UL 60730-2-12

STANDARD FOR SAFETY

Automatic Electrical Controls – Part 2-12: Particular Requirements for Electrically Operated Door Locks

UL Standard for Safety for Automatic Electrical Controls – Part 2-12: Particular Requirements for Electrically Operated Door Locks, UL 60730-2-12

Third Edition, Dated May 11, 2017

Summary of Topics

This revision of ANSI/UL 60730-2-12 dated June 9, 2022 is being issued to update the title page to reflect the most recent designation as a Reaffirmed American National Standard (ANS). No technical changes have been made.

Text that has been changed in any manner or impacted by UL's electronic publishing system is marked with a vertical line in the margin.

The requirements are substantially in accordance with Proposal(s) on this subject dated April 15, 2022.

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UL 60730-2-12

Standard for Automatic Electrical Controls – Part 2-12: Particular Requirements for Electrically Operated Door Locks

Prior to the second edition of UL 60730-2-12, the requirements for the products covered by this Standard were included in UL 60730-2-12A.

First Edition – February, 2002
Second Edition – June, 2014

Third Edition

May 11, 2017

This ANSI/UL Standard for Safety consists of the Third Edition including revisions through June 9, 2022.

The most recent designation of ANSI/UL 60730-2-12 as a Reaffirmed American National Standard (ANS) occurred on June 9, 2022. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page, or Preface. The National Difference Page and IEC Foreword are also excluded from the ANSI approval of IEC-based standards.

Comments or proposals for revisions on any part of the Standard may be submitted to UL at any time. Proposals should be submitted via a Proposal Request in UL's On-Line Collaborative Standards Development System (CSDS) at https://csds.ul.com.

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Preface (UL)

This UL Standard is based on IEC Publication 60730-2-12:2015 third edition Automatic Electrical Controls – Part 2-12: Particular Requirements for Electrically Operated Door Locks. IEC publication 60730-2-12 is copyrighted by the IEC.

This UL Standard 60730-2-12 Standard for Safety for Automatic Electrical Controls – Part 2-12: Particular Requirements for Electrically Operated Door Locks, is to be used in conjunction with the Fifth edition of UL 60730-1. The requirements for electrically operated door locks are contained in this Part 2 Standard and UL 60730-1.

Requirements of this Part 2 Standard, where stated, amend the requirements of UL 60730-1.

Where a particular subclause of UL 60730-1 is not mentioned in UL 60730-2-12, the UL 60730-2-12 subclause applies.

Note – Although the intended primary application of this Standard is stated in its Scope, it is important to note that it remains the responsibility of the users of the Standard to judge its suitability for their particular purpose.

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NATIONAL DIFFERENCES

GENERAL

National Differences from the text of International Electrotechnical Commission (IEC) Publication 60730-2-12, Automatic Electrical Controls – Part 2: Particular Requirements for Electrically Operated Door Locks, copyright 2015, are indicated by notations (differences) and are presented in bold text.

There are five types of National Differences as noted below. The difference type is noted on the first line of the National Difference in the standard. The standard may not include all types of these National Differences.

DR – These are National Differences based on the **national regulatory requirements**.

D1 – These are National Differences which are based on **basic safety principles and requirements**, elimination of which would compromise safety for consumers and users of products.

D2 – These are National Differences from IEC requirements based on existing **safety practices**. These requirements reflect national safety practices, where empirical substantiation (for the IEC or national requirement) is not available or the text has not been included in the IEC standard.

DC – These are National Differences based on the **component standards** and will not be deleted until a particular component standard is harmonized with the IEC component standard.

DE – These are National Differences based on **editorial comments or corrections**.

Each national difference contains a description of what the national difference entails. Typically one of the following words is used to explain how the text of the national difference is to be applied to the base IEC text:

Addition / Add - An addition entails adding a complete new numbered clause, subclause, table, figure, or annex. Addition is not meant to include adding select words to the base IEC text.

Modification / Modify - A modification is an altering of the existing base IEC text such as the addition, replacement or deletion of certain words or the replacement of an entire clause, subclause, table, figure, or annex of the base IEC text.

Deletion / Delete - A deletion entails complete deletion of an entire numbered clause, subclause, table, figure, or annex without any replacement text.

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FOREWORD

INTERNATIONAL ELECTROTECHNICAL COMMISSION

AUTOMATIC ELECTRICAL CONTROLS – Part 2-12: Particular requirements for electrically operated door locks

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.

