INTERNATIONAL STANDARD

IEC 60335-2-97

Second edition
2002-11

Household and similar electrical appliances – Safety –

Part 2-97: Particular requirements for drives for rolling shutters, awnings, blinds and similar equipment

Appareils électrodomestiques et analogues – Sécurité –

Partie 2-97: Règles particulières pour les motorisations de volets, stores, rideaux et équipements enroulables analogues

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-97: Particular requirements for drives for rolling shutters, awnings, blinds and similar equipment

FOREWORD

1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.
3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
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6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

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

This second edition cancels and replaces the first edition published in 1998. It constitutes a technical revision.

The text of this part of IEC 60335 is based on the following documents:

FDIS	Report on voting
61/2230/FDIS	61/2305/RVD

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

This part 2 is to be used in conjunction with the latest edition of IEC 60335-1 and its amendments. It was established on the basis of the fourth edition (2001) of that standard.

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

This part 2 supplements or modifies the corresponding clauses in IEC 60335-1, so as to convert that publication into the IEC standard: Safety requirements for electric drives for rolling shutters, awnings, blinds and similar equipment.

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 publication will remain unchanged until 2004. At this date, the publication will be

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

A bilingual version of this publication may be issued at a later date.

INTRODUCTION

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

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

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

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

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.

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

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

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-97: Particular requirements for drives for rolling shutters, awnings, blinds and similar equipment

1 Scope

This clause of Part 1 is replaced by the following.

This International Standard deals with the safety of electric **drives** for rolling equipment such as shutters, blinds and awnings, intended for household and similar purposes, their **rated voltage** being not more than 250 V for single-phase appliances and 480 V for other appliances.

Drives for equipment with a spring-controlled **driven part**, such as a folding arm awning, are also within the scope of this standard.

NOTE 101 Examples of rolling equipment that can be driven are

– awnings;
– blinds;
– grilles;
– projection screens;
– shutters for doors and windows.

Examples are shown in Figure 101.

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

Appliances not intended for normal household use but that nevertheless may be a source of danger to the public, such as appliances intended to be used by laymen in shops, in light industry, on farms and on industrial premises, are within the scope of this standard.

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

NOTE 103 Attention is drawn to the fact that

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

NOTE 104 This standard does not apply to

– **drives** for vertically moving garage doors for residential use (IEC 60335-2-95);
– **drives** for rolling doors (IEC 60335-2-103);
– **drives** used in premises such as hangars or in heavy industry;
– **drives** for theatre curtains;
– sliding and trolley jack **drives**.

2 Normative references

This clause of Part 1 is applicable except as follows.

Addition:

60068-2-52:1996, *Environmental testing – Part 2: Tests – Test Kb: Salt mist, cyclic (sodium chloride solution)*

3 Definitions

This clause of Part 1 is applicable except as follows.

3.1.9 *Replacement:*
normal operation
operation of the **drive** under the following conditions

Drives supplied without a **driven part** are operated at **rated torque**.

Drives supplied with a **driven part** are operated with the **driven part** installed in accordance with the instructions.

3.101
drive
motor and other components that control the movement of the **driven part**

NOTE Examples of components are gears, controls and brakes.

3.102
driven part
movable part, such as a rolling shutter, awning or blind, that is operated by the **drive**

3.103
rated torque
torque assigned to the **drive** by the manufacturer

3.104
rated operating time
duration of continuous operation assigned to the **drive** by the manufacturer

NOTE During continuous operation, the **drive** may reverse its direction.

3.105
rated number of operating cycles
number of uninterrupted cycles assigned to the **drive** by the manufacturer

3.106
biased-off switch
switch that automatically returns to the **off position** when its actuating member is released

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.

5.101 ***Drives*** *incorporating a tubular motor that are supplied without a* ***driven part*** *are tested using the apparatus described in Figure 102.*

NOTE This apparatus is considered to be the **driven part** for the tests of 20.101, 20.102 and 20.103.

6 Classification

This clause of Part 1 is applicable except as follows.

6.2 *Addition:*

Parts of the **drive** for installation outdoors shall be at least IPX4.

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.1 *Addition:*

Drives supplied without a **driven part** shall be marked with

– the **rated torque**, in newton-metres;
– the **rated operating time**, in minutes, unless the appliance is intended for continuous operation.

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

7.12 *Addition:*

The instructions for **drives** supplied with a **driven part** shall state that the **rated number of operating cycles** is not to be exceeded.

