**Test Report issued under the responsibility of:**

# TEST REPORT
# IEC 60335-2-40
# HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY – Part 1: General requirements
# Part 2-40: Particular requirements for electrical heat pumps, air-conditioners and dehumidifiers

| | |
|---|---|
| **Report Number. ..... :** | AOC250820011S |
| **Date of issue ..... :** | August 26, 2025 |
| **Total number of pages ..... :** | 229 pages |
| **Name of CB Testing Laboratory preparing the Report ..... :** | Shenzhen AOCE Electronic Technology Service Co., Ltd |
| **Applicant's name ..... :** | Foshan City Shunde District Honghaier Electric Appliance Co., Ltd. |
| **Address ..... :** | 2nd Floor, No. 7 Xinghe Road, Tianhe Industrial Zone, Rongbian Community, Ronggui Street, Shunde District, Foshan City, Guangdong Province, China |
| **Test specification:** | |
| **Standard ..... :** | ☒ IEC 60335-2-40:2024 in conjunction with IEC 60335-1:2020<br>☒ European Group Differences And National Differences |
| **Test procedure ..... :** | Type testing |
| **Non-standard test method ..... :** | N/A |
| **TRF template used ..... :** | IECEE OD-2020-F1:2024, Ed.1.7 |
| **Test Report Form No. ..... :** | IEC60335_2_40Y |
| **Test Report Form(s) Originator .... :** | VDE Prüf- und Zertifizierungsinstitut GmbH |
| **Master TRF ..... :** | Dated 2025-05-02 |



If this Test Report Form is used by non-IECEE members, the IECEE/IEC logo and the reference to the CB Scheme procedure shall be removed.

**This report is not valid as a CB Test Report unless signed by an approved IECEE Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.**

**General disclaimer:**

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing Testing Laboratory. The authenticity of this Test Report and its contents can be verified by contacting the Testing Laboratory, responsible for this Test Report.

| | |
|---|---|
| **Test item description .....:** | Air conditioner |
| **Trademark(s).....:** | N/A |
| **Manufacturer.....:** | Foshan City Shunde District Honghaier Electric Appliance Co., Ltd.<br>2nd Floor, No. 7 Xinghe Road, Tianhe Industrial Zone, Rongbian Community, Ronggui Street, Shunde District, Foshan City, Guangdong Province, China |
| **Model/Type reference.....:** | HHR-6 |
| **Ratings.....:** | 220-240 V~, 50/60Hz, 440 W |

**Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):**

| | | | |
|---|---|---|---|
| ☒ | **Testing Laboratory:** | Shenzhen AOCE Electronic Technology Service Co., Ltd | |
| | **Testing location/ address ..... :** | Room 202, 2nd Floor, No.12th Building of Xinhe Tongfuyu Industrial Park, Fuhai Street, Baoan District, Shenzhen, Guangdong, China | |
| | **Tested by (name, function, signature) ..... :** | Bruce Lin<br>Technical Engineer | Bruce Lin |
| | **Approved by (name, function, signature) .. :** | Robin Liu<br>Technical Manager | Robin Liu |
| ☐ | **Testing procedure: CTF Stage 1:** | N/A | |
| | **Testing location/ address ..... :** | | |
| | **Tested by (name, function, signature) ..... :** | | |
| | **Approved by (name, function, signature) .. :** | | |
| ☐ | **Testing procedure: CTF Stage 2:** | N/A | |
| | **Testing location/ address ..... :** | | |
| | **Tested by (name + signature)..... :** | | |
| | **Witnessed by (name, function, signature) . :** | | |
| | **Approved by (name, function, signature) .. :** | | |
| ☐ | **Testing procedure: CTF Stage 3:** | N/A | |
| ☐ | **Testing procedure: CTF Stage 4:** | N/A | |
| | **Testing location/ address ..... :** | | |
| | **Tested by (name, function, signature) ..... :** | | |
| | **Witnessed by (name, function, signature) . :** | | |
| | **Approved by (name, function, signature) .. :** | | |
| | **Supervised by (name, function, signature) :** | | |

