

INTERNATIONAL STANDARD



**Household and similar electrical appliances – Safety –
Part 2-108: Particular requirements for electrolyzers**

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

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

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INTERNATIONAL STANDARD



**Household and similar electrical appliances – Safety –
Part 2-108: Particular requirements for electrolyzers**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-108: Particular requirements for electrolyzers

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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- 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 redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 60335-2-108:2008. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

IEC 60335-2-108 has been prepared by IEC technical committee 61: Safety of household and similar electrical appliances. It is an International Standard.

This second edition cancels and replaces the first edition published in 2008. 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) some notes have been converted to normative text (Clause 1, 22.012);
- c) application of test probe 19 has been introduced (8.1.1, 20.2, B22.3, B22.4);
- d) addition of external accessible surface temperatures (Clause 11).

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

Draft	Report on voting
61/6955/CDV	61/7056A/RVC

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 electrolyzers.

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.

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 standard be adopted for implementation nationally not earlier than 12 months from the date of its publication.

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.

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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 ~~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.~~

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.

For **electrolysers**, testing in accordance with this standard is an option and cannot be required as a precondition for testing the complete appliance, for example by reference in Clause 24 of a part 2 of IEC 60335. Testing of the appliance ~~should~~ may be reduced if an incorporated **electrolyser** including its protection system or control system, if any, complies with this standard.

In particular, the construction detail inspection and testing may be done separately on the **electrolysers**, thereby eliminating the need for inspection and testing when the **electrolysers** is applied to different appliances.

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.

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HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-108: Particular requirements for electrolyzers

1 Scope

This clause of Part 1 is replaced by the following.

This part of IEC 60335 deals with the safety of **electrolyzers** that produce low viscosity, ionized liquids intended for use as detergent free wash water in appliances for household and similar purposes and which conform with the standards applicable to such appliances. It applies to **electrolyzers** tested separately, under the most severe conditions that ~~may~~ can be expected to occur in normal use, their **rated voltage** being not more than 250 V including direct current (DC) supplied appliances and **battery-operated appliances**.

~~NOTE 101~~ Examples of appliances that ~~may~~ can contain **electrolyzers** are

- dishwashers (IEC 60335-2-5);
- washing machines (IEC 60335-2-7);
- appliances producing wash water for hygiene purposes.

~~NOTE 102~~ This standard does not supersede the requirements of standards relevant to the particular appliance in which the **electrolyser** is used. However, if the **electrolyser** used complies with this standard, the tests for the **electrolyser** specified in the particular appliance standard ~~may not need to be made~~ can be unnecessary in the particular appliance or assembly. If the **electrolyser** control system is associated with the particular appliance control system, additional tests ~~may~~ can be necessary on the final appliance. Guidance for additional requirements to be considered for inclusion in the end product standards for appliances that use **electrolyzers** is given in **informative** Annex BB.

~~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~~ 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.

~~NOTE 104~~ This standard does not apply to

- 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).

2 Normative references

This clause of Part 1 is applicable except as follows.

Addition:

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

IEC 60079-15, *Explosive atmospheres – Part 15: Equipment protection by type of protection "n"*

~~IEC 60079-15:2005, *Electrical apparatus for explosive gas atmospheres – Part 15: Construction, test and marking of type of protection, "n" electrical apparatus*~~

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

ISO 1817:2005/2022, *Rubber, vulcanized or thermoplastic– Determination of the effect of liquids*

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: normal operation

Replace the first paragraph with the following:

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

If the **electrolyser** is intended to be filled by the user, it is filled with the amount and type of electrolyte specified in the instructions.

Water is passed through the **electrolyser**, the temperature of the water being $15\text{ °C} \begin{smallmatrix} +10 \\ -5 \end{smallmatrix} \text{ °C}$.

3.5 Definitions relating to types of appliances

3.5.101

electrolyser

device to produce ionized washing water

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 *Electrolysers are tested as motor-operated appliances.*

6 Classification

This clause of Part 1 is applicable except as follows.

6.1 Modification:

Replace the first paragraph with the following:

Electrolysers shall be of **class I**, **class II** or **class III**. They may be **class 0** if their **rated voltage** does not exceed 150 V.

6.101 Electrolysers are classified as being

- intended for direct connection of the appliance **supply cord** to the **electrolyser** terminals, or
- not intended for direct connection of the appliance **supply cord** to the **electrolyser** terminals.

NOTE 1 **Electrolysers** can, in both cases, be delivered with or without the **supply cord**.

NOTE 2 **Electrolysers** intended for direct connection of the appliance **supply cord** to their terminals ~~may~~ can also be used without the **supply cord** being connected directly to their terminals.

Compliance is checked by inspection and by the relevant tests.

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.1 Modification:

The **rated power input** or **rated current** need not be marked.

7.5 Not applicable.

7.7 Not applicable.

7.12 Replacement:

The instructions shall contain the quantity and details of the electrolyte to be used and details of the chemical reactions that occur in the **electrolyser**.