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;
– frequently examine the installation for imbalance and signs of wear or damage to cables and springs. Do not use if repair or adjustment is necessary;
– details on how to use the manual release.

The instructions for shutters shall also include the substance of the following:

– watch the moving shutter and keep people away until the shutter is completely closed;
– care should be taken when operating the manual release since an open shutter may fall rapidly due to weak or broken springs.

The instructions for awnings shall state the substance of the following:

Do not operate the awning when maintenance, such as window cleaning, is being carried out in the vicinity.

The instructions for automatically controlled awnings shall state the substance of the following:

Disconnect the awning from the supply when maintenance, such as window cleaning, is being carried out in the vicinity.

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 indicate the type of **driven part** for which the **drive** is intended to be used.

The installation instructions shall state the substance of the following:

– before installing the drive, remove any unnecessary cords and disable any equipment not needed for powered operation;
– install the actuating member of a manual release at a height less than 1,8 m;
– 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. It is to be installed at a minimum height of 1,5 m;
– the manufacturer's reference of parts that are not supplied but are necessary to complete the installation.

For **drives** supplied without a **driven part**, the installation instructions shall state the substance of the following:

– that the characteristics of the driven part must be compatible with the rated torque and rated operating time;
– the minimum tube diameter, for tubular drives;
– how to assemble the driven part and how to adjust the controls.

The installation instructions for awnings shall state that a horizontal distance of at least 0,4 m is to be maintained between the fully unrolled driven part and any permanent object.

7.15 *Modification:*

The marking of tubular **drives** may be concealed after installation.

8 Protection against access to live parts

This clause of Part 1 is applicable except as follows.

8.2 *Modification:*

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

9 Starting of motor-operated appliances

This clause of Part 1 is not applicable.

10 Power input and current

This clause of Part 1 is applicable except as follows.

10.1 *Modification:*

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

10.2 *Modification:*

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

11 Heating

This clause of Part 1 is applicable except as follows.

11.7 *Replacement:*

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

*Other **drives** are operated as follows:*

– ***drives** supplied without a **driven part** are operated without rest periods for the **rated operating time** but for not less than 4 min;*

– ***drives** supplied with a **driven part** are operated without rest periods for the **rated number of operating cycles** but for not less than two cycles of operation.*

12 Void

13 Leakage current and electric strength at operating temperature

This clause of Part 1 is applicable.

14 Transient overvoltages

This clause of Part 1 is applicable.

15 Moisture resistance

This clause of Part 1 is applicable except as follows.

15.1.2 *Addition:*

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

***Drives** with a **driven part** are tested with the **driven part** fully unrolled but at the end of the test the **driven part** is fully retracted.*

16 Leakage current and electric strength

This clause of Part 1 is applicable.

17 Overload protection of transformers and associated circuits

This clause of Part 1 is applicable.

18 Endurance

This clause of Part 1 is not applicable.

19 Abnormal operation

This clause of Part 1 is applicable except as follows.

19.9 Not applicable.

19.10 *Modification:*

*Instead of being tested with the lowest possible load for 1 min, **drives** incorporating series motors are operated for one downward run.*

19.13 *Addition:*

After each test, the appliance shall comply with the requirements of 20.101 to 20.104.

20 Stability and mechanical hazards

This clause of Part 1 is applicable except as follows.

20.2 *Addition:*

NOTE 101 Moving parts of **drives** intended to be installed at a height of at least 2,5 m above the ground are considered to be positioned so that adequate protection is provided.

20.101 Driven parts shall be prevented from unrolling in a hazardous manner.

*Compliance is checked by the following test, which is carried out with the **drive** disconnected from the supply mains.*

*The **drive** is loaded with twice the **rated torque** 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.*

NOTE The highest force is determined with the **driven part** in the most unfavourable position.

*Spring-controlled **driven parts** are fully retracted and a force equal to the mass of the driven part is applied in the unrolling direction for 30 min.*

*The **driven part** shall not move faster than 150 mm/s.*

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

20.102 **Drives** shall prevent the **driven part** from unrolling in a hazardous manner due to a reduction of the supply voltage.

Compliance is checked by the following test.

*The **drive**, with the **driven part** approximately half unrolled, is supplied at 0,85 times **rated voltage** and operated until the **driven part** is fully unrolled. After 15 s, the **driven part** is retracted.*

*The **driven part** shall not unroll in an uncontrolled manner.*

20.103 The actuation of a control to stop the unrolling movement shall be effective.

Compliance is checked by the following test.