**List of Attachments (including a total number of pages in each attachment):**

**- Attachment No.1:** European Group Differences and National Differences
**- Attachment No.2:** Photo document.

**Summary of testing:**

| **Tests performed (name of test, test clause and date test performed):** | **Testing location: (CBTL, SPTL, CTF, Subcontractor)** |
|---|---|
| - All tests performed on model HHR-6<br>- EN IEC 60335-2-40:2024+A11:2024<br>- EN IEC 60335-1:2023+A11:2023<br>- EN 62233:2008 | Provide information on testing location (CBTL, SPTL, Client's laboratory, Subcontractor's laboratory and split testing when allowed and used).<br>Shenzhen AOCE Electronic Technology Service Co., Ltd<br>Room 202, 2nd Floor, No.12th Building of Xinhe Tongfuyu Industrial Park, Fuhai Street, Baoan District, Shenzhen, Guangdong, China |

**Summary of compliance with National Differences**

*Include only National Differences evaluated and declared by member countries of IECEE CB Scheme. Non-member countries or national or regional standards can be included for information in the General Product Information section of the Test Report but will not to be listed on CB Test Certificate. (See OD 2037, item 7.1).*

- IECEE Member countries that are also CENELEC members
  Compliance with Group Differences evaluated ☒ **yes** ☐ **No** ☐ N/A
  *No countries to be listed here. Select N/A if no GD TRF published.*
  *Select No if the client did not request to evaluate Group Differences*

  - IECEE Member countries with published National Differences which were evaluated:
    *Insert countries (ISO codes) or N/A. CENELEC members evaluated in first bullet and with National Differences in addition to Group Differences shall also be listed here.*

- IECEE Member countries that did not publish any National Differences:
  *Insert countries (ISO codes) or N/A*

To support compliance with published National Differences, attach a compilation of relevant ND and/or GD TRFs to the CB Test Report

**Use of uncertainty of measurement for decisions on conformity (decision rule):**

☒ No decision rule is specified by the IEC standard, when comparing the measurement result with the applicable limit according to the specification in that standard. The decisions on conformity are made without applying the measurement uncertainty ("simple acceptance" decision rule, previously known as "accuracy method").

☐ Other: … (to be specified, for example when required by the standard or client, or if national accreditation requirements apply)

**Information on uncertainty of measurement:**
The uncertainties of measurement are calculated by the laboratory based on application of criteria given by OD-5014 for test equipment and application of test methods, decision sheets and operational procedures of IECEE.
IEC Guide 115 provides guidance on the application of measurement uncertainty principles and applying the decision rule when reporting test results within IECEE scheme, noting that the reporting of the measurement uncertainty for measurements is not necessary unless required by the test standard or customer.
Calculations leading to the reported values are on file with the NCB and testing laboratory that conducted the testing.

**Copy of marking plate:**

**The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.**

Air conditioner
HHR-6
220-240 V~, 50/60 Hz, 440 W, IPX4

Foshan City Shunde District Honghaier Electric Appliance Co., Ltd.
Made in China

| | |
|---|---|
| **Test item particulars..... :** | |
| **Classification of installation and use..... :** | IPX0, Class I, Portable appliance |
| **Supply Connection ..... :** | Plug with supply cord |
| **..... :** | |
| **Possible test case verdicts:** | |
| **- test case does not apply to the test object.....:** | N/A |
| **- test object does meet the requirement.....:** | P (Pass) |
| **- test object does not meet the requirement.....:** | F (Fail) |
| **Testing.....:** | |
| **Date of receipt of test item .....:** | August 11, 2025 |
| **Date (s) of performance of tests .....:** | August 11, 2025 - August 26, 2025 |

**General remarks:**

"(See Enclosure #)" refers to additional information appended to the report.
"(See appended table)" refers to a table appended to the report.