2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.

3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.

4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.

5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.

6) All users should ensure that they have the latest edition of this publication.

7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.

8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.

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

International Standard IEC 60730-2-12 has been prepared by technical committee 72: Automatic electrical controls.

This third edition cancels and replaces the second edition published in 2005. This edition constitutes a technical revision. This edition includes the following significant technical changes with respect to the previous edition:

a) aligns the text with IEC 60730-1, Edition 5;

b) modifies requirements for Class B control function (H.27.1.2.2);

c) modifies requirements for Class C control function (H.27.1.2.3);

d) modifies requirements for faults during safety shut-down.

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

FDIS	Report on voting
72/981/FDIS	72/993/RVD

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

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

This part 2 is intended to be used in conjunction with IEC 60730-1. It was established on the basis of the fifth edition (2013) of that publication. Consideration may be given to future editions of, or amendments to, IEC 60730-1.

This part 2 supplements or modifies the corresponding clauses in IEC 60730-1 so as to convert that publication into the IEC standard: Particular requirements for electrically operated door locks.

Where this part 2 states "addition", "modification", or "replacement", the relevant requirement, test specification or explanatory matter in part 1 should be adapted accordingly.

Where no change is necessary, this part 2 indicates that the relevant clause or subclause applies.

In the development of a fully international standard, it has been necessary to take into consideration the differing requirements resulting from practical experience in various parts of the world and to recognize the variation in national electrical systems and wiring rules.

The “in some countries” notes regarding differing national practices are contained in the following subclauses:

17.1.3.1

17.7.1

17.7.7

17.10.4

27.2.3.1

In this publication:

1) The following print types are used:

- Requirements proper: in roman type;
- *Test specifications: in italic type;*
- Notes; in small roman type;
- Words defined in Clause 2: **bold**.

2) Subclauses, notes, tables and figures which are additional to those in part 1 are numbered starting from 101; additional annexes are lettered AA, BB, etc.

A list of all parts of the IEC 60730 series, published under the title *Automatic electrical controls* can be found on the IEC website.

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

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

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

101DV DE *Addition to the part 2:*

The numbering system in the Standard uses a space instead of a comma to indicate thousands and uses a comma instead of a period to indicate a decimal point. For example, 1 000 means 1,000 and 1,01 means 1.01.

102DV DE *Modification of the paragraph starting with, "In this publication"*

– words in SMALL ROMAN CAPITALS in the text are defined in clause 2.

103DV D2 *Modification of the first sentence of the 6th paragraph after item (9) by replacing it with the following paragraph:*

This Part 2-12 is intended to be used in conjunction with UL 60730-1, edition 5.

No Text on This Page

AUTOMATIC ELECTRICAL CONTROLS – Part 2-12: Particular requirements for electrically operated door locks

1 Scope and normative references

This clause of Part 1 is applicable except as follows:

1.1 Scope

Replacement:

This part of IEC 60730 applies to ELECTRICALLY OPERATED DOOR LOCKS for use in, on or in association with equipment, including equipment for heating, air-conditioning and similar applications. The equipment may use electricity, gas, oil, solid fuel, solar thermal energy, etc., or a combination thereof.

NOTE 1 Throughout this standard, the word "equipment" includes "appliance" and "control system".

This standard also applies to ELECTRICALLY OPERATED DOOR LOCKS for equipment that may be used by the public, such as equipment intended to be used in shops, offices, hospitals, farms and commercial and industrial applications.

This standard does not apply to ELECTRICALLY OPERATED DOOR LOCKS intended exclusively for industrial process applications unless explicitly mentioned in the equipment standard.

This standard does not apply to ELECTRICALLY OPERATED DOOR LOCKS intended for security access applications.

NOTE 2 Standards that cover these applications are under IEC Technical Committee 79.

1.1.1 *Replacement:*

This standard applies to the inherent safety, to the OPERATING VALUES, OPERATING SEQUENCES where such are associated with equipment protection, and to the testing of door locks used in, or in association with equipment.

This standard is also applicable to door locks for appliances within the scope of IEC 60335-1.

NOTE Throughout this standard, the word “door” means “door, cover or lid”. The words “door lock” mean “electrically operated door lock”.

This standard is also applicable to individual door locks utilized as part of a CONTROL SYSTEM or door locks which are mechanically integral with multi-functional CONTROLS having non-electrical outputs or employing motors.