*The **drive** is supplied at **rated voltage** and operated under **normal operation** in the unrolling direction and the control is then actuated.*

*The **driven part** shall not move more than 100 mm before stopping.*

NOTE The release of a **biased-off switch** is considered to be actuation.

20.104 **Drives** supplied with a **driven part** shall operate so that injury is prevented during the unrolling movement.

This requirement is considered to be met if the appliance is controlled by a fixed **biased-off switch** only or if the **driven part**, when fully unrolled, is at a height of at least 1,8 m.

Compliance is checked by inspection, by measurement or by the test of 20.104.1 or 20.104.2.

20.104.1 *The appliance is supplied at **rated voltage** and operated under **normal operation** in the unrolling direction. An obstacle is placed 400 mm above the fully unrolled position.*

*The force exerted by the bottom edge of the **driven part** is measured.*

The test is repeated with the obstacle placed 100 mm above the fully unrolled position.

The force shall not exceed

– *25 N, for more than 5 s;*
– *150 N, for more than 0,5 s.*

NOTE Impact forces are not measured.

20.104.2 *The appliance is installed with the **driven part** assembled in a rigid frame and positioned vertically. The bottom edge of the **driven part** is positioned approximately 160 mm from the fully unrolled position. A force of 150 N is applied upwards to the bottom edge.*

The displacement shall be at least 40 mm.

21 Mechanical strength

This clause of Part 1 is applicable.

22 Construction

This clause of Part 1 is applicable.

23 Internal wiring

This clause of Part 1 is applicable.

24 Components

This clause of Part 1 is applicable.

25 Supply connection and external flexible cords

This clause of Part 1 is applicable except as follows.

25.5 *Addition:*

Type Z attachment is allowed.

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).

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.

30 Resistance to heat and fire

This clause of Part 1 is applicable except as follows.

30.2.3 Not applicable.

31 Resistance to rusting

This clause of Part 1 is applicable except as follows.

Addition:

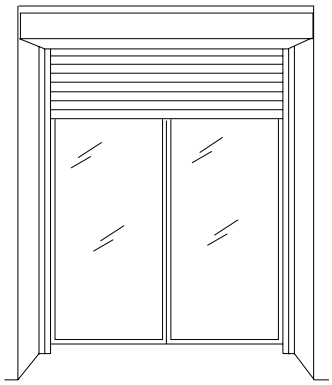
For parts intended to be installed outdoors, compliance is checked by the salt mist test of IEC 60068-2-52, severity 2 being applicable.

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

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

32 Radiation, toxicity and similar hazards

This clause of Part 1 is applicable.



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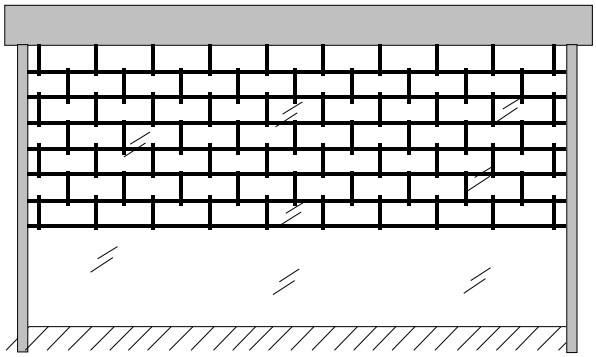

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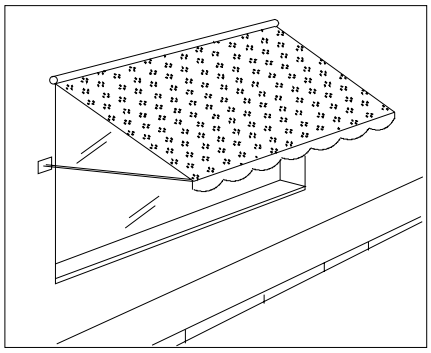

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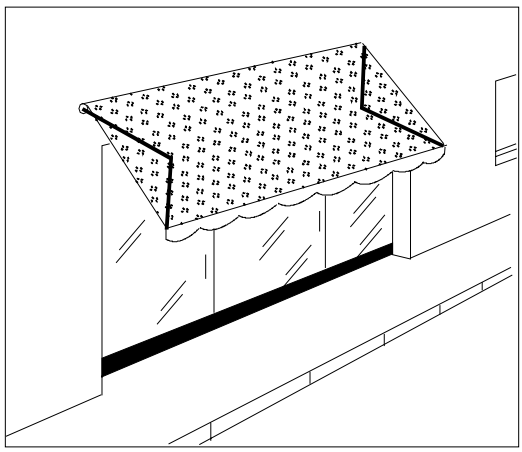