NOTE Details of the electrolyte used ~~may~~ can be given, for example, in terms of a generic name or a manufacturer's part number.

8 Protection against access to live parts

This clause of Part 1 is applicable *except as follows*.

8.1.1 Addition:

For parts of appliances situated not more than 850 mm above the floor after installation or in normal use, in addition to the use of test probe 18, test probe 19 of IEC 61032 is also applied wherever test probe 18 is used and with the same test conditions used for test probe 18.

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 not applicable.

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 101 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~~ Modification:

Replace the first paragraph with the following:

Electrolysers are operated until steady conditions are established.

11.8 Modification:

Replace the first paragraph with the following:

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

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 situated not more than 850 mm above the floor after installation or in normal use	Surfaces of appliances situated more than 850 mm above the floor after installation or in normal use
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:

- the underside of appliances intended to be used on a working surface or floor, where these surfaces are inaccessible to a 75 mm diameter probe having a hemispherical end;
- the rear surface of appliances which, according to the instructions, shall be placed against a wall 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.

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

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.

20 Stability and mechanical hazards

This clause of Part 1 is applicable except as follows.

20.2 Addition:

For parts of appliances situated not more than 850 mm above the floor after installation or in normal use, in addition to the use of test probe 18, test probe 19 of IEC 61032 is also applied wherever test probe 18 is used and with the same test conditions used 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.

22.6 Addition:

Elastomeric parts that withstand the ageing test specified in normative Annex AA are not considered to be parts where leakage could occur.

Modification:

Instead of coloured water, a coloured solution from the electrolysed wash water is used.

22.101 Electrolysers shall be constructed so that they are always open to the atmosphere through an aperture of at least 5 mm in diameter, or 20 mm² in area with a width of at least 3 mm. The aperture shall be located so that it is unlikely to be obstructed in normal use.

Compliance is checked by inspection and by measurement.

22.102 During normal use of the **electrolyser**, the chemical reaction in the **electrolyser** shall not produce hydrogen gas that is released in hazardous amounts into areas

- where electrical components that produce arcs and sparks during **normal operation** or abnormal operation are mounted, unless these components have been tested and found at least to comply with IEC 60079-15 for group IIC gases; or
- that contain surfaces with a temperature exceeding 460 °C during **normal operation** or abnormal operation and that ~~may~~ can be exposed to the released hydrogen gas.

*Compliance is checked by inspection, by measuring the temperature of the relevant surfaces during **normal operation** and abnormal operation and by the following test.*

*The **electrolyser** is operated for one cycle under conditions of **normal operation**.*

The concentration of hydrogen gas in the relevant areas is measured continuously from the beginning of the test until the end of the cycle. The background hydrogen concentration measured prior to the test is subtracted from the maximum concentration measured during the test.

The measured value shall not exceed 50 % of the lower flammability limit (LFL) of hydrogen.

NOTE 1 The LFL of hydrogen gas is 4 %V/V of air.

~~NOTE 2~~—The instruments used for monitoring gas concentration, such as those which use infrared sensing techniques, should have a fast response, typically 2 s to 3 s and should not unduly influence the result of the test.

~~NOTE 3~~—If gas chromatography is to be used, the gas sampling in confined areas should occur at a rate not exceeding 2 ml every 30 s.

NOTE 42 Other instruments ~~are not precluded from being~~ can be used provided that they do not unduly influence the results.

22.103 During normal use of the **electrolyser**, the chemical reaction in the **electrolyser** shall not produce wash water that causes corrosion due to the pH value of the wash water.

Compliance is checked by the salt mist test, Kb of IEC 60068-2-52, severity 2 being applicable. The pH value of the solution used shall be approximately equal to that of the wash water as measured during normal use of the appliance if the value is greater than that specified in IEC 60068-2-52.

Before the test, enclosures having a coating are scratched by means of a hardened steel pin, the end of which has the form of a cone with a top 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 pin is held at an angle of 80° to 85° to the horizontal and 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 **electrolyser** shall not have deteriorated to such an extent that compliance with this standard, in particular with Clause 8 and Clause 27, is impaired. The coating shall not be broken and shall not have loosened from the surface.*

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.

26 Terminals for external conductors

This clause of Part 1 is applicable.

27 Provision for earthing

This clause of Part 1 is applicable.

28 Screws and connections

This clause of Part 1 is applicable.

29 Clearances, creepage distances and solid insulation

This clause of Part 1 is applicable except as follows.

29.2 Replacement:

The microenvironment is pollution degree 3, and the insulation shall have a CTI not less than 250, unless the insulation is enclosed or located so that it is unlikely to be exposed to pollution during normal use of the **electrolyser** due to electrolyte used.

30 Resistance to heat and fire

This clause of Part 1 is applicable except as follows.

