

INTERNATIONAL STANDARD

IEC
60335-2-82

First edition
1999-11

**Safety of household and similar
electrical appliances –**

**Part 2-82:
Particular requirements for service machines
and amusement machines**

*Sécurité des appareils électrodomestiques
et analogues –*

*Partie 2-82:
Règles particulières pour les machines de service
et les machines de divertissement*



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* See web site address on title page.

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CONTENTS

	Page
FOREWORD	3
Clause	
1 Scope	5
2 Definitions	6
3 General requirement	7
4 General conditions for the tests	7
5 Void	8
6 Classification	8
7 Marking and instructions	9
8 Protection against access to live parts	10
9 Starting of motor-operated appliances	10
10 Power input and current	10
11 Heating	10
12 Void	11
13 Leakage current and electric strength at operating temperature	11
14 Void	11
15 Moisture resistance	11
16 Leakage current and electric strength	11
17 Overload protection of transformers and associated circuits	11
18 Endurance	11
19 Abnormal operation	12
20 Stability and mechanical hazards	13
21 Mechanical strength	14
22 Construction	14
23 Internal wiring	15
24 Components	16
25 Supply connection and external flexible cords	16
26 Terminals for external conductors	16
27 Provision for earthing	17
28 Screws and connections	17
29 Creepage distances, clearances and distances through insulation	17
30 Resistance to heat, fire and tracking	17
31 Resistance to rusting	17
32 Radiation, toxicity and similar hazards	18
Annex A (normative) Normative references	19

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**SAFETY OF HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES –
Part 2-82: Particular requirements for service machines
and amusement machines**

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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- 5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
- 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.

It forms the first edition of IEC 60335-2-82.

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

FDIS	Report on voting
61/1652/FDIS	61/1748/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 third edition (1991) of that standard.

This part 2 supplements or modifies the corresponding clauses in IEC 60335-1, so as to convert it into the IEC standard: Safety requirements for electric service machines and amusement machines.

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 1 – 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 2. When a definition of part 1 concerns an adjective, the adjective and the associated noun are also in bold.

NOTE 2 – Subclauses and figures which are additional to those in part 1 are numbered starting from 101.

The following additional differences exist in some countries:

- Clause 1: Gaming machines have to comply with IEC 60950 (South Africa).
- 6.1: Class 0 is allowed for appliances having a rated voltage not exceeding 150 V (Japan and USA).
- 6.1: Class 0I is allowed (Japan).
- 19.101: The fault condition with the contactor locked in the on-position is not applied (USA).
- 20.1: The test is different (USA).
- Clause 21: The impact energy is different (USA).
- 25.7: Lighter supply cords are allowed (USA).
- 25.7: The requirements for supply cords are different. Additional protection of the supply cord is required (Australia).

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

SAFETY OF HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – Part 2-82: Particular requirements for service machines and amusement machines

1 Scope

This clause of part 1 is replaced by:

This standard deals with the safety of electric personal service machines and amusement machines for commercial use, their **rated voltage** being not more than 250 V for single-phase appliances and 480 V for other appliances.

NOTE 1 – Examples of appliances which are within the scope of this standard

a) are personal service machines:

- shoe shining appliances;
- personal weighing machines;
- luggage lockers;
- currency dispensers;
- card re-value machines;

b) amusement machines:

- gaming machines;
- pinball machines;
- laser shooting appliances;
- dartboards;
- bowling machines;
- billiard tables;
- video games;
- kiddie rides;
- driving simulators.

NOTE 2 – If an appliance incorporates a part which is within the scope of IEC 60065 or IEC 60950, the part has to comply with the relevant standard.

So far as is practicable, this standard deals with the common hazards presented by appliances which are encountered by users and **maintenance persons**.

NOTE 3 – 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,
- for appliances intended to be used in tropical countries, special requirements may be necessary,
- in many countries additional requirements are specified by the national authorities responsible for health, for the protection of labour and similar authorities.

NOTE 4 – This standard does not apply to

- appliances intended exclusively for household use,
- appliances intended exclusively for industrial purposes,
- appliances intended to be used in locations where special conditions prevail, such as the presence of a corrosive or explosive atmosphere (dust, vapour or gas),
- appliances for washing cars,
- dispensing appliances and vending machines (IEC 60335-2-75),
- appliances within the scope of IEC 60065, such as jukeboxes and household video games,
- appliances within the scope of IEC 60950, such as copying machines, ticket machines and automatic teller machines,
- appliances intended to be used when a trained attendant is present, such as a virtual reality system,
- equipment intended exclusively for fairgrounds, such as carousels.