**Throughout this report a ☐ comma / ☒ point is used as the decimal separator.**

☐ **This Test Report Form contains requirements according to** EN IEC 60335-2-40:2024+A11:2024 & EN IEC 60335-1:2023+A11:2023

**Manufacturer's Declaration per sub-clause 4.2.5 of IECEE 02:**

| | |
|---|---|
| The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided ..... : | ☐ **Yes**<br>☒ **Not applicable** |

**When differences exist; they shall be identified in the General product information section.**

| | |
|---|---|
| **Name and address of factory (ies) ..... :** | Foshan City Shunde District Honghaier Electric Appliance Co., Ltd.<br>2nd Floor, No. 7 Xinghe Road, Tianhe Industrial Zone, Rongbian Community, Ronggui Street, Shunde District, Foshan City, Guangdong Province, China |

**General product information and other remarks:**

- All models are the same except the model name

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| **5** | **GENERAL CONDITIONS FOR THE TESTS** | | - |
| | Tests performed according to clause 5, e.g. nature of supply, sequence of testing, etc. | | P |
| 5.2 | Tests of clause 21 carried out on separate samples. Tests of clauses 11, 19 and 21 require pressure measurements made at various points in refrigerating system (IEC 60335-2-40:2024) | | P |
| | If the tests of Annex FF (Leak simulation tests) and Annex QQ (Methods for determining releasable charge) are carried out, at least one additional specially prepared sample is required. (IEC 60335-2-40:2024) | | N/A |
| | Additional appliance was used for Annex NN. (IEC 60335-2-40:2024) | | P |
| 5.6 | Any controls which regulate the temperature or humidity of the conditioned space are rendered inoperative during the test. (IEC 60335-2-40:2024) | | P |
| 5.7 | The tests and test conditions of Clauses 10 and 11 are carried out under the most severe operating conditions within the operating temperature range specified by the manufacturer. Annex AA provides examples of such temperature conditions. (IEC 60335-2-40:2024) | | P |
| 5.8.2 | Appliances having more than one rated voltage ..... : | | N/A |
| 5.8.3 | Heating Appliances and combined appliances marked with a rated power input range ..... : | | N/A |
| 5.8.4 | Appliances with a rated voltage range and with a rated power input corresponding to the mean value of the rated voltage range | | P |
| 5.10 | For split units, the refrigerant lines installed in accordance with the installation instructions. The length of pipe between 5 m and 7,5 m. (IEC 60335-2-40:2024) | | N/A |
| | Where the installation instructions specify a maximum pipe length of less than 5 m, the length of pipe the maximum length specified in the installation instructions, and where the installation instructions specify a minimum pipe length of more than 7,5 m, the length of pipe the minimum length specified in the installation instructions. (IEC 60335-2-40:2024) | | N/A |
| | The thermal insulation of the refrigerant lines applied in accordance with the installation instructions. (IEC 60335-2-40:2024) | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| **6** | **CLASSIFICATION** | | - |
| 6.1 | Protection against electric shock:<br>Class I, II, III (IEC 60335-2-40:2024) .....: | Class I | P |
| 6.2 | Appliances classified according to degree of protection against harmful ingress of water in accordance with IEC 60529: (IEC 60335-2-40:2024) | | P |
| | -appliances or parts intended for outdoor use be at least IPX4 (IEC 60335-2-40:2024) | | P |
| | -appliances intended only for indoor use (excluding laundry rooms) be IPX0 (IEC 60335-2-40:2024) | | P |
| | -appliances intended to be used in laundry rooms be at least IPX1(IEC 60335-2-40:2024) | | N/A |
| | Protection against harmful ingress of water. | | N/A |
| 6.101 | Appliances classified according to the accessibility either as appliance accessible to the general public or as appliance not accessible to the general public. (IEC 60335-2-40:2024) | | N/A |
| **7** | **MARKING AND INSTRUCTIONS** | | - |
| 7.1 | Appliances marked with | | P |
| | Symbol for nature of supply including number of phases, unless for single phase operation (IEC 60335-2-40:2024) ..... : | Single phase | P |
| | Rated voltage or voltage range (V) .....: | 220-240 | P |
| | Symbol for nature of supply, or .....: | ~ | P |
| | Rated power input (W), or .....: | 550 | P |
