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COMMENTED VERSION

INTERNATIONAL STANDARD

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Household and similar electrical appliances – Safety – Part 2-41: Particular requirements for pumps

IEC 60335-2-41:2024-01 CMV(en)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-41: Particular requirements for pumps

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 received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at https://patents.iec.ch. IEC shall not be held responsible for identifying any or all such patent rights.

This commented version (CMV) of the official standard IEC 60335-2-41:2024 edition 5.0 allows the user to identify the changes made to the previous IEC 60335-2-41:2012 edition 4.0. Furthermore, comments from IEC TC 61 experts are provided to explain the reasons of the most relevant changes, or to clarify any part of the content.

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

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

IEC 60335-2-41 has been prepared by IEC technical committee 61: Safety of household and similar electrical appliances. It is an International Standard.

This fifth edition cancels and replaces the fourth edition published in 2012. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) alignment with IEC 60335-1:2020;
b) modification or conversion of some notes to normative text (Clause 1, 7.12.1, 25.7);
c) introduction of IEC 60417 symbol for maximum operating depth and indoor use only (7.1, 7.6, 7.12.1);
d) clarification of requirements for aquarium pumps and garden pond pumps;
e) addition of legibility requirements for markings exposed to solar radiation (7.14);
f) clarification of pumps subjected to test probe 18 (8.1.1, 20.2);
g) introduction of accessible surface temperature limits (Clause 11);
h) addition of requirements for IEC 61984 connectors for pumps intended for permanent connection to fixed wiring (22.107, 24.1.5, 24.1.101, 25.3).
i) clarifications on remote operation for pumps in scope of this standard (22.40, 22.49, 22,51)

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

Draft	Report on voting
61/7007/FDIS	61/7079/RVD

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

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

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

A list of all parts of the IEC 60335 series, under the general title: *Household and similar electrical appliances – Safety*, can be found on the IEC website.

This part 2 is to be used in conjunction with the latest edition of IEC 60335-1 and its amendments unless that edition precludes it; in that case, the latest edition that does not preclude it is used. It was established on the basis of the sixth edition (2020) of that standard.

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

This part 2 supplements or modifies the corresponding clauses in IEC 60335-1, so as to convert that publication into the IEC standard: Particular requirements for pumps.

When a particular subclause of Part 1 is not mentioned in this part 2, that subclause applies as far as is reasonable. When this standard states “addition”, “modification” or “replacement”, the relevant text in Part 1 is to be adapted accordingly.

NOTE 2 The following numbering system is used:

– subclauses, tables and figures that are numbered starting from 101 are additional to those in Part 1;

– unless notes are in a new subclause or involve notes in Part 1, they are numbered starting from 101, including those in a replaced clause or subclause;

– additional annexes are lettered AA, BB, etc.

NOTE 3 The following print types are used:

– requirements: in roman type;

– *test specifications: in italic type*;

– notes: in small roman type.

Words in **bold** in the text are defined in Clause 3. When a definition concerns an adjective, the adjective and the associated noun are also in bold.

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

- reconfirmed,
- withdrawn, or
- revised.

NOTE 4 The attention of National Committees is drawn to the fact that equipment manufacturers and testing organizations can need a transitional period following publication of a new, amended or revised IEC publication in which to make products in accordance with the new requirements and to equip themselves for conducting new or revised tests.

It is the recommendation of the committee that the content of this publication be adopted for implementation nationally not earlier than 12 months or later than 36 months from the date of publication.

The following differences exist in the countries indicated below.

– 6.1: Pumps intended to be used in or close to swimming pools, garden ponds and similar places may be class 0I if their supply circuit incorporates a residual current device. Other pumps may be class 0I (Japan).

– 7.14: Marking and labelling systems complying with UL 969 for outdoor use are considered to meet the UV exposure compliance criteria (USA).

IMPORTANT – The "colour inside" logo on the cover page of this document indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

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

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

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

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

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

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

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

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

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

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

NOTE 2 ~~Horizontal and generic standards~~ Horizontal publications, basic safety publications and group safety publications covering a hazard are not applicable since they have been taken into consideration when developing the general and particular requirements for the IEC 60335 series of standards. ~~For example, in the case of temperature requirements for surfaces on many appliances, generic standards, such as ISO 13732-1 for hot surfaces, are not applicable in addition to part 1 or part 2 standards.~~ **1**

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

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

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

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

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-41: Particular requirements for pumps

1 Scope

This clause of Part 1 is replaced by the following.

This part of IEC 60335 deals with the safety of electric pumps for liquids having a temperature not exceeding 90 °C, intended for household and similar purposes, their **rated voltage** being not more than 250 V for single-phase appliances and 480 V for other appliances including direct current (DC) supplied appliances and **battery-operated appliances**. 3

~~NOTE 101~~ Examples of appliances within the scope of this standard are

– **aquarium pumps**;
– ~~pumps for garden ponds~~ **garden pond pumps**;
– **shower-boost pumps**;
– **sludge pumps**;
– **submersible pumps**;
– table fountain pumps;
– **vertical wet pit pumps**.

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

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

– persons (including children) whose
  - physical, sensory or mental capabilities; or
  - lack of experience and knowledge

  prevents them from using the appliance safely without supervision or instruction;
– children playing with the appliance.

~~NOTE 102~~ 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 and similar authorities.

~~NOTE 103~~ This standard does not apply to

– **stationary circulation pumps** for heating and service water installations (IEC 60335-2-51);
– pumps for flammable liquids;
– pumps intended exclusively for industrial purposes;

– pumps intended to be used in locations where special conditions prevail, such as the presence of a corrosive or explosive atmosphere (dust, vapour or gas);
– pumps incorporating chlorinators of the electrolytic type.

~~NOTE 104~~ Pumps incorporated in appliances are not covered by this standard unless a specific reference is made.

2 Normative references

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

Addition:

IEC 60068-2-5:2018, *Environmental testing − Part 2-5: Tests − Test S: Simulated solar radiation at ground level and guidance for solar radiation testing and weathering*

IEC 60364-7-701, *Low voltage electrical installations – Part 7-701: Requirements for special installations or locations – Locations containing a bath or shower*

IEC 60364-7-702, *Low voltage electrical installations – Part 7-702: Requirements for special installations or locations – Swimming pools and fountains*

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

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

3 Terms and definitions

This clause of Part 1 is applicable except as follows.

3.1 Definitions relating to physical characteristics

3.1.9 ~~*Replacement*~~ *Modification:*

Replace the first paragraph with the following: **4**

~~**normal operation**~~
operation of the appliance under the following conditions:

Pumps are operated with the inlet in liquid at zero pressure, and the discharge outlet is maintained between the minimum and maximum total head, so that the highest power input is attained. The total head is measured between the inlet and the discharge outlet.

Sludge pumps are operated with water.

Vertical wet pit pumps are operated with water unless they can also pump sludge, in which case they are operated with sludge having a density not less than the maximum density specified in the instructions and not more than 105 % of the specified maximum density. **5**

3.5 Definitions relating to types of appliances

3.5.101
submersible pump
pump having the electrical part completely or partially immersed in liquid during normal use

Note 1 to entry: The motor windings may be dry, immersed in oil or in the pumped liquid.

3.5.102
vertical wet pit pump
pump having the electrical part separated from the hydraulic part and not immersed in liquid during normal use

Note 1 to entry: Controls such as water level switches may be immersed in the liquid.

3.5.103
sludge pump
pump intended for moving a mixture of water and small solids

Note 1 to entry: **Sludge pumps** may be **submersible pumps** or **vertical wet pit pumps**.

3.5.104
shower-boost pump
pump for installation in the water supply system to increase the water flow for showering purposes

3.5.105
deep well pump
multistage **submersible pump** intended to be used in bore wells

3.5.106
aquarium pump
pump intended to be used indoors with an aquarium

3.5.107
garden pond pump
pump intended to be used outdoors with a garden pond **6**

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.

5.7 *Addition:*

The liquid temperature is maintained between 0 °C and –5 °C of the temperature marked on the pump.

5.101 *Pumps are tested as **portable appliances**, unless they are **fixed appliances**.*

5.102 ***Stationary pumps** having a three-phase motor that does not incorporate a **protective device** are installed with an appropriate device, in accordance with the instructions.*

6 Classification

This clause of Part 1 is applicable except as follows.

6.1 *Modification:*

Replace the first paragraph with the following:

Submersible pumps for use in swimming pools when persons are in the pool shall be **class III** with a **rated voltage** not exceeding 12 V.

Other **submersible pumps** for use in water and other conducting liquids shall be **class I** or **class III**. However, **aquarium pumps** may be **class II**. Table fountain pumps for indoor use may also be **class II** as long as their **rated power input** does not exceed 25 W.

Portable pumps for cleaning and other maintenance of swimming pools shall be **class I** or **class III**.

Other pumps shall be **class I**, **class II** or **class III**.

6.2 *Addition:*

Submersible pumps shall be IPX8.

Portable pumps for cleaning and other maintenance of swimming pools shall be at least IPX7.

Shower-boost pumps intended for installation outside of zones 1 and 2, as specified in IEC 60364-7-701, shall be at least IPX2.

Other pumps shall be at least IPX4.

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.1 *Addition:*

Pumps having a **rated power input** exceeding 50 W shall be marked with

– H_{min}, the minimum total head, in metres, if greater than zero;

~~– the maximum operating depth, in metres, with a minimum of 1 m (for **submersible pumps**);~~

– the direction of rotation (for pumps having three-phase motors).

The maximum operating depth, in metres, with a minimum of 1 m, shall be marked using symbol IEC 60417-6444 (2020-12) for:

– **submersible aquarium pumps**; and

– other **submersible pumps** having a **rated power input** exceeding 50 W. 7

Pumps shall be marked with the maximum liquid temperature, which shall not be less than 35 °C. If the temperature exceeds 35 °C, pumps shall be marked with the maximum period of operation, unless they are intended for continuous operation.

Pumps that are not intended for outdoor use shall be marked with symbol IEC 60417-5957 (2004-12) or with the substance of the following:

For indoor use only **8**

7.6 *Addition:*

~~H_{min}~~ ~~minimum total head~~

~~m~~ ~~maximum operating depth~~

[symbol IEC 60417-6444 (2020-12)] maximum operating depth where X specifies the value

Note 101 The indication of the maximum operating depth in metres can be located on the left or right side adjacent to the arrows.