Door locks for equipment not intended for normal household use, but which nevertheless may be used by the public, such as equipment intended to be used by laymen in shops, in light industry and on farms, are within the scope of this standard.

This standard is also applicable to the FUNCTIONAL SAFETY of LOW COMPLEXITY SAFETY RELATED SYSTEMS and CONTROLS employing door locks as the actuating element.

1.1.2 *Replacement:*

This standard applies to door locks with electrical circuits and CONTROL circuits which are, for example, operated by bimetals, magnet coils, memory metals, pressure elements, temperature-sensitive expansion elements or electronic elements.

1.1.3 Not applicable.

1.1.4 *Replacement:*

This standard applies to MANUAL CONTROLS when such are electrically and/or mechanically integral with door locks.

NOTE Requirements for manual switches not forming part of a door lock are contained in IEC 61058-1.

1.1.5 *Replacement:*

This standard applies to a.c. or d.c. powered door locks with a rated voltage not exceeding 690 V a.c. or 600 V d.c.

1.1.6 *Replacement:*

This standard does not take into account the RESPONSE VALUE of an AUTOMATIC ACTION of a door lock, if such a RESPONSE VALUE is dependent upon the method of mounting the CONTROL in the equipment. Where a RESPONSE VALUE is of significant purpose for the protection of the USER, or surroundings, the value defined in the appropriate equipment standard or as determined by the manufacturer shall apply.

1.1.7 *Replacement:*

This standard applies also to door locks incorporating ELECTRONIC DEVICES, requirements for which are contained in Annex H and door locks using THERMISTORS, requirements for which are contained in Annex J.

2 Terms and definitions

This clause of Part 1 is applicable except as follows:

2.2 Definitions of types of control according to purpose

Additional definition:

2.2.101
ELECTRICALLY OPERATED DOOR LOCK
incorporated or integrated ELECTRICALLY OPERATED MECHANISM intended to control the door LOCKING in equipment by means of a mechanical output mechanism which physically secures a door, COVER or lid

2.3 Definitions relating to the function of controls

Additional definitions:

2.3.101
DROP-OUT VALUE
OPERATING VALUE at which the LOCKING means is disengaged

2.3.102
LOCKING
mechanical action intended to block a door mechanism in such a way that opening of the door is prevented under defined conditions

2.3.103
LOCKING DELAY
period of time elapsing between the signal to lock and completion of the LOCKING action

2.3.104
LOCKING FORCE
minimum mechanical force intended for the door lock to prevent opening of the door

2.3.105
LOCKING SECURITY
condition in which the door lock either prevents an appliance door from being opened or prevents the appliance from being operated, even if the door lock is damaged

2.3.106
UNLOCKING DELAY
period of time elapsing between the signal to unlock and completion of the unlocking action

3 General requirements

This clause of Part 1 is applicable.

4 General notes on tests

This clause of Part 1 is applicable except as follows:

4.1 Conditions of test

4.1.1 *Addition:*

NOTE 101 An actual door or a suitable device simulating the door may be used for the tests of this standard.

5 Rating

This clause of Part 1 is applicable.

6 Classification

This clause of Part 1 is applicable except as follows:

6.3 According to their purpose

Additional subclauses:

6.3.101 – door locks;

6.3.101.1 – voltage sensing;

NOTE The design may include a voltage-sensitive heating element, a magnet coil or an electronic element.

6.3.101.2 – current sensing;

NOTE The design may include a current-sensitive heating element, a magnet coil or an electronic element.

6.3.101.3 – thermally operated;

NOTE LOCKING may be controlled either directly or indirectly by a temperature-sensitive element.

6.3.101.4 – pressure operated.

NOTE Latching may either be directly or indirectly controlled by pressure-sensitive elements.

6.4 According to features of automatic action

Additional subclause:

6.4.101 – LOCKING SECURITY (Type 1.AA or 2.AA).

7 Information

This clause of Part 1 is applicable except as follows:

7.2 Methods of providing information

Addition:

Table 1
(7.2 of edition 3) – Required information and methods of providing information

	Information	Clause or subclause	Method
101	LOCKING DELAY[101]	2.3.103	X
102	UNLOCKING DELAY[101]	2.3.106	X
103	LOCKING FORCE (if declared)[101]	2.3.104 18.101.1	X
104	DROP-OUT VALUE	2.3.101	X
105	Effects on controlled outputs (if declared)[102]	6.4.101 18.101.2	X
106	Method of OPERATION for the test of Clause 17	17	X

Addition to Note i:

For door locks, limits of ACTIVATING QUANTITY are specified either in the applicable appliance standard, by the appliance manufacturer or as declared by the door lock manufacturer (see 17.7 and 17.8).