30.2.2 Not applicable.

31 Resistance to rusting

This clause of Part 1 is applicable.

32 Radiation, toxicity and similar hazards

This clause of Part 1 is applicable except as follows.

Addition:

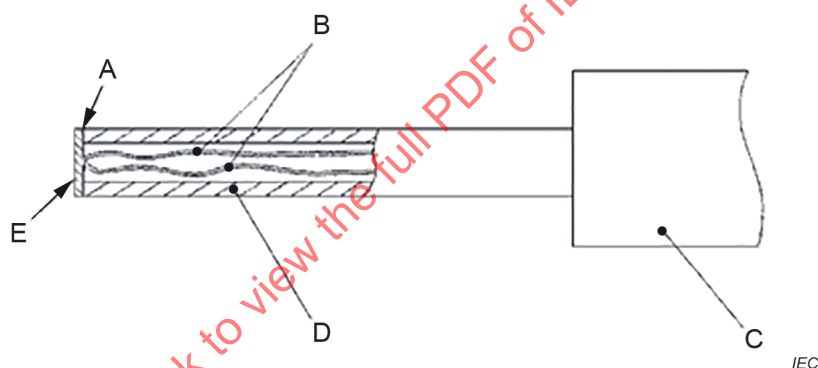
The ozone concentration produced by the chemical reactions in the **electrolyser** shall not be excessive.

Compliance is checked by the following test, which is carried out in a room without openings having dimensions of 2,5 m × 3,5 m × 3,0 m, the walls being covered with polyethylene sheet.

*The room is maintained at approximately 25 °C and 50 % relative humidity. The **electrolyser** is positioned in accordance with the instructions and then operated for one cycle under conditions of **normal operation**.*

The ozone sampling tube is to be located 10 mm from the gas outlet aperture specified in 22.101. The background ozone concentration measured prior to the test is subtracted from the maximum concentration measured during the test.

The percentage of ozone in the room shall not exceed 5×10^{-6} .



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 101 – Probe for measuring surface temperatures

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

Annex B of Part 1 Is applicable except as follows.

B.22.3 Addition:

For parts of appliances situated not more than 850 mm above the floor after installation or in normal use, in addition to the use of test probe 18, test probe 19 of IEC 61032 is also applied wherever test probe 18 is used and with the same test conditions used for test probe 18.

B.22.4 Addition:

For parts of appliances situated not more than 850 mm above the floor after installation or in normal use, in addition to the use of test probe 18, test probe 19 of IEC 61032 is also applied wherever test probe 18 is used and with the same test conditions used for test probe 18.

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Annex AA (normative)

Ageing test for elastomeric parts

The ageing test on elastomeric parts is carried out by measuring their hardness and mass before and after immersion in a solution of the electrolysed portion of the wash water at elevated temperature.

The test is carried out on at least three samples of each part. The samples and test procedure are as specified in ISO 1817:2022, with the following modifications.

46 Test liquids

The liquid used is the electrolysed portion of the wash water obtained under the conditions of Clause 11.

The total mass of the test pieces immersed shall not exceed 100 g for each litre of solution. The test pieces are completely immersed with their entire surface freely exposed to the solution. During the tests, the test pieces shall not be exposed to direct light. Test pieces of different compounds shall not be immersed in the same solution at the same time.

57 Test pieces

57.4 Conditioning

The temperature is $23\text{ °C} \pm 2\text{ °C}$ and the relative humidity is $(50 \pm 5)\%$.

68 Immersion in the test liquid

68.1 Temperature

The solution is heated within 1 h with the test pieces immersed, to a temperature of 75^{+5}_0 °C and maintained at this value. The solution is renewed every 24 h and heated in the same way.

NOTE To avoid undue evaporation of the solution, it is recommended to use a closed-circuit system or similar method for renewing the solution.

68.2 Duration

The test pieces are immersed for a total period of 48^{+1}_0 h .

The test pieces are then immediately immersed in a fresh solution that is maintained at ambient temperature. The pieces are immersed for $45\text{ min} \pm 15\text{ min}$.

After having been removed from the solution, the test pieces are rinsed in cold water at $15\text{ °C} \pm 5\text{ °C}$ and then dried with blotting paper.

7.9 Procedure

7.29.3 Change in mass

The increase in mass of the test pieces shall not exceed 10 % of the value determined before immersion.

9.7.6 Change in hardness

The micro-test for hardness applies.

The hardness of the test pieces shall not have changed by more than 8 IRHD. Their surface shall not have become sticky and shall show no crack visible to the naked eye or any other deterioration.

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Annex BB (informative)

Guidance for additional requirements to be considered for inclusion in the end product standards for appliances that incorporate electrolyzers

The following list is given as guidance for the detailed information that ~~may~~ **can** need to be specified in the end product standards for appliances that incorporate **electrolyzers**:

- instruction to the user to avoid blocking the **electrolyser** aperture during use;
- application of 22.17 to spacers intended to prevent the **electrolyser** aperture being blocked by walls;
- the need to apply 22.102 to the end product to check that hydrogen gas does not accumulate in the vicinity of critical components;
- the need to apply 22.103 to the end product to check that the electrolysed water does not cause corrosion of critical parts.