[symbol IEC 60417-5957 (2004-12)] for indoor use only

7.12 *Addition:*

If symbol IEC 60417-6444 (2020-12) or symbol 60417-5957(2004-12) is used the meaning shall be explained. **9**

The instructions for **class I portable pumps** for cleaning and other maintenance of swimming pools shall include the substance of the following:

– the pump must not be used when people are in the water;
– the pump must be supplied through a residual current device (RCD) having a rated residual operating current not exceeding 30 mA.

The instructions for pumps marked with a temperature exceeding 35 °C shall state the maximum period of operation and the minimum rest period, unless the pump is intended for continuous operation at this temperature.

For **vertical wet pit pumps**, the instruction shall indicate the maximum density (in kg/m^3) of the media intended for use with the pump. **10**

The instructions for **submersible pumps** for use in swimming pools shall state the substance of the following:

Disconnect the pump from the supply mains before carrying out user maintenance such as cleaning the filter.

7.12.1 *Addition:*

The installation instructions shall provide information on requirements specified for the electrical installation and shall include reference to national wiring rules. If reference is made to zones, the corresponding drawings shall be included.

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

~~– the maximum total head, in metres (for pumps having a **rated power input** exceeding 50 W);~~

~~– pollution of the liquid could occur due to leakage of lubricants (for **submersible pumps** and **vertical wet pit pumps** containing lubricants);~~

~~– a protective device is to be installed in the fixed wiring and its characteristics are to be specified (for **stationary pumps** having a three-phase motor not incorporating a **protective device**).~~

– for pumps having a **rated power input** exceeding 50 W, the maximum total head, in metres;

– for **submersible pumps** and **vertical wet pit pumps** containing lubricants, the substance of the following:

Pollution of the liquid could occur due to leakage of lubricants.

– for **stationary pumps** having a three-phase motor not incorporating a **protective device,** the substance of the following:

A protective device is to be installed in the fixed wiring and its characteristics are to be specified. **11**

The installation instructions for pumps intended to be used in outdoor fountains, garden ponds and similar places shall state that the pump is to be supplied through a residual current device (RCD) having a rated residual operating current not exceeding 30 mA.

The installation instructions for **class I pumps** for swimming pools shall state that the pump is to be supplied by an isolating transformer or supplied through a residual current device (RCD) having a rated residual operating current not exceeding 30 mA.

The installation instructions for **class III pumps** intended to be installed in zone 0 of a swimming pool, as defined in IEC 60364-7-702, shall state that the transformer is to be located outside zone 1.

~~The installation instructions for **class II pumps** intended to be fixed in zone 1 of a swimming pool, as defined in IEC 60364-7-702, or fixed close to a garden pond or similar place, shall state that the pump is to be located where flooding cannot occur.~~

~~NOTE A sump without an adequate outlet for the liquid is considered to be a place where flooding is likely to occur.~~

The installation instructions for **class II pumps** intended to be fixed:

– in zone 1 of a swimming pool, as defined in IEC 60364-7-702;

– in a sump without an adequate outlet for the liquid; or

– close to a garden pond or similar place

shall state that the pump is to be located where flooding cannot occur. **12**

For **fixed pumps** intended for permanent connection to fixed wiring, delivered with a separate connector to ease the installation and establish the supply connection, the instructions shall state the substance of the following:

Only use the supplied connector when installing the pump. **13**

7.14.101 Markings on pumps intended for outdoor use in daylight shall remain legible after being exposed to solar radiation.

NOTE 1 Submersible pumps are not considered to be used in daylight.

NOTE 2 Markings located at a position without direct sunlight exposure in normal use (e.g. on the bottom of an enclosure) are not considered to be used in daylight.

This requirement does not apply to markings that are moulded in, engraved, or stamped and either raised above or have a depth below the surface of at least 0,25 mm and laser engraved markings.

Compliance is checked by IEC 60068-2-5:2018 procedure Sb 1 using a xenon-arc lamp as the radiation source.

The test conditions shall be as specified in IEC 60068-2-5:2018, Table 5. Both the narrowband irradiance level and the black panel temperature shall be controlled.

The test shall be in cycles for a total duration of 515 h.

After the test, the marking shall be clearly legible. **14**

8 Protection against access to live parts

This clause of Part 1 is applicable except as follows.

8.1.1 *Addition:*

Probe 18 of IEC 61032 is not applied to

- ***sludge pumps****;*
- ***vertical wet pit pumps****;*
- ***submersible pumps****, other than* ***aquarium pumps****, table fountain pumps and* ***garden pond pumps****; and*
- ***shower-boost pumps****, swimming pool pumps and other pumps, if they have instructions that indicate that the pump is not to be installed or used in areas accessible to children.* **15**

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.

11.3 *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 N ± 1 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. **16**

11.7 ~~*Replacement*~~ *Modification:*

Replace the first paragraph with the following: **17**

Pumps are operated with the liquid maintained at the temperature marked on the pump. They are operated until steady conditions are established unless they are marked with a maximum period of operation. In this case, they are operated for the marked period followed by the rest period specified in the instructions, the test being carried out for three cycles of operation. ***Shower-boost pumps*** *that are also supplied with cold water are operated with the cold water at 15 °C ± 2 °C.*

Pumps, other than ***shower-boost pumps****, marked with a maximum period of operation are also operated with the liquid maintained at 35 °C 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. **18**

Addition:

For pumps whose enclosure temperature arises mainly from the medium being pumped and where the pump is marked with a liquid temperature exceeding 35 °C, when applying Table 3, the temperature rise of the external enclosure is not measured and Table 101 is not applicable. **19**

The temperature rise of handles or grips of vents and air shutters shall not exceed the value specified in Table 3 for surfaces of handles, knobs, grips and similar parts which are held for short periods only in normal use. **20**

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 pumps without instructions that indicate the pump is not to be installed or used in areas accessible to children, and surfaces of aquarium pumps, garden pond pumps, table fountain pumps, shower-boost pumps, swimming pool pumps	***Surfaces of other pumps with instructions that indicate the pump is not to be installed or used in areas accessible to children***
Bare metal	*38*	*48*
Coated metal [b]	*42*	*59*
Glass and ceramic	*51*	*65*
Plastic and plastic coating > 0,4 mm [c, d]	*58*	*74*
NOTE The temperature rise limits of handles, knobs, grips, keyboards, keypads and similar parts are specified in Table 3.		

[a] *Temperature rises are not measured on:*
- *surfaces that are inaccessible to a 75 mm diameter probe having a hemispherical end;*
- *surfaces that are submersed during **normal operation**.*

[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. **21**

13 Leakage current and electric strength at operating temperature

This clause of Part 1 is applicable.

14 Transient overvoltages

This clause of Part 1 is applicable.

15 Moisture resistance

This clause of Part 1 is applicable except as follows.

15.1.1 *Addition:*

***Shower-boost pumps** are subjected to the appropriate test of IEC 60529:1989 including IEC 60529:1989/AMD1:1999 and IEC 60529:1989/AMD2:2013 both at rest and in operation while supplied at **rated voltage**.*

15.1.2 *Addition:*

Pumps classified IPX4 are tested with the inlet connected to the outlet by means of a tube filled with water. The pump is supplied at ***rated voltage*** *and the tube is positioned so that the pump operates at any value between the minimum and maximum total head.*

NOTE 101 The tube connecting the inlet to the outlet can go via a tank containing a suitable volume of water so as to avoid overheating the pump.

Submersible pumps *are immersed for 24 h in water containing approximately 1 % NaCl and having a temperature of 30 °C ± 5 °C. The water pressure on the enclosure is equal to*

– *1,5 times the pressure occurring at the maximum operating depth, when this depth does not exceed 10 m;*
– *1,3 times the pressure occurring at*
  - *the maximum operating depth, or*
  - *15 m, if this is higher.*

Before the test, the temperature of the pump is raised to within 5 K of the water temperature.

15.3 *Addition:*

Submersible pumps *are not subjected to the test.*

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:*

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

19.9 Not applicable.

19.101 *Pumps are supplied at* ***rated voltage*** *and operated at approximately half the maximum total head for 5 min, after which the inlet is removed from the liquid and the operation continued for 7 h. Pumps are then operated again for 5 min at approximately half the maximum total head.*

If the pump becomes inoperable during the test, it is disconnected from the supply and filled with water.

19.102 *Pumps marked with a maximum period of operation are supplied at **rated voltage** and operated under **normal operation** until steady conditions are established.*

20 Stability and mechanical hazards

This clause of Part 1 is applicable except as follows.

20.1 *Addition:*

***Submersible pumps** are not subjected to the test.*

20.2 *Addition:*

The requirement concerning moving parts of appliances does not apply to moving parts of pumps that are necessarily exposed to perform the working function, including moving parts of pumps, which are also intended for moving water containing fibrous materials or solids and pumps intended for moving liquids with higher viscosity than water. **22**

Probe 18 of IEC 61032 is not applied to

- ***sludge pumps**;*
- ***vertical wet pit pumps**;*
- ***submersible pumps**, other than **aquarium pumps**, table fountain pumps and **garden pond pumps**; and*
- ***shower-boost pumps**, swimming pool pumps and other pumps, if they have instructions that indicate that the pump is not to be installed or used in areas accessible to children.* **23**

21 Mechanical strength

21.1 ~~Modification~~ *Addition:*

*For pumps, other than **shower-boost pumps**, the impact energy is increased to 1,0 J.*

22 Construction

This clause of Part 1 is applicable except as follows.

22.6 *Addition:*

*The seal is removed from the shaft of **class II pumps**. The pump is supplied at **rated voltage** and operated for 10 min with the maximum head that can be achieved.*

If a static pressure can occur, the test is repeated at a pressure corresponding to the maximum total head.

The pump shall then withstand the electric strength test of 16.3.

Shower-boost pumps having a separate enclosure shall have a drain hole in the enclosure positioned so that the water can drain out without impairing electrical insulation, unless water cannot accumulate within the enclosure in normal use. ~~The~~ A drain hole that is needed to comply with the standard shall be at least 5 mm in diameter or 20 mm^2 in area with a width of least 3 mm. Holes that do not meet these dimensions are considered blocked when determining compliance. **24**

22.18 *Addition:*

NOTE 101 Direct contact between copper and aluminium or their alloys is likely to result in corrosion.