Additional notes:

[101] These are specified either in the applicable appliance standard, by the appliance manufacturer or by the door lock manufacturer.

[102] This provides for manufacturer declaration of the outputs which will result after FAILURE of the door lock.

8 Protection against electric shock

This clause of Part 1 is applicable.

9 Provision for protective earthing

This clause of Part 1 is applicable.

10 Terminals and terminations

This clause of Part 1 is applicable.

11 Constructional requirements

This clause of Part 1 is applicable.

12 Moisture and dust resistance

This clause of Part 1 is applicable.

13 Electric strength and insulation resistance

This clause of Part 1 is applicable.

14 Heating

This clause of Part 1 is applicable.

15 Manufacturing deviation and drift

This clause of Part 1 is applicable.

15DV D2 *Modification of 15 of the Part 2 by adding the following note:*

NOTE – Values of MANUFACTURING DEVIATION shall not vary by more than 5 % of the declared OPERATING VALUE and DRIFT shall not vary by more than 5 % of the initial measured value.

16 Environmental stress

This clause of Part 1 is applicable.

17 Endurance

This clause of Part 1 is applicable except as follows:

17.1.3 Test sequence and conditions

Replacement:

17.1.3.1 *In general, the sequence of tests is:*

– *an ageing test specified in 17.6 (this test applies only to those actions classified as Type 1.M or 2.M);*

– *an over-voltage test of* AUTOMATIC ACTION *at accelerated rate specified in 17.7 (in Canada and the USA this test is replaced by the overload test);*

– *a test of AUTOMATIC ACTION at acceleration rate specified in 17.8;*

– *an over-voltage test of MANUAL ACTION at accelerated speed specified in 17.10 (in Canada and the USA, this test is replaced by an overload test);*

– *a test of MANUAL ACTION as specified in 17.11.*

17.1.3.1DV.1 D2 *Modification of 17.1.3.1 of the Part 2 by adding the following note:*

NOTE – For DOOR INTERLOCKS used in self-cleaning ovens, the aging period is 250 hrs, at the declared SWITCH HEAD temperature during self-cleaning OPERATION of the appliance.

17.3 Thermal conditions for the tests

Replacement:

17.3.1 *The following thermal conditions apply to door locks:*

– *those parts which are accessible when the door lock is mounted in a declared manner shall be exposed to normal room temperature;*

– *the mounting surface of the door lock shall be maintained between $T_{s\,max}$ and $T_{s\,max}$ +5 °C, or 1,05 times $T_{s\,max}$, whichever is greater;*

– *if the CONTROL does not cycle with a mounting surface temperature of $T_{s\,max}$, then the test is conducted at (20 ± 5) °C.*

17.3.2 Not applicable.

17.4 Manual and mechanical conditions for the tests

17.4.1 *Replacement:*

Manual ACTUATION shall simulate OPERATION of the door. Each operating cycle shall consist of one closing and opening action of the door.

17.4.2 *Replacement:*

The speed of movement of the simulated door latch for the test shall be:

– *(9 to 45) °/s for rotary actions;*

– *(5 to 25) mm/s for linear actions.*

17.4.3 to 17.4.5 Not applicable.

17.7 Overvoltage (or overload test in Canada, the USA, and all countries using an overload test) of automatic action at accelerated rate

Replace the existing title with the following new title:

17.7 Overvoltage (or, in Canada and the USA, overload) test of automatic action at accelerated rate

17.7.1 *Replacement:*

The electrical conditions for automatically operated circuits, with the exception of the lock CONTROL circuit of current sensing door locks, shall be those specified for overvoltage (or, in Canada, China and the USA, overload) in 17.2.

The current for the CONTROL circuit of current sensitive door locks shall be that declared in Table 1.

17.7.3 *Replacement:*

The method of OPERATION and the OPERATING SEQUENCE shall be as declared by the manufacturer.

17.7.7 *Replacement:*

During the test, the LOCKING means of the door lock shall be in its operating position.

NOTE In Canada and the USA, the number of cycles is 50.