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Bibliography

The Bibliography of Part 1 is applicable except as follows.

Addition:

IEC 60335-2-5, *Household and similar electrical appliances – Safety – Part 2: Particular requirements for dishwashers*

IEC 60335-2-7, *Household and similar electrical appliances – Safety – Part 2: Particular requirements for washing machines*

ISO 13732-1, *Ergonomics of the thermal environment – Methods for the assessment of human responses to contact with surfaces – Part 1: Hot surfaces*

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Household and similar electrical appliances – Safety –
Part 2-108: Particular requirements for electrolyzers**

**Appareils électrodomestiques et analogues – Sécurité –
Partie 2-108: Règles particulières pour les électrolyseurs**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES –
SAFETY –****Part 2-108: Particular requirements for electrolyzers****FOREWORD**

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IEC 60335-2-108 has been prepared by IEC technical committee 61: Safety of household and similar electrical appliances. It is an International Standard.

This second edition cancels and replaces the first edition published in 2008. 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) some notes have been converted to normative text (Clause 1, 22.012);
- c) application of test probe 19 has been introduced (8.1.1, 20.2, B22.3, B22.4);
- d) addition of external accessible surface temperatures (Clause 11).

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

Draft	Report on voting
61/6955/CDV	61/7056A/RVC

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 electrolyzers.

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.

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 standard be adopted for implementation nationally not earlier than 12 months from the date of its publication.

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.

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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.

For **electrolysers**, testing in accordance with this standard is an option and cannot be required as a precondition for testing the complete appliance, for example by reference in Clause 24 of a part 2 of IEC 60335. Testing of the appliance may be reduced if an incorporated **electrolyser** including its protection system or control system, if any, complies with this standard.

In particular, the construction detail inspection and testing may be done separately on the **electrolysers**, thereby eliminating the need for inspection and testing when the **electrolysers** is applied to different appliances.

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.

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HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-108: Particular requirements for electrolyzers

1 Scope

This clause of Part 1 is replaced by the following.

This part of IEC 60335 deals with the safety of **electrolyzers** that produce low viscosity, ionized liquids intended for use as detergent free wash water in appliances for household and similar purposes and which conform with the standards applicable to such appliances. It applies to **electrolyzers** tested separately, under the most severe conditions that can be expected to occur in normal use, their **rated voltage** being not more than 250 V including direct current (DC) supplied appliances and **battery-operated appliances**.

Examples of appliances that can contain **electrolyzers** are

- dishwashers (IEC 60335-2-5);
- washing machines (IEC 60335-2-7);
- appliances producing wash water for hygiene purposes.

This standard does not supersede the requirements of standards relevant to the particular appliance in which the **electrolyser** is used. However, if the **electrolyser** used complies with this standard, the tests for the **electrolyser** specified in the particular appliance standard can be unnecessary in the particular appliance or assembly. If the **electrolyser** control system is associated with the particular appliance control system, additional tests can be necessary on the final appliance. Guidance for additional requirements to be considered for inclusion in the end product standards for appliances that use **electrolyzers** is given in informative Annex BB.

Attention is drawn to the fact that

- 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

- 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).

2 Normative references

This clause of Part 1 is applicable except as follows.

Addition:

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

IEC 60079-15, *Explosive atmospheres – Part 15: Equipment protection by type of protection "n"*

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

ISO 1817:2022, *Rubber, vulcanized or thermoplastic– Determination of the effect of liquids*

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:* **normal operation**

Replace the first paragraph with the following:

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

If the **electrolyser** is intended to be filled by the user, it is filled with the amount and type of electrolyte specified in the instructions.

Water is passed through the **electrolyser**, the temperature of the water being $15\text{ °C}^{+10}_{-5}\text{ °C}$.

3.5 Definitions relating to types of appliances

3.5.101

electrolyser

device to produce ionized washing water

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 *Electrolysers are tested as motor-operated appliances.*

6 Classification

This clause of Part 1 is applicable except as follows.

6.1 Modification:

Replace the first paragraph with the following:

Electrolysers shall be of **class I**, **class II** or **class III**. They may be **class 0** if their **rated voltage** does not exceed 150 V.

6.101 Electrolysers are classified as being

- intended for direct connection of the appliance **supply cord** to the **electrolyser** terminals, or
- not intended for direct connection of the appliance **supply cord** to the **electrolyser** terminals.

NOTE 1 **Electrolysers** can, in both cases, be delivered with or without the **supply cord**.

NOTE 2 **Electrolysers** intended for direct connection of the appliance **supply cord** to their terminals can also be used without the **supply cord** being connected directly to their terminals.