22.40 *Addition:*

~~The requirement is not applicable to **submersible pumps** and **vertical wet pit pumps**.~~

Submersible pumps for cleaning and other maintenance of swimming pools shall not be controlled by **remote operation** unless they are **class III pumps** with a **rated voltage** not exceeding 12 V. **25**

A switch to control the motor and a switch for stopping the operation of pumps for **remote operation** are not required for:

– pumps without **accessible moving parts** that are intended to be used in a closed hydraulic system;
– table fountain pumps;
– **vertical wet pit pumps**;
– **submersible pumps** or
– other pumps that can operate continuously without giving rise to a hazard. **26**

22.49 *Addition:*

The duration of operation is not required to be set before **remote operation** of:

– pumps without **accessible moving parts** that are intended to be used in a closed hydraulic system;
– table fountain pumps;
– **vertical wet pit pumps**;
– **submersible pumps** or
– other pumps that can operate continuously without giving rise to a hazard. **27**

22.51 *Addition:*

A control on the pump for manually setting the pump for **remote operation** is not required for:

– pumps without **accessible moving parts** that are intended to be used in a closed hydraulic system;
– table fountain pumps;
– **vertical wet pit pumps**;
– **submersible pumps** or
– other pumps that can operate continuously without giving rise to a hazard. **28**

22.101 Pumps shall withstand the static pressure occurring in normal use.

Compliance is checked by the following test.

The pump is filled with water, ensuring that all air is removed. The pressure is raised hydraulically to 1,2 times the pressure occurring at maximum total head and is maintained for 1 min.

*Inspection shall show that there is no trace of water on insulation that could result in a reduction of **clearances** and **creepage distances** below the values specified in Clause 29.*

Submersible pumps *and* ***vertical wet pit pumps*** *are not subjected to this test.*

22.102 The material of the pump shall not be affected by the liquid for which the pump is intended if a hazard could result.

Compliance is checked by inspection.

22.103 **Submersible pumps** and **vertical wet pit pumps** shall be constructed so that pollution of the liquid by lubricants is prevented as far as possible.

Compliance is checked by inspection.

22.104 **Submersible pumps** and **vertical wet pit pumps** having a mass exceeding 3 kg shall be constructed so that means for hoisting can be attached.

Compliance is checked by inspection.

22.105 **Class I submersible pumps** having a plastic enclosure shall be constructed so that leakage of liquid into the motor does not result in a hazard.

Compliance is checked by the following test.

A hole is made in the plastic enclosure.

The pump is placed in the most unfavourable position intended in normal use. Water containing approximately 1 % NaCl is poured into the enclosure at a rate of approximately 100 ml/min, ~~avoiding~~ without pouring directly onto ***live parts****. The accumulating water shall come into contact with earthed metal before it reaches* ***live parts****.*

22.106 **Shower-boost pumps** shall be constructed so that they can be permanently connected to the water supply.

Shower-boost pumps for wall mounting shall be constructed so that they can be securely fixed independently of the connection to the water supply. Keyhole slots, hooks and similar means, without any further means to prevent the pump from being inadvertently lifted off the wall, are not considered to be adequate means for fixing the pump securely.

Compliance is checked by inspection.

22.107 Pumps intended for permanent connection to fixed wiring, may be delivered with a separate connector, to ease the installation and establish the supply connection. Such a connector shall become a **non-detachable part** once engaged. **29**

Such a connector shall not be interchangeable with plugs and socket-outlets listed in IEC TR 60083 or IEC 60906-1 or with appliance couplers complying with the standard sheets of IEC 60320-3. **30**

23 Internal wiring

This clause of Part 1 is applicable.

24 Components

This clause of Part 1 is applicable except as follows.

24.1.3 *Addition:*

Level switches are subjected to 50 000 cycles of operation.

24.1.5 *Addition:*

NOTE 101 Connectors which are **non-detachable parts** once engaged are not considered to be part of an appliance coupler. **31**

24.1.101 The relevant standard for a connector as referenced in 22.107 is IEC 61984:2008. Classification and ratings used for the tests of IEC 61984:2008 shall correspond to the ratings of the pump and its intended use.

The following clauses of IEC 61984:2008 and the corresponding test requirements in Clause 7, are not applicable: 5.2 a), 5.4 d), 6.2.1, 6.2.2, 6.4.1, 6.4.2, 6.4.3, 6.10, 6.14.2, 6.14.3, 6.17, 6.19 and 6.20. Subclause 6.5.1 is also applicable for connectors without breaking capacity (COC). Subclauses 6.15 and 6.16 are applicable but are modified to the pump temperature ratings. The tests in 7.3.6, 7.3.7 are performed when the connector referenced in 22.107 is engaged. **32**

24.2 ~~*Modification*~~ *Addition:*

Level switches may be incorporated in **interconnection cords**.

25 Supply connection and external flexible cords

This clause of Part 1 is applicable except as follows.

25.1 ~~*Modification*~~ *Addition:*

Submersible pumps, other than **class III pumps**, shall be provided with a **supply cord** fitted with a plug.

25.3 ~~*Modification*~~ *Addition:*

Submersible pumps, other than **class III pumps**, shall be provided with a flexible cord.

Add the following Note after the first dashed item:

NOTE 101 The set of terminals can be located in a separate connector complying with 24.1.101. **33**

25.5 *Addition:*

Type X attachment is not allowed for **submersible pumps**.

Type Z attachment is allowed for

– pumps having a **rated power input** not exceeding 100 W;

– ~~pumps for garden ponds~~ **garden pond pumps**.

25.7 *Addition:*

For pumps intended for outdoor use and pumps intended for use in swimming pools, other than **class III pumps**, the **supply cord** shall be polychloroprene sheathed or equivalent synthetic elastomer and not be lighter than heavy polychloroprene sheathed cord (code designation 60245 IEC 66). However, **fixed pumps** having a **rated power input** not exceeding 1 kW and

portable pumps having a mass not exceeding 5 kg may be fitted with ordinary polychloroprene sheathed cord (code designation 60245 IEC 57).

~~NOTE 101~~ The mass of the **portable pump** is determined without water and without the **supply cord**.

25.8 *Addition:*

The **supply cord** of **submersible pumps** intended for outdoor use, other than **class III pumps**, shall have a length of 10 m or at least 3 m in excess of the maximum operating depth marked on the pump, whichever is greater.

The **supply cord** of other **submersible pumps**, other than **class III pumps**~~, aquarium pumps~~ and table fountain pumps, shall have a length of at least 3,0 m in excess of the maximum operating depth marked on the pump.

The **supply cord** of **aquarium pumps** shall have a length of at least 0,5 m in excess of the maximum operating depth marked on the pump, with a minimum length of 1,5 m. **34**

The **supply cord** of **deep well pumps** shall have a length of at least 3 m in excess of the maximum well depth, unless the **deep well pump** is provided with a coupling device having at least the same degree of protection as required for the pump.

25.14 *Addition:*

The requirement applies to ***portable pumps****, except table fountain pumps and* ***aquarium pumps***~~*, are subjected to the test*~~*.* The number of flexings for **type Z attachments** shall be 2 000 and for other attachments 1 000. **35**

26 Terminals for external conductors

This clause of Part 1 is applicable.

27 Provision for earthing

This clause of Part 1 is applicable.

28 Screws and connections

This clause of Part 1 is applicable.

29 Clearances, creepage distances and solid insulation

This clause of Part 1 is applicable.

30 Resistance to heat and fire

This clause of Part 1 is applicable except as follows.

30.2 *Modification:*

~~For **submersible pumps** if their **live parts** are completely contained within an enclosure of metal or porcelain and the instructions state that the pump shall be supplied through a residual~~

~~current device (RCD) having a rated residual operating current not exceeding 30 mA, 30.2.1 is applicable. For other pumps 30.2.3 is applicable.~~

Replace the two dashed items in the compliance criteria with the following:

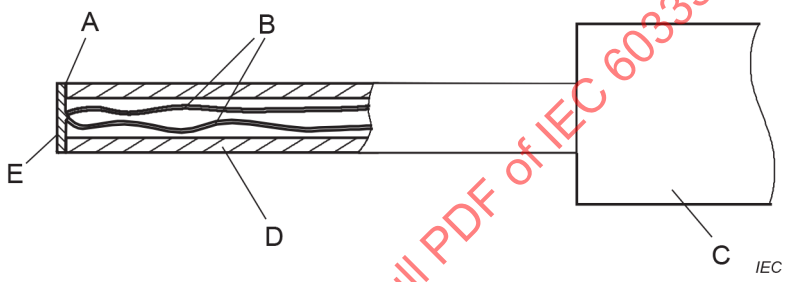
– *for pumps, other than **submersible pumps** with their **live parts** completely contained within an enclosure of metal or porcelain and instructions stating that the pump shall be supplied through a residual current device (RCD) having a rated residual operating current not exceeding 30 mA, 30.2.3 is applicable.* **36**

31 Resistance to rusting

This clause of Part 1 is applicable.

32 Radiation, toxicity and similar hazards

This clause of Part 1 is applicable.



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 N ± 1 N

D polycarbonate tube: inside diameter 3 mm, outside diameter 5 mm

E tinned copper disc: 5 mm diameter, 0,5 mm thick with flat contact face

Figure 101 – Probe for measuring surface temperatures

Annexes

The annexes of Part 1 are applicable except as follows.

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.

11 Heating

B.11.1 *Addition:*

*If marked with a maximum period of operation, **battery-operated pumps** are tested under the conditions of **normal operation** with the pump operated for the marked period followed by the rest period specified in the instructions, the test being carried out for three cycles of operation. Pumps, other than **shower-boost pumps**, marked with a maximum period of operation are also operated with the liquid maintained at 35 °C until steady conditions are established.*

Modification:

Replace the third paragraph with the following:

*For appliances incorporating **integral batteries** or **separable batteries** not disconnected from the appliance for charging purposes, and that cannot perform their intended function while the **batteries** are being charged, the appliance is operated as specified until it cannot perform its intended function due to the depletion of the **batteries**.* **37**

Bibliography

The bibliography of Part 1 is applicable except as follows.