| | Rated current (A) .....: | | N/A |
| | Manufacturer's or responsible vendor's name, trademark or identification mark.....: | See Copy of marking plate | P |
| | Model or type reference .....: | | P |
| | Symbol IEC 60417-5172, for class II appliances | | N/A |
| | IP number, other than IPX0.....: | IPX4 | N/A |
| | Symbol IEC 60417-5180, for class III appliances, unless | | N/A |
| | the appliance is operated by batteries only, or | | N/A |
| | the appliance is powered by rechargeable batteries recharged in the appliance | | N/A |
| | Rated frequency (Hz) (IEC 60335-2-40:2024) ..... : | 50/60 Hz | P |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Refrigerant charge for each refrigerating system (IEC 60335-2-40:2024)..... : | | N/A |
| | Refrigerant designation in accordance with ISO 817 (IEC 60335-2-40:2024)..... : | | P |
| | maximum allowable pressure for the storage (IEC 60335-2-40:2024)..... : | | P |
| | Maximum allowable pressure in the water and/or brine circuit for the heat exchanger for hydronic fan coil units (IEC 60335-2-40:2024) ..... : | | P |
| | Maximum allowable pressure for the refrigerant circuit; if the maximum allowable pressures for the suction and discharge side differ, a separate indication is required (IEC 60335-2-40:2024) ..... : | | P |
| | for pre-charged pipe sets (IEC 60335-2-40:2024) | | P |
| | - refrigerant designation in accordance with ISO 817 (IEC 60335-2-40:2024) | | P |
| | - the refrigerant charge in the line set (IEC 60335-2-40:2024) | | N/A |
| | - maximum allowable pressure (IEC 60335-2-40:2024) | | N/A |
| | if charged with a flammable refrigerant, the flame symbol ISO 7010-W021 (2011-05) including the safety group per ISO 817 (IEC 60335-2-40:2024) | | P |
| | Ratings in watts and voltage of a UV-C germicidal lamp system if employed (IEC 60335-2-40:2024) | | N/A |
| | Appliances are marked with all of the designations and the rated inputs of the supplementary heaters for which they are intended to be used, and have provision for identifying the actual heater that is field installed. (IEC 60335-2-40:2024) | | N/A |
| | Unless it is evident from the design, the enclosure of the appliance marked, by words or by symbols, with the direction of the fluid flow. (IEC 60335-2-40:2024) | | N/A |
| | If a flammable refrigerant is used, a warning symbol (flame symbol: ISO 7010-W021 (2011-05)) including the safety group per ISO 817 as described in 7.6 placed within sight of the marking of the refrigerant designation on the appliance. The height of the symbol at least 10 mm, and the symbol need not be in colour. (IEC 60335-2-40:2024) | | P |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Appliances using flammable refrigerants marked with the flame symbol ISO 7010-W021 (2011-05) including the safety group per ISO 817. The height of the triangle used for the symbol at least 30 mm. The required markings shall be provided on all units which contain compressors.<br>(IEC 60335-2-40:2024) | | P |
| | If not already visible when accessing a service port and if a service port is provided, the service port marked to identify the type of refrigerant. If the refrigerant is flammable, symbol ISO 7010-W021 (2011-05) including the safety group per ISO 817 included, without specifying the colour.<br>(IEC 60335-2-40:2024) | | P |
| | Appliances employing refrigerating systems with maximum allowable pressures > than 7 MPa be marked with symbol ISO 7000-1701 (2004-01) followed by the text “(X) MPa” and the Operator's manual; ISO 7000-0790 (2004-01). Where: "X" is the maximum allowable pressure.<br>(IEC 60335-2-40:2024) | | P |
| | Appliance outlets accessible to the user and socket-outlets accessible to the user: | | N/A |
| | - that are incorporated in appliances connected to the supply mains, and | | N/A |
| | - that operate at rated voltage | | N/A |
| | marked with their outlet load (W or A) .....: | | N/A |
| | Appliances intended to be supplied from a detachable power supply part to recharge the battery marked with: | | N/A |
| | - symbol ISO 7000-0790 | | N/A |
| | - symbol IEC 60417-6181 | | N/A |
| | - model or type reference of the detachable power supply part, or.....: | | N/A |
| | - the substance of the following:<br>“Use only with <model or type reference> supply unit” | | N/A |
| | Symbol IEC 60417-5018, for class II and class III appliances incorporating a functional earth | | N/A |
| | Symbol IEC 60417-5036, for the enclosure of electrically-operated water valves in external hose-sets for connection of an appliance to the water mains, if the working voltage exceeds extra-low voltage | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 7.2 | stationary appliances for multiple supply: | | N/A |
| | Warning to disconnect all supply circuits | | N/A |
| | Warning placed in vicinity of terminal cover | | N/A |
| 7.3 | Range of rated values marked with the lower and upper limits separated by a hyphen | | P |
| | Different rated values marked with the values separated by an oblique stroke | | P |
| | Requirement also applied to appliances for connection to both single phase and multiphase supplies | | P |
| 7.4 | Appliances adjustable for different rated voltages or rated frequencies, the voltage or the frequency setting is clearly discernible | | N/A |
| | frequent changes in voltage or frequency setting not required, adjustment of rated voltage or rated frequency determined from wiring diagram | | P |
| | Wiring diagram may be on the inside of a cover that has to be removed to connect the supply conductors | | N/A |
| | Wiring diagram not on a label loosely attached to the appliance | | N/A |
| 7.5 | Appliances with more than one rated voltage or one or more rated voltage ranges, marked with rated input or rated current for each rated voltage or range, unless | | N/A |
| | the power input or current are related to the arithmetic mean value of the rated voltage range | | P |
| | Relation between marking for upper and lower limits of rated power input or rated current and voltage is clear | | N/A |
| 7.6 | Correct symbols used.<br>(IEC 60335-1:2020 + IEC 60335-2-40:2024) | | P |
| | Symbol for nature of supply placed next to rated voltage | | N/A |
| | Symbol for class II appliances placed unlikely to be confused with other marking | | N/A |
| | Units of physical quantities and their symbols according to international standardized system | | P |
| | Additional symbols give no rise to misunderstanding | | P |
| | Symbols specified in IEC60417 and ISO7000 are used. | | P |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 7.7 | Connection diagram fixed to appliances to be connected to more than two supply conductors and appliances for multiple supply, unless | | N/A |
| | correct mode of connection is obvious | | N/A |
| | For multi-phase appliances, correct mode of connection considered to be obvious if: | | N/A |
| | - indicated by arrows pointing towards the terminals, or | | N/A |
| | - marked in words | | N/A |
| | Connection diagram is the wiring diagram | | N/A |
| 7.8 | Except for type Z attachment, terminals for connection to the supply mains indicated as follows: | | P |
| | - marking of terminals exclusively for the neutral conductor (letter N) | | N/A |
| | - marking of protective earthing terminals (symbol IEC 60417-5019) | | P |
| | - marking of functional earthing terminals (symbol IEC 60417-5018) | | P |
| | - marking not placed on removable parts | | P |
| 7.9 | Marking or placing of switches which may cause a hazard | | N/A |
| 7.10 | Indications of switches on stationary appliances and controls on all appliances by use of figures, letters or other visual means.....: | Figure | P |
| | This applies also to switches which are part of a control | | N/A |
| | If figures are used, the off position indicated by the figure 0 | | N/A |
| | The figure 0 indicates only OFF position, unless no confusion with the OFF position | | N/A |
| | The figure 0 is used on a digital programming keyboard | | N/A |
| 7.11 | Indication for direction of adjustment of controls | | P |
| 7.12 | Instructions for safe use provided in hard copy form | | P |
| | Instructions marked on the appliance are visible in normal use | | P |
| | Details concerning precautions during user maintenance | | P |
| | The instructions the substance of the following: | | P |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - this appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety | | P |
| | - children should be supervised not to play with the appliance | | P |
| | For a part of class III construction supplied from a detachable power supply part, the instructions state that the appliance is only to be used with the unit provided | | N/A |
| | Instructions for class III appliances state that it must only be supplied at SELV, unless | | N/A |
| | it is a battery-operated appliance, the battery being charged outside the appliance | | N/A |
| | For appliances for altitudes exceeding 2 000 m, the maximum altitude is stated.....: | | N/A |
| | The instructions for appliances incorporating a functional earth state that the appliance incorporates an earth connection for functional purposes | | N/A |
| | The instructions for appliances intended to be connected to a supply for battery recharging state a warning to only use an external supply with the described specifications | | N/A |
| | The instructions for appliances intended to be supplied from a detachable power supply part for battery recharging state the type reference of the supply part along with a warning to only use the unit provided with this appliance | | N/A |
| | The instructions for appliances intended for use with batteries using metal-ion chemistries state the normal temperature range for battery charging | | N/A |
| | Meaning of symbol for detachable power supply part explained, unless not used | | N/A |
| 7.12.1 | Sufficient details for installation supplied | | P |
| | For an appliance intended to be permanently connected to the water mains and not connected by a hose-set, this is stated | | N/A |
| | If different rated voltages or different rated frequencies are marked, the instructions state what action to be taken to adjust the appliance | | P |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | In particular, the following information supplied: (IEC 60335-2-40:2024) | | P |
| | a) that the appliance shall be installed in accordance with national wiring regulations can impose additional requirements; (IEC 60335-2-40:2024) | | P |
| | b) the dimensions of the space necessary for correct installation of the appliance including the minimum permissible distances to adjacent structures; (IEC 60335-2-40:2024) | | N/A |
| | c) for appliances with supplementary air heaters, the minimum clearance from the appliance to combustible surfaces; (IEC 60335-2-40:2024) | | N/A |
| | d) a wiring diagram with a clear indication of the connections and wiring to external control devices and supply cord; (IEC 60335-2-40:2024) | | N/A |
| | e) the range of external static pressures at which the appliance was tested (add-on heat pumps and ducted appliances with supplementary air heaters only); (IEC 60335-2-40:2024) | | N/A |
| | f) the method of connection of the appliance to the electrical supply and interconnection of separate components; (IEC 60335-2-40:2024) | | N/A |
| | g) indication of which parts of the appliance are suitable for outdoor use, if applicable; (IEC 60335-2-40:2024) | | P |
| | h) details of type and rating of fuses, or rating of circuit breakers; (IEC 60335-2-40:2024) | | N/A |
| | i) details of supplementary heating elements that may be used in conjunction with the appliance, including fitting instructions either with the appliance or with the supplementary heater; (IEC 60335-2-40:2024) | | N/A |
| | j) maximum and minimum water or brine operating temperatures; (IEC 60335-2-40:2024) | | P |
| | k) maximum and minimum water or brine operating pressures; (IEC 60335-2-40:2024) | | N/A |
| | l) maximum and minimum operating indoor and outdoor air temperatures (IEC 60335-2-40:2024) | | P |
| | m) instructions on charging of refrigerants when addition of charge is required by the manufacturer for completing the refrigerating system. (IEC 60335-2-40:2024) | | P |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | n) when the symbol IEC 60417-6412 (2019-03) is used, a warning that the appliance installed, operated and stored in a room with a floor area not less than the minimum room area. (IEC 60335-2-40:2024) | | P |
| 7.12.2 | Stationary appliances not fitted with means for disconnection from the supply mains having a contact separation in all poles that provide full disconnection under overvoltage category III, the instructions state that means for disconnection must be incorporated in the fixed wiring in accordance with the wiring rules | | N/A |
| 7.12.3 | Insulation of the fixed wiring in contact with parts exceeding 50 K during clause 11; instructions state that the fixed wiring must be protected | | N/A |