17.8 Test of automatic action at accelerated rate

Replacement:

17.8.1 *The electrical conditions for all automatically operated circuits, with the exception of the lock CONTROL circuit of current sensing door locks, shall be those specified in 17.2. The current for the CONTROL circuit of current sensing door locks shall be that specified in 17.2.*

17.8.2 *The thermal conditions shall be those specified in 17.3.*

17.8.3 *The method of OPERATION and the OPERATING SEQUENCE shall be as declared by the manufacturer.*

17.8.4 *The number of automatic cycles for the test is that declared in Table 1, requirement 27, less the number of cycles specified in 17.7.*

17.9 Test of automatic action at slow rate

Not applicable.

17.10 Overvoltage (or overload test in Canada USA and 17.10 all countries that use the overload test) of manual action at accelerated speed

17.10.3 *Replacement:*

The method of OPERATION and the OPERATING SEQUENCE shall be as declared by the manufacturer.

17.10.4 *Replacement:*

The number of manual cycles is either 10 % of the number declared in Table 1 or 100 cycles, whichever is the smaller.

NOTE In Canada and the USA, the number of cycles is 50.

17.11 Test of manual action at slow speed

Replacement:

17.11.1 *The electrical conditions for manually operated circuits shall be those specified in 17.2.*

17.11.2 *The thermal conditions shall be those specified in 17.3.*

17.11.3 *The method of OPERATION and the OPERATING SEQUENCE shall be as declared by the manufacturer.*

17.11.4 *The number of manual cycles is that declared in Table 1, requirement 26, less the number of cycles specified in 17.10.*

17.12 Test of manual action at high speed

Not applicable.

17.13 Test of manual action at accelerated speed

Not applicable.

17.16DV D2 *Addition to the Part 2:*

NOTE – For door locks used in self-cleaning ovens, the number of required cycles is specified to be 100,000 cycles: 6,000 cycles with load and 94,000 cycles with no load.

18 Mechanical strength

This clause of Part 1 is applicable except as follows:

Additional subclauses:

18.101 Locking tests

One sample shall be used for the tests of 18.101.1 and 18.101.2.

18.101.1 Locking force

Upon completion of the LOCKING process, the declared LOCKING FORCE shall be applied, without jerks, on the LOCKING means for 1 min.

After this test, there shall be no evidence of mechanical damage to the door lock. The door lock shall continue to operate as intended and shall comply with the requirements of Clauses 8 and 20.

18.101.2 Locking security

After the tests of 18.101.1, the LOCKING FORCE shall be increased at an even rate and without jerks until unlocking occurs.

After this test, the door lock shall comply with the requirements of Clauses 8 and 20.

In addition, for door locks classified under 6.4.101, the outputs shall be as declared in Table 1, requirement 105.

18.101.2DV D2 *Modification of 18.101.2 of the Part 2 by adding the following:*

18.101.2DV.1 Door lock controls with a sensing bulb for use in self-cleaning ovens shall be subjected to bulb temperature excursion conditions. One sample shall be tested. The sensing bulb shall be subjected to temperature excursions as follows: 250 cycles; 1/2 hour at 550°C, 1/2 hour at 40°C; no load.

18.101.2DV.2 The value of MANUFACTURING DEVIATION and DRIFT shall comply with clause 15.

19 Threaded parts and connections

This clause of Part 1 is applicable.

20 Creepage distances, clearances and distances through solid insulation

This clause of Part 1 is applicable.

21 Resistance to heat, fire and tracking

This clause of Part 1 is applicable.

22 Resistance to corrosion

This clause of Part 1 is applicable.

23 Electromagnetic compatibility (EMC) requirements – Emission

This clause of Part 1 is applicable.

24 Components

This clause of Part 1 is applicable.

25 Normal operation

This clause of Part 1 is applicable.

26 Electromagnetic compatibility (EMC) requirements – Immunity

This clause of Part 1 is applicable. See also Annex H.

27 Abnormal operation

This clause of Part 1 is applicable except as follows:

27.2.3 Blocked mechanical output test (abnormal temperature test)

Modification of the first paragraph and the following subclauses:

ELECTRICALLY OPERATED DOOR LOCKS with motors shall withstand the effects of blocked output without exceeding the temperatures indicated in Table 26. Temperatures are measured by the method specified in 14.7.1. This test is not conducted on ELECTRICALLY OPERATED DOOR LOCKS with motors where, when tested under blocked output conditions for 7 h, any protective device, if provided, does not cycle under stalled conditions, and which do not exceed temperature limits in Table 13.