2 Definitions

This clause of part 1 is applicable except as follows.

2.2.9 Replacement:

normal operation

operation of the appliance under the following conditions:

The appliance is operated in the **standby mode** until steady conditions are established and then operated under the most unfavourable conditions of normal use.

The appliance is refilled when necessary in accordance with the instructions for use or the **instructions for maintenance** and the next operating period started as soon as possible.

Appliances which support persons in normal use are loaded as follows:

- **kiddie rides**, 50 kg for each riding position;
- other appliances, 100 kg for the first riding position and 75 kg for each additional riding position.

NOTE – The riding position may be for a sitting or standing person.

If the instructions state that higher loads are allowed, the appliance is loaded accordingly.

Audio amplifiers are operated in accordance with the normal operating conditions specified in IEC 60065.

2.7.2 Replacement:

detachable part

part which can be removed without the aid of a **tool**, a part which is removed in accordance with the instructions for use or **instructions for maintenance** even if a **tool** or **access key** is needed for removal, or a part which does not fulfill the test of 22.11

2.8.3 Replacement:

thermal cut-out

device which during abnormal operation limits the temperature of the controlled part by automatically opening the circuit or reducing the current and constructed so that its setting cannot be altered by the user or the **maintenance person**

2.9.9 Replacement:

maintenance operation

operation stated in the instructions for use, the **instructions for maintenance** or marked on the appliance which the user or **maintenance person** is intended to perform

NOTE 1 – The **instructions for maintenance** marked on the appliance or supplied with the appliance are applicable only to the **user area** and the **maintenance area**.

NOTE 2 – **Maintenance operation** includes preparing the appliance for new operating methods.

NOTE 3 – **Maintenance operation** does not include operations that are to be performed in the **service area**.

2.101**standby mode**

state of the appliance when it is ready for use, energized and completely filled in accordance with the instructions. Cash boxes are empty

2.102**access key**

key or other means which gives access to the **maintenance area** and which does not give access to the **service area**

NOTE – "Other means" includes a **tool** or operation by codes or signals produced by optical or electromagnetic sources.

2.103**override key**

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

2.104**instructions for maintenance**

instructions explaining how to carry out cleaning, replenishing, coin collecting, setting of controls and similar operations

2.105**maintenance person**

person who maintains the appliance in accordance with the **instructions for maintenance**

2.106**user area**

area where access is gained without the use of an **access key** or a **tool**

2.107**maintenance area**

area where access can only be gained by the use of an **access key**

2.108**service area**

area where access cannot be gained by the use of an **access key** alone

2.109**kiddie ride**

moving appliance having a stationary base for use by one or two children between the ages of three and ten years, under the supervision of an adult

3 General requirement

This clause of part 1 is applicable.

4 General conditions for the tests

This clause of part 1 is applicable except as follows.

4.3 Addition:

Compliance with 22.101 is determined during the tests of clause 8.

4.6 Replacement:

*Controls or switching devices in the **user area** are adjusted to the most unfavourable setting.*

*Controls, switching devices or other parts in the **maintenance area** are adjusted to the most unfavourable setting within the limits stated in the **instructions for maintenance**.*

NOTE – Controls or switching devices in the **service area** are not adjusted.

4.9 Addition:

When alternative software is made available by the appliance manufacturer, the appliance is tested with the software which gives the most unfavourable results.

4.101 *The requirements of this standard for the **maintenance area** are applicable when the **instructions for maintenance** are being followed. If an **override key** is provided for access to the **maintenance area**, it is used before a test is carried out if this is more unfavourable.*

4.102 *When reference is made to the application of the test finger of figure 1, the test probe 18 of IEC 61032 is also applied in the **user area**.*

4.103 *Appliances incorporating transformers, **electronic circuits** and lamps are tested as **motor-operated appliances** unless they incorporate a heating element, in which case they are tested as **combined appliances**.*

5 Void

6 Classification

This clause of part 1 is applicable except as follows.

6.1 Replacement:

Appliances shall be one of the following classes with respect to protection against electric shock:

class I, class II, or class III.

Compliance is checked by inspection and by the relevant tests.

6.2 Addition:

Appliances intended for outdoor use shall be at least IPX4.

Appliances which may be cleaned by water jets or installed where water jets are liable to be used shall be at least IPX5.

Appliances which use water jets in normal use shall be at least IPX5 unless the water jet cannot be directed at the enclosure of electrical parts, in which case it may be IPX4.

7 Marking and instructions

This clause of part 1 is applicable except as follows.

7.1 Addition:

For appliances having a socket outlet, the voltage, nature of the supply and current or power output shall be marked in the vicinity of the socket outlet.