Addition:

IEC 60335-2-51, *Household and similar electrical appliances – Safety – Part 2-51: Particular requirements for stationary circulation pumps for heating and service water installations*

List of comments

1 This revision is for alignment with IEC 60335-1:2020.

2 This revision is for alignment with IEC 60335-1:2020.

3 This revision is for alignment with IEC 60335-1:2020.

4 This revision maintains the normal operation while charging as specified in IEC 60335-1:2020.

5 Normal operation for vertical wet pit pumps is defined to ensure that the media pumped is representative of the intended worst case load.

6 New definitions are added to clarify the intended use and difference between aquarium pumps and garden pond pumps.

7 The maximum operating depth marking is updated to utilize the IEC 60417 symbol. This marking is required for all submersible aquarium pumps because the cord length in Subclause 25.8 is allowed to be 0,5 m longer than maximum operating depth.

8 The indoor use only marking is added to distinguish indoor use pumps from those intended for outdoor use where the additional marking legibility requirements of Subclause 7.14.101 are applicable.

9 It is common to require the meaning of symbols used in place of marking text to be explained in the instructions.

10 This instruction is added to ensure that normal operation in Subclause 3.1.9 for vertical wet pit pumps is representative of the intended worst case load.

11 This revision is intended to separate the information to be provided in the instructions from the "substance of" wording to be provided in the instructions.

12 This requirement is updated for clarity and to incorporate the note.

13 This additional instruction is related to the allowance of a separate connector in Subclause 22.107. The instruction is intended to avoid the mating of male and female parts of connectors not tested with the pump.

14 Exposure to daylight can cause markings to fade to the point that they are no longer legible. This UV conditioning is introduced to evaluate the marking legibility on pumps intended for outdoor use in daylight.

15 This revision is for alignment with IEC 60335-1:2020 and to identify those pumps where test probe 18 is not applied because the pumps are not accessible to children once installed.

16 Limits on the temperature rise of external accessible surfaces are introduced to address the risk of thermal injury from contact with external accessible surfaces based on IEC Guide 117 for Temperatures of touchable hot surfaces.

17 This revision maintains the Part 1 requirements for appliance outlets and socket outlets and for charging of battery-operated appliances.

18 Limits on the temperature rise of external accessible surfaces are introduced to address the risk of thermal injury from contact with external accessible surfaces based on IEC Guide 117 for Temperatures of touchable hot surfaces.

19 This requirement is updated for clarity and to also exclude surface temperatures specified in Table 101 for these pumps.

20 This addition clarifies that these parts are considered to be held for short periods only.

21 This revision is for alignment with IEC 60335-1:2020.

22 This addition is intended to clarify the Part 1 requirement for pumps regarding moving parts that are necessarily exposed to perform the working function.

23 This revision is for alignment with IEC 60335-1:2020 and to identify those pumps where test probe 18 is not applied because the pumps are not accessible to children once installed.

24 Clarification that a drain hole needs to meet the minimum dimensions or it is considered to be blocked when determining compliance.

25 Additional requirements for remote operation were added to IEC 60335-1:2020. However, some appliances covered by this Part 2 Standard are not considered suitable for remote operation because they are considered to give rise to a hazard if operated continuously, automatically or remotely.

26 A switch to control the motor is not required if the moving parts are not accessible after installation.

Additional requirements for remote operation were added to IEC 60335-1:2020. However, a switch to stop operation of an appliance for remote operation is not necessary for some appliances covered by this Part 2 Standard because they do not have accessible moving parts and are not considered to give rise to a hazard when operated continuously, automatically or remotely.

27 Additional requirements for remote operation were added to IEC 60335-1:2020. However, the duration of operation of an appliance for remote operation does not need to be set before remote operation for some appliances covered by this Part 2 Standard because they are not considered to give rise to a hazard when operated continuously.

28 Additional requirements for remote operation were added to IEC 60335-1:2020. However, a control on the appliance for manually setting the appliance for remote operation is not required for some appliances covered by this Part 2 Standard because they are not considered to give rise to a hazard when operated continuously, automatically or remotely.

29 This addition allows use of a separate connector for the supply connection. This separate connector is intended to facilitate installation and replacement of the appliance.

30 This is to avoid the separate connector for installation purposes that can mate with standardised plug systems. This note clarifies that the separate connector referenced in Subclause 22.107 should not be confused with an appliance coupler because it cannot be disconnected “at will“ (IEC ref 442-07-01).

31 This note clarifies that the separate connector referenced in Subclause 22.107 should not be confused with an appliance coupler because it cannot be disconnected “at will“ (IEC ref 442-07-01).

32 Subclause 24.1.101 sets the requirements for the separate connector referenced in Subclause 22.107 and the conditions under which it must comply with selected parts of IEC 61984:2008. Requirements in clauses made not applicable are already part of 60335 elsewhere or not relevant for this type of connector.

33 This is a clarification that a supply connection utilising a separate connector as referenced in Subclause 22.107, will be allowed under the first dashed item (see Subclause 25.3 in IEC 60335-1:2020).

34 The minimum cord length is added for aquarium pumps to reduce the likelihood that the pump may be connected via a cord extension set as defined in IEC 60884-1.

35 Portable pumps are not intended to be moved while in use. Therefore, the number of flexings is reduced from what is specified in the Part 1 for appliances that are intended to be moved while in operation.

36 This revision clarifies the applicable requirements in Subclause 30.2 for pumps.

37 These Annex B revisions align testing of battery-operated pumps with the testing of mains operated pumps.

IEC 60335-2-41

Edition 5.0 2024-01

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Household and similar electrical appliances – Safety – Part 2-41: Particular requirements for pumps

Appareils électrodomestiques et analogues – Sécurité – Partie 2-41: Exigences particulières pour les pompes

IEC 60335-2-41:2024-01 (en-fr)

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-41: Particular requirements for pumps

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 received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at https://patents.iec.ch. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 60335-2-41 has been prepared by IEC technical committee 61: Safety of household and similar electrical appliances. It is an International Standard.

This fifth edition cancels and replaces the fourth edition published in 2012. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) alignment with IEC 60335-1:2020;
b) modification or conversion of some notes to normative text (Clause 1, 7.12.1, 25.7);
c) introduction of IEC 60417 symbol for maximum operating depth and indoor use only (7.1, 7.6, 7.12.1);
d) clarification of requirements for aquarium pumps and garden pond pumps;

e) addition of legibility requirements for markings exposed to solar radiation (7.14);

f) clarification of pumps subjected to test probe 18 (8.1.1, 20.2);

g) introduction of accessible surface temperature limits (Clause 11);

h) addition of requirements for IEC 61984 connectors for pumps intended for permanent connection to fixed wiring (22.107, 24.1.5, 24.1.101, 25.3).

i) clarifications on remote operation for pumps in scope of this standard (22.40, 22.49, 22,51)

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

Draft	Report on voting
61/7007/FDIS	61/7079/RVD

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

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

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

A list of all parts of the IEC 60335 series, under the general title: *Household and similar electrical appliances – Safety*, can be found on the IEC website.

This part 2 is to be used in conjunction with the latest edition of IEC 60335-1 and its amendments unless that edition precludes it; in that case, the latest edition that does not preclude it is used. It was established on the basis of the sixth edition (2020) of that standard.

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

This part 2 supplements or modifies the corresponding clauses in IEC 60335-1, so as to convert that publication into the IEC standard: Particular requirements for pumps.

When a particular subclause of Part 1 is not mentioned in this part 2, that subclause applies as far as is reasonable. When this standard states “addition”, “modification” or “replacement”, the relevant text in Part 1 is to be adapted accordingly.

NOTE 2 The following numbering system is used:

– subclauses, tables and figures that are numbered starting from 101 are additional to those in Part 1;

– unless notes are in a new subclause or involve notes in Part 1, they are numbered starting from 101, including those in a replaced clause or subclause;

– additional annexes are lettered AA, BB, etc.

NOTE 3 The following print types are used:

– requirements: in roman type;

– *test specifications: in italic type*;

– notes: in small roman type.

Words in **bold** in the text are defined in Clause 3. When a definition concerns an adjective, the adjective and the associated noun are also in bold.

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

- reconfirmed,
- withdrawn, or
- revised.

NOTE 4 The attention of National Committees is drawn to the fact that equipment manufacturers and testing organizations can need a transitional period following publication of a new, amended or revised IEC publication in which to make products in accordance with the new requirements and to equip themselves for conducting new or revised tests.

It is the recommendation of the committee that the content of this publication be adopted for implementation nationally not earlier than 12 months or later than 36 months from the date of publication.

The following differences exist in the countries indicated below.

– 6.1: Pumps intended to be used in or close to swimming pools, garden ponds and similar places may be class 0I if their supply circuit incorporates a residual current device. Other pumps may be class 0I (Japan).

– 7.14: Marking and labelling systems complying with UL 969 for outdoor use are considered to meet the UV exposure compliance criteria (USA).

INTRODUCTION

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-41: Particular requirements for pumps

1 Scope

This clause of Part 1 is replaced by the following.

This part of IEC 60335 deals with the safety of electric pumps for liquids having a temperature not exceeding 90 °C, intended for household and similar purposes, their **rated voltage** being not more than 250 V for single-phase appliances and 480 V for other appliances including direct current (DC) supplied appliances and **battery-operated appliances**.

Examples of appliances within the scope of this standard are

– **aquarium pumps**;
– **garden pond pumps**;
– **shower-boost pumps**;
– **sludge pumps**;
– **submersible pumps**;
– table fountain pumps;
– **vertical wet pit pumps**.

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

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

– persons (including children) whose
  - physical, sensory or mental capabilities; or
  - lack of experience and knowledge

  prevents them from using the appliance safely without supervision or instruction;
– children playing with the appliance.

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 and similar authorities.

This standard does not apply to

– **stationary circulation pumps** for heating and service water installations (IEC 60335-2-51);
– pumps for flammable liquids;
– pumps intended exclusively for industrial purposes;

– pumps intended to be used in locations where special conditions prevail, such as the presence of a corrosive or explosive atmosphere (dust, vapour or gas);
– pumps incorporating chlorinators of the electrolytic type.

Pumps incorporated in appliances are not covered by this standard unless a specific reference is made.