27.2.3.1 *ELECTRICALLY OPERATED DOOR LOCKS with motors are tested for 24 h with the output blocked at rated voltage and in a room temperature in the range of 15 °C to 30 °C, the resulting measured temperature being corrected to a 25 °C reference value.*

NOTE In Canada and the USA, the test is conducted at the voltages indicated in 17.2.3.1 and 17.2.3.2.

27.2.3.3 During the test, power shall be continually supplied to the door lock.

27.2.3.4 Immediately upon completion of the test, the door lock shall be capable of withstanding the electric strength test specified in Clause 13, without first applying the humidity treatment of 12.2.

27.5 Not applicable.

Additional subclauses:

27.101 Test with disconnected phase on three phase electrically operated door locks with motors

27.101.1 *With any one phase disconnected, the ELECTRICALLY OPERATED DOOR LOCK with motors is operated under normal OPERATION and supplied at rated voltage. For asymmetrical motor windings, the test is to be repeated until all phases have been singly opened.*

27.101.1.1 *The test duration shall be such that the first and second hour winding temperatures are recorded or until temperatures stabilize, whichever is longer. Temperatures are measured by the method specified in 14.7.1.*

27.101.1.2 *The temperature of the winding shall not exceed the temperatures indicated in Table 26.*

27.102 Running overload test

27.102.1 A running overload test is carried out on ELECTRICALLY OPERATED DOOR LOCKS with motors that are intended to be remotely or automatically controlled or liable to be operated continuously in unattended mode. If present, overload protective devices relying on electronic circuits to protect the motor windings, are also subjected to the running overload test.

27.102.2 The door lock is operated under normal operating condition, carrying its rated load and supplied at rated voltage until the temperature of the motor windings stabilizes. The protector or protective method shall not operate or open the circuit while the door lock is operating under the above conditions.

27.102.2.1 For all ELECTRICALLY OPERATED DOOR LOCKS with motors where the maximum trip point in the sensing variable is not known or cannot be quickly determined (for example, temperature sensing method, impedance protected motors, sensor-less motor protection methods, position sensing, etc.), the load to the door lock is increased in increments of 10 % of the rated value (torque, current, etc.) and operated until temperatures of the winding stabilize. If the protector or the protective circuit does not function under this overload condition, the load to the door lock is again increased by 10 % of the previous load SETTING and the door lock is operated until temperatures of the windings stabilize. This process is continued until the protective device or protective circuit operates.

When the protector or protective circuit operates, the load is slowly decreased until the protector or protective circuit is not activated. The door lock is then run at this maximum load until the temperature of the winding stabilizes.

Any mechanical protection such as a CLUTCH shall be defeated for this test.

27.102.2.2 For ELECTRICALLY OPERATED DOOR LOCKS with motors where the maximum trip point in the sensing variable is known or can be quickly determined (for example, current sensing methods), the load to the door lock is gradually increased, in a controlled manner, until the protective device or protective circuit is activated. This is the load cut-off point and the loading parameters (torque, current, etc.) shall be measured and recorded. Then, the load is decreased slowly from the load cut-off point until the protector or protective circuit is not activated. The door lock is then run at this maximum load until the temperature of the winding stabilizes.

NOTE A brake dynamometer may be used to gradually increase the torque on the door lock shaft in a controlled manner.

27.102.3 During the test, the maximum winding temperature prior to the functioning of the protective device or protective circuit shall not exceed:

– 140 °C, for class 105 (A) winding insulation;

– 155 °C, for class 120 (E) winding insulation;

– 165 °C, for class 130 (B) winding insulation;

– 180 °C, for class 155 (F) winding insulation;

– 200 °C, for class 180 (H) winding insulation;

– 220 °C, for class 200 (N) winding insulation;

– 240 °C, for class 220 (R) winding insulation;

– 270 °C, for class 250 winding insulation.

NOTE If the load cannot be increased in appropriate steps, the motor and the protective electronics, if applicable, may be removed from the door lock assembly and tested separately.

27.102.3.1 During the test, the MAXIMUM TEMPERATURE recorded on insulating parts that directly supports the motor shall not exceed 1,5 times the relevant values specified in Clause 14.

28 Guidance on the use of electronic disconnection

This clause of Part 1 is applicable.

Annexes

The annexes of Part 1 are applicable except as follows: