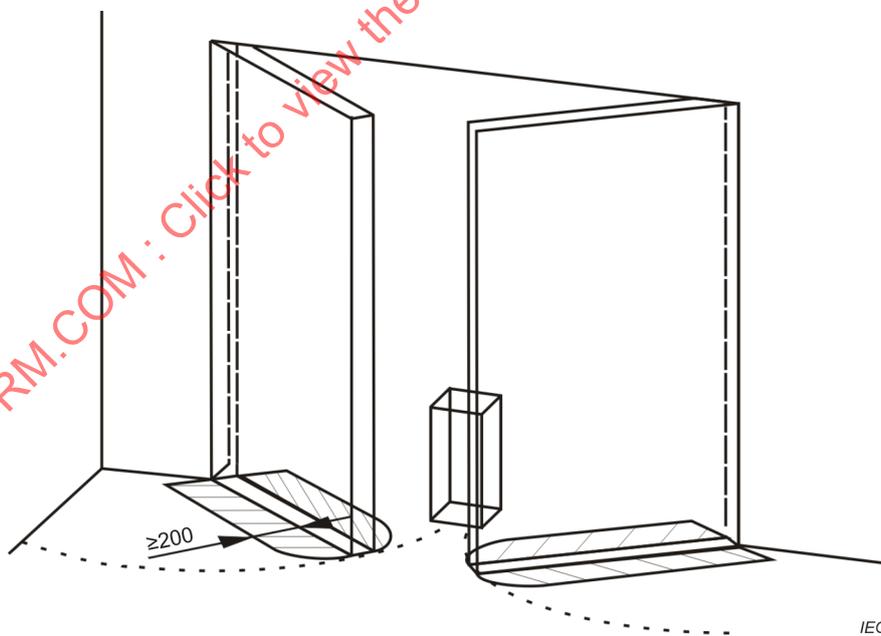
Key



protected area

Figure EE.3 – Single-leaf swing doorset

Dimensions in millimetres



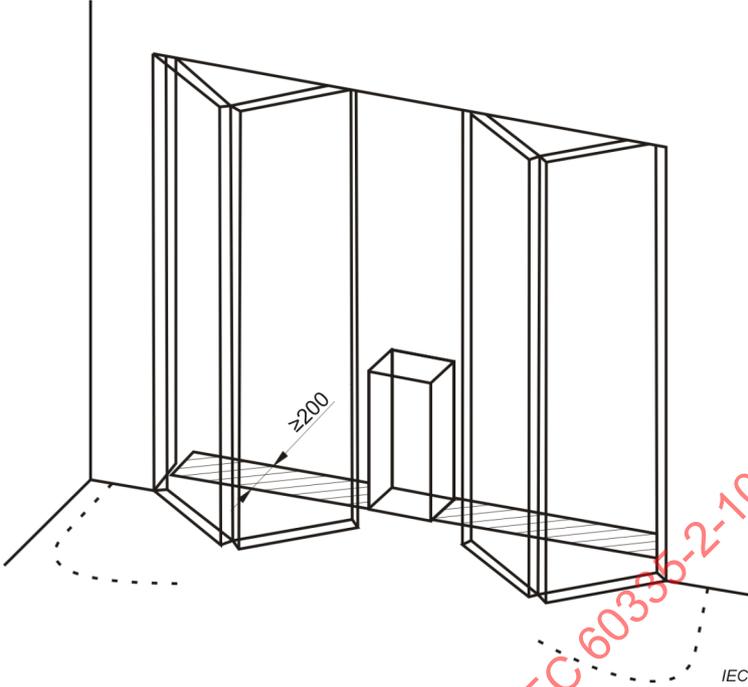
Key



protected area

Figure EE.4 – Double-leaf swing doorset

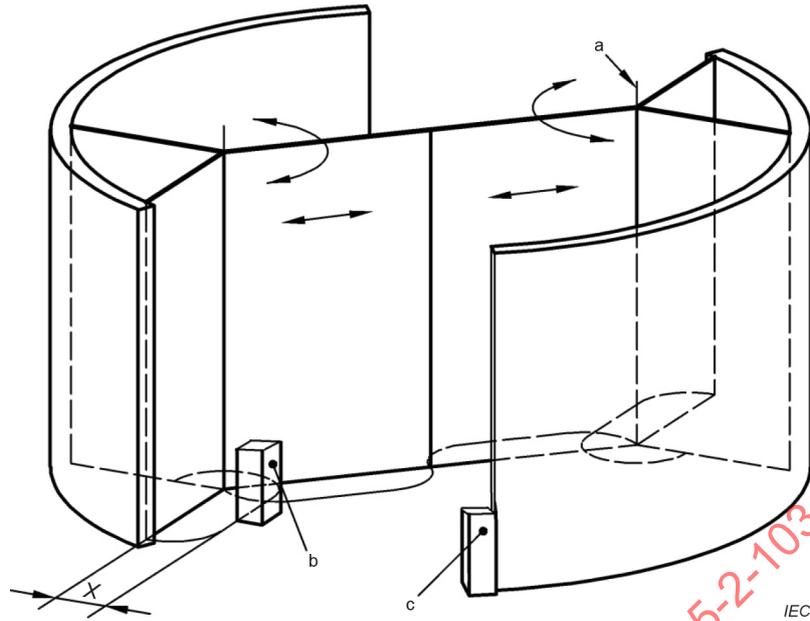
Dimensions in millimetres



Key
▬ protected area

Figure EE.5 – Folding doorset

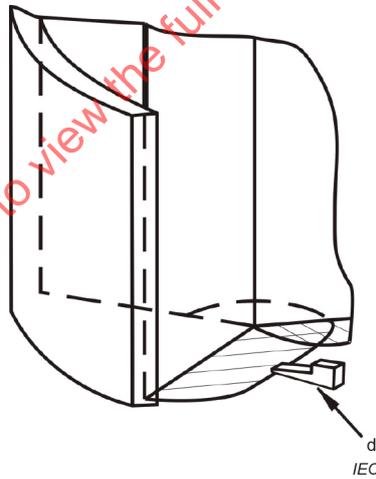
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Key

- a pivot point for doorsets with a break-out system
- b test 1 (with CA) for doorset diameters greater than 3 000 mm
- c test 2 (with CA) for all doorset diameters, see also Clause GG.1 in normative Annex GG
- X protected area

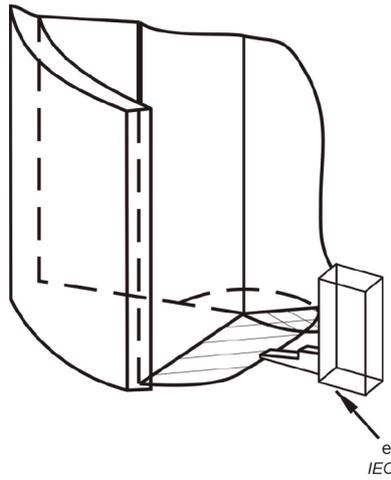
a) Reference body positions for test 1 and test 2



Key

- d test 3 (with CB) in centre of doorset leaf

b) Reference body position for test 3

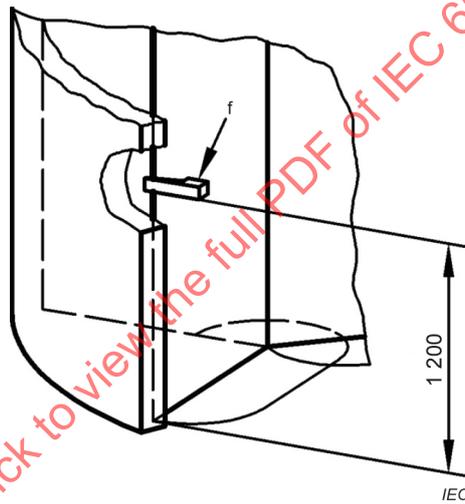


Key

e test 4 (with the combination of CB and CA) for all doorset diameters, in centre of doorset leaf

c) Reference body position for test 4

Dimensions in millimetres



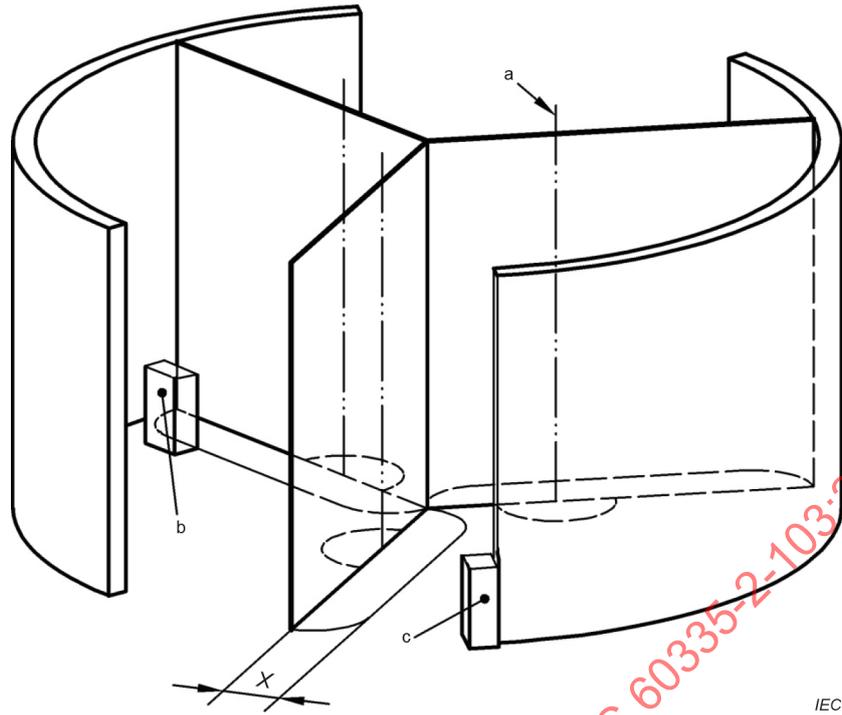
Key

f test 5 (with CB) for all doorset diameters

d) Reference body position for test 5

Figure EE.6 – Revolving doorset, two leaves

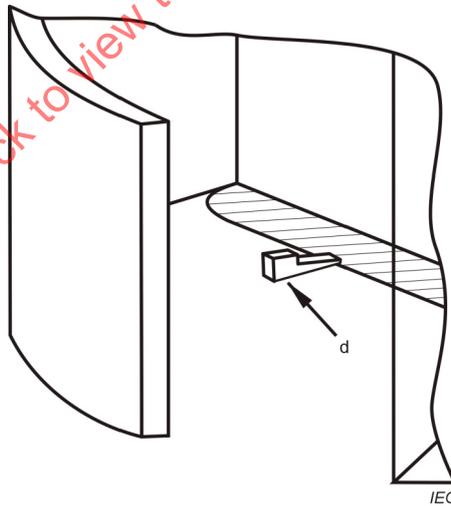
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Key

- a pivot point for doorsets with a break-out system
- b test 1 (with CA) for doorset diameters greater than 3 000 mm, see also Clause GG.1 in normative Annex GG
- c test 2 (with CA) for all doorset diameters, see also Clause GG.1 in normative Annex GG
- X protection area

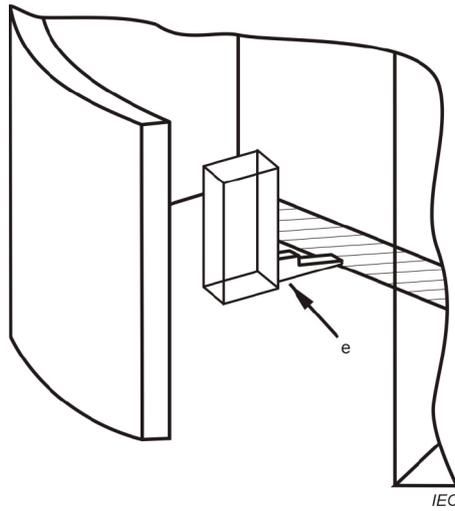
a) Reference body positions for test 1 and test 2



Key

- d test 3 (with CB) in centre of doorset leaf

b) Reference body position for test 3

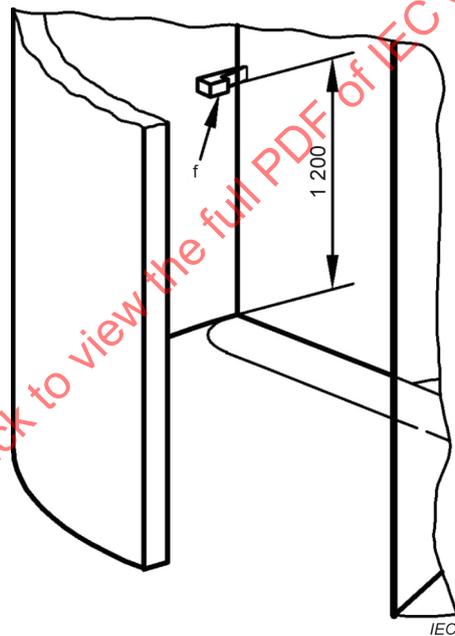


Key

e test 4 (with the combination of CB and CA) for all doorset diameters, in centre of doorset leaf

c) Reference body position for test 4

Dimensions in millimetres

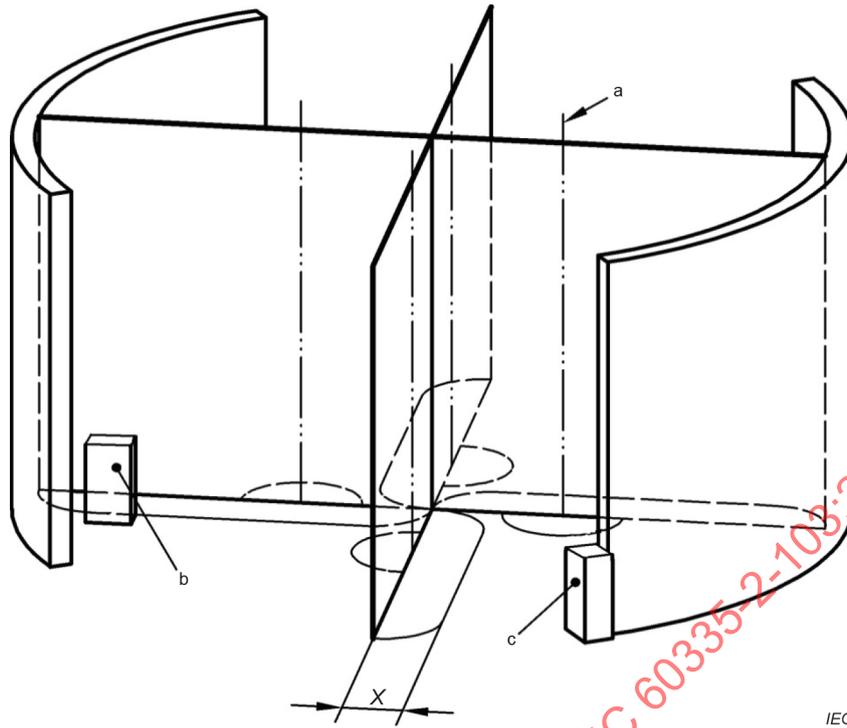


Key

f test 5 (with CB) for all doorset diameters

d) Reference body position for test 5

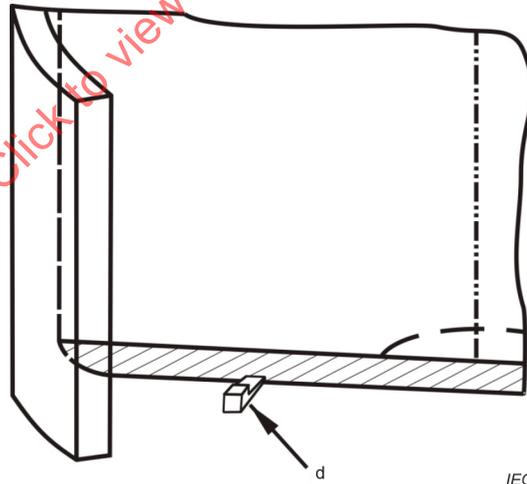
Figure EE.7 – Revolving doorset, three leaves