2 Normative references

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

Addition:

IEC 60068-2-5:2018, *Environmental testing − Part 2-5: Tests − Test S: Simulated solar radiation at ground level and guidance for solar radiation testing and weathering*

IEC 60364-7-701, *Low voltage electrical installations – Part 7-701: Requirements for special installations or locations – Locations containing a bath or shower*

IEC 60364-7-702, *Low voltage electrical installations – Part 7-702: Requirements for special installations or locations – Swimming pools and fountains*

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

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

3 Terms and definitions

This clause of Part 1 is applicable except as follows.

3.1 Definitions relating to physical characteristics

3.1.9 *Modification:*

Replace the first paragraph with the following:

operation of the appliance under the following conditions:

Pumps are operated with the inlet in liquid at zero pressure, and the discharge outlet is maintained between the minimum and maximum total head, so that the highest power input is attained. The total head is measured between the inlet and the discharge outlet.

Sludge pumps are operated with water.

Vertical wet pit pumps are operated with water unless they can also pump sludge, in which case they are operated with sludge having a density not less than the maximum density specified in the instructions and not more than 105 % of the specified maximum density.

3.5 Definitions relating to types of appliances

3.5.101
submersible pump
pump having the electrical part completely or partially immersed in liquid during normal use

Note 1 to entry: The motor windings may be dry, immersed in oil or in the pumped liquid.

3.5.102
vertical wet pit pump
pump having the electrical part separated from the hydraulic part and not immersed in liquid during normal use

Note 1 to entry: Controls such as water level switches may be immersed in the liquid.

3.5.103
sludge pump
pump intended for moving a mixture of water and small solids

Note 1 to entry: **Sludge pumps** may be **submersible pumps** or **vertical wet pit pumps**.

3.5.104
shower-boost pump
pump for installation in the water supply system to increase the water flow for showering purposes

3.5.105
deep well pump
multistage **submersible pump** intended to be used in bore wells

3.5.106
aquarium pump
pump intended to be used indoors with an aquarium

3.5.107
garden pond pump
pump intended to be used outdoors with a garden pond

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.

5.7 *Addition:*

The liquid temperature is maintained between 0 °C and –5 °C of the temperature marked on the pump.

5.101 *Pumps are tested as **portable appliances**, unless they are **fixed appliances**.*

5.102 ***Stationary pumps** having a three-phase motor that does not incorporate a **protective device** are installed with an appropriate device, in accordance with the instructions.*

6 Classification

This clause of Part 1 is applicable except as follows.

6.1 *Modification:*

Replace the first paragraph with the following:

Submersible pumps for use in swimming pools when persons are in the pool shall be **class III** with a **rated voltage** not exceeding 12 V.

Other **submersible pumps** for use in water and other conducting liquids shall be **class I** or **class III**. However, **aquarium pumps** may be **class II**. Table fountain pumps for indoor use may also be **class II** as long as their **rated power input** does not exceed 25 W.

Portable pumps for cleaning and other maintenance of swimming pools shall be **class I** or **class III**.

Other pumps shall be **class I**, **class II** or **class III**.

6.2 *Addition:*

Submersible pumps shall be IPX8.

Portable pumps for cleaning and other maintenance of swimming pools shall be at least IPX7.

Shower-boost pumps intended for installation outside of zones 1 and 2, as specified in IEC 60364-7-701, shall be at least IPX2.

Other pumps shall be at least IPX4.

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.1 *Addition:*

Pumps having a **rated power input** exceeding 50 W shall be marked with

– H_{min}, the minimum total head, in metres, if greater than zero;

– the direction of rotation (for pumps having three-phase motors).

The maximum operating depth, in metres, with a minimum of 1 m, shall be marked using symbol IEC 60417-6444 (2020-12) for:

– **submersible aquarium pumps**; and

– other **submersible pumps** having a **rated power input** exceeding 50 W.

Pumps shall be marked with the maximum liquid temperature, which shall not be less than 35 °C. If the temperature exceeds 35 °C, pumps shall be marked with the maximum period of operation, unless they are intended for continuous operation.

Pumps that are not intended for outdoor use shall be marked with symbol IEC 60417-5957 (2004-12) or with the substance of the following:

For indoor use only

7.6 *Addition:*

	[symbol IEC 60417-6444 (2020-12)]	maximum operating depth where X specifies the value

Note 101 The indication of the maximum operating depth in metres can be located on the left or right side adjacent to the arrows.

	[symbol IEC 60417-5957 (2004-12)]	for indoor use only

7.12 *Addition:*

If symbol IEC 60417-6444 (2020-12) or symbol 60417-5957(2004-12) is used the meaning shall be explained.

The instructions for **class I portable pumps** for cleaning and other maintenance of swimming pools shall include the substance of the following:

– the pump must not be used when people are in the water;

– the pump must be supplied through a residual current device (RCD) having a rated residual operating current not exceeding 30 mA.

The instructions for pumps marked with a temperature exceeding 35 °C shall state the maximum period of operation and the minimum rest period, unless the pump is intended for continuous operation at this temperature.

For **vertical wet pit pumps**, the instruction shall indicate the maximum density (in kg/m^3) of the media intended for use with the pump.

The instructions for **submersible pumps** for use in swimming pools shall state the substance of the following:

Disconnect the pump from the supply mains before carrying out user maintenance such as cleaning the filter.

7.12.1 *Addition:*

The installation instructions shall provide information on requirements specified for the electrical installation and shall include reference to national wiring rules. If reference is made to zones, the corresponding drawings shall be included.

The installation instructions shall include the following:

– for pumps having a **rated power input** exceeding 50 W, the maximum total head, in metres;

– for **submersible pumps** and **vertical wet pit pumps** containing lubricants, the substance of the following:

Pollution of the liquid could occur due to leakage of lubricants.

– for **stationary pumps** having a three-phase motor not incorporating a **protective device,** the substance of the following:

A protective device is to be installed in the fixed wiring and its characteristics are to be specified.

The installation instructions for pumps intended to be used in outdoor fountains, garden ponds and similar places shall state that the pump is to be supplied through a residual current device (RCD) having a rated residual operating current not exceeding 30 mA.

The installation instructions for **class I pumps** for swimming pools shall state that the pump is to be supplied by an isolating transformer or supplied through a residual current device (RCD) having a rated residual operating current not exceeding 30 mA.

The installation instructions for **class III pumps** intended to be installed in zone 0 of a swimming pool, as defined in IEC 60364-7-702, shall state that the transformer is to be located outside zone 1.

The installation instructions for **class II pumps** intended to be fixed:

– in zone 1 of a swimming pool, as defined in IEC 60364-7-702;

– in a sump without an adequate outlet for the liquid; or

– close to a garden pond or similar place

shall state that the pump is to be located where flooding cannot occur.

For **fixed pumps** intended for permanent connection to fixed wiring, delivered with a separate connector to ease the installation and establish the supply connection, the instructions shall state the substance of the following:

Only use the supplied connector when installing the pump.

7.14.101 Markings on pumps intended for outdoor use in daylight shall remain legible after being exposed to solar radiation.

NOTE 1 Submersible pumps are not considered to be used in daylight.

NOTE 2 Markings located at a position without direct sunlight exposure in normal use (e.g. on the bottom of an enclosure) are not considered to be used in daylight.

This requirement does not apply to markings that are moulded in, engraved, or stamped and either raised above or have a depth below the surface of at least 0,25 mm and laser engraved markings.

Compliance is checked by IEC 60068-2-5:2018 procedure Sb 1 using a xenon-arc lamp as the radiation source.

The test conditions shall be as specified in IEC 60068-2-5:2018, Table 5. Both the narrowband irradiance level and the black panel temperature shall be controlled.

The test shall be in cycles for a total duration of 515 h.

After the test, the marking shall be clearly legible.

8 Protection against access to live parts

This clause of Part 1 is applicable except as follows.

8.1.1 *Addition:*

Probe 18 of IEC 61032 is not applied to

– ***sludge pumps****;*
– ***vertical wet pit pumps****;*
– ***submersible pumps****, other than* ***aquarium pumps****, table fountain pumps and* ***garden pond pumps****; and*
– ***shower-boost pumps****, swimming pool pumps and other pumps, if they have instructions that indicate that the pump is not to be installed or used in areas accessible to children.*

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.

11.3 *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 N ± 1 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:

Pumps are operated with the liquid maintained at the temperature marked on the pump. They are operated until steady conditions are established unless they are marked with a maximum period of operation. In this case, they are operated for the marked period followed by the rest period specified in the instructions, the test being carried out for three cycles of operation. ***Shower-boost pumps*** *that are also supplied with cold water are operated with the cold water at 15 °C ± 2 °C.*

Pumps, other than ***shower-boost pumps****, marked with a maximum period of operation are also operated with the liquid maintained at 35 °C 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.

Addition:

For pumps whose enclosure temperature arises mainly from the medium being pumped and where the pump is marked with a liquid temperature exceeding 35 °C, when applying Table 3, the temperature rise of the external enclosure is not measured and Table 101 is not applicable.

The temperature rise of handles or grips of vents and air shutters shall not exceed the value specified in Table 3 for surfaces of handles, knobs, grips and similar parts which are held for short periods only in normal use.

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 pumps without instructions that indicate the pump is not to be installed or used in areas accessible to children, and surfaces of aquarium pumps, garden pond pumps, table fountain pumps, shower-boost pumps, swimming pool pumps	***Surfaces of other pumps with instructions that indicate the pump is not to be installed or used in areas accessible to children***
Bare metal	*38*	*48*
Coated metal [b]	*42*	*59*
Glass and ceramic	*51*	*65*
Plastic and plastic coating > 0,4 mm [c, d]	*58*	*74*
NOTE The temperature rise limits of handles, knobs, grips, keyboards, keypads and similar parts are specified in Table 3.		

[a] *Temperature rises are not measured on:*

- *surfaces that are inaccessible to a 75 mm diameter probe having a hemispherical end;*
- *surfaces that are submersed during* ***normal operation****.*

[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 except as follows.

15.1.1 *Addition:*

***Shower-boost pumps** are subjected to the appropriate test of IEC 60529:1989 including IEC 60529:1989/AMD1:1999 and IEC 60529:1989/AMD2:2013 both at rest and in operation while supplied at **rated voltage**.*

15.1.2 *Addition:*

*Pumps classified IPX4 are tested with the inlet connected to the outlet by means of a tube filled with water. The pump is supplied at **rated voltage** and the tube is positioned so that the pump operates at any value between the minimum and maximum total head.*

NOTE 101 The tube connecting the inlet to the outlet can go via a tank containing a suitable volume of water so as to avoid overheating the pump.