7.3 Addition:

The requirement also applies when the adjustment has to be made by the **maintenance person**.

7.12.1 Replacement:

If it is necessary to take special precautions for installation or **maintenance operations**, details of these shall be supplied. The **instructions for maintenance** shall state how to gain access to the **maintenance area**. They shall not include instructions on how to gain access to a **service area**.

The **instruction for maintenance** for appliances incorporating an appliance inlet and intended to be partially or completely immersed in water for cleaning, shall state that the connector must be removed before the appliance is cleaned and that the appliance inlet must be dried before the appliance is used again.

If the use of an **override key** allows access to moving parts, a suitable warning shall be given in the **instructions for maintenance**.

The instructions for installation for moving ride appliances shall state the free space necessary around the appliance for safe operation.

The instructions for installation for **kiddie-rides** shall state that the installation of a residual current device (RCD) having a rated residual operating current not exceeding 30 mA is advisable.

Compliance is checked by inspection.

7.12.101 The **instructions for maintenance** shall list any accessories that may be used with the appliance.

Compliance is checked by inspection.

7.12.102 The instructions for installation shall state if the appliance is suitable for outdoor use.

For appliances which are not at least IPX5, the instructions shall state that the appliance is not suitable for installation in an area where a water jet could be used.

If the appliance is not at least IPX5, the **instructions for maintenance** shall state that the appliance must not be cleaned by a water jet.

Compliance is checked by inspection.

7.12.103 For appliances using water, the **instruction for maintenance** shall give details on how to prevent freezing-up or how to ensure safe operation if freezing-up occurs.

Compliance is checked by inspection

8 Protection against access to live parts

This clause of part 1 is applicable.

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.

11 Heating

This clause of part 1 is applicable except as follows.

11.2 Modification:

Instead of the positioning of the appliance, the following applies:

Built-in appliances are installed according to the instructions for installation.

Other appliances are placed in a test corner as follows, a free space being provided above the appliance in accordance with the instructions for installation:

- *appliances normally fixed to a wall are fixed to one of the walls, as near to the other wall and to the floor or ceiling as is likely to occur in normal use, unless otherwise stated in the instructions for installation;*
- *appliances normally fixed to the floor or having a mass greater than 40 kg and not provided with casters or rollers, are installed in accordance with the instructions for installation;*

NOTE – If no instructions are given, the appliance is placed on the floor as close to the walls as possible.

- *other appliances are placed on the floor as near to the wall as possible.*

11.7 Replacement:

*The appliance is operated under **normal operation** until steady conditions are established.*

11.8 Addition:

*The temperature rise limits for handles and similar parts which are continuously held in normal use also applies to seats. The temperature rise of other surfaces in the **user area** shall not exceed the limits specified for handles and similar parts which are held for short periods only in normal use.*

NOTE – Illuminated surfaces of glass or plastic which are not intended to be touched by the user are considered to be outside the **user area**.

12 Void

13 Leakage current and electric strength at operating temperature

This clause of part 1 is applicable.

14 Void

15 Moisture resistance

This clause of part 1 is applicable except as follows.

15.2 Addition:

15.2.1 *Appliances having external surfaces which are lower than 2 m above the floor on which it is possible to place a vessel, such as a cup, are tested by rapidly pouring 0,5 l of water over the surface.*

NOTE – If there is more than one surface, they are tested in turn.

15.2.2 *The **instructions for maintenance** involving the use of liquids are carried out three times.*

15.2.3 *Parts liable to be cleaned are cleaned with a sponge approximately 150 mm × 75 mm × 50 mm which is saturated with water. The sponge is applied without appreciable force for approximately 10 s to each surface.*

NOTE – This test is not applied to surfaces in the **maintenance area** for which cleaning instructions are given.

15.3 Addition:

NOTE – If it is not possible to place the appliance into the humidity cabinet, electrical parts are tested separately, taking into account the conditions occurring in the appliance.

16 Leakage current and electric strength

This clause of part 1 is applicable.

17 Overload protection of transformers and associated circuits

This clause of part 1 is applicable.

18 Endurance

This clause of part 1 is not applicable.

19 Abnormal operation

This clause of part 1 is applicable except as follows.

19.1 Addition:

Appliances are also subjected to the tests of 19.101 and 19.102.

Detachable parts in the user area are placed in the most unfavourable position or removed.

Detachable parts in the maintenance area are placed in accordance with the **instructions for maintenance**. If no instructions are given, the parts are placed in the most unfavourable position or removed.

Containers are filled to the most unfavourable level.