Key

- a pivot point for doorsets with a break-out system
- b test 1 (with CA) for doorset diameters greater than 3 000 mm
- c test 2 (with CA) for all doorset diameters, see also Clause GG.1 in normative Annex GG
- X protection area

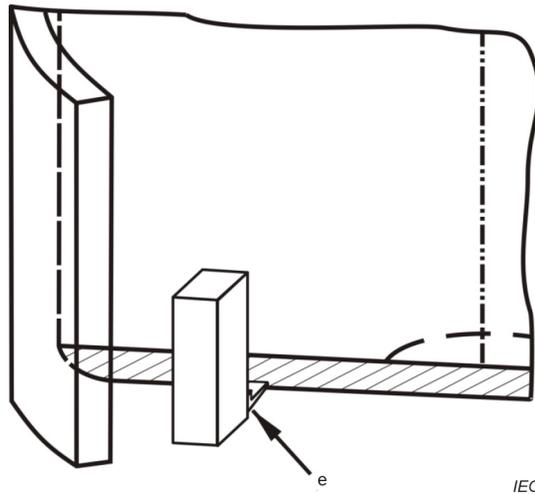
a) Reference body positions for test 1 and test 2



Key

- d test 3 (with CB) in centre of doorset leaf

b) Reference body position for test 3

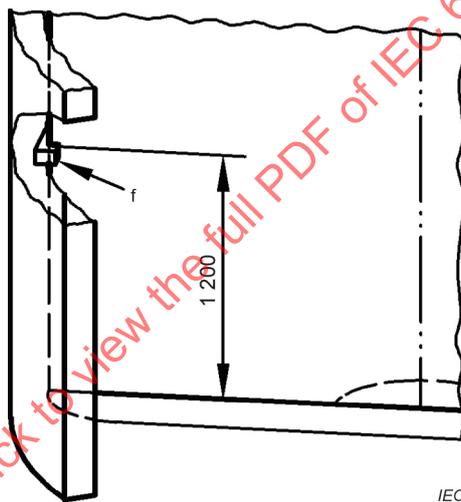


Key

e test 4 (with the combination of CB and CA) for all doorset diameters, in centre of doorset leaf

c) Reference body position for test 4

Dimensions in millimetres



Key

f test 5 (with CB) for all doorset diameters

d) Reference body position for test 5

Figure EE.8 – Revolving doorset, four leaves

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Annex FF (normative)

Reference bodies

This annex is applicable to **entrapment protection system** sensing devices based on active optoelectronic protective devices responsive to diffuse reflection (AOPDDRs) using a radiation wavelength in the range 820 nm to 946 nm. For sensing devices using other technologies, this annex may be used as a guide.

An **entrapment protection system** shall always be tested on a complete power operated doorset assembly.

The CA reference body (see Figure FF.1a)) is a box with the dimensions 0,7 m × 0,3 m × 0,2 m. Both the top side and two sides that meet are made of a material with a diffuse reflectance value in the range of 2 % to 5 % of the wavelength of the **entrapment protection system** transmitter (e.g. IC antistatic foam; see also IEC 61496-3:2018, Figure 5 for further materials) while the other two sides are made of a material with a diffuse reflectance value in the range of 80 % to 90 % of the wavelength of the **entrapment protection system** transmitter (e.g. white paper). The base of the reference body is not defined as it does not serve any purpose in the test.

The CB reference body (see Figure FF.1b)) is made of a matt-black elastomer with a Shore-A hardness of 70 ± 5 and a diffuse reflectance value in the range of 10 % to 90 % of the wavelength of the **entrapment protection system** transmitter.

Tests for **entrapment protection system** using the background as a reference shall be performed with a background with a diffuse reflectance value of (20 ± 5) % of the **entrapment protection system** wavelength (e.g. carpet).

The reference body shall be detected and the doorset shall then either stop before it touches the reference body, or reverse or switch over to low-speed motion as described in the product documentation.

Entrapment protection systems which do not move with the doorset leave(s) shall be tested using all relevant sides of the CA reference body.

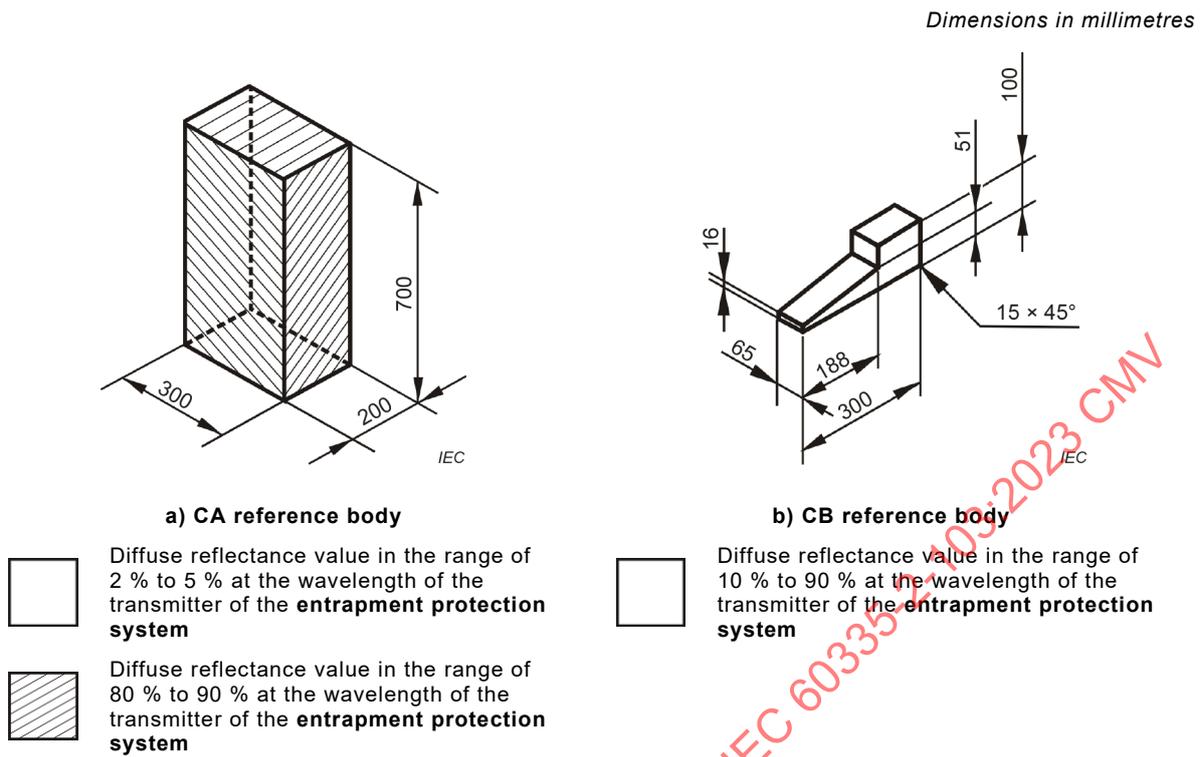


Figure FF.1 – Reference bodies

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Annex GG (normative)

Test method of entrapment protection system of drives for revolving doors

GG.1 Main closing edge/opposing closing edge – no contact protection

If the hazard between the **main closing edge** and **opposing closing edge** is protected by an **entrapment protection system** not allowing contact with the doorset, it shall be tested using a CA reference body (see normative Annex FF). The CA reference body shall be located next to the **opposing closing edge** and shall not be touched by the doorset leaf (see test 2 in Figure EE.6a), Figure EE.7a) and Figure EE.8a) of normative Annex EE).

For doorsets diameters greater than 3 000 mm, the CA reference body shall additionally be located next to the edge of the doorset moving leaf and shall not be touched by the doorset leaf itself (see test 1 in Figure EE.6a), Figure EE.7a) and Figure EE.8a) of normative Annex EE).

GG.2 Main closing edge/opposing closing edge – contact protection

If the hazard between the **main closing edge** and **opposing closing edge** is protected by a device or combination of devices allowing contact with the doorset, it shall be tested by a force measurement according to normative Annex HH at an opening width as specified in Figure II.4 or Figure II.5 or Figure II.6. If electro-sensitive protective equipment (ESPE) is used for speed reduction, the test shall be carried out at the speed after activation of the ESPE.

GG.3 Secondary closing edge/floor

The **entrapment protection system** protecting the hazard between the secondary closing edge and the floor shall be tested using the CB reference body.

The CB reference body is positioned on the floor so that it cannot be pushed away. The doorset shall come to a stop without completely passing over the reference body or the reference body being touched by the doorset leaf in the slanted areas. Contact with the flexible parts of the protective equipment is accepted (see test 3 in Figure EE.6b), Figure EE.7b) and Figure EE.8b) of normative Annex EE). If an **entrapment protection system** is used for speed reduction, the test shall be carried out with the combination of test bodies CB and CA (see test 4 in Figure EE.6c), Figure EE.7c) and Figure EE.8c) of normative Annex EE).

The test need not be performed if this hazard is safeguarded by safety distances.

GG.4 Main closing edge/inside wall

The **entrapment protection system** protecting the hazard between **main closing edge** and the inside wall shall be tested by means of the CB reference body.

The reference body is positioned at a height of 1 200 mm above the floor on the drum wall as shown in test 5 in Figure EE.6d), Figure EE.7d) and Figure EE.8d) of normative Annex EE). During the test, the reference body shall not come into contact with the doorset leaf. Contact with the flexible parts of the protective equipment is accepted.

Annex HH (normative)

Limitation of impact forces of pedestrian doors

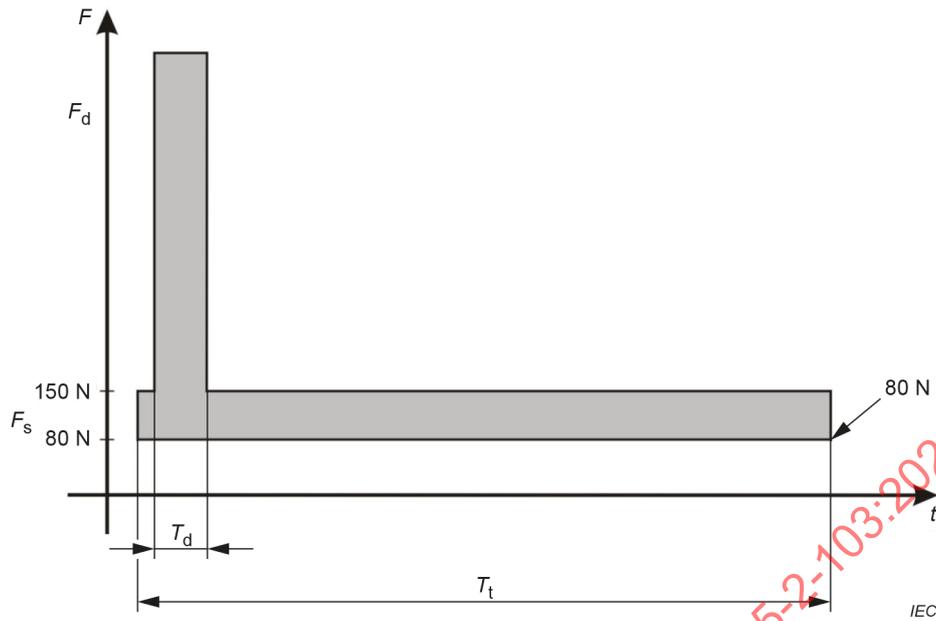
HH.1 Permissible dynamic forces

The values of dynamic force generated by the doorset leaf when impacting a person or an obstacle shall be considered to be safe if the limits specified in Table HH.1 are not exceeded, when measured according to normative Annex II with an instrument complying with Clause HH.3 or Clause HH.4.

Table HH.1 – Permissible dynamic forces

Doorset type	Permissible dynamic forces			Measuring points
	Between closing edges and opposing closing edges in gaps of ^a			
	< 200 mm	200 mm to 500 mm	> 500 mm	
Sliding doorset and sliding/swing (balanced) doorset	400 N	700 N	1 400 N	Figure II.1 and Figure II.2
Folding doorset	400 N	700 N	1 400 N	Figure II.3
Revolving doorset	400 N	700 N	1 400 N	Figure II.4 to Figure II.6
Flat areas are areas other than closing edges > 0,1 m ² and with no side < 100 mm.				
The above values shall be the maximum allowed within a maximum period of time of 0,75 s ($T_d < 0,75$ s).				
^a The opposing closing edge may also be a second main closing edge or flat areas around the opening doorset.				

The leaf force measurements shall not exceed the profile shown in Figure HH.1.



Key

F_d maximum force measured during the dynamic period T_d (dynamic force) – see Table HH.1 for permitted values

T_d period of time of max. 0,75 s starting from the first measured force exceeding 150 N

F_s maximum force measured outside the dynamic period T_d (static force)

T_t period of 5 s starting from the first measured force exceeding 80 N and including T_d

Figure HH.1 – Force versus time

HH.2 Permissible static forces

After T_d has elapsed, no static force >150 N is allowed. This static force shall come down to < 80 N after a total time T_t of maximum 5 s.

However, after T_d , peaks exceeding 150 N but lower than the admissible dynamic forces shown in Table HH.1 are accepted if:

- they are decreasing from one to the other; and
- the period of oscillation is ≤ 1 s; and
- the average force calculated over the period of $T_t - T_d$ is ≤ 150 N.

HH.3 Impact force measuring equipment

The test equipment for measuring forces shall consist of the following parts:

- two contact areas with a diameter of 80 mm. The contact areas shall be made of a hard material with sufficient strength, e.g. steel;
- spring that gives the contact area a spring ratio of 500 N/mm \pm 50 N/mm;
- load cell;
- time measuring device;
- measuring value display/measuring value output device.

The measuring equipment shall comply with the following specification:

- rising/falling time of the load cell amplifier < 5 ms;
- the equipment shall be able to give measured values with an accuracy of at least $\pm 5\%$ or $\pm 10\text{ N}$, whichever is the maximum deviation;
- measurements to be given in graphical form or by displaying the values.

HH.4 Field impact force measuring equipment

Field measuring equipment need not display the values and accuracy shall at least be $\pm 10\%$ or $\pm 20\text{ N}$ of measured values, whichever is the maximum deviation. Calibration shall be performed at least once per year.

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Annex II (normative)

Measuring points for limitation of impact forces of pedestrian doors

Forces (see Table HH.1) shall be measured at the measuring points (F) shown in Figure II.1 to Figure II.6 with the instrument of Clause HH.3 or Clause HH.4.

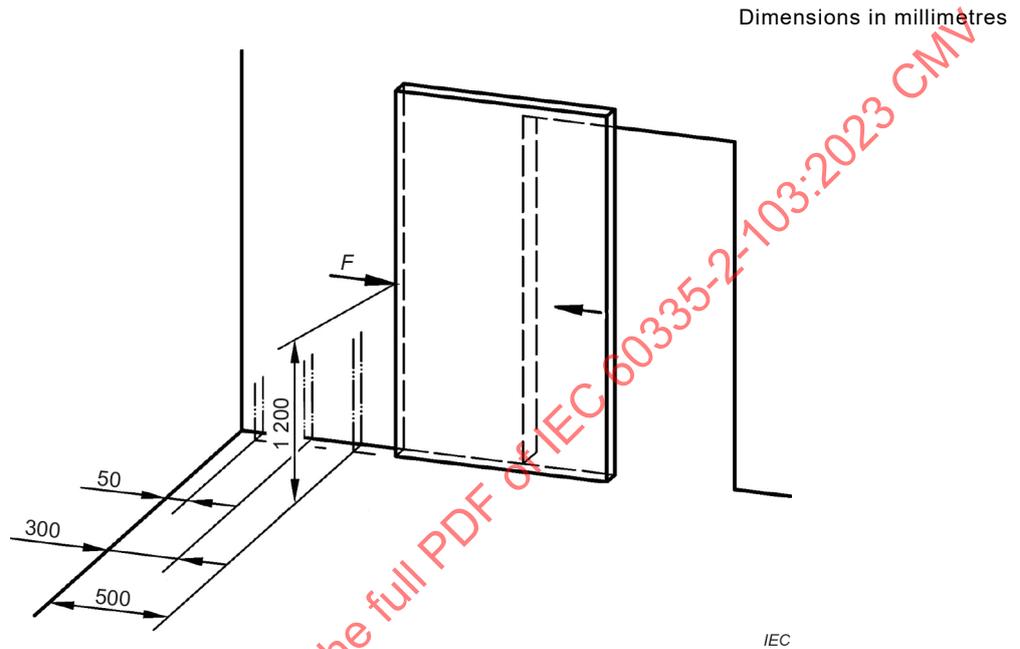


Figure II.1 – Single-leaf sliding doorset

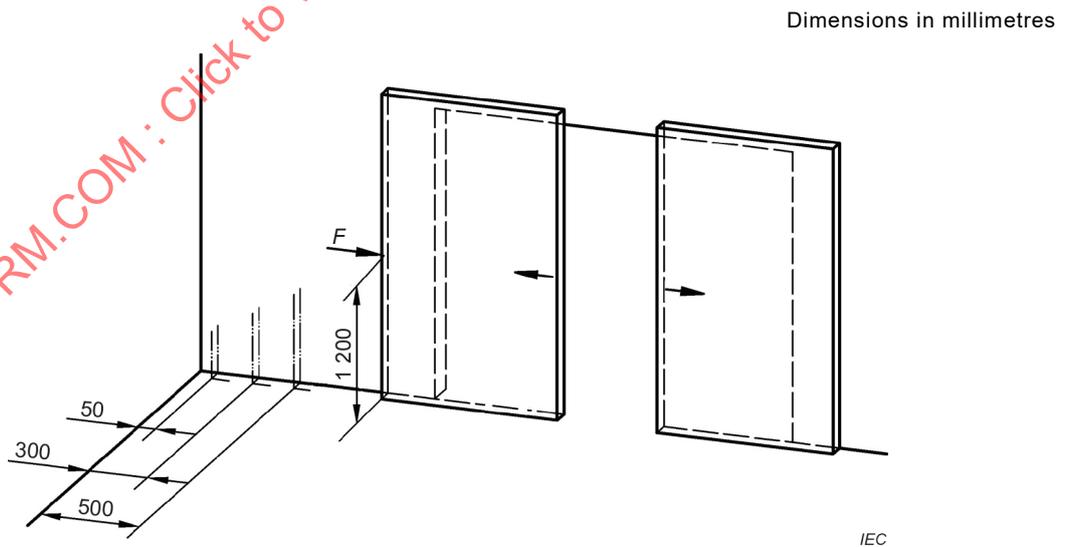


Figure II.2 – Double-leaf sliding doorset

Dimensions in millimetres

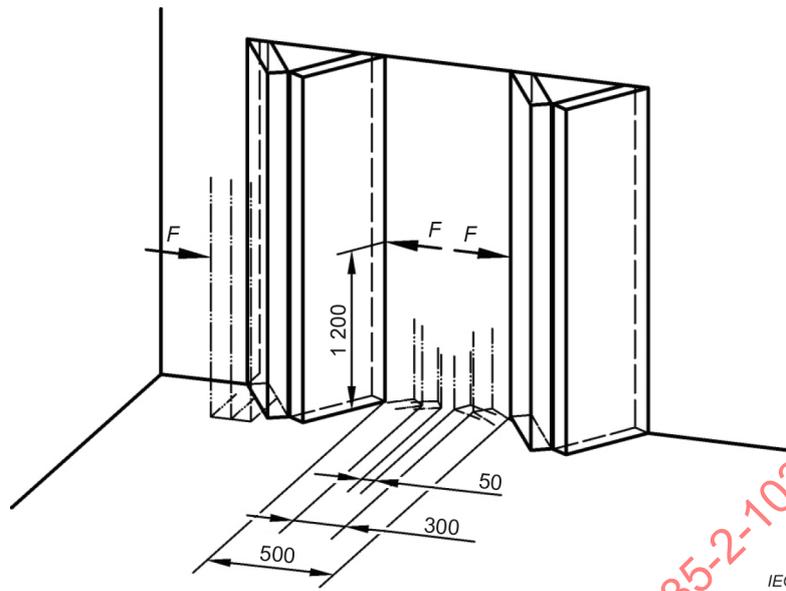


Figure II.3 – Folding doorset

Dimensions in millimetres

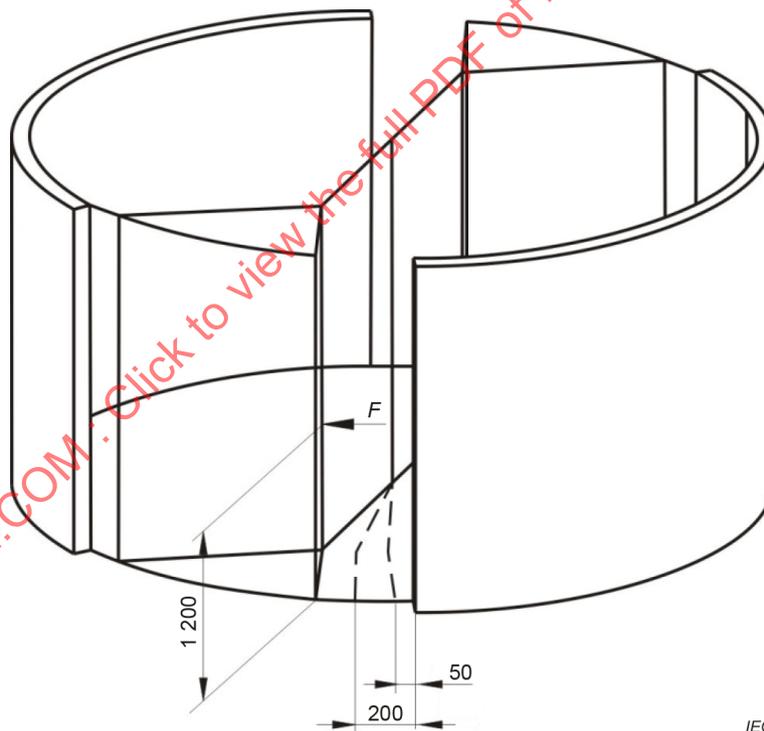
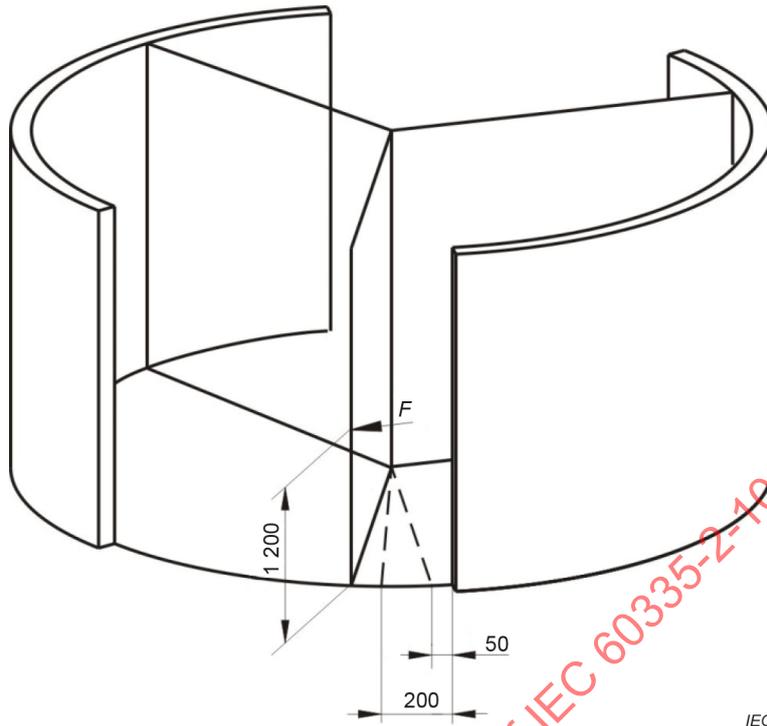


Figure II.4 – Revolving doorset, 2-leaf

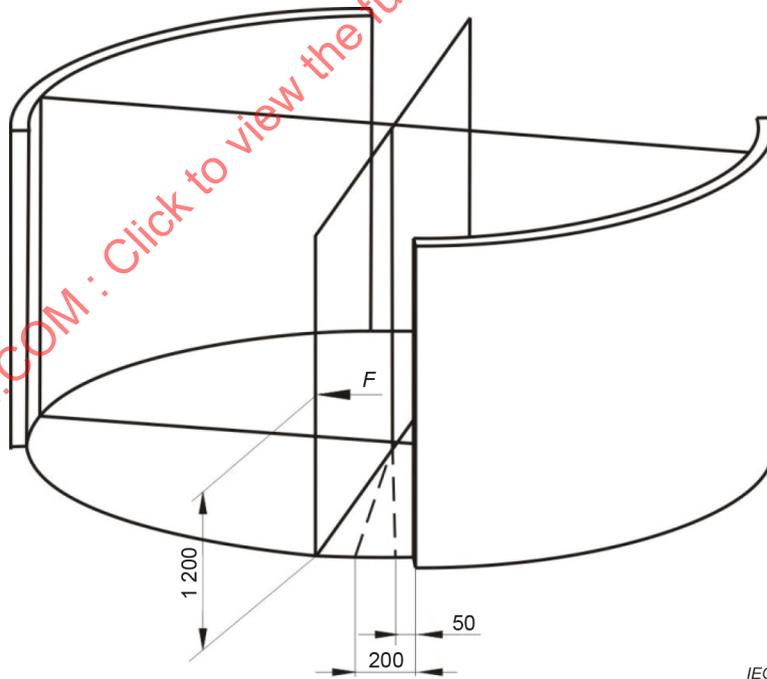
Dimensions in millimetres



IEC

Figure II.5 – Revolving doorset, 3-leaf

Dimensions in millimetres



IEC

Figure II.6 – Revolving doorset, 4-leaf

Annex JJ (normative)

Low energy movement of pedestrian doors

JJ.1 General

The force required to prevent a stopped doorset from opening or closing any further – measured at the **main closing edge** in the direction of travel – shall not exceed 67 N at any point in the opening or closing **cycle**.

The kinetic energy of a doorset in motion shall not exceed 1,69 J. Normative Annex KK states the speed settings for various widths and masses of doorsets required to obtain results conforming to this requirement.

In the event of any interruption of mains power or failure of the **drive**, it shall be possible to open the doorset with a manual force not exceeding 67 N to release a latch and 90 N to open the doorset, when the force is applied to the **main closing edge** in the direction of travel.

Low energy movement of the doorset is generally not protected with additional protective devices because the kinetic energy levels are not considered to be hazardous. However, use of low energy doorset movement should only be considered when the risk assessment has taken account of elderly, frail and disabled users and indicates that the risk to these users is low.

A static closing force up to 150 N is allowed:

- when the gap between the **main closing edge** and the counter-closing edge is ≤ 8 mm for swing doorsets; or
- during the last 50 mm for any type of sliding and folding doorsets.

JJ.2 Additional requirements for low-energy movement of hinged and swing doorsets

JJ.2.1 Opening time

Doorsets shall open from closed to back check, or 80° whichever occurs first, in 3 s or longer as required in Table KK.1. Back check shall not occur before 60° opening. If the doorset opens more than 90°, it shall continue at the same rate as back check speed.

NOTE Back check – Back check is the checking or slowing down of the speed of doorset opening before being fully opened (also called open check).

JJ.2.2 Closing time

It shall be possible to adjust the doorset on site to close from 90° to 10° in not less than 3 s and from 10° to fully closed in not less than 1,5 s as required in Table KK.1.

Annex KK
(normative)

Speed setting for low energy movement of pedestrian doors

KK.1 Speed settings for low energy power operated swing doorsets

Table KK.1 shows the minimum opening time (in seconds) to back-check or to 80° open or minimum closing time (in seconds) from 90° to 10° open for most common doorset widths and masses.

Table KK.1 – Speed settings

Width of doorset leaf m	Mass of doorset leaf kg				
	50	60	70	80	90
	Time s				
0,75	3,0	3,0	3,0	3,0	3,2
0,85	3,0	3,0	3,2	3,4	3,6
1,00	3,2	3,4	3,7	4,0	4,2
1,20	3,8	4,1	4,5	4,8	5,0

NOTE Calculated with an energy 1,69 J and values for time rounded up to nearest one decimal place.

The minimum opening time for doorsets of other widths and/or masses shall be calculated using the following formula:

$$t = \frac{D\sqrt{m}}{2,26}$$

where

- t is the time, in s;
- D is the doorset width, in m;
- m is the mass of the doorset leaf, in kg;
- 2,26 is the conversion factor (units $mKg^{1/2} s^{-1}$).

KK.2 Speed settings for low energy sliding doorsets

Table KK.2 shows the minimum travelling time per doorset leaf referred to the doorset mass and the travelling distance per doorset leaf.

Table KK.2 – Minimum travelling time per doorset leaf vs. mass of door leaf

90 % travelling distance per leaf <i>D</i> m	Mass of doorset leaf <i>m</i> kg														
	150	140	130	120	110	100	90	80	70	60	50	40	30	20	10
	Maximum travelling speed <i>v</i> m/s														
	0,15	0,16	0,16	0,17	0,18	0,18	0,19	0,21	0,22	0,24	0,26	0,29	0,34	0,41	0,58
Minimum travelling time <i>t</i> s															
0,7	4,7	4,6	4,4	4,2	4,0	3,9	3,7	3,5	3,2	3,0	2,7	2,5	2,1	1,8	1,3
0,8	5,4	5,2	5,0	4,8	4,6	4,4	4,2	3,9	3,7	3,4	3,1	2,8	2,4	2,0	1,4
0,9	6,0	5,8	5,6	5,4	5,2	4,9	4,7	4,4	4,1	3,8	3,5	3,1	2,7	2,2	1,6
1,0	6,7	6,5	6,3	6,0	5,8	5,5	5,2	4,9	4,6	4,3	3,9	3,5	3,0	2,5	1,8
1,1	7,4	7,1	6,9	6,6	6,3	6,0	5,7	5,4	5,1	4,7	4,3	3,8	3,3	2,7	1,9
1,2	8,0	7,8	7,5	7,2	6,9	6,6	6,2	5,9	5,5	5,1	4,7	4,2	3,6	3,0	2,1
1,3	8,7	8,4	8,1	7,8	7,5	7,1	6,8	6,4	6,0	5,5	5,0	4,5	3,9	3,2	2,3
1,4	9,4	9,1	8,7	8,4	8,0	7,7	7,3	6,9	6,4	5,9	5,4	4,9	4,2	3,5	2,5
1,5	10,0	9,7	9,4	9,0	8,6	8,2	7,8	7,3	6,9	6,4	5,8	5,2	4,5	3,7	2,6

NOTE For telescopic sliding doorsets, the travelling distance applies to the fast moving leaf.

The maximum speed for doorsets of other masses shall be calculated using the kinetic energy formula, considering that the maximum admitted energy is 1,69 J:

$$E_c = \frac{1}{2} m v^2 = 1,69 \text{ (J)}$$

By knowing the leaf weight, it is possible to calculate the maximum allowed speed as follows:

$$v = \sqrt{\frac{2E_c}{m}} \text{ (m/s)}$$

where

v is the speed, in m/s;

E_c is the kinetic energy, in J (always 1,69 J);

m is the mass of the doorset leaf, in kg.

Time settings for other travelling distances per leaf and masses shall be calculated using the following formula:

$$t = \frac{D}{v}$$

where

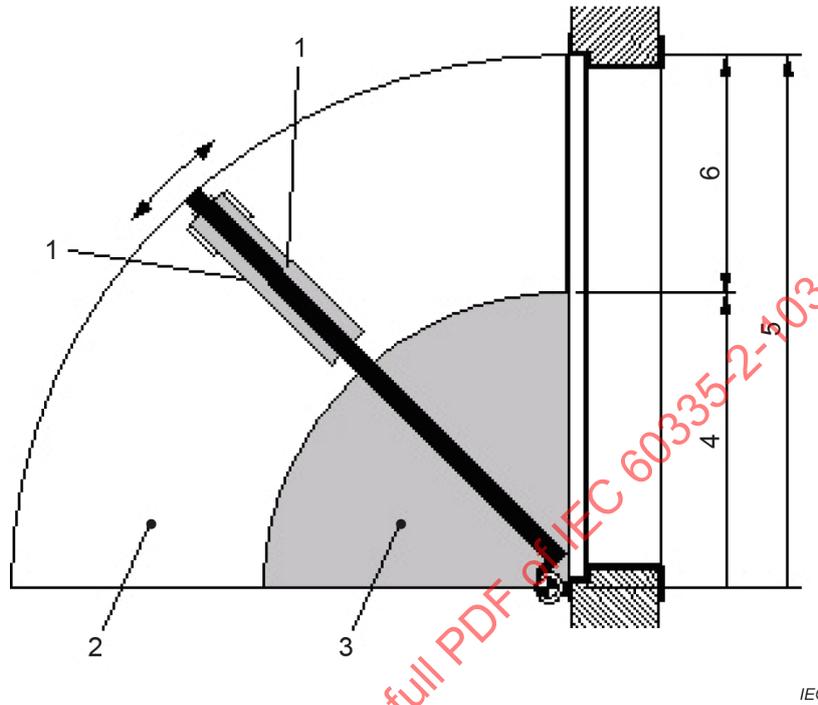
t is the travelling time for opening or closing, in s;

D is 90 % of the travelling distance of the leaf, in m;

v is the doorset speed, in (m/s).

Annex LL
(normative)

Safeguarding of swing pedestrian doors



Key

- 1 protective device
- 2 fast area requiring protection
- 3 slow area
- 4 radius of slow area ($r_{\text{slow area}}$)
- 5 radius of the door (r_{doorset})
- 6 radius of the protected area ($d_{\text{protected}}$)

Figure LL.1 – Areas of the door sweep

Figure LL.1 shows the areas of the door sweep.

Table LL.1 shows the minimum distance from the leading edge to be protected.

Table LL.1 – Minimum width of door leaf to be protected vs. radius of doorset and doorset travelling time

r_{doorset} m	Time s										
	1	1,5	2	2,5	3	3,5	4	4,5	5	5,5	6
	$r_{\text{slow area}}$ m										
	0,16	0,24	0,32	0,4	0,48	0,56	0,64	0,72	0,8	0,88	0,95
$d_{\text{protected}}$ m											
0,7	0,54	0,46	0,38	0,30	0,22	0,14	0,06	–	–	–	–
0,8	0,64	0,56	0,48	0,40	0,32	0,24	0,16	0,08	–	–	–
0,9	0,74	0,66	0,58	0,50	0,42	0,34	0,26	0,18	0,10	0,02	–
1,0	0,84	0,76	0,68	0,60	0,52	0,44	0,36	0,28	0,20	0,12	0,05
1,1	0,94	0,86	0,78	0,70	0,62	0,54	0,46	0,38	0,30	0,22	0,15
1,2	1,04	0,96	0,88	0,80	0,72	0,64	0,56	0,48	0,40	0,32	0,25
1,3	1,14	1,06	0,98	0,90	0,82	0,74	0,66	0,58	0,50	0,42	0,35
1,4	1,24	1,16	1,08	1,00	0,92	0,84	0,76	0,68	0,60	0,52	0,45
1,5	1,34	1,26	1,18	1,10	1,02	0,94	0,86	0,78	0,70	0,62	0,55
1,6	1,44	1,36	1,28	1,20	1,12	1,04	0,96	0,88	0,80	0,72	0,65
1,7	1,54	1,46	1,38	1,30	1,22	1,14	1,06	0,98	0,90	0,82	0,75
1,8	1,64	1,56	1,48	1,40	1,32	1,24	1,16	1,08	1,00	0,92	0,85

The opening time is measured from 0° to 80° and the closing time from 90° to 10°.

$r_{\text{slow area}}$ and the width of the doorset which needs to be protected ($d_{\text{protected}}$) by protective devices for doorsets with other opening and closing times shall be calculated using the following formulas:

$$r_{\text{slow area}} = \frac{2}{\pi} \cdot v \cdot t = 0,16 \cdot t$$

$$d_{\text{protected}} = r_{\text{doorset}} - r_{\text{slow area}}$$

where

t is the time, in s;

$r_{\text{slow area}}$ is the radius of the slow area, in m;

v is the maximum allowed collision speed of 0,25 m/s;

0,16 is the conversion factor, in m/s;

$d_{\text{protected}}$ is the width of the doorset which needs to be protected.

Bibliography

The bibliography of Part 1 is applicable except as follows.

Addition:

IEC 60335-2-95, *Household and similar electrical appliances – Safety – Part 2-95: Particular requirements for drives for vertically moving garage doors for residential use*

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

ISO 21927-2, *Smoke and heat control systems – Part 2: Specifications for natural smoke and heat exhaust ventilators*

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COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

**APPAREILS ÉLECTRODOMESTIQUES ET ANALOGUES –
SÉCURITÉ –****Partie 2-103: Exigences particulières pour les motorisations de portails,
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Cette quatrième édition annule et remplace la troisième édition parue en 2015, l'Amendement 1:2017 et l'Amendement 2:2019. 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'IEC 60335-1:2020;
- b) le domaine d'application comprend les appareils alimentés en courant continu et les appareils alimentés par batteries (Article 1);
- c) certaines notes ont été converties en texte normatif (Article 1);
- d) des exigences supplémentaires relatives aux instructions d'installation ont été incorporées (7.12);
- e) l'application du calibre d'essai 18 et du calibre d'essai 19 a été introduite (8.1.1, 20.2, Annexes BB, CC et DD);
- f) des températures de surface ont été ajoutées pour les surfaces accessibles extérieures (11.3, 11.8);
- g) des exigences relatives au chargement des socles femelles de connecteurs et socles de prises de courant accessibles ont été ajoutées (11.7);
- h) des exigences ont été ajoutées pour les appareils qui comportent des batteries intégrées ou des batteries séparables (11.7);
- i) des exigences ont été ajoutées pour les motorisations destinées à être raccordées de façon permanente livrées avec un connecteur afin de faciliter l'installation (22.108, 24.101, 25.3).

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

Projet	Rapport de vote
61/7017/FDIS	61/7082/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à son approbation.

La langue employée pour l'élaboration de cette Norme internationale est l'anglais.

Ce document a été rédigé selon les Directives ISO/IEC, Partie 2, il a été développé selon les Directives ISO/IEC, Partie 1 et les Directives ISO/IEC, Supplément IEC, disponibles sous www.iec.ch/members_experts/refdocs. Les principaux types de documents développés par l'IEC sont décrits plus en détail sous www.iec.ch/publications.

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La présente partie 2 doit être utilisée conjointement avec la dernière édition de l'IEC 60335-1 et ses amendements sauf si cette édition l'exclut. Dans ce cas, la dernière édition qui n'exclut pas la présente partie 2 est utilisée. Elle a été établie sur la base de la sixième édition (2020) de cette norme.

NOTE 1 L'expression "la 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 particulières pour les motorisations de portails, portes et fenêtres.

Lorsqu'un paragraphe particulier de la Partie 1 n'est pas mentionné dans la présente partie 2, ce paragraphe s'applique pour autant que cela soit raisonnable. Lorsque la présente norme mentionne "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:

- les paragraphes, tableaux et figures qui s'ajoutent à ceux de la Partie 1 sont numérotés à partir de 101;
- 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 remplacés;
- les annexes qui sont ajoutées sont désignées 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 termes 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.

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- supprimé, ou
- révisé.

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 cette publication soit adopté pour application nationale (obligatoire) au plus tôt 12 mois et au plus tard 36 mois après la date de publication.

INTRODUCTION

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

Les documents de recommandations concernant l'application des exigences de sécurité pour les appareils peuvent être consultés dans les documents de support du CE 61, accessibles sur le site web de l'IEC à l'adresse:

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

Cette information est donnée à l'intention des utilisateurs de la présente Norme internationale et ne constitue nullement un remplacement du texte normatif de la présente norme.

La présente norme 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 norme 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 un appareil relevant du domaine d'application de la présente norme comporte également des fonctions couvertes par une autre partie 2 de l'IEC 60335, la partie 2 correspondante est appliquée à chaque fonction séparément, dans la limite du raisonnable. Si cela s'applique, 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 publications horizontales, les publications fondamentales de sécurité et les publications groupées de sécurité couvrant un danger ne s'appliquent pas, parce qu'elles ont été prises en considération lorsque les exigences générales et particulières ont été étudiées pour la série de normes IEC 60335.

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 aux essais 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 présente norme.