***Submersible pumps** are immersed for 24 h in water containing approximately 1 % NaCl and having a temperature of 30 °C ± 5 °C. The water pressure on the enclosure is equal to*

- *1,5 times the pressure occurring at the maximum operating depth, when this depth does not exceed 10 m;*
- *1,3 times the pressure occurring at*
  - *the maximum operating depth, or*
  - *15 m, if this is higher.*

Before the test, the temperature of the pump is raised to within 5 K of the water temperature.

15.3 *Addition:*

***Submersible pumps** are not subjected to the test.*

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:*

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

19.9 Not applicable.

19.101 *Pumps are supplied at **rated voltage** and operated at approximately half the maximum total head for 5 min, after which the inlet is removed from the liquid and the operation continued for 7 h. Pumps are then operated again for 5 min at approximately half the maximum total head.*

If the pump becomes inoperable during the test, it is disconnected from the supply and filled with water.

19.102 *Pumps marked with a maximum period of operation are supplied at **rated voltage** and operated under **normal operation** until steady conditions are established.*

20 Stability and mechanical hazards

This clause of Part 1 is applicable except as follows.

20.1 *Addition:*

***Submersible pumps** are not subjected to the test.*

20.2 *Addition:*

The requirement concerning moving parts of appliances does not apply to moving parts of pumps that are necessarily exposed to perform the working function, including moving parts of pumps, which are also intended for moving water containing fibrous materials or solids and pumps intended for moving liquids with higher viscosity than water.

Probe 18 of IEC 61032 is not applied to

- ***sludge pumps**;*
- ***vertical wet pit pumps**;*
- ***submersible pumps**, other than **aquarium pumps**, table fountain pumps and **garden pond pumps**; and*
- ***shower-boost pumps**, swimming pool pumps and other pumps, if they have instructions that indicate that the pump is not to be installed or used in areas accessible to children.*

21 Mechanical strength

21.1 *Addition:*

*For pumps, other than **shower-boost pumps**, the impact energy is increased to 1,0 J.*

22 Construction

This clause of Part 1 is applicable except as follows.

22.6 *Addition:*

*The seal is removed from the shaft of **class II pumps**. The pump is supplied at **rated voltage** and operated for 10 min with the maximum head that can be achieved.*

If a static pressure can occur, the test is repeated at a pressure corresponding to the maximum total head.

The pump shall then withstand the electric strength test of 16.3.

Shower-boost pumps having a separate enclosure shall have a drain hole in the enclosure positioned so that the water can drain out without impairing electrical insulation, unless water cannot accumulate within the enclosure in normal use. A drain hole that is needed to comply with the standard shall be at least 5 mm in diameter or 20 mm^2 in area with a width of least 3 mm. Holes that do not meet these dimensions are considered blocked when determining compliance.

22.18 *Addition:*

NOTE 101 Direct contact between copper and aluminium or their alloys is likely to result in corrosion.

22.40 *Addition:*

Submersible pumps for cleaning and other maintenance of swimming pools shall not be controlled by **remote operation** unless they are **class III pumps** with a **rated voltage** not exceeding 12 V.

A switch to control the motor and a switch for stopping the operation of pumps for **remote operation** are not required for:

– pumps without **accessible moving parts** that are intended to be used in a closed hydraulic system;
– table fountain pumps;
– **vertical wet pit pumps**;
– **submersible pumps** or
– other pumps that can operate continuously without giving rise to a hazard.

22.49 *Addition:*

The duration of operation is not required to be set before **remote operation** of:

– pumps without **accessible moving parts** that are intended to be used in a closed hydraulic system;
– table fountain pumps;
– **vertical wet pit pumps**;
– **submersible pumps** or
– other pumps that can operate continuously without giving rise to a hazard.

22.51 *Addition:*

A control on the pump for manually setting the pump for **remote operation** is not required for:

– pumps without **accessible moving parts** that are intended to be used in a closed hydraulic system;
– table fountain pumps;
– **vertical wet pit pumps**;
– **submersible pumps** or

– other pumps that can operate continuously without giving rise to a hazard.

22.101 Pumps shall withstand the static pressure occurring in normal use.

Compliance is checked by the following test.

The pump is filled with water, ensuring that all air is removed. The pressure is raised hydraulically to 1,2 times the pressure occurring at maximum total head and is maintained for 1 min.

*Inspection shall show that there is no trace of water on insulation that could result in a reduction of **clearances** and **creepage distances** below the values specified in Clause 29.*

***Submersible pumps** and **vertical wet pit pumps** are not subjected to this test.*

22.102 The material of the pump shall not be affected by the liquid for which the pump is intended if a hazard could result.

Compliance is checked by inspection.

22.103 **Submersible pumps** and **vertical wet pit pumps** shall be constructed so that pollution of the liquid by lubricants is prevented as far as possible.

Compliance is checked by inspection.

22.104 **Submersible pumps** and **vertical wet pit pumps** having a mass exceeding 3 kg shall be constructed so that means for hoisting can be attached.

Compliance is checked by inspection.

22.105 **Class I submersible pumps** having a plastic enclosure shall be constructed so that leakage of liquid into the motor does not result in a hazard.

Compliance is checked by the following test.

A hole is made in the plastic enclosure.

*The pump is placed in the most unfavourable position intended in normal use. Water containing approximately 1 % NaCl is poured into the enclosure at a rate of approximately 100 ml/min, without pouring directly onto **live parts**. The accumulating water shall come into contact with earthed metal before it reaches **live parts**.*

22.106 **Shower-boost pumps** shall be constructed so that they can be permanently connected to the water supply.

Shower-boost pumps for wall mounting shall be constructed so that they can be securely fixed independently of the connection to the water supply. Keyhole slots, hooks and similar means, without any further means to prevent the pump from being inadvertently lifted off the wall, are not considered to be adequate means for fixing the pump securely.

Compliance is checked by inspection.

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

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

23 Internal wiring

This clause of Part 1 is applicable.

24 Components

This clause of Part 1 is applicable except as follows.

24.1.3 *Addition:*

Level switches are subjected to 50 000 cycles of operation.

24.1.5 *Addition:*

NOTE 101 Connectors which are **non-detachable parts** once engaged are not considered to be part of an appliance coupler.

24.1.101 The relevant standard for a connector as referenced in 22.107 is IEC 61984:2008. Classification and ratings used for the tests of IEC 61984:2008 shall correspond to the ratings of the pump and its intended use.

The following clauses of IEC 61984:2008 and the corresponding test requirements in Clause 7, are not applicable: 5.2 a), 5.4 d), 6.2.1, 6.2.2, 6.4.1, 6.4.2, 6.4.3, 6.10, 6.14.2, 6.14.3, 6.17, 6.19 and 6.20. Subclause 6.5.1 is also applicable for connectors without breaking capacity (COC). Subclauses 6.15 and 6.16 are applicable but are modified to the pump temperature ratings. The tests in 7.3.6, 7.3.7 are performed when the connector referenced in 22.107 is engaged.

24.2 *Addition:*

Level switches may be incorporated in **interconnection cords**.

25 Supply connection and external flexible cords

This clause of Part 1 is applicable except as follows.

25.1 *Addition:*

Submersible pumps, other than **class III pumps**, shall be provided with a **supply cord** fitted with a plug.

25.3 *Addition:*

Submersible pumps, other than **class III pumps**, shall be provided with a flexible cord.

Add the following Note after the first dashed item:

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

25.5 *Addition:*

Type X attachment is not allowed for **submersible pumps**.

Type Z attachment is allowed for

– pumps having a **rated power input** not exceeding 100 W;
– **garden pond pumps**.

25.7 *Addition:*

For pumps intended for outdoor use and pumps intended for use in swimming pools, other than **class III pumps**, the **supply cord** shall be polychloroprene sheathed or equivalent synthetic elastomer and not be lighter than heavy polychloroprene sheathed cord (code designation 60245 IEC 66). However, **fixed pumps** having a **rated power input** not exceeding 1 kW and **portable pumps** having a mass not exceeding 5 kg may be fitted with ordinary polychloroprene sheathed cord (code designation 60245 IEC 57).

The mass of the **portable pump** is determined without water and without the **supply cord**.

25.8 *Addition:*

The **supply cord** of **submersible pumps** intended for outdoor use, other than **class III pumps**, shall have a length of 10 m or at least 3 m in excess of the maximum operating depth marked on the pump, whichever is greater.

The **supply cord** of other **submersible pumps**, other than **class III pumps** and table fountain pumps, shall have a length of at least 3,0 m in excess of the maximum operating depth marked on the pump.

The **supply cord** of **aquarium pumps** shall have a length of at least 0,5 m in excess of the maximum operating depth marked on the pump, with a minimum length of 1,5 m.

The **supply cord** of **deep well pumps** shall have a length of at least 3 m in excess of the maximum well depth, unless the **deep well pump** is provided with a coupling device having at least the same degree of protection as required for the pump.

25.14 *Addition:*

*The requirement applies to **portable pumps**, except table fountain pumps and **aquarium pumps**.* The number of flexings for **type Z attachments** shall be 2 000 and for other attachments 1 000.

26 Terminals for external conductors

This clause of Part 1 is applicable.

27 Provision for earthing

This clause of Part 1 is applicable.

28 Screws and connections

This clause of Part 1 is applicable.

29 Clearances, creepage distances and solid insulation

This clause of Part 1 is applicable.

30 Resistance to heat and fire

This clause of Part 1 is applicable except as follows.

30.2 *Modification:*

Replace the two dashed items in the compliance criteria with the following:

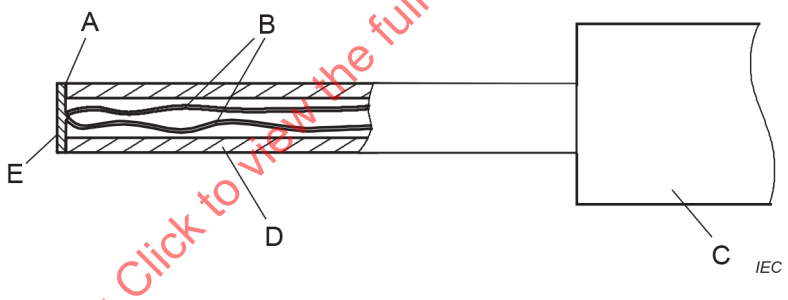
– *for pumps, other than **submersible pumps** with their **live parts** completely contained within an enclosure of metal or porcelain and instructions stating that the pump shall be supplied through a residual current device (RCD) having a rated residual operating current not exceeding 30 mA, 30.2.3 is 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.