Compliance is checked by inspection and by the relevant tests.

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.1 Modification:

The **rated power input** or **rated current** need not be marked.

7.5 Not applicable.

7.7 Not applicable.

7.12 Replacement:

The instructions shall contain the quantity and details of the electrolyte to be used and details of the chemical reactions that occur in the **electrolyser**.

NOTE Details of the electrolyte used can be given, for example, in terms of a generic name or a manufacturer's part number.

8 Protection against access to live parts

This clause of Part 1 is applicable except as follows.

8.1.1 Addition:

For parts of appliances situated not more than 850 mm above the floor after installation or in normal use, in addition to the use of test probe 18, test probe 19 of IEC 61032 is also applied wherever test probe 18 is used and with the same test conditions used for test probe 18.

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 not applicable.

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 101 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 Modification:

Replace the first paragraph with the following:

Electrolysers are operated until steady conditions are established.

11.8 Modification:

Replace the first paragraph with the following:

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

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 situated not more than 850 mm above the floor after installation or in normal use	Surfaces of appliances situated more than 850 mm above the floor after installation or in normal use
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:

- the underside of appliances intended to be used on a working surface or floor, where these surfaces are inaccessible to a 75 mm diameter probe having a hemispherical end;
- the rear surface of appliances which, according to the instructions, shall be placed against a wall 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.

14 Transient overvoltages

This clause of Part 1 is applicable.

15 Moisture resistance

This clause of Part 1 is applicable

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.

20 Stability and mechanical hazards

This clause of Part 1 is applicable except as follows.

20.2 Addition:

For parts of appliances situated not more than 850 mm above the floor after installation or in normal use, in addition to the use of test probe 18, test probe 19 of IEC 61032 is also applied wherever test probe 18 is used and with the same test conditions used 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.

22.6 Addition:

Elastomeric parts that withstand the ageing test specified in normative Annex AA are not considered to be parts where leakage could occur.

Modification:

Instead of coloured water, a coloured solution from the electrolysed wash water is used.

22.101 Electrolysers shall be constructed so that they are always open to the atmosphere through an aperture of at least 5 mm in diameter, or 20 mm² in area with a width of at least 3 mm. The aperture shall be located so that it is unlikely to be obstructed in normal use.

Compliance is checked by inspection and by measurement.

22.102 During normal use of the **electrolyser**, the chemical reaction in the **electrolyser** shall not produce hydrogen gas that is released in hazardous amounts into areas

- where electrical components that produce arcs and sparks during **normal operation** or abnormal operation are mounted, unless these components have been tested and found at least to comply with IEC 60079-15 for group IIC gases; or
- that contain surfaces with a temperature exceeding 460 °C during **normal operation** or abnormal operation and that can be exposed to the released hydrogen gas.

*Compliance is checked by inspection, by measuring the temperature of the relevant surfaces during **normal operation** and abnormal operation and by the following test.*

*The **electrolyser** is operated for one cycle under conditions of **normal operation**.*

The concentration of hydrogen gas in the relevant areas is measured continuously from the beginning of the test until the end of the cycle. The background hydrogen concentration measured prior to the test is subtracted from the maximum concentration measured during the test.

The measured value shall not exceed 50 % of the lower flammability limit (LFL) of hydrogen.

NOTE 1 The LFL of hydrogen gas is 4 %V/V of air.

The instruments used for monitoring gas concentration, such as those which use infrared sensing techniques, should have a fast response, typically 2 s to 3 s and should not unduly influence the result of the test.

If gas chromatography is to be used, the gas sampling in confined areas should occur at a rate not exceeding 2 ml every 30 s.

NOTE 2 Other instruments can be used provided that they do not unduly influence the results.

22.103 During normal use of the **electrolyser**, the chemical reaction in the **electrolyser** shall not produce wash water that causes corrosion due to the pH value of the wash water.

Compliance is checked by the salt mist test, Kb of IEC 60068-2-52, severity 2 being applicable. The pH value of the solution used shall be approximately equal to that of the wash water as measured during normal use of the appliance if the value is greater than that specified in IEC 60068-2-52.

Before the test, enclosures having a coating are scratched by means of a hardened steel pin, the end of which has the form of a cone with a top 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 pin is held at an angle of 80° to 85° to the horizontal and 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 **electrolyser** shall not have deteriorated to such an extent that compliance with this standard, in particular with Clause 8 and Clause 27, is impaired. The coating shall not be broken and shall not have loosened from the surface.*

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.

26 Terminals for external conductors

This clause of Part 1 is applicable.

27 Provision for earthing

This clause of Part 1 is applicable.

28 Screws and connections

This clause of Part 1 is applicable.

29 Clearances, creepage distances and solid insulation

This clause of Part 1 is applicable except as follows.

29.2 Replacement:

The microenvironment is pollution degree 3, and the insulation shall have a CTI not less than 250, unless the insulation is enclosed or located so that it is unlikely to be exposed to pollution during normal use of the **electrolyser** due to electrolyte used.

30 Resistance to heat and fire

This clause of Part 1 is applicable except as follows.

30.2.2 Not applicable.

31 Resistance to rusting

This clause of Part 1 is applicable.

32 Radiation, toxicity and similar hazards

This clause of Part 1 is applicable except as follows.

Addition:

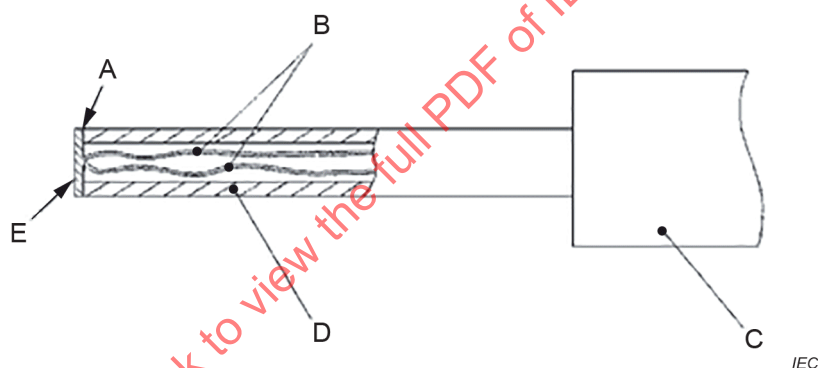
The ozone concentration produced by the chemical reactions in the **electrolyser** shall not be excessive.

Compliance is checked by the following test, which is carried out in a room without openings having dimensions of 2,5 m × 3,5 m × 3,0 m, the walls being covered with polyethylene sheet.

*The room is maintained at approximately 25 °C and 50 % relative humidity. The **electrolyser** is positioned in accordance with the instructions and then operated for one cycle under conditions of **normal operation**.*

The ozone sampling tube is to be located 10 mm from the gas outlet aperture specified in 22.101. The background ozone concentration measured prior to the test is subtracted from the maximum concentration measured during the test.

The percentage of ozone in the room shall not exceed 5×10^{-6} .



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 101 – Probe for measuring surface temperatures

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

Annex B of Part 1 is applicable except as follows.

B.22.3 Addition:

For parts of appliances situated not more than 850 mm above the floor after installation or in normal use, in addition to the use of test probe 18, test probe 19 of IEC 61032 is also applied wherever test probe 18 is used and with the same test conditions used for test probe 18.

B.22.4 Addition:

For parts of appliances situated not more than 850 mm above the floor after installation or in normal use, in addition to the use of test probe 18, test probe 19 of IEC 61032 is also applied wherever test probe 18 is used and with the same test conditions used for test probe 18.

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Annex AA (normative)

Ageing test for elastomeric parts

The ageing test on elastomeric parts is carried out by measuring their hardness and mass before and after immersion in a solution of the electrolysed portion of the wash water at elevated temperature.

The test is carried out on at least three samples of each part. The samples and test procedure are as specified in ISO 1817:2022, with the following modifications.

6 Test liquids

The liquid used is the electrolysed portion of the wash water obtained under the conditions of Clause 11.

The total mass of the test pieces immersed shall not exceed 100 g for each litre of solution. The test pieces are completely immersed with their entire surface freely exposed to the solution. During the tests, the test pieces shall not be exposed to direct light. Test pieces of different compounds shall not be immersed in the same solution at the same time.

7 Test pieces

7.4 Conditioning

The temperature is $23\text{ °C} \pm 2\text{ °C}$ and the relative humidity is $(50 \pm 5)\%$.

8 Immersion in the test liquid

8.1 Temperature

The solution is heated within 1 h with the test pieces immersed, to a temperature of 75^{+5}_0 °C and maintained at this value. The solution is renewed every 24 h and heated in the same way.

NOTE To avoid undue evaporation of the solution, it is recommended to use a closed-circuit system or similar method for renewing the solution.

8.2 Duration

The test pieces are immersed for a total period of 48^{+1}_0 h .

The test pieces are then immediately immersed in a fresh solution that is maintained at ambient temperature. The pieces are immersed for $45\text{ min} \pm 15\text{ min}$.

After having been removed from the solution, the test pieces are rinsed in cold water at $15\text{ °C} \pm 5\text{ °C}$ and then dried with blotting paper.

9 Procedure

9.3 Change in mass

The increase in mass of the test pieces shall not exceed 10 % of the value determined before immersion.

9.7 Change in hardness

The micro-test for hardness applies.

The hardness of the test pieces shall not have changed by more than 8 IRHD. Their surface shall not have become sticky and shall show no crack visible to the naked eye or any other deterioration.

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Annex BB (informative)

Guidance for additional requirements to be considered for inclusion in the end product standards for appliances that incorporate electrolyzers

The following list is given as guidance for the detailed information that can need to be specified in the end product standards for appliances that incorporate **electrolyzers**:

- instruction to the user to avoid blocking the **electrolyser** aperture during use;
- application of 22.17 to spacers intended to prevent the **electrolyser** aperture being blocked by walls;
- the need to apply 22.102 to the end product to check that hydrogen gas does not accumulate in the vicinity of critical components;
- the need to apply 22.103 to the end product to check that the electrolysed water does not cause corrosion of critical parts.

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Bibliography

The Bibliography of Part 1 is applicable except as follows.

Addition:

IEC 60335-2-5, *Household and similar electrical appliances – Safety – Part 2: Particular requirements for dishwashers*

IEC 60335-2-7, *Household and similar electrical appliances – Safety – Part 2: Particular requirements for washing machines*

ISO 13732-1, *Ergonomics of the thermal environment – Methods for the assessment of human responses to contact with surfaces – Part 1: Hot surfaces*

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COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

APPAREILS ÉLECTRODOMESTIQUES ET ANALOGUES – SÉCURITÉ –

Partie 2-108: Exigences particulières pour les électrolyseurs

AVANT-PROPOS

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L'IEC 60335-2-108 a été établie par le comité d'études 61 de l'IEC: Sécurité des appareils électrodomestiques et analogues. Il s'agit d'une Norme internationale.

Cette deuxième édition annule et remplace la première édition parue en 2008. 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) certaines notes ont été converties en texte normatif (Article 1, 22.012);
- c) introduction de l'application du calibre d'essai 19 (8.1.1, 20.2, B22.3, B22.4);
- d) ajout d'exigences relatives aux températures des surfaces accessibles extérieures (Article 11).

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

Projet	Rapport de vote
61/6955/CDV	61/7056A/RVC

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/.

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

La présente partie 2 doit être utilisée conjointement avec la dernière édition de l'IEC 60335-1 et ses amendements 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 "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 électrolyseurs.

Lorsqu'un paragraphe particulier de la Partie 1 n'est pas mentionné dans cette 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:

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

NOTE 3 Les caractères d'imprimerie suivants sont utilisés:

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

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

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

Le comité recommande que le contenu de la présente norme soit adopté au niveau national au plus tôt 12 mois après sa date de publication.

Le comité a décidé que le contenu de ce document ne sera pas modifié avant la date de stabilité indiquée sur le site web de l'IEC sous webstore.iec.ch dans les données relatives au document recherché. À cette date, le document sera

- reconduit,
- supprimé, ou
- révisé.

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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 des 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 utilisation normale en tenant compte des instructions du fabricant. Elle couvre également les situations anormales qui peuvent être attendues dans la pratique et elle tient compte de la façon dont les phénomènes électromagnétiques peuvent altérer 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 les fonctions d'un appareil sont couvertes par différentes parties 2 de l'IEC 60335, la partie 2 correspondante est appliquée à chaque fonction séparément, dans la limite du raisonnable. Si cela 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 prévaut 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 n'est pas nécessairement jugé conforme aux principes de sécurité de la norme si, lorsqu'il est examiné et soumis aux essais, il apparaît qu'il présente d'autres caractéristiques qui compromettent le niveau de sécurité visé par ces exigences.

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

Pour les **électrolyseurs**, effectuer des essais conformément à cette norme est une option et ne peut pas être exigé comme condition préalable pour soumettre à l'essai un appareil complet, par exemple en se référant à l'Article 24 d'une partie 2 de l'IEC 60335. Les essais sur un appareil complet peuvent être réduits si un **électrolyseur** incorporé, y compris son système de protection ou son système de commande éventuel, est conforme la présente norme.

En particulier, un examen détaillé de la construction et les essais peuvent être faits séparément sur les **électrolyseurs**, éliminant de cette façon la nécessité d'un examen et d'essais lorsque l'**électrolyseur** est appliqué à différents appareils.

NOTE 3 Les normes traitant des aspects non relatifs à la sécurité des appareils électrodomestiques sont:

- les normes IEC publiées par le CE 59 concernant les méthodes de mesure de l'aptitude à la fonction;
- les normes CISPR 11, CISPR 14-1 et 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 CE 111 concernant l'environnement.

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APPAREILS ÉLECTRODOMESTIQUES ET ANALOGUES – SÉCURITÉ –

Partie 2-108: Exigences particulières pour les électrolyseurs

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 **électrolyseurs** qui produisent des liquides ionisés à faible viscosité destinés à être utilisés comme eau de lavage sans détergent dans les appareils à usages domestiques et analogues et qui sont conformes aux normes applicables à de tels appareils. Elle s'applique aux **électrolyseurs** soumis aux essais séparément, dans les conditions les plus sévères qui peuvent se produire en utilisation normale, et dont la **tension assignée** est inférieure ou égale à 250 V, y compris les appareils alimentés en courant continu et les **appareils alimentés par batteries**.