19.2 Addition:

NOTE – Examples of achieving restricted heat dissipation are

- operating without water,
- switching off the fan,
- covering ventilation openings.

19.4 Addition:

NOTE – If a control also performs other functions, only the part controlling the temperature is rendered inoperative.

19.7 Addition:

The appliance is operated with the most unfavourable cycle for the motor under test.

19.9 Addition:

*This test is applicable for **kiddie-rides**, regardless of their method of control.*

19.11.2 Modification:

Instead of the duration specified for the tests, the following applies:

The fault conditions are simulated until steady conditions are established.

19.13 Addition:

During the tests, molten plastic shall not be emitted.

After the tests, compliance with 15.1 and 15.2 shall not be impaired.

19.101 *The appliance is supplied at **rated voltage** and operated under **normal operation**. Any operation or defect which may be expected in normal use is applied.*

NOTE 1 – Damaged components or parts may be replaced after each test.

NOTE 2 – Examples of fault conditions are

defects in the appliance:

- a programmer stopping in any position;
- disconnection and reconnection of one or more phases of the supply mains during any part of the programme;
- open-circuiting or short-circuiting of components;
- locking in the "ON" position of the main contacts or a contactor which switches heating elements on and off in normal use, unless the appliance is provided with at least two sets of contacts connected in series. This may be achieved by providing two contactors operating independently of each other or by providing one contactor having two independent armatures operating two independent sets of main contacts;
- failure of a pneumatic or hydraulic controller;
- blocking the coin or prize channel.

faulty operation by the user:

- incorrect actuation of knobs, handles, switches or push-buttons;
- incorrect opening or closing of doors or lids;

improper application of the **instructions for maintenance**:

- setting controls, switches or programmers in the most unfavourable position;
- incorrect loading;
- incorrect coin collection;
- incorrect opening or closing of doors or lids;
- incorrect actuation of knobs, handles, switches or push-buttons.

abuse by the user:

- obstructing openings;
- blocking moving parts if this could result in a hazard.

NOTE 3 – In general, tests are limited to the fault conditions which may be expected to give the most unfavourable results.

19.102 *Appliances with **accessible openings** which are lower than 2 m above the floor are tested by slowly pouring 0,25 l of water containing approximately 1 % NaCl into each opening. If the opening is in a vertical surface, the solution is directed towards the opening.*

NOTE – **Accessible openings** include slots for coins or cards.

20 Stability and mechanical hazards

This clause of part 1 is applicable except as follows.

20.1 Addition:

*The appliance is tested with doors, lids and similar parts in the **maintenance area** placed in the normal position of use. **Kiddie rides** and driving simulators are loaded as specified for **normal operation**.*

*The test is repeated with doors, lids and similar parts in the **maintenance area** placed in the most unfavourable positions, the appliance being tilted to an angle of 5°.*

Kiddie rides and driving simulators, while still placed on the plane inclined by 10°, are then supplied at **rated voltage** and operated under **normal operation**.

The test with the appliance tilted to 15° is not carried out.

20.2 Addition:

Covers over moving parts having a kinetic energy exceeding 4 J shall be interlocked so that it is only possible to remove them when the parts are stationary or they shall only be removable with the aid of a **tool**.

*For **kiddie rides**, compliance is also checked by applying a spherical probe having a diameter of 150 mm. The probe shall not be trapped by the movement of any parts.*

21 Mechanical strength

This clause of part 1 is applicable except as follows.

Addition:

*The impact energy of 0,5 J is applied in the **maintenance area**. In the **user area**, the value is increased to 1,0 J ± 0,05 J. An impact energy of 2 J is applied to floor mounted appliances as described in IEC 60068-2-75.*

22 Construction

This clause of part 1 is applicable except as follows.

22.7 Addition:

Pressure relief devices shall be constructed so that they cannot be rendered inoperative or set to a higher pressure without the aid of a **tool** which is normally only available to the manufacturer.

Compliance is checked by inspection.

22.14 Addition:

The requirement also applies in the **maintenance area** to parts liable to be touched during **maintenance operations**.

22.101 Appliances shall be constructed so that it is not possible to render an interlock inoperative without using an **override key**, if the interlock is necessary for compliance with the standard.

It shall not be possible to reset **thermal cut-outs** from the **user area**.

Compliance is checked by inspection, by manual test and by applying the test finger of figure 1.

22.102 It shall not be possible to gain access to the **service area** by only using the **access key** for the **maintenance area**.

Compliance is checked by inspection and manual test.

22.103 Appliances incorporating lasers shall comply with subclause 6.2 of IEC 60065.

Compliance is checked by inspection and by the relevant tests.