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 N ± 1 N

D polycarbonate tube: inside diameter 3 mm, outside diameter 5 mm

E tinned copper disc: 5 mm diameter, 0,5 mm thick with flat contact face

Figure 101 – Probe for measuring surface temperatures

Annexes

The annexes of Part 1 are applicable except as follows.

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.

11 Heating

B.11.1 *Addition:*

*If marked with a maximum period of operation, **battery-operated pumps** are tested under the conditions of **normal operation** with the pump operated for the marked period followed by the rest period specified in the instructions, the test being carried out for three cycles of operation. Pumps, other than **shower-boost pumps**, marked with a maximum period of operation are also operated with the liquid maintained at 35 °C until steady conditions are established.*

Modification:

Replace the third paragraph with the following:

*For appliances incorporating **integral batteries** or **separable batteries** not disconnected from the appliance for charging purposes, and that cannot perform their intended function while the **batteries** are being charged, the appliance is operated as specified until it cannot perform its intended function due to the depletion of the **batteries**.*

Bibliography

The bibliography of Part 1 is applicable except as follows.

Addition:

IEC 60335-2-51, *Household and similar electrical appliances – Safety – Part 2-51: Particular requirements for stationary circulation pumps for heating and service water installations*

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SOMMAIRE

COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

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APPAREILS ÉLECTRODOMESTIQUES ET ANALOGUES – SÉCURITÉ –

Partie 2-41: Exigences particulières pour les pompes

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L'IEC 60335-2-41 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 cinquième édition annule et remplace la quatrième édition parue en 2012. 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 modifiées ou converties en texte normatif (Article 1, 7.12.1, 25.7);

c) le symbole IEC 60417 a été ajouté pour la profondeur maximale de fonctionnement et pour l'usage intérieur uniquement (7.1, 7.6, 7.12.1);

d) les exigences relatives aux pompes pour aquariums et aux pompes pour bassins de jardin ont été clarifiées;

e) des exigences de lisibilité ont été ajoutées pour les marquages exposés aux rayonnements solaires (7.14);

f) les pompes vérifiées à l'aide du calibre d'essai 18 ont été clarifiées (8.1.1, 20.2);

g) des limites de température ont été ajoutées pour les surfaces accessibles (Article 11);

h) des exigences ont été ajoutées pour les connecteurs IEC 61984 des pompes destinées à être raccordées de façon permanente à des conducteurs fixes (22.107, 24.1.5, 24.1.101, 25.3);

i) la commande à distance des pompes relavant du domaine d'application de la présente norme a été clarifiée (22.40, 22.49, 22,51).

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

Projet	Rapport de vote
61/7007/FDIS	61/7079/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à son approbation.

La langue employée pour l'élaboration de cette Norme internationale est l'anglais.

Ce document a été rédigé selon les Directives ISO/IEC, Partie 2, il a été développé selon les Directives ISO/IEC, Partie 1 et les Directives ISO/IEC, Supplément IEC, disponibles sous www.iec.ch/members_experts/refdocs. Les principaux types de documents développés par l'IEC sont décrits plus en détail sous www.iec.ch/publications.

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 "la Partie 1" utilisée dans la présente norme fait référence à l'IEC 60335-1.

La présente partie 2 complète ou modifie les articles correspondants de l'IEC 60335-1, de façon à transformer cette publication en norme IEC: Exigences particulières pour les pompes.

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:

– les paragraphes, tableaux et figures qui s'ajoutent à ceux de la Partie 1 sont numérotés à partir de 101;

– à l'exception de celles qui sont dans un nouveau paragraphe ou de celles qui concernent des notes de la Partie 1, les notes sont numérotées à partir de 101, y compris celles des articles ou paragraphes qui sont remplacés;

– les annexes qui sont ajoutées sont désignées AA, BB, etc.

NOTE 3 Les caractères d'imprimerie suivants sont utilisés:

– exigences: caractères romains;

– *modalités d'essais: caractères italiques*;

– notes: petits caractères romains.

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

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.

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

Le comité recommande que le contenu de cette publication soit adopté pour application nationale (obligatoire) au plus tôt 12 mois et au plus tard 36 mois après la date de publication.

Les différences suivantes existent dans les pays indiqués ci-après.

– 6.1: Les pompes destinées à être utilisées dans ou à proximité de piscines, bassins de jardin et lieux analogues peuvent être de la classe 0I si leur circuit d'alimentation comporte un dispositif à courant différentiel résiduel (DDR). Les autres pompes peuvent être de la classe 0I (Japon).

– 7.14: Les systèmes de marquage et d'étiquetage conformes à la norme UL 969 relative à l'étiquetage et au marquage des appareils destinés à un usage extérieur sont présumés remplir les critères de conformité en matière d'exposition aux UV (États-Unis).

INTRODUCTION

Il a été admis par hypothèse, en établissant la présente Norme internationale, que l'exécution de ses dispositions était confiée à des personnes expérimentées et ayant une qualification appropriée.

Les documents de recommandations concernant l'application des exigences de sécurité pour les appareils peuvent être consultés dans les documents de support du CE 61, accessibles sur le site web de l'IEC à l'adresse:

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

Cette information est donnée à l'intention des utilisateurs de la présente Norme internationale et ne constitue nullement un remplacement du texte normatif de la présente norme.

La présente norme reconnaît le niveau de protection internationalement accepté contre les dangers électriques, mécaniques, thermiques, liés au feu et au rayonnement des appareils, lorsqu'ils fonctionnent comme en usage normal en tenant compte des instructions du fabricant. Elle couvre également les situations anormales auxquelles on peut s'attendre dans la pratique et elle tient compte de la façon dont les phénomènes électromagnétiques peuvent affecter le fonctionnement sûr des appareils.

La présente norme tient compte autant que possible des exigences de l'IEC 60364, de façon à rester compatible avec les règles d'installation quand l'appareil est raccordé au réseau d'alimentation. Cependant, des règles nationales d'installation peuvent être différentes.

Si un appareil relevant du domaine d'application de la présente norme comporte également des fonctions couvertes par une autre partie 2 de l'IEC 60335, la partie 2 correspondante est appliquée à chaque fonction séparément, dans la limite du raisonnable. Si cela s'applique, l'influence d'une fonction sur les autres fonctions est prise en compte.

Lorsqu'une partie 2 ne comporte pas d'exigences complémentaires pour couvrir les dangers traités dans la Partie 1, la Partie 1 s'applique.

NOTE 1 Cela signifie que les comités d'études responsables pour les Parties 2 ont déterminé qu'il n'était pas nécessaire de spécifier des exigences particulières pour l'appareil en question en plus des exigences générales.

La présente norme est une norme de famille de produits traitant de la sécurité d'appareils et a préséance sur les normes horizontales et génériques couvrant le même sujet.

NOTE 2 Les publications horizontales, les publications fondamentales de sécurité et les publications groupées de sécurité couvrant un danger ne s'appliquent pas, parce qu'elles ont été prises en considération lorsque les exigences générales et particulières ont été étudiées pour la série de normes IEC 60335.

Un appareil conforme au texte de la présente norme ne sera pas nécessairement jugé conforme aux principes de sécurité de la norme si, lorsqu'il est examiné et soumis aux essais, il apparaît qu'il présente d'autres caractéristiques qui compromettent le niveau de sécurité visé par ces exigences.

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

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

– les normes IEC publiées par le comité d'études 59 concernant les méthodes de mesure d'aptitude à la fonction;
– les normes CISPR 11 et CISPR 14-1, ainsi que les normes applicables de la série IEC 61000-3 concernant les émissions électromagnétiques;
– la norme CISPR 14-2 concernant l'immunité électromagnétique;
– les normes IEC publiées par le comité d'études 111 concernant l'environnement.

APPAREILS ÉLECTRODOMESTIQUES ET ANALOGUES – SÉCURITÉ –

Partie 2-41: Exigences particulières pour les pompes

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 pompes électriques pour liquides dont la température ne dépasse pas 90 °C, destinées à un usage domestique et analogue, dont la **tension assignée** est inférieure ou égale à 250 V pour les appareils monophasés et à 480 V pour les autres appareils, y compris les appareils alimentés en courant continu et les **appareils alimentés par batteries**.

La liste suivante répertorie les exemples d'appareils qui relèvent du domaine d'application de la présente norme:

– les **pompes pour aquariums**;
– les **pompes pour bassins de jardin**;
– les **pompes de circulation pour douches**;
– les **pompes à boue**;
– les **pompes submersibles**;
– les pompes pour fontaines de table;
– les **pompes verticales noyées**.

Les appareils non destinés à un usage domestique normal, mais qui peuvent néanmoins constituer une source de danger pour le public, tels que les appareils destinés à être utilisés par des usagers non avertis dans des magasins, chez des artisans et dans des fermes, sont compris dans le domaine d'application de la présente norme.

Dans la mesure du possible, la présente norme traite des dangers courants que présentent les appareils et auxquels sont exposés tous les individus situés à l'intérieur et autour de l'habitation. Cependant, elle ne tient en général pas compte:

– des personnes (y compris des enfants) dont
  • les capacités physiques, sensorielles ou mentales; ou
  • le manque d'expérience et de connaissance
  les empêchent d'utiliser l'appareil en toute sécurité sans surveillance ou instruction;
– des enfants qui jouent avec l'appareil.

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'avions, des exigences supplémentaires peuvent être nécessaires;
– dans de nombreux pays, des exigences supplémentaires sont spécifiées par les organismes nationaux de la santé, par les organismes nationaux responsables de la protection des travailleurs et par des organismes similaires.

La présente norme ne s'applique pas:

– aux **pompes de circulation fixes** pour installations de chauffage et de distribution d'eau (IEC 60335-2-51);
– aux pompes pour liquides inflammables;
– aux pompes destinées exclusivement à des usages industriels;
– aux pompes destinées à être utilisées dans des locaux qui présentent des conditions particulières, telles que la présence d'une atmosphère corrosive ou explosive (poussière, vapeur ou gaz);
– aux pompes incorporant des chlorateurs de type électrolytique.