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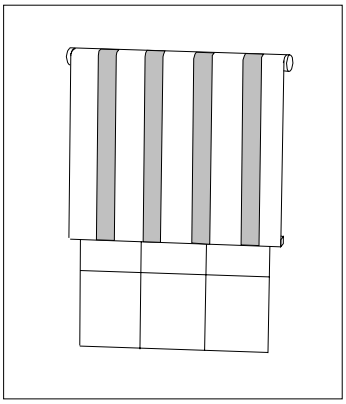

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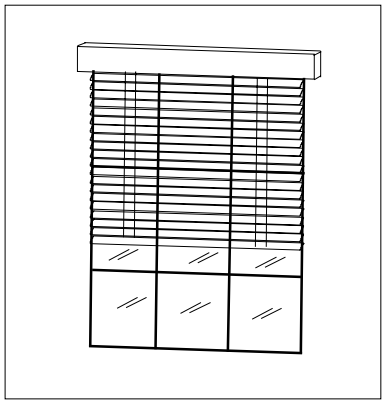


f

IEC 2722/02

Types

a Shutter

b Grille

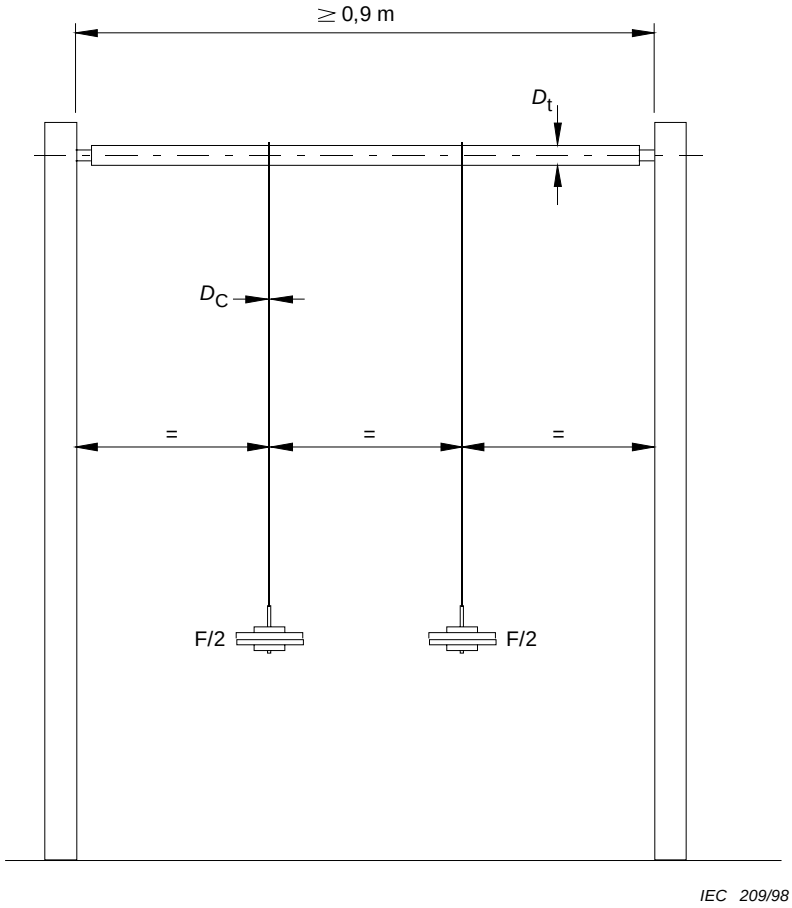
c Awning

d Folding awning

e Blind

f Venetian blind

Figure 101 – Examples of types of driven parts



The applied load (F), in newtons, is given by:

$$\frac{2\,000\,T_r}{D_t + D_c}$$

where,

T_r is the **rated torque** in Nm;

D_t is the tube diameter, in mm;

D_c is the cord diameter, in mm.

NOTE 1 D_t is the smallest diameter specified in the instructions.

NOTE 2 The load moves through a height of 2 m.

NOTE 3 D_c is measured under load.

Figure 102 – Test apparatus for drives without a driven part

Annexes

The annexes of Part 1 are applicable except as follows.

Annex C
(normative)

Aging test on motors

Modification:

The value of *p* in Table C.1 is 2 000.

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

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