| 7.12.4 | Instructions for built-in appliances: | | N/A |
| | - dimensions of space | | N/A |
| | - dimensions and position of supporting and fixing | | N/A |
| | - minimum distances between parts and surrounding structure | | N/A |
| | - minimum dimensions of ventilating openings and arrangement | | N/A |
| | - connection to supply mains and interconnection of separate components | | N/A |
| | - allow disconnection of the appliance after installation, by accessible plug or a switch in the fixed wiring, unless | | N/A |
| | a switch complying with 24.3 | | N/A |
| 7.12.5 | Replacement cord instructions, type X attachment with a specially prepared cord | | N/A |
| | Replacement cord instructions, type Y attachment | | P |
| | Replacement cord instructions, type Z attachment | | N/A |
| | Replacement cord set instructions, if required according to 22.58 | | N/A |
| 7.12.6 | Caution in the instructions for appliances incorporating a non-self-resetting thermal cut-out that is reset by disconnection of the supply mains, if this cut-out is required to comply with the standard | | N/A |
| 7.12.7 | Instructions for fixed appliances stating how the appliance is to be fixed | | N/A |
| 7.12.8 | Instructions for appliances connected to the water mains: | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - max. inlet water pressure (Pa) ..... : | | N/A |
| | - min. inlet water pressure, if necessary (Pa) ..... : | | N/A |
| | Instructions concerning new and old hose-sets for appliances connected to the water mains by detachable hose-sets | | N/A |
| 7.12.9 | Instructions specified in 7.12 and from 7.12.1 to 7.12.8, 7.12.101 and 7.12.102 are in hard copy form and appear together before any other instructions supplied with the appliance.<br>(IEC 60335-1:2020 and IEC 60335-2-40:2024) | | P |
| | Alternatively, these instructions may be supplied with the appliance separately from any functional use booklet | | P |
| | They may follow the description of the appliance that identifies parts, or follow the drawings/sketches common to the languages of the instructions | | P |
| | They may follow the description of the appliance that identifies parts, or follow the drawings/sketches | | P |
| | In addition, instructions are also available in an alternative format such as on a website or on request in a format such as a DVD ..... : | | P |
| 7.12.101 | For appliances not accessible to the general public, the classification according to 6.101 included.<br>(IEC 60335-2-40:2024) | | N/A |
| 7.12.102 | For appliances using flammable refrigerants, an installation manual, service, maintenance and repair manual, and decommissioning manual, either as separate or combined manuals, made available and include the information given in Annex DD. (IEC 60335-2-40:2024) | | P |
| 7.13 | Instructions and other texts in an official language | | P |
| 7.14 | Markings clearly legible: | | P |
| | Signal words WARNING, CAUTION, DANGER in uppercase having a height as specified ..... : | | P |
| | Uppercase letter of the text explaining the signal word not smaller than 1,6 mm ..... : | | N/A |
| | Moulded in, engraved, or stamped markings either raised above or have a depth below the surface of at least 0,25 mm, unless | | N/A |
| | contrasting colours are used | | P |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Markings checked by inspection, measurement and rubbing test as specified | | P |
| | Markings clearly durable, and on containers that are likely to be cleaned frequently they are not by means of paint or enamel, other than vitreous enamel. | | P |
| 7.15 | Markings specified in 7.1 to 7.5 on a main part. | | P |
| | Marking clearly discernible from the outside, if necessary after removal of a cover. | | P |
| | For portable appliances, cover can be removed or opened without a tool. | | N/A |
| | For stationary appliances, name, trademark or identification mark and model or type reference visible after installation. | | N/A |
| | For fixed appliances, name, trademark or identification mark and model or type reference visible after installation according to the instructions | | N/A |
| | Indications for switches and controls placed on or near the components. Marking not on parts which can be positioned or repositioned in such a way that the marking is misleading. | | P |