NOTE 3 Les normes traitant des aspects non relatifs à la sécurité des appareils électrodomestiques sont:

- les normes IEC publiées par le comité d'études 59 concernant les méthodes de mesure d'aptitude à la fonction;
- les normes CISPR 11 et CISPR 14-1, ainsi que les normes applicables de la série IEC 61000-3 concernant les émissions électromagnétiques;
- la norme CISPR 14-2 concernant l'immunité électromagnétique;
- les normes IEC publiées par le comité d'études 111 concernant l'environnement.

APPAREILS ÉLECTRODOMESTIQUES ET ANALOGUES – SÉCURITÉ –

Partie 2-103: Exigences particulières pour les motorisations de portails, portes et fenêtres

1 Domaine d'application

L'article de la Partie 1 est remplacé par le texte suivant.

La présente partie de l'IEC 60335 traite de la sécurité des **motorisations** électriques de portails, portes et portes de garage et **fenêtres**, à déplacement horizontal ou vertical pour usage domestique et analogue, dont la **tension assignée** n'est pas supérieure à 250 V pour les **motorisations** monophasées et à 600 V pour les autres **motorisations**, y compris les appareils alimentés en courant continu et les **appareils alimentés par batteries**. Elle couvre également les dangers liés au mouvement de la **partie entraînée**.

Les **motorisations** non destinées à un usage domestique normal, mais qui néanmoins peuvent constituer une source de danger pour le public, telle que les **motorisations** destinées à être utilisées par des utilisateurs non avertis dans des magasins, des bureaux, des hôtels, des restaurants, des hôpitaux, dans l'industrie et dans des fermes, sont comprises dans le domaine d'application de la présente norme.

Les exigences pour les **motorisations** des portes qui peuvent être utilisées en cas d'urgence sont données à l'Annexe AA normative.

Les **motorisations** applicables aux éléments suivants sont des exemples de **motorisations** qui entrent dans le domaine d'application de la présente norme:

- portes pliantes;
- portes tournantes;
- portes à enroulement;
- **fenêtres** de toit;
- portes sectionnelles relevantes;
- portails ou portes de type battant et coulissant.

NOTE 101 Des exemples sont représentés à la Figure 101.

NOTE 102 Les **motorisations** peuvent être livrées avec une **partie entraînée**.

Dans la mesure du possible, la présente norme traite des dangers ordinaires présentés par les **motorisations**, encourus par toutes les personnes à l'intérieur et autour de l'habitation. Cependant, elle ne tient pas compte en général

- des personnes (y compris des enfants) dont
 - les capacités physiques, sensorielles ou mentales; ou
 - le manque d'expérience et de connaissanceles empêchent d'utiliser la **motorisation** en toute sécurité sans surveillance ou instruction;
- de l'utilisation de la **motorisation** comme jouet par des enfants.

Pour les appareils destinés à être utilisés dans des véhicules ou à bord de navires ou d'avions, des exigences supplémentaires peuvent être nécessaires. Dans de nombreux pays, des exigences supplémentaires sont spécifiées par les organismes nationaux de la santé, par les organismes nationaux responsables de la protection des travailleurs, par les organismes nationaux responsables de l'alimentation en eau et par des organismes similaires.

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

- des portes de garage à ouverture verticale pour usage résidentiel (IEC 60335-2-95);
- des volets qui couvrent les portes et les **fenêtres** (y compris dans les cas où la porte est en retrait par rapport au volet), des stores, des rideaux et des équipements analogues (IEC 60335-2-97);
- destinées exclusivement à une utilisation par des personnes averties dans des locaux à usage commercial et industriel;
- pour des usages spécifiques, comme les portes coupe-feu;
- pour des dispositifs d'évacuation naturelle des fumées non utilisés comme **fenêtres** (ISO 21927-2);
- 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).

La présente norme ne s'applique pas au mouvement d'une porte piétonne lorsque ce mouvement repose uniquement sur l'énergie stockée.

2 Références normatives

L'article de la Partie 1 s'applique, 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)*

IEC 60584-1, *Couples thermoélectriques – Partie 1: Spécifications et tolérances en matière de FEM*

IEC 60825-1:2014, *Sécurité des appareils à laser – Partie 1: Classification des matériels et exigences*

IEC 61496-3:2018, *Sécurité des machines – Équipements de protection électro-sensibles – Partie 3: Exigences particulières pour les équipements utilisant des dispositifs protecteurs optoélectroniques actifs sensibles aux réflexions diffuses (AOPDDR)*

IEC 61984:2008, *Connecteurs – Exigences de sécurité et essais*

3 Termes et définitions

L'article de la Partie 1 s'applique, avec les exceptions suivantes.

3.1 Définitions relatives aux caractéristiques physiques

3.1.9 *Modification:*

Remplacer le premier alinéa par ce qui suit:

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

- les **motorisations** fournies sans **partie entraînée** sont mises en fonctionnement sous la **charge assignée**;
- les **motorisations** fournies avec une **partie entraînée** sont mises en fonctionnement avec la **partie entraînée** installée conformément aux instructions

3.1.101

charge assignée

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

3.1.102

durée de fonctionnement assignée

durée de fonctionnement ininterrompu, attribuée à la **motorisation** par le fabricant

Note 1 à l'article: Au cours d'un fonctionnement ininterrompu, la **motorisation** peut inverser son sens de fonctionnement.

3.1.103

nombre assigné de cycles de fonctionnement

nombre de **cycles** ininterrompus, attribué à la **motorisation** par le fabricant

3.5 Définitions relatives aux types d'appareils

3.5.101

motorisation

moteur et tous les composants qui commandent le mouvement de la **partie entraînée**

Note 1 à l'article: Les engrenages, les dispositifs de commande, les freins, les composants destinés à la transmission de puissance de la **motorisation** à la **partie entraînée** et les **systèmes de protection contre l'écrasement** sont des exemples de composants.

3.5.102

motorisation automatique

motorisation qui fait fonctionner la **partie entraînée** dans au moins une direction sans activation intentionnelle par l'utilisateur

3.5.103

motorisation réversible

motorisation qui peut être mise en fonctionnement manuellement dans les deux directions, avec ou sans courant, en actionnant manuellement la **partie entraînée**

3.7 Définitions relatives aux composants de sécurité

3.7.101

système de protection contre l'écrasement

partie de la **motorisation** qui assure la protection contre l'écrasement

Note 1 à l'article: Un **système de protection contre l'écrasement** peut être constitué d'un ou de plusieurs dispositifs, comme des bords sensibles à la pression, des capteurs infrarouges passifs et des capteurs photosensibles actifs, des **interrupteurs sans verrouillage** ou des dispositifs de surveillance du courant du moteur.

Note 2 à l'article: Un **système de protection contre l'écrasement** peut être incorporé dans le bloc moteur ou être installé séparément.

3.7.102

interrupteur sans verrouillage

dispositif à action maintenue qui déclenche et maintient le mouvement de la **motorisation** tant que la commande manuelle est actionnée par l'utilisateur

3.8 Définitions relatives à des sujets divers

3.8.101

partie entraînée

partie d'un portail, d'une porte, d'une porte de garage ou d'une **fenêtre** destinée à être déplacée par la **motorisation**

3.8.102

fenêtre

élément d'un bâtiment qui s'ouvre et se ferme pour contrôler l'aération et l'éclairage et qui n'est pas destiné à servir de passage

3.8.103

cycle

mouvement complet d'ouverture et de fermeture de la **partie entraînée**

Note 1 à l'article: Pour les portes tournantes, un **cycle** est la rotation nécessaire pour permettre à une personne de passer par ces portes.

3.8.104

porte piétonne à déplacement horizontal

porte battante, coulissante ou tournante, réservée à l'usage des piétons

3.8.105

bord principal de fermeture

bord(s) d'un battant de porte piétonne dont la distance par rapport à un **bord opposé de fermeture** parallèle ou une surface parallèle détermine le chemin utilisable

3.8.106

bord opposé de fermeture

bord(s) d'un battant de porte piétonne formé par le **bord principal de fermeture** et un bord défini ou une surface que la porte piétonne touche en se déplaçant

4 Exigences générales

L'article de la Partie 1 s'applique.

5 Conditions générales d'essais

L'article de la Partie 1 s'applique, avec les exceptions suivantes.

5.2 Addition:

*Lorsqu'un essai doit être réalisé avec une **partie entraînée**, la **partie entraînée** spécifiée pour l'installation avec cette **motorisation** qui donne les conditions les plus défavorables pour l'essai est utilisée. La **motorisation** est réglée conformément aux instructions.*

*La **partie entraînée** peut être simulée par une charge artificielle.*

5.5 Addition:

Un portillon est maintenu:

- en position complètement fermée s'il se déplace avec la porte au cours des essais, ou
- en position totalement ouverte ou totalement retirée s'il ne se déplace pas avec la porte au cours des essais.

5.7 Addition:

Si la **motorisation** est marquée avec une température ambiante en dehors de la plage de +5 °C à +40 °C, les essais des Articles 11, 13 et 21 et des BB.20.10, BB.20.5, BB.20.6, BB.20.7, BB.20.9, CC.20.3, CC.20.4, CC.20.5, CC.20.6, DD.20.5, DD.20.6, DD.20.7 et DD.20.8 sont effectués à la température marquée la plus défavorable.

5.101 Les motorisations doivent être soumises aux essais de conformité à la présente norme pour tous les modes de fonctionnement suivants, comme cela est prévu par le fabricant:

- fonctionnement automatique (fonctionnement dans au moins une direction sans activation intentionnelle par l'utilisateur);
- activation par impulsion (fonctionnement dans l'une ou l'autre des directions avec activation intentionnelle par l'utilisateur);
- fonctionnement sans verrouillage (nécessitant une action maintenue).

Lorsque les instructions l'exigent, des composants doivent être ajoutés ou modifiés pour la réalisation des essais.

6 Classification

L'article de la Partie 1 s'applique, avec les exceptions suivantes.

6.1 Modification:

Remplacer le premier alinéa par ce qui suit:

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

6.2 Addition:

Les **motorisations** ou éléments de **motorisation** destinés à être utilisés à l'extérieur doivent être au moins IPX4.

7 Marquage et instructions

L'article de la Partie 1 s'applique, avec les exceptions suivantes.

7.1 Addition:

La plage des températures ambiantes doit être marquée sur les **motorisations**.

Les **motorisations** fournies sans **partie entraînée** doivent comporter le marquage de la **charge assignée**, en newtons (N) ou en newtons-mètres (Nm).

À moins que la **motorisation** ne soit prévue pour un fonctionnement continu, les **motorisations** fournies sans **partie entraînée** doivent comporter le marquage de la **durée de fonctionnement**

assignée, en minutes, ou le nombre de **cycles** par heure, ou le **nombre assigné de cycles de fonctionnement**.

Les **motorisations** avec **partie entraînée** doivent comporter le marquage du **nombre assigné de cycles de fonctionnement** ou du nombre de **cycles** par heure, à moins que la **motorisation** ne soit prévue pour un fonctionnement continu.

7.6 Addition:



[symbole ISO 7000-0533
(2004-01)]

limite supérieure de température



[symbole ISO 7000-0534
(2004-01)]

limite inférieure de température

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 ces instructions. Conserver ces instructions.

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

- ne pas laisser les enfants jouer avec les dispositifs de commande fixes. Mettre les télécommandes hors de portée des enfants;
- l'activation du dispositif de débrayage manuel peut déclencher un mouvement incontrôlé de la partie entraînée en raison de défaillances mécaniques ou d'une situation de perte d'équilibre;
- lors de l'utilisation d'un interrupteur sans verrouillage, vérifier que les autres personnes sont tenues à distance;
- lors de la fermeture d'une fenêtre qui a été ouverte par un système de détection de fumée, vérifier que les autres personnes sont tenues à distance;
- vérifier fréquemment l'installation pour déceler tout mauvais équilibre, le cas échéant, ou tout signe d'usure ou de détérioration des câbles, des ressorts et du montage. Ne pas utiliser l'appareil si une réparation ou un réglage est nécessaire;
- déconnecter de l'alimentation pendant les opérations de nettoyage ou d'autres opérations d'entretien.

Les instructions doivent comporter les informations suivantes:

- l'explication des indicateurs de modes;
- les détails sur la façon d'utiliser tout dispositif de débrayage manuel, ou la **motorisation réversible** utilisée comme dispositif de débrayage manuel;
- les détails sur la façon de régler à nouveau les dispositifs de commande, (le cas échéant);
- dans le cas où le fonctionnement de la **motorisation** est spécifié en **cycles** par heure, la période de repos exigée entre les **cycles**.

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, dans la mesure où une installation incorrecte peut entraîner des blessures graves.

Les instructions d'installation doivent spécifier le type, la taille et la masse de la **partie entraînée** et les emplacements auxquels la **motorisation** peut être installée et doivent comprendre des détails concernant l'aptitude de la **motorisation** uniquement pour les **parties entraînées** équilibrées verticalement.

Elles doivent indiquer que l'installateur doit vérifier que la plage de températures marquée sur la **motorisation** est adaptée à l'emplacement.

Elles doivent indiquer que la **motorisation**

- ne peut pas être utilisée lorsque le portillon est ouvert (pour les **motorisations** construites de sorte à pouvoir fonctionner uniquement lorsque le portillon est fermé); ou
- ne peut pas être utilisée lorsque le portillon est fermé (pour les **motorisations** construites de sorte à pouvoir fonctionner uniquement lorsque le portillon est ouvert ou retiré).

Pour les **motorisations** destinées à être raccordées de façon permanente à des conducteurs fixes, fournies avec un connecteur distinct afin de faciliter l'installation et d'effectuer le raccordement au réseau, les instructions doivent comporter, en substance, le texte suivant: Utiliser uniquement le connecteur fourni lors de l'installation de la **motorisation**.

Les instructions doivent comporter les informations suivantes:

- les informations nécessaires à la manipulation en toute sécurité d'une **motorisation** qui pèse plus de 20 kg. Ces informations doivent décrire comment utiliser les dispositifs de manutention tels que les crochets et les cordes;
- les détails de la distance maximale admise entre le mur, parallèle au mouvement de glissement, et l'extérieur des **parties entraînées** qui glissent horizontalement;
- les détails d'installation de la **motorisation** et de ses composants associés, y compris les précisions concernant les accessoires appropriés exigés pour les modes alternés de fonctionnement;
- l'organe de manœuvre d'un **interrupteur sans verrouillage** doit être en vue directe de la **partie entraînée**, mais éloigné des parties mobiles. Sauf s'il fonctionne avec une clé, il doit être installé à une hauteur minimale de 1,5 m et ne pas être accessible au public;
- des détails sur la façon de régler les commandes;
- la hauteur minimale pour l'installation des parties de la **motorisation** prévues pour être montées à plus de 850 mm, 1,8 m ou 2,5 m du sol conformément au 8.1.1, au Tableau 101, au 20.2, au B.22.3 ou au B.22.4.