22.104 Coin boxes, and containers for other payment means, shall be positioned or protected so that overfilling cannot cause a hazard.

Compliance is checked by inspection.

22.105 Seats of **kiddie rides** shall not be adjustable to a height exceeding 1.5 m above the floor. **Kiddie rides** with adjustable seats shall be provided with means for restraining passengers. The width of any slots in barriers provided for this purpose shall be between 60 mm and 75 mm.

NOTE – Examples of restraining means are hand holds, footwells, seat belts and lap bars.

Compliance is checked by inspection and by measurement.

23 Internal wiring

This clause of part 1 is applicable except as follows.

23.3 Addition:

The requirement also applies to **maintenance operations**.

*The number of flexings for conductors flexed during normal use is increased to 200 000. The number of flexings for conductors flexed during **maintenance operations** is 10 000.*

23.101 Anchorages for internal wiring which can easily be replaced shall be constructed and located so that

- the wiring cannot touch the clamping screws of the anchorage if these screws are accessible, unless they are separated from **accessible metal parts** by **supplementary insulation**,
- the wiring is not clamped by a metal screw which bears directly on the wiring,
- for **class I appliances**, the anchorages are of insulating material or are provided with an insulating lining, unless a failure of the insulation of the wiring does not make **accessible metal parts** live,
- for **class II appliances**, the anchorages are of insulating material or if of metal, they are insulated from **accessible metal parts** by **supplementary insulation**.

Compliance is checked by inspection.

23.102 Internal wiring which is accessible in the **maintenance area** and which is moved during **normal operation** shall also comply with 25.13, 25.14, 25.15 and 25.21.

24 Components

This clause of part 1 is applicable except as follows.

24.2 Addition:

Switches and automatic controls operating at **safety extra-low voltage** may be fitted in **interconnection cords** in the **maintenance area**.

24.5 Addition:

Connecting devices of **interconnection cords** shall be identified if they are interchangeable with other connecting means in the appliance if this could result in a hazard.

NOTE – Colour coding may be used for identification.

24.101 Interlock switches shall comply with IEC 61058-1 as far as reasonable and shall ensure **all pole disconnection** but for protection against mechanical hazards, single-pole disconnection is allowed.

Compliance is checked by testing the switch in accordance with the relevant clauses of IEC 61058-1, the number of cycles of operation for the test of clause 17 being 10 000. However, if the switch is operated once per operating cycle, the number of cycles of operation is 100 000.

NOTE – This requirement only applies to interlock switches necessary for compliance with this standard.

24.102 Thermal cut-outs which are necessary for compliance with clause 19 and which disconnect heating elements shall be non-self resetting with a trip-free mechanism.

Compliance is checked by inspection and manual test.

25 Supply connection and external flexible cords

This clause of part 1 is applicable except as follows.

25.7 Addition:

The **supply cord** of appliances intended to be used outdoors shall be polychloroprene sheathed and be not lighter than ordinary polychloroprene sheathed cord (code designation 60245 IEC 57). However if these appliances are intended to be placed on the ground, the **supply cord** shall be not lighter than heavy polychloroprene sheathed cord (code designation 60245 IEC 66).

25.15 Addition:

When the test is conducted on internal wiring, the pull force is 30 N and the torque 0,1 Nm, irrespective of the mass of the appliance. For such wiring, a push force of 30 N is applied.

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 except as follows.

28.1 Addition:

The requirement also applies to screws which may be removed during **maintenance operations**.

*The test also applies to screws likely to be tightened during **maintenance operations**.*

28.3 Addition:

The requirement also applies to screws operated by the **maintenance person**.

29 Creepage distances, clearances and distances through insulation

This clause of part 1 is applicable except as follows.

29.1 Modification:

The force applied by the test finger to enclosures is increased to 100 N.

30 Resistance to heat, fire and tracking

This clause of part 1 is applicable except as follows.

30.2.2 Not applicable.

30.3 Addition:

NOTE – Switching devices with moving contacts, other than those manually operated and those intended to operate only during abnormal operation, are considered to be subjected to extra-severe duty conditions.

Switching devices with moving contacts intended to operate only during abnormal operation and other parts of insulating materials are also considered to be subjected to extra-severe duty conditions, unless they are enclosed or located so that pollution is unlikely to occur, in which case they are considered to be subjected to severe duty conditions.

31 Resistance to rusting

This clause of part 1 is applicable except as follows.

Addition:

For appliances intended for outdoor use, compliance is checked by the salt mist test of IEC 60068-2-52. Severity 2 is 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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Withdrawn