Exemples d'appareils qui peuvent contenir des **électrolyseurs**:

- les lave-vaisselle (IEC 60335-2-5);
- les machines à laver le linge (IEC 60335-2-7);
- les appareils produisant de l'eau de lavage à caractère hygiénique.

La présente norme ne remplace pas les exigences des normes applicables aux appareils particuliers qui utilisent un **électrolyseur**. Toutefois, si l'**électrolyseur** utilisé est conforme à la présente norme, les essais spécifiés pour l'**électrolyseur** dans la norme de l'appareil particulier peuvent ne pas être nécessaires s'il est intégré dans l'appareil particulier ou fait partie d'un assemblage. Si le dispositif de commande de l'**électrolyseur** est associé au dispositif de commande de l'appareil particulier, des essais supplémentaires peuvent être nécessaires sur l'appareil final. Des recommandations pour les exigences supplémentaires à prendre en considération pour être rajoutées dans les normes de produit fini des appareils utilisant des **électrolyseurs** sont données à l'Annexe BB informative.

L'attention est attirée sur le fait que

- pour les appareils destinés à être utilisés dans des véhicules ou à bord de navires ou d'aéronefs, 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 appareils prévus exclusivement pour des usages industriels;
- aux appareils destinés à être utilisés dans des locaux qui présentent des conditions particulières, telles que la présence d'une atmosphère corrosive ou explosive (poussière, vapeur ou gaz).

2 Références normatives

L'article de la Partie 1 s'applique, avec les exceptions suivantes.

Addition:

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

IEC 60079-15, *Atmosphères explosives gazeuses – Partie 15: Protection du matériel par mode de protection "n"*

IEC 60584-1, *Couples thermoélectriques – Partie 1: Spécifications et tolérances en matière de FEM*

ISO 1817:2022, *Caoutchouc vulcanisé ou thermoplastique – Détermination de l'action des liquides*

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:

conditions de fonctionnement normal

Remplacer le premier alinéa par ce qui suit:

fonctionnement de l'**électrolyseur** dans les conditions suivantes:

Si l'**électrolyseur** est destiné à être rempli par l'utilisateur, il est rempli avec la quantité et le type d'électrolyte spécifiés dans les instructions.

L'eau circule à travers l'**électrolyseur**, la température de l'eau étant de $15\text{ °C}^{+10}_{-5}\text{ °C}$.

3.5 Définitions relatives aux types d'appareils

3.5.101

électrolyseur

dispositif de production d'eau de lavage ionisée

4 Exigence générale

L'article de la Partie 1 s'applique.

5 Conditions générales d'essais

L'article de la Partie 1 s'applique, avec l'exception suivante.

5.101 Les **électrolyseurs** sont soumis aux essais comme des **appareils à moteur**.

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 **électrolyseurs** doivent être de la **classe I**, de la **classe II** ou de la **classe III**. Ils peuvent être de la **classe 0** si leur **tension assignée** ne dépasse pas 150 V.

6.101 Les **électrolyseurs** sont classés en

- appareils prévus pour un raccordement direct du **câble d'alimentation** de l'appareil aux bornes de l'**électrolyseur**, ou
- appareils non prévus pour un raccordement direct du **câble d'alimentation** de l'appareil aux bornes de l'**électrolyseur**.

NOTE 1 Les **électrolyseurs** peuvent, dans les deux cas, être fournis avec ou sans **câble d'alimentation**.

NOTE 2 Les **électrolyseurs** prévus pour un raccordement direct du **câble d'alimentation** de l'appareil à leurs bornes peuvent également être utilisés sans le **câble d'alimentation** prévu pour être raccordé directement à leurs bornes.

La vérification est effectuée par examen et par les essais appropriés.

7 Marquage et instructions

L'article de la Partie 1 s'applique, avec les exceptions suivantes.

7.1 *Modification:*

La **puissance assignée** ou le **courant assigné** n'ont pas besoin d'être marqués.

7.5 Ne s'applique pas.

7.7 Ne s'applique pas.

7.12 *Remplacement:*

Les instructions doivent comporter la quantité et les détails de l'électrolyte à utiliser et les détails des réactions chimiques qui se produisent dans l'**électrolyseur**.

NOTE Les détails de l'électrolyte utilisé peuvent être donnés, par exemple, en précisant son nom générique ou par un numéro d'identification du fabricant.

8 Protection contre l'accès aux parties actives

L'article de la Partie 1 s'applique, avec l'exception suivante.

8.1.1 *Addition:*

Pour les parties d'appareils situées au maximum à 850 mm du sol après installation ou en utilisation normale, en plus de l'utilisation du calibre d'essai 18, le calibre d'essai 19 de l'IEC 61032 est également appliqué chaque fois que le calibre d'essai 18 est utilisé et dans les mêmes conditions d'essai que ce dernier.