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

- la nécessité d'un dispositif antichute pour les portes et portails verticaux;
- avant d'installer la **motorisation**, vérifier que la **partie entraînée** est en bon état mécanique, qu'elle s'ouvre et se ferme correctement et qu'elle est correctement équilibrée, le cas échéant;
- à l'exception des **portes piétonnes à déplacement horizontal**, vérifier que l'écrasement entre la **partie entraînée** et les parties fixes environnantes dû au mouvement d'ouverture de la **partie entraînée** est évité;

- pour les **portes piétonnes à déplacement horizontal**, vérifier que l'écrasement entre la **partie entraînée** et les parties fixes environnantes dû au mouvement de la **partie entraînée** est évité. Cela peut être réalisé si la distance correspondante ne dépasse pas 8 mm. Cependant, les distances suivantes sont considérées comme suffisantes pour éviter l'écrasement des parties identifiées du corps:
 - pour les doigts, une distance supérieure à 25 mm;
 - pour les pieds, une distance supérieure à 50 mm;
 - pour la tête, une distance supérieure à 200 mm; et
 - pour le corps entier, une distance supérieure à 500 mm.Si ces distances ne peuvent pas être obtenues, des dispositifs de protection doivent être fournis;
- après installation, vérifier que le mécanisme est correctement réglé et que le système de protection et tout dispositif de débrayage manuel fonctionnent correctement;
- fixer à demeure l'étiquette concernant le dispositif de débrayage manuel près de son organe de manœuvre;

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** qui ont un dispositif de débrayage manuel doivent être fournies avec une étiquette qui décrit la manière de l'utiliser, sauf si l'information est déjà marquée sur la **motorisation**.

La vérification est effectuée par examen.

8 Protection contre l'accès aux parties actives

L'article de la Partie 1 s'applique, avec les exceptions suivantes.

8.1.1 Remplacement:

L'exigence du 8.1 s'applique à toutes les positions de l'appareil lorsqu'il est mis en fonctionnement comme en usage normal.

Le calibre d'essai B, le calibre d'essai 18 et le calibre d'essai 19 de l'IEC 61032 sont appliqués avec une force qui ne dépasse pas 1 N, l'appareil étant dans toutes les positions possibles. Le calibre d'essai est appliqué à travers les ouvertures, à toute profondeur admise par le calibre, et il est tourné ou plié avant, pendant et après l'insertion à travers l'ouverture dans toute position. Si l'ouverture ne permet pas l'entrée du calibre, la force appliquée sur le calibre en position droite est portée à 20 N lorsque le calibre B est utilisé ou à 10 N lorsque le calibre d'essai 18 ou le calibre d'essai 19 sont utilisés. Si le calibre d'essai pénètre alors dans l'ouverture, l'essai est répété, le calibre étant en position pliée.

*Pendant les essais avec le calibre d'essai B, toutes les **parties amovibles** sont retirées, à l'exception des lampes. Toutefois, lors de la mise en place ou du retrait de lampes, la protection contre le contact avec les **parties actives** du culot de lampe doit être assurée.*

Pendant les essais avec le calibre d'essai 18 et le calibre d'essai 19 de l'IEC 61032, l'appareil doit être entièrement assemblé comme en usage normal, sans qu'aucune partie ne soit retirée.

Le calibre d'essai 19 de l'IEC 61032 n'est pas appliqué aux parties des **motorisations** qui sont situées à une hauteur supérieure à 850 mm au-dessus du sol ou de tout autre niveau d'accès en usage normal.

Le calibre d'essai 18 de l'IEC 61032 n'est pas appliqué aux parties des **motorisations** dont les instructions précisent que celles-ci doivent être montées à plus de 1,8 m au-dessus du sol ou de tout autre niveau d'accès.

Le calibre d'essai 18 et le calibre d'essai 19 de l'IEC 61032 ne sont pas appliqués aux appareils à usage commercial, à moins qu'ils ne soient destinés à être installés dans un endroit ouvert au public.

Il ne doit pas être possible de toucher des **parties actives** ou des **parties actives** protégées uniquement par laque, émail, papier ordinaire, coton, film d'oxyde, billes ou matériau d'étanchéité, à l'exception des résines autodurcissantes, avec le calibre d'essai B, le calibre d'essai 18 ou le calibre d'essai 19, selon le cas.

8.2 Addition:

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

9 Démarrage des appareils à moteur

L'article de la Partie 1 ne s'applique pas.

10 Puissance et courant

L'article de la Partie 1 s'applique, avec l'exception suivante.

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.

11 Échauffements

L'article de la Partie 1 s'applique, avec l'exception suivante.

11.3 Addition:

Lorsque les **surfaces accessibles** extérieures sont suffisamment planes et que l'accès le permet, le calibre d'essai de la Figure 103 est utilisé pour mesurer les échauffements des **surfaces accessibles** extérieures spécifiées dans le Tableau 101. Le calibre est appliqué sur la surface avec une force de $4\text{ N} \pm 1\text{ N}$ de manière à établir le meilleur contact possible entre le calibre et la surface. Le mesurage est effectué après une durée de contact de 30 s.

Le calibre peut être maintenu en place à l'aide d'une pince de laboratoire sur statif ou d'un dispositif analogue. Tout instrument de mesure qui donne les mêmes résultats que le calibre peut être utilisé.

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** pour fonctionnement non continu sont mises en fonctionnement comme suit:

- les **motorisations** de portails pour un ménage et de portes de garage à déplacement horizontal pour un ménage sont mises en fonctionnement sans période de repos pendant trois **cycles**, pendant la **durée de fonctionnement assignée** ou pendant le **nombre assigné de cycles de fonctionnement**, en choisissant la durée la plus longue;
- les **motorisations** de **fenêtres** sont mises en fonctionnement sans période de repos pendant le **nombre assigné de cycles de fonctionnement** ou la **durée de fonctionnement assignée** en minutes;
- les autres **motorisations** sont mises en fonctionnement sans période de repos pendant quatre minutes, pendant la **durée de fonctionnement assignée** ou pendant le **nombre assigné de cycles de fonctionnement**, en choisissant la durée la plus longue, mais avec un minimum de cinq **cycles** de fonctionnement;
- les **motorisations** soumises aux **cycles** assignés par heure sont mises en fonctionnement pendant une période supérieure de 20 % au nombre de **cycles** assigné par heure et pendant la ou les périodes de repos correspondantes déclarées par le fabricant.

Les socles femelles de connecteurs accessibles à l'utilisateur et les socles de prises de courant accessibles à l'utilisateur sont chargés avec une charge résistive qui donne la **charge de sortie** indiquée.

Pour les appareils qui comportent des **batteries intégrées** ou des **batteries séparables** non déconnectées de l'appareil pour la charge:

- la **batterie complètement déchargée** est chargée pendant 1 h, l'appareil étant mis en fonctionnement de la manière spécifiée et remplissant sa fonction prévue, si cela est admis par la construction de l'appareil;
- la **batterie** qui a été **complètement déchargée** est chargée pendant 24 h ou jusqu'à ce qu'elle soit **complètement chargée**, si cette durée est plus courte, l'**appareil alimenté par batteries** ne remplissant pas sa fonction prévue.

11.8 Modification:

Remplacer le premier alinéa par le texte suivant:

Pendant l'essai, les échauffements sont relevés en permanence et ne doivent pas dépasser les valeurs indiquées dans le Tableau 3 et le Tableau 101.

Addition:

Tableau 101 – Échauffements maximaux pour les surfaces accessibles extérieures spécifiées en conditions de fonctionnement normal

Surface	Échauffement des surfaces accessibles extérieures ^a	
	K	
	Surfaces des appareils situées au maximum à 850 mm au-dessus du sol ou de tout autre niveau d'accès après installation	Surfaces des appareils situées à une hauteur comprise entre 850 mm et 2,3 m au-dessus du sol ou de tout autre niveau d'accès après installation
Métal nu	38	42
Métal recouvert ^b	42	49
Verre et céramique	51	56
Plastique et revêtement plastique > 0,4 mm ^{c, d}	58	62

NOTE Les limites d'échauffement des poignées, boutons, manettes, claviers, pavés numériques et parties analogues sont spécifiées dans le Tableau 3.

^a Les échauffements ne sont pas mesurés sur les surfaces des appareils qui, selon les instructions, doivent être fixés au mur ou au plafond et lorsque ces surfaces sont inaccessibles par un calibre de 75 mm de diamètre et à extrémité hémisphérique.

^b Un métal est considéré comme recouvert lorsqu'un revêtement en émail ou en poudre d'une épaisseur minimale de 90 µm ou qu'un revêtement non constitué majoritairement de plastique est utilisé.

^c La limite d'échauffement du plastique s'applique également aux matières plastiques dont l'épaisseur de la finition métallique est inférieure à 0,1 mm.

^d Lorsque l'épaisseur du revêtement plastique ne dépasse pas 0,4 mm, les limites d'échauffement du métal recouvert pour le métal sous-jacent s'appliquent ou les limites d'échauffement du matériau en verre ou céramique pour le matériau en verre ou céramique sous-jacent s'appliquent.

12 Charge des batteries à ions métalliques

L'article de la Partie 1 s'applique.

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

L'article de la Partie 1 s'applique, avec l'exception suivante.

13.3 Addition:

Dans le Tableau 4, ajouter la nouvelle note a:

La tension d'essai pour les appareils multiphasés de 600 V est celle spécifiée pour une **tension de service** > 250 V, où U est la **tension assignée**.

14 Surtensions transitoires

L'article de la Partie 1 s'applique.

15 Résistance à l'humidité

L'article de la Partie 1 s'applique, avec l'exception suivante.

15.1.2 Addition:

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

16 Courant de fuite et rigidité diélectrique

L'article de la Partie 1 s'applique comme suit.

16.3 Dans le Tableau 7, ajouter la nouvelle note a:

La tension d'essai pour les appareils multiphasés de 600 V est celle spécifiée pour une **tension de service** > 250 V, où U est la **tension assignée**.

17 Protection contre la surcharge des transformateurs et des circuits associés

L'article de la Partie 1 s'applique.

18 Endurance

L'article de la Partie 1 ne s'applique pas.

19 Fonctionnement anormal

L'article de la Partie 1 s'applique, avec les exceptions suivantes.

19.1 Addition:

La vérification est également effectuée par l'essai du 19.101.

19.11.2 Addition:

Si la **motorisation** peut fonctionner lorsqu'une des conditions de défaut est simulée, les essais applicables des BB.20.4, BB.20.7, CC.20.5, DD.20.4 et DD.20.7 sont effectués, la **motorisation** étant toutefois alimentée sous la **tension assignée**.

Soit la **motorisation** continue à satisfaire aux exigences, soit, après au maximum un **cycle** de fonctionnement, elle doit s'arrêter avec la **partie entraînée** dans une position sûre, soit la **motorisation** doit passer à un mode de fonctionnement avec **interrupteur sans verrouillage**.

19.11.4.8 Remplacement:

La **motorisation** est alimentée sous la **tension assignée** et mise en fonctionnement dans les **conditions de fonctionnement normal**. Après environ 60 s, la tension d'alimentation est réduite à un niveau tel que la **motorisation** cesse de répondre aux commandes de l'utilisateur ou que des parties commandées par le composant programmable cessent de fonctionner, si cet événement se produit en premier. Cette valeur de la tension d'alimentation est enregistrée. La **motorisation** est alimentée sous la **tension assignée** et mise en fonctionnement dans les **conditions de fonctionnement normal**. La tension est alors réduite à une valeur d'environ 10 % inférieure à la tension enregistrée. Elle est maintenue à cette valeur pendant environ 60 s puis portée au niveau de la **tension assignée**. Les taux de décroissance et d'accroissement de la tension d'alimentation doivent être d'environ 10 V/s.

Soit la **motorisation** doit continuer à se déplacer dans la même direction pendant le **cycle** de fonctionnement au cours duquel est survenue la baisse de tension, soit une opération manuelle doit être nécessaire pour la redémarrer.

19.13 Addition:

Si la **motorisation** peut fonctionner lorsqu'une des conditions de défaut est simulée, les essais applicables des BB.20.4, BB.20.7, CC.20.5, DD.20.4 et DD.20.7 sont effectués, la **motorisation** étant toutefois alimentée sous la **tension assignée**.

Soit la **motorisation** continue à satisfaire aux exigences, soit, après au maximum un **cycle** de fonctionnement, elle doit s'arrêter avec la **partie entraînée** dans une position sûre, soit la **motorisation** doit passer à un mode de fonctionnement avec **interrupteur sans verrouillage**.

19.101 Les **motorisations** autres que celles pour fonctionnement continu sont alimentées sous la **tension assignée** et mises en fonctionnement continu dans les conditions de **fonctionnement normal**.

20 Stabilité et dangers mécaniques

L'article de la Partie 1 s'applique, avec les exceptions suivantes et tel que modifié dans les Annexes AA, BB, CC et DD normatives.

20.1 Non applicable.

20.2 Addition:

Le calibre d'essai 18 de l'IEC 61032 n'est pas appliqué aux parties des **motorisations** dont les instructions d'installation précisent que celles-ci doivent être montées à plus de 1,8 m au-dessus du sol ou de tout autre niveau d'accès.

Le calibre d'essai similaire au calibre d'essai B de l'IEC 61032, mais dont la face d'arrêt circulaire a un diamètre de 50 mm, à la place de la face non circulaire, n'est pas appliqué aux parties des **motorisations** dont les instructions précisent que celles-ci doivent être montées à plus de 2,5 m du sol ou d'un autre niveau d'accès.

NOTE 101 Les escaliers et les terrasses sont des exemples de niveaux d'accès. Les surfaces sur lesquelles les personnes ne montent pas en usage normal, comme les rebords des fenêtres et les équipements mobiles tels que les échelles, ne sont pas considérées comme des niveaux d'accès.