Sauf indication contraire, les pompes incorporées dans des appareils ne sont pas couvertes par la présente norme.

2 Références normatives

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

Addition:

IEC 60068-2-5:2018, *Essais d'environnement – Partie 2-5: Essais – Essai S: Rayonnement solaire simulé au niveau du sol et recommandations pour les essais de rayonnement solaire et le vieillissement aux intempéries*

IEC 60364-7-701, *Installations électriques à basse tension – Partie 7-701: Exigences pour les installations et emplacements spéciaux – Emplacements contenant une baignoire ou une douche*

IEC 60364-7-702, *Installations électriques à basse tension – Partie 7-702: Exigences pour les installations ou emplacements spéciaux – Piscines et fontaines*

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

IEC 61984:2008, *Connecteurs – Exigences de sécurité et essais*

3 Termes et définitions

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

3.1 Définitions relatives aux caractéristiques physiques

3.1.9 *Modification:*

Remplacer le premier alinéa par ce qui suit:

fonctionnement de l'appareil dans les conditions suivantes:

Les pompes sont mises en fonctionnement avec l'entrée dans le liquide sous une pression nulle, puis la sortie de décharge est maintenue entre les valeurs minimale et maximale de la hauteur manométrique, de manière à obtenir la puissance la plus élevée. La hauteur manométrique est mesurée entre l'entrée et la sortie de décharge.

Les **pompes à boue** sont mises en fonctionnement avec de l'eau.

Les **pompes verticales noyées** sont mises en fonctionnement avec de l'eau, sauf si elles peuvent également pomper la boue, auquel cas les pompes sont mises en fonctionnement avec de la boue d'une masse volumique supérieure ou égale à la masse volumique maximale spécifiée dans les instructions et inférieure ou égale à 105 % de la masse volumique maximale spécifiée.

3.5 Définitions relatives aux types d'appareils

3.5.101
pompe submersible
pompe dont la partie électrique est complètement ou partiellement immergée dans un liquide en usage normal

Note 1 à l'article: Les enroulements de moteur peuvent être secs, immergés dans de l'huile ou dans le liquide pompé.
Note 2 à l'article: En français, les pompes submersibles sont également appelées pompes immergées.

3.5.102
pompe verticale noyée
pompe dont la partie électrique est séparée de la partie hydraulique et n'est pas immergée dans un liquide en usage normal

Note 1 à l'article: Les dispositifs de commande tels que des pressostats peuvent être immergés dans le liquide.

3.5.103
pompe à boue
pompe prévue pour déplacer un mélange d'eau et de produits solides de faibles dimensions

Note 1 à l'article: Les **pompes à boue** peuvent être des **pompes submersibles** ou des **pompes verticales noyées**.

3.5.104
pompe de circulation pour douches
pompe installée dans le réseau d'alimentation en eau pour augmenter le débit d'eau destiné aux douches

3.5.105
pompe pour puits profond
pompe submersible multicellulaire destinée à être utilisée dans des puits forés

3.5.106
pompe pour aquarium
pompe destinée à être utilisée en extérieur avec un aquarium

3.5.107
pompe pour bassin de jardin
pompe destinée à être utilisée en extérieur avec un bassin de jardin

4 Exigences générales

L'article de la Partie 1 s'applique.

5 Conditions générales d'essais

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

5.7 *Addition:*

La température du liquide est maintenue entre 0 °C et –5 °C de la température marquée sur la pompe.

5.101 *Les pompes sont soumises à l'essai comme des* ***appareils mobiles****, sauf s'il s'agit d'****appareils installés à poste fixe****.*

5.102 *Les* ***pompes fixes*** *équipées d'un moteur triphasé sans* ***dispositif de protection*** *sont installées avec un dispositif approprié, conformément aux instructions.*

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 **pompes submersibles** destinées à être utilisées dans des piscines lorsque des personnes occupent le bassin doivent être de la **classe III** avec une **tension assignée** inférieure ou égale à 12 V.

Les autres **pompes submersibles** destinées à être utilisées dans l'eau ou dans d'autres liquides conducteurs doivent être de la **classe I** ou de la **classe III**. Toutefois, les **pompes pour aquariums** peuvent être de la **classe II**. Les pompes pour fontaines de table destinées à un usage intérieur peuvent également être de la **classe II** si leur **puissance assignée** ne dépasse pas 25 W.

Les **pompes mobiles** destinées au nettoyage et à d'autres opérations d'entretien des piscines doivent être de la **classe I** ou de la **classe III**.

Les autres pompes doivent être de la **classe I**, de la **classe II** ou de la **classe III**.

6.2 *Addition:*

Les **pompes submersibles** doivent procurer le degré de protection IPX8.

Les **pompes mobiles** destinées au nettoyage et à d'autres opérations d'entretien des piscines doivent procurer le degré de protection IPX7 au minimum.

Les **pompes de circulation pour douches** destinées à être installées à l'extérieur des volumes 1 et 2, comme cela est spécifié dans l'IEC 60364-7-701, doivent procurer le degré de protection IPX2 au minimum.

Les autres pompes doivent procurer le degré de protection IPX4 au minimum.

7 Marquage et instructions

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

7.1 *Addition:*

Les pompes dont la **puissance assignée** est supérieure à 50 W doivent porter les marquages suivants:

– H_{min}, la hauteur manométrique minimale, en mètres, si celle-ci est supérieure à zéro;

– le sens de rotation (pour les pompes équipées de moteurs triphasés).

La profondeur maximale de fonctionnement, en mètres, la valeur minimale étant de 1 m, doit être marquée avec le symbole IEC 60417-6444 (2020-12) sur:

– les **pompes submersibles pour aquariums**; et

– les autres **pompes submersibles** dont la **puissance assignée** dépasse 50 W.

Les pompes doivent porter le marquage de la température maximale du liquide, qui ne doit pas être inférieure à 35 °C. Si la température dépasse 35 °C, les pompes doivent porter le marquage de la durée maximale de fonctionnement, sauf si elles sont destinées à fonctionner en continu.

Les pompes non destinées à un usage extérieur doivent porter un marquage sur lequel est apposé le symbole IEC 60417-5957 (2004-12) ou qui comporte en substance l'indication suivante:

Pour usage intérieur uniquement

7.6 *Addition:*

	[symbole IEC 60417-6444 (2020-12)]	profondeur maximale de fonctionnement, où X représente la valeur

NOTE 101 La profondeur maximale de fonctionnement en mètres peut être indiquée à gauche ou à droite des flèches.

	[symbole IEC 60417-5957 (2004-12)]	pour usage intérieur uniquement

7.12 *Addition:*

Si le symbole IEC 60417-6444 (2020-12) ou IEC 60417-5957(2004-12) est utilisé, sa signification doit être expliquée.

Les instructions pour les **pompes mobiles de la classe I** destinées au nettoyage et à d'autres opérations d'entretien des piscines doivent inclure en substance les indications suivantes:

– la pompe ne doit pas être utilisée lorsque des personnes occupent le bassin;

– la pompe doit être alimentée par un dispositif à courant différentiel résiduel (DDR) dont le courant différentiel de fonctionnement assigné est inférieur ou égal à 30 mA.

Les instructions pour les pompes marquées d'une température supérieure à 35 °C doivent préciser la durée maximale de fonctionnement et la durée minimale de repos, sauf si la pompe est destinée à fonctionner en continu à cette température.

Pour les **pompes verticales noyées**, l'instruction doit préciser la masse volumique maximale (en kg/m^3) des milieux destinés à être utilisés avec la pompe.

Les instructions pour les **pompes submersibles** utilisées dans des piscines doivent inclure en substance l'indication suivante:

Déconnecter la pompe du réseau d'alimentation avant d'effectuer l'entretien par l'usager, tel que le nettoyage du filtre.

7.12.1 *Addition:*

Les instructions d'installation doivent fournir des informations sur les exigences spécifiées pour l'installation électrique et doivent comporter une référence aux règles d'installation nationales. S'il est fait référence à des volumes, les dessins correspondants doivent être inclus.

Les instructions d'installation doivent comporter les informations suivantes:

– pour les pompes dont la **puissance assignée** dépasse 50 W, la hauteur manométrique maximale, en mètres;

– pour les **pompes submersibles** et les **pompes verticales noyées** contenant des agents lubrifiants, l'indication suivante en substance:

Le liquide peut être pollué du fait d'une fuite de lubrifiant.

– pour les **pompes fixes** équipées d'un moteur triphasé sans **dispositif de protection**, l'indication suivante en substance:

Un dispositif de protection doit être installé dans les conducteurs fixes, et ses caractéristiques doivent être spécifiées.

Les instructions d'installation des pompes destinées à être utilisées dans des fontaines extérieures, des bassins de jardin et lieux analogues doivent indiquer que la pompe doit être alimentée par un dispositif à courant différentiel résiduel (DDR) dont le courant différentiel de fonctionnement assigné est inférieur ou égal à 30 mA.

Les instructions d'installation des **pompes de la classe I** pour piscines doivent indiquer que la pompe doit être alimentée par un transformateur de séparation ou par un dispositif à courant différentiel résiduel (DDR) dont le courant différentiel de fonctionnement assigné est inférieur ou égal à 30 mA.

Les instructions d'installation des **pompes de la classe III** destinées à être installées dans le volume 0 d'une piscine, comme cela est défini dans l'IEC 60364-7-702, doivent indiquer que le transformateur doit être placé à l'extérieur du volume 1.

Les instructions d'installation des **pompes de la classe II** destinées à être installées à poste fixe:

– dans le volume 1 d'une piscine, comme cela est défini dans l'IEC 60364-7-702;

– dans une fosse qui ne comporte pas d'orifice de sortie approprié pour le liquide; ou

– à proximité d'un bassin de jardin ou d'un lieu analogue

doivent indiquer que la pompe ne doit pas être placée dans une zone inondable.

Pour les **pompes installées à poste fixe** destinées à être raccordées de façon permanente à des conducteurs fixes, fournies avec un connecteur distinct afin de faciliter l'installation et d'effectuer le raccordement au réseau, les instructions doivent inclure en substance l'indication suivante:

Utiliser uniquement le connecteur fourni lors de l'installation de la pompe.