IEC 60335-2-51

Edition 5.0 2023-12
COMMENTED VERSION

INTERNATIONAL STANDARD

colour inside

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

IEC 60335-2-51:2023-12 CMV(en)

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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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This commented version (CMV) of the official standard IEC 60335-2-51:2023 edition 5.0 allows the user to identify the changes made to the previous IEC 60335-2-51:2019 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 60335-2-51 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 2019. This edition constitutes a technical revision.

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

a) the text has been aligned with IEC 60335-1:2020;

b) some notes have been converted to normative text (Clause 1);

c) the use of separate connectors to ease the installation and establish the supply connection has been introduced (7.12.1, 22.102, 24.1.5, 24.1.101, 25.3);

d) clarifications related to remote operation (22.40, 22.49, 22.51).

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

Draft	Report on voting
61/7008/FDIS	61/7073/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 stationary circulation pumps for heating and service water installations.

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

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.

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 2-51: Particular requirements for stationary circulation pumps for heating and service water installations

1 Scope

This clause of Part 1 is replaced by the following.

This part of IEC 60335 deals with the safety of electric **stationary circulation pumps** for household and similar purposes intended for use in heating systems or in service water systems, 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. 3

NOTE 101 The hydraulic and electrical parts of the pump can be in the same enclosure, so that the water flows through the motor and serves as a coolant, or they can be separated.

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

- pumps for circulating liquids other than water;
- pumps, other than circulation pumps (IEC 60335-2-41);
- circulation pumps intended exclusively for industrial purposes;
- circulation 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).

2 Normative references

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

Addition:

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

~~*Replacement:*~~

3.1.9 *Modification:*

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

~~**normal operation**~~
operation ~~of the circulation pump~~ with the water pressure and flow rate adjusted within their specified limits, so that the highest power input is attained

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 water temperature at the inlet is maintained between 0 °C and –5 °C of the value corresponding to the TF class of the pump.

For circulation pumps intended to be located within the enclosure of a boiler, the tests of Clauses 10, 11 and 13 are carried out at an ambient temperature of 55 °C or at the temperature specified in the instructions, whichever is higher.

5.101 *Circulation 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:

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

6.2 *Addition:*

Circulation pumps shall be at least IPX2.

6.101 Circulation pumps shall be of one of the classes shown in Table 101.

Table 101 – Temperature classification of circulation pumps

Class	Maximum temperature of the circulating water °C
TF 60	60
TF 95	95
TF 110	110
NOTE TF means Temperature of the Fluid.	

Compliance is checked by inspection.

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.1 *Addition:*

Circulation pumps shall be marked with

- the TF class;
- the direction of the water flow;
- the direction of rotation (for pumps having three-phase motors);
- the **rated current** (for pumps having three-phase motors if a **protective device** has to be installed in the fixed wiring).

7.12 *Modification:*

The instruction concerning persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge is not applicable.

The instruction regarding supervision of children is not applicable.

7.12.1 *Addition:*

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

- the maximum flow rate or total head;
- the maximum ambient temperature at which the pump is to be used;
- the maximum system pressure, which shall not be less than:
  - 0,6 MPa for pumps for heating systems;
  - 1,0 MPa for pumps for service water systems;
- the intended orientation of the pump;
- for 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 ~~(for pumps having a three-phase motor not incorporating a **protective device**)~~.

– for the thermal insulation of circulation pumps in heating systems, the substance of the following:

Only the supplied kit or a kit made available by the manufacturer shall be used. It shall be ensured that the drain openings ~~of the motor~~ are not sealed after installation of the thermal insulation. **5**

For circulation 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 circulation pump. **6**

8 Protection against access to live parts

This clause of Part 1 is applicable.

9 Starting of motor-operated appliances

This clause of Part 1 is not applicable.

10 Power input and current

This clause of Part 1 is applicable.

11 Heating

This clause of Part 1 is applicable except as follows.

11.2 *Addition:*

Circulation pumps that are only fixed by the water pipes are positioned against one wall of the test corner and away from the other.

11.3 *Addition:*

The temperatures t_1 and t_2 are the ambient temperatures of the environment in which the pump is installed, for instance inside the enclosure of a boiler.

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

Replace the first paragraph with the following: **7**

Circulation pumps are operated until steady conditions are established.

11.8 *Addition*:

The temperature rise limits of pumps located within the enclosure of a boiler are reduced by the difference between the ambient temperature at which the test is carried out and 25 °C.

The temperature rise of the external enclosure is not measured.

For circulation pumps in which water flows through the motor, the temperature rise limits for windings are increased by 5 K. The temperature rise limits are increased further by

- *5 K, if the winding insulation is class 130 (B);*
- *10 K, if the winding insulation is class 155 (F) or 180 (H).*

For circulation pumps in which water flows through the motor, the increase of 5 K allowed by footnote [a] to Table 3 does not apply.

12 ~~Void~~ Charging of metal-ion batteries

This clause of Part 1 is applicable. **8**

13 Leakage current and electric strength at operating temperature

This clause of Part 1 is applicable.

14 Transient overvoltages

This clause of Part 1 is applicable.

15 Moisture resistance

This clause of Part 1 is applicable.

16 Leakage current and electric strength

This clause of Part 1 is applicable.

17 Overload protection of transformers and associated circuits

This clause of Part 1 is applicable.

18 Endurance

This clause of Part 1 is not applicable.

19 Abnormal operation

This clause of Part 1 is applicable except as follows.

19.1 *Addition:*

Circulation pumps are also subjected to the test of 19.101.

19.7 *Addition:*

The test is carried out with the water flow stopped or reduced to 5 l/min, whichever is more unfavourable.

19.101 *Circulation pumps are supplied at **rated voltage** and operated at approximately half the maximum system pressure for 5 min, after which the water is drained off and the operation continued for 7 h. The system is replenished with water and the pump operated again for 5 min at approximately half the maximum system pressure.*

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

20 Stability and mechanical hazards

This clause of Part 1 is applicable.

21 Mechanical strength

This clause of Part 1 is applicable.

22 Construction

This clause of Part 1 is applicable except as follows.

22.40 Not applicable.

22.49 Not applicable.

22.51 Not applicable. **9**

22.101 Circulation pumps shall withstand the water pressure occurring in normal use.

Compliance is checked by subjecting the pump to a water pressure equal to 1,2 times the maximum system pressure for 1 min.

The pump shall not leak.

22.102 Circulation 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. **10**

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. **11**

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 ~~*Modification*~~ *Addition:*

Switches that are only intended to be operated during installation of the pump are subjected to 100 cycles of operation.