Le calibre d'essai 19 de l'IEC 61032 est appliqué aux parties de l'appareil placées à une hauteur inférieure à 850 mm au-dessus du sol ou de tout autre niveau d'accès en usage normal dans les conditions spécifiées pour le calibre d'essai 18.

21 Résistance mécanique

L'article de la Partie 1 s'applique.

22 Construction

L'article de la Partie 1 s'applique, avec les exceptions suivantes.

22.40 Non applicable.

22.46 *Addition:*

Si la conformité aux exigences de l'Article 20 dépend du fonctionnement d'un **circuit électronique** programmable, les logiciels doivent comporter des mesures pour contrôler les conditions de défaut/d'erreur spécifiées dans le Tableau R.1.

22.101 Les **motorisations** qui pèsent plus de 20 kg doivent comporter des dispositifs de manutention appropriés, tels que des crochets.

La vérification est effectuée par examen.

22.102 Tous les dispositifs de commande fournis avec la **motorisation** doivent être marqués de manière à indiquer les fonctions de la même façon.

Lorsque la **motorisation** est équipée d'un bouton d'arrêt, ce bouton d'arrêt doit être clairement identifiable.

La vérification est effectuée par examen.

22.103 Lorsque plusieurs modes de fonctionnement peuvent être choisis par l'utilisateur, le mode choisi doit être clairement indiqué.

La vérification est effectuée par examen.

22.104 Les réglages susceptibles de compromettre la conformité à la présente norme ne doivent pouvoir être effectués qu'à l'aide d'un **outil** ou en utilisant un code.

La vérification est effectuée par examen.

22.105 Une **motorisation** pour une porte ou un portail qui incorpore un portillon doit être construite de telle manière que la **motorisation**

- ne puisse pas être utilisée lorsque le portillon est ouvert (pour les **motorisations** construites de sorte à pouvoir fonctionner uniquement lorsque le portillon est fermé); ou
- ne puisse pas être utilisée lorsque le portillon est fermé (pour les **motorisations** construites de sorte à pouvoir fonctionner uniquement lorsque le portillon est ouvert ou retiré).

La vérification est effectuée par examen.

22.106 Les **motorisations** doivent être livrées avec tous les composants associés nécessaires pour assurer la conformité à la présente norme pour le mode de fonctionnement défini. Les composants exigés pour les modes alternatifs de fonctionnement peuvent être livrés séparément, à condition qu'ils soient énumérés dans les instructions.

La vérification est effectuée par examen.

22.107 Les dispositifs de commande ne doivent pas être en mesure de contourner un **système de protection contre l'écrasement**, sauf s'ils ne peuvent activer la **motorisation** qu'en vue de la **partie entraînée**.

La vérification est effectuée par essai.

22.108 Les **motorisations** destinées à être raccordées de façon permanente à des conducteurs fixes peuvent être fournies avec un connecteur distinct afin de faciliter l'installation et d'effectuer le raccordement au réseau. Un tel connecteur doit être une **partie non amovible** lorsqu'il est engagé.

Ce connecteur ne doit pas être interchangeable avec les prises de courant répertoriées dans l'IEC TR 60083 ou l'IEC 60906-1 ni avec les connecteurs conformes aux feuilles de normes de l'IEC 60320-3.

La vérification est effectuée par essai.

23 Conducteurs internes

L'article de la Partie 1 s'applique.

24 Composants

L'article de la Partie 1 s'applique, avec les exceptions suivantes.

24.1.3 Addition:

*Si un interrupteur est utilisé pour déconnecter la **motorisation** lorsque le dispositif de débrayage manuel est mis en fonctionnement, cet interrupteur est soumis à l'essai pendant 300 cycles de fonctionnement.*

24.1.5 Addition:

Les connecteurs qui, lorsqu'ils sont engagés, deviennent des **parties non amovibles**, ne sont pas considérés comme faisant partie d'un connecteur.

24.1.101 *L'IEC 61984:2008 constitue la norme applicable pour les connecteurs mentionnés en 22.108. La classification et les caractéristiques assignées utilisées pour les essais de l'IEC 61984:2008 doivent correspondre aux caractéristiques assignées de la **motorisation** et à son usage prévu.*

*Les paragraphes suivants de l'IEC 61984:2008 et les exigences d'essai correspondantes spécifiées à l'Article 7 ne s'appliquent pas: 5.2 a), 5.4 d), 6.2.1, 6.2.2, 6.4.1, 6.4.2, 6.4.3, 6.10, 6.14.2, 6.14.3, 6.17, 6.19 et 6.20. Le 6.5.1 s'applique également aux connecteurs sans pouvoir de coupure (COC). Le 6.15 et le 6.16 s'appliquent, mais sont modifiés en fonction des caractéristiques assignées de température de la **motorisation**. Les essais décrits en 7.3.6 et en 7.3.7 sont effectués lorsque le connecteur mentionné dans le présent article est engagé.*

25 Raccordement au réseau et câbles souples extérieurs

L'article de la Partie 1 s'applique, avec les exceptions suivantes.

25.3 Ajouter la note suivante sous le premier tiret:

NOTE 101 L'ensemble de bornes peut résider sur un connecteur distinct conforme au 24.1.101.

25.5 Addition:

Une **fixation du type Z** est admise pour les alimentations séparées pour usage à l'intérieur pour les **motorisations** dont la **puissance assignée** ne dépasse pas 100 W.

25.7 Addition:

Le **câble d'alimentation des motorisations** pour usage à l'extérieur doit être un câble sous gaine de polychloroprène et ne doit pas être moins résistant que les câbles souples sous gaine ordinaire de polychloroprène (dénomination 60245 IEC 57).

25.8 Addition:

Il n'est pas nécessaire que les **câbles d'alimentation** des **appareils de la classe III** soient conformes au Tableau 11 si les échauffements de la matière isolante du câble spécifiés dans le Tableau 3 et dans le Tableau 9 ne sont pas dépassés pendant les essais de l'Article 11 et de l'Article 19, respectivement.

25.15 Addition:

Pour les **appareils de la classe III** et les **parties de la classe III** dont la **puissance assignée** dépasse 15 W, la force de traction est de 30 N. L'essai n'est pas effectué sur les **appareils de la classe III** ou sur les **parties de la classe III** dont la **puissance assignée** est inférieure ou égale à 15 W.

26 Bornes pour conducteurs externes

L'article de la Partie 1 s'applique.

27 Dispositions en vue de la mise à la terre

L'article de la Partie 1 s'applique.

28 Vis et connexions

L'article de la Partie 1 s'applique.

29 Distances dans l'air, lignes de fuite et isolation solide

L'article de la Partie 1 s'applique, avec les exceptions suivantes.

29.1 Addition:

Pour une **tension assignée** > 300 V et ≤ 346 V, la tension assignée de tenue aux chocs est de

- pour la catégorie de surtension I: 2 500 V;
- pour la catégorie de surtension II: 4 000 V;
- pour la catégorie de surtension III: 6 000 V.

29.3.4 Addition:

Pour une **tension assignée** > 300 V et ≤ 346 V, l'épaisseur minimale des parties accessibles d'une **isolation renforcée** constituée d'une seule couche est de

- pour la catégorie de surtension I: 0,6 mm;
- pour la catégorie de surtension II: 1,2 mm;
- pour la catégorie de surtension III: 2,0 mm.

30 Résistance à la chaleur et au feu

L'article de la Partie 1 s'applique, avec l'exception suivante.

30.2 Addition:

Pour les **motorisations** qui sont actionnées uniquement par un **interrupteur sans verrouillage**, le 30.2.2 s'applique.

Pour les autres **motorisations**, le 30.2.3 s'applique.

31 Protection contre la rouille

L'article de la Partie 1 s'applique, avec l'exception suivante.

Addition:

Pour les parties destinées à être installées à l'extérieur, la vérification est effectuée par l'essai au brouillard salin de l'IEC 60068-2-52:2017, la méthode d'essai 2 étant applicable.

Avant l'essai, les revêtements sont rayés au moyen d'une aiguille en acier trempé dont l'extrémité a la forme d'un cône qui a un angle au sommet de 40°. La pointe est arrondie selon un rayon de 0,25 mm ± 0,02 mm. Une force de 10 N ± 0,5 N est appliquée sur l'aiguille le long de son axe. Les rayures sont pratiquées en tirant l'aiguille le long des surfaces du revêtement à une vitesse de 20 mm/s environ. Cinq rayures sont pratiquées à intervalles d'au moins 5 mm et à au moins 5 mm des bords.

Après l'essai, la **motorisation** ne doit pas être détériorée au point de compromettre la conformité à la présente norme, en particulier aux Articles 8 et 27. Le revêtement ne doit pas être coupé ni désolidarisé de la surface métallique.

32 Rayonnement, toxicité et dangers analogues

L'article de la Partie 1 s'applique, avec l'exception suivante.

32.101 Les **motorisations** qui incorporent un laser doivent être construites de manière à procurer une protection adéquate contre les rayonnements laser.

La vérification est effectuée par l'essai suivant.

Les **parties amovibles** sont retirées. Tout **dispositif de commande accessible** est réglé pour donner le rayonnement laser le plus élevé même si un outil est exigé pour réaliser le réglage. Si le dispositif de commande n'est pas accessible, il est également réglé pour donner le rayonnement laser le plus élevé sauf si son organe de manœuvre est verrouillé de manière appropriée en position.

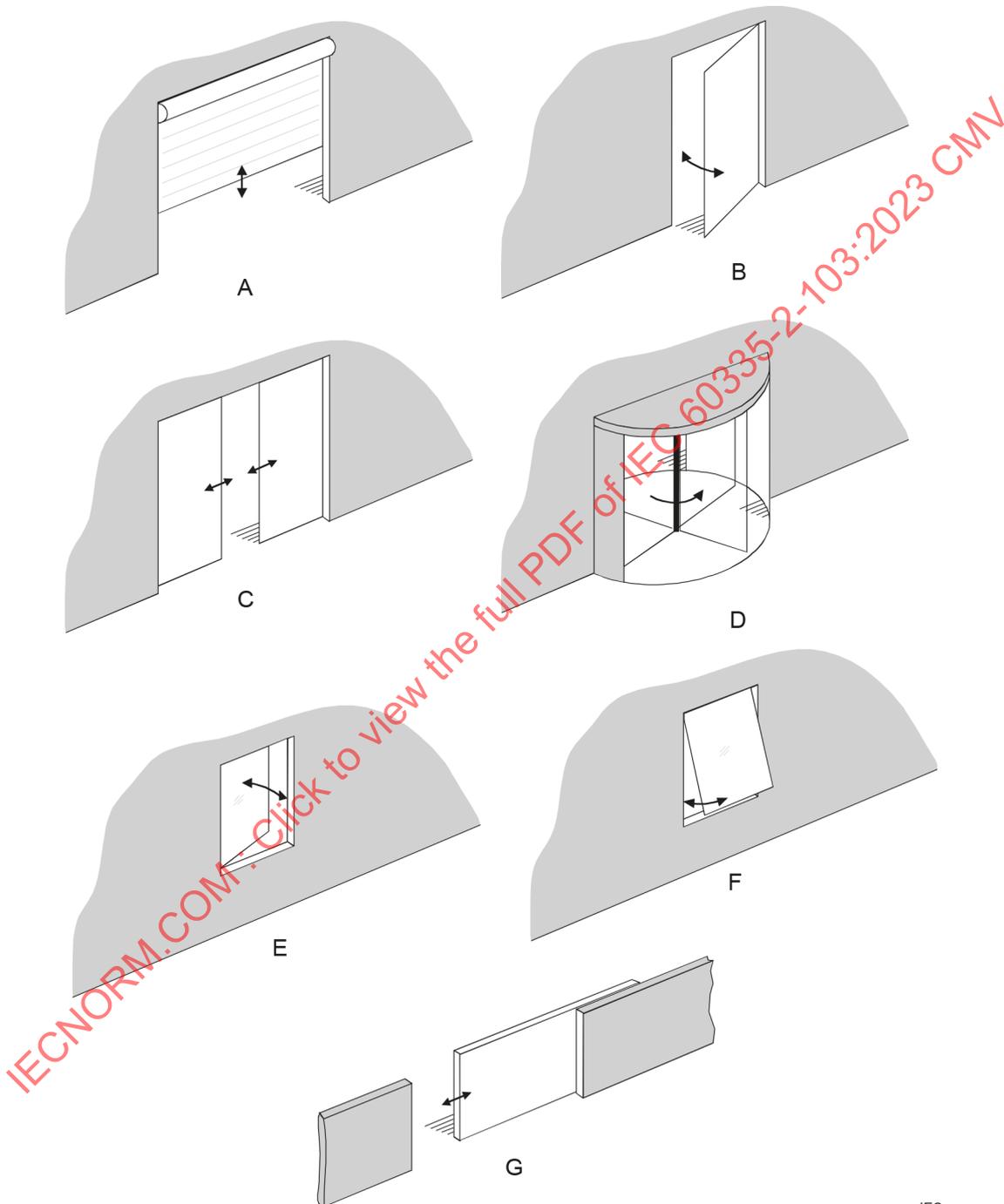
NOTE Une soudure ou un matériau de scellement est considéré comme offrant un verrouillage approprié.

La **motorisation** est alimentée sous la **tension assignée** et mise en fonctionnement dans les **conditions de fonctionnement normal**. Le rayonnement laser est mesuré conformément à l'IEC 60825-1:2014, 5.2, et le niveau d'émission accessible ne doit pas dépasser les limites pour un appareil à laser de classe 1 spécifié dans le Tableau 3 de cette norme pendant une durée d'émission de 100 s.

L'essai est répété, mais dans des conditions spécifiées à l'Article 19 et le rayonnement laser est de nouveau mesuré. Le niveau d'émission accessible ne doit pas dépasser cinq fois les limites spécifiées pour la classe I pour les longueurs d'onde de 400 nm à 700 nm. Pour les

autres longueurs d'onde, il ne doit pas dépasser les limites pour un appareil à laser de classe 3R spécifiées dans l'IEC 60825-1:2014, Tableau 6.

Si la conformité à l'IEC 60825-1:2014 repose sur le fonctionnement d'un verrouillage, celui-ci doit être du type à sécurité intrinsèque ou être soumis à l'essai pendant 30 000 cycles de fonctionnement dans les conditions décrites en 24.1.4.



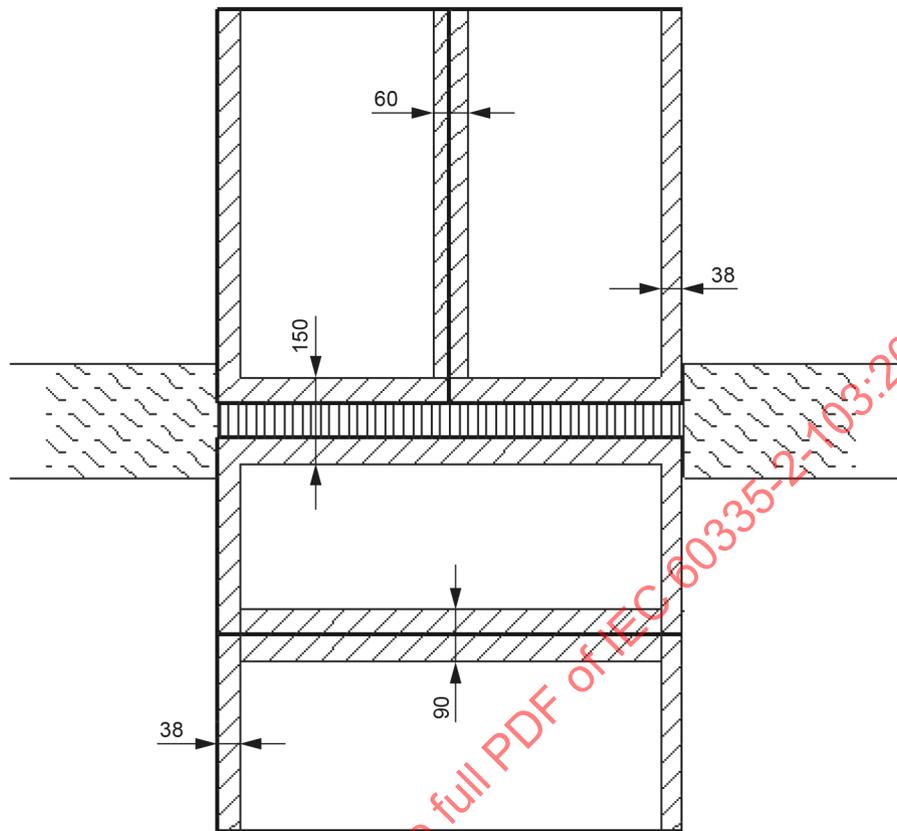
Légende

- A porte à enroulement
- B porte battante horizontale
- C porte coulissante horizontale
- D porte tournante
- E **fenêtre** à articulation verticale (à déplacement horizontal)
- F **fenêtre** à articulation horizontale (à déplacement vertical)
- G portail coulissant horizontal

IEC

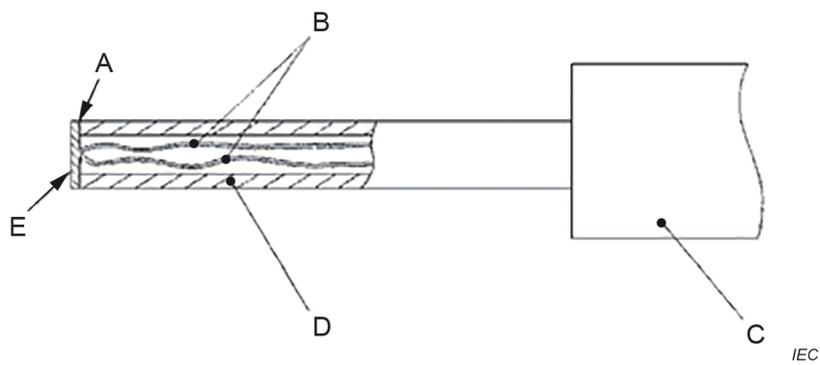
Figure 101 – Exemples de parties entraînées

Dimensions en millimètres

**Légende**

	seuil
	zone inactive
	mur

Figure 102 – Zones inactives des tapis de sol sensibles à la pression



Légende

- A adhésif
- B câbles de couples thermoélectriques d'un diamètre 0,3 mm selon l'IEC 60584-1, type K
- C position de la poignée pour permettre l'application d'une force de contact de $4\text{ N} \pm 1\text{ N}$
- D tube en polycarbonate d'un diamètre intérieur de 3 mm et d'un diamètre extérieur de 5 mm
- E disque en cuivre étamé: 5 mm de diamètre, 0,5 mm d'épaisseur avec une face de contact plane

Figure 103 – Calibre pour le mesurage des températures de surface

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Annexes

Les annexes de la Partie 1 s'appliquent, avec les exceptions suivantes.

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Annexe B (normative)

Appareils alimentés par batteries, batteries séparables et batteries amovibles pour les appareils alimentés par batteries

11 Échauffements

11.1 Remplacement:

Les **appareils alimentés par batteries**, leur environnement ainsi que les **batteries** ne doivent pas atteindre des températures excessives en usage normal.

La vérification est effectuée en déterminant les échauffements des différentes parties dans les conditions spécifiées en B.11.1, 11.2, 11.3, 11.7 et 11.8.

*Pour les **motorisations** pour fonctionnement continu, le B.11.1 s'applique.*

*Pour les autres **motorisations**, le B.11.1 ne s'applique pas. En lieu et place, les autres **motorisations** sont soumises à l'essai conformément au 11.7, avec la **batterie complètement chargée**.*

*Les **batteries** ne doivent pas être déchargées avant la fin de la **durée de fonctionnement assignée** ou du **nombre assigné de cycles de fonctionnement** définis en 11.7.*

NOTE Les échauffements du moteur et des parties environnements sont vérifiés conformément au 11.7.

B.22.3 Addition:

Le calibre d'essai 19 de l'IEC 61032 est également appliqué comme cela est spécifié pour le calibre d'essai 18.

*Le calibre d'essai 19 de l'IEC 61032 n'est pas appliqué aux parties des **motorisations** qui sont situées à une hauteur supérieure à 850 mm au-dessus du sol ou de tout autre niveau d'accès en usage normal.*

*Le calibre d'essai 18 de l'IEC 61032 n'est pas appliqué aux parties des **motorisations** dont les instructions précisent que celles-ci doivent être montées à plus de 1,8 m au-dessus du sol ou de tout autre niveau d'accès.*

B.22.4 Addition:

Le calibre d'essai 19 de l'IEC 61032 est également appliqué comme cela est spécifié pour le calibre d'essai 18.

*Le calibre d'essai 19 de l'IEC 61032 n'est pas appliqué aux parties des **motorisations** qui sont situées à une hauteur supérieure à 850 mm au-dessus du sol ou de tout autre niveau d'accès en usage normal.*

*Le calibre d'essai 18 de l'IEC 61032 n'est pas appliqué aux parties des **motorisations** dont les instructions précisent que celles-ci doivent être montées à plus de 1,8 m au-dessus du sol ou de tout autre niveau d'accès.*

Annexe R (normative)

Évaluation des logiciels

L'annexe de la Partie 1 s'applique avec les exceptions suivantes:

R.2.2.5 *Addition:*

Pour les autres **circuits électroniques** programmables qui comportent des fonctions qui exigent des logiciels avec des mesures de contrôle des conditions de défaut/d'erreur spécifiées dans le Tableau R.1, la détection d'un défaut/d'une erreur doit intervenir dans les limites d'un **cycle** de fonctionnement si la conformité à l'Article 20 est compromise.

R.2.2.9 *Addition:*

Pour les autres **circuits électroniques** programmables, le logiciel et le matériel lié à la sécurité sous son contrôle doivent être initialisés et doivent achever leur tâche dans les limites d'un **cycle** de fonctionnement si la conformité à l'Article 20 est compromise.

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Annexe AA (normative)

Motorisations de portes piétonnes motorisées utilisées pour les voies et les issues de secours

Les ajouts suivants à la présente norme s'appliquent aux **motorisations** des portes utilisées pour les voies et les issues de secours.

NOTE Dans de nombreux pays, des exigences supplémentaires sont spécifiées par les autorités nationales.

Les numéros d'articles et de paragraphes de la présente annexe renvoient aux numéros d'articles et de paragraphes de la partie principale de la présente norme qui sont modifiés. Les articles qui s'ajoutent à ceux de la partie principale de la présente norme sont identifiés par l'ajout de la lettre de l'annexe comme préfixe et numérotés à partir de 1.

7 Marquage et instructions

7.7 Lorsque des bornes sont fournies pour la connexion à un système d'alarme incendie, ces bornes doivent être identifiées.

7.12 Les instructions doivent comporter, en substance, l'indication suivante:

Vérifier que les dispositifs de commande qui peuvent être mis en mode de position verrouillée sont uniquement activés lorsqu'il n'y a pas d'autre personne à l'intérieur du local.

7.12.1 Les instructions doivent comporter, en substance, l'indication suivante:

À moins que le système ne permette le déblocage dans la direction de la sortie de secours, les motorisations doivent être raccordées de façon telle que les portes s'ouvrent dans la direction de la sortie de secours ou bien qu'elles assurent un passage dégagé de tout obstacle.

NOTE 101 Il est considéré que les portes coulissantes assurent un passage dégagé de tout obstacle.

20 Stabilité et dangers mécaniques

L'article de la Partie 1 est modifié comme cela est spécifié à l'Annexe CC normative.

22 Construction

AA.22.1 Les **motorisations** doivent être construites de manière telle qu'elles ne puissent pas être mises dans un mode verrouillé qui empêche la porte d'être ouverte de l'intérieur, à moins qu'une position de sécurité pour la nuit soit choisie à l'aide d'une clé, d'un système de code ou de tout autre moyen.

La vérification est effectuée par examen.

AA.22.2 Les **motorisations** doivent être construites de manière à faire fonctionner les portes d'évacuation ou les portes à ouverture automatique.

La vérification est effectuée par examen.

AA.22.3 Les **motorisations** des portes d'évacuation doivent être construites de manière à libérer la porte en cas d'urgence.

La vérification est effectuée par l'essai suivant.

*La **motorisation** est installée avec une porte et alimentée sous la **tension assignée**. Une force de 220 N est appliquée à une hauteur de 1 m ± 10 mm au bord principal de la porte dans le sens d'évacuation. La porte doit être libérée de la **motorisation**.*

AA.22.4 Les **motorisations** des portes à ouverture automatique doivent être construites de manière telle que la porte s'ouvre automatiquement en cas de défaut d'alimentation et quand le système n'a pas été choisi intentionnellement en position de sécurité.

*La vérification est effectuée par l'essai du AA.22.4.1 et si une **batterie** est exigée, également par l'essai du AA.22.4.2 et du AA.22.4.3.*

AA.22.4.1 *La **motorisation** est installée avec une porte et alimentée sous la **tension assignée**, toute **batterie** éventuelle étant **complètement chargée**. L'alimentation est déconnectée et la porte doit commencer à s'ouvrir immédiatement à une vitesse d'au moins 200 mm/s. Elle doit ensuite rester ouverte.*

AA.22.4.2 *La **motorisation** est installée avec une porte et alimentée sous la **tension assignée**, toute **batterie** éventuelle étant **complètement chargée**. La **batterie** est déchargée à un rythme qui correspond à environ 25 % de sa capacité assignée par heure. La porte doit commencer à s'ouvrir dans les 4 h, la vitesse d'ouverture étant d'au moins 200 mm/s. Elle doit ensuite rester ouverte.*

AA.22.4.3 *La **motorisation** est installée avec une porte et alimentée sous la **tension assignée**. La **batterie** est déconnectée. La porte doit commencer à s'ouvrir dans les 30 min, la vitesse d'ouverture étant d'au moins 200 mm/s. Elle doit ensuite rester ouverte.*

Annexe BB (normative)

Motorisations de fenêtres

20 Stabilité et dangers mécaniques

L'article de la Partie 1 s'applique, avec l'exception suivante.

BB.20.1 Les **motorisations** de **fenêtres** doivent fonctionner de sorte que le mouvement de la **fenêtre** ne soit pas susceptible de blesser des personnes.

La vérification est effectuée comme suit:

- **motorisations** commandées par un **interrupteur sans verrouillage**, par l'exigence et l'essai du BB.20.4;
- **motorisations** équipées d'un **système de protection contre l'écrasement**, par l'exigence et les essais pertinents du BB.20.7 au BB.20.9.

Les autres **motorisations** sont soumises à l'essai suivant.

La **motorisation** est installée avec une **fenêtre** et alimentée sous la tension la plus défavorable comprise entre 0,94 fois et 1,06 fois la **tension assignée**. La **motorisation** est réglée pour les forces d'ouverture et de fermeture les plus élevées, si le réglage est indiqué dans les instructions.

La **motorisation** est mise en fonctionnement pour ouvrir la **fenêtre**. La vitesse du bord principal ne doit pas dépasser 50 mm/s.

En ouverture complète, l'espace entre les bords opposés ne doit pas dépasser 200 mm, à moins que le mouvement d'ouverture ne soit commandé par un système de détection de fumée. La **motorisation** est ensuite mise en fonctionnement pour fermer la **fenêtre** et la vitesse du bord principal ne doit pas dépasser 15 mm/s.

Si la **motorisation** est commandée par un **circuit électronique** programmable, les logiciels doivent comporter des mesures pour contrôler les conditions de défaut/d'erreur spécifiées dans le Tableau R.1 et sont évalués conformément aux exigences pertinentes de l'Annexe R normative.

BB.20.2 Si un débrayage manuel ou une **motorisation réversible** est fourni(e), son utilisation doit être aisée. Le fonctionnement du dispositif de débrayage ne doit pas entraîner de situation dangereuse telle qu'un retour de manivelle ou un fonctionnement intempestif de la **motorisation**.

La **motorisation** ne doit pas créer de situation dangereuse lorsque le dispositif de débrayage manuel est activé.

Le fonctionnement d'une **motorisation réversible** utilisée comme un dispositif de débrayage manuel ne doit pas entraîner de situation dangereuse.

La vérification est effectuée par l'essai suivant.

Le fonctionnement automatique des **motorisations automatiques** est désactivé.