| | The symbol IEC 60417-5018 placed next to the symbol IEC 60417-5172 or IEC 60417-5180. | | N/A |
| | Type reference of detachable power supply part placed next to symbol IEC 60417-6181. | | N/A |
| | Marking of outlet load close to appliance outlet or socket-outlet. | | N/A |
| | A marking located on a panel that can be removed. (IEC 60335-2-40:2024) | | N/A |
| 7.16 | Marking of a possible replaceable thermal link or fuse link clearly visible with regard to replacing the link. | | N/A |
| 7.101 | Marking of fuses and overload protective devices, if replaceable (IEC 60335-2-40:2024) | | N/A |
| | - fuse rated current in amperes, type and rated voltage or (IEC 60335-2-40:2024) | | N/A |
| | - manufacturer and model of overload protective device (IEC 60335-2-40:2024) | | N/A |
| 7.102 | Marking for connection with aluminium wire, if necessary (IEC 60335-2-40:2024) | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 7.103 | For appliances made up of more than one factory made assembly specified by the manufacturer to be used together, instructions shall be provided for completing the assembly to ensure compliance with the requirements. (IEC 60335-2-40:2024) | | N/A |
| 7.104 | For partial units, the instructions or markings include the following additional information: (IEC 60335-2-40:2024) | | P |
| | - For evaporating units and condensing units, the instructions or markings shall include wording to assure that the maximum operating pressure is considered when connecting to any condenser unit or evaporator unit. (IEC 60335-2-40:2024) | | P |
| | - For evaporating units, condensing units and condenser units, the instructions or markings include refrigerant charging instructions. (IEC 60335-2-40:2024) | | P |
| | - A warning to assure that partial units only be connected to an appliance suitable for the same refrigerant. (IEC 60335-2-40:2024) | | P |
| | - This unit <model xxx> is a partial unit air conditioner, complying with partial unit requirements of this International Standard, and must only be connected to other units that have been confirmed as complying to corresponding partial unit requirements of this International Standard. (IEC 60335-2-40:2024) | | N/A |
| | - The electrical interfaces specified with purpose, voltage, current, and safety class of construction. (IEC 60335-2-40:2024) | | P |
| | - The SELV connection points, if provided, are to be clearly indicated in the instructions. The connection point should be marked with the “read the instructions” symbol per ISO 7000-0790 (2004-01) and the Class III symbol according to IEC 60417-5180 (2003- 02). (IEC 60335-2-40:2024) | | N/A |
| 7.105 | For appliances using flammable refrigerants that have safety features depending upon the proper function of a leak detection system, the instructions or unit markings shall contain the substance of the following: (IEC 60335-2-40:2024) | | P |
| | “This unit is equipped with a refrigerant leak detection system for safety. To be effective, the unit must be electrically powered at all times after installation, other than when servicing.” (IEC 60335-2-40:2024) | | P |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | If any remote located refrigerant sensor is employed to detect leaked refrigerant, such remote located refrigerant sensor also apply this marking or be accompanied by such instructions. (IEC 60335-2-40:2024) | | P |
| 7.106 | For appliances using flammable refrigerants that have safety features depending upon the proper function of electrically powered safety measures, the instructions or unit markings shall contain the substance of the following: (IEC 60335-2-40:2024) | | N/A |
| | “This unit is equipped with electrically powered safety measures. For the safety measures to be effective, the unit must be electrically powered at all times after installation, other than when servicing.” (IEC 60335-2-40:2024) | | N/A |
| | If any mechanical ventilation unit is employed to dilute leaked refrigerant and is not integrated in the appliance, such unit also apply this marking or be accompanied by such instructions. (IEC 60335-2-40:2024) | | N/A |
| 7.107 | For flammable refrigerants, when addition of charge is required by the installation instructions for completing the refrigerating system, the manufacturer provides a label that allows the installer to note the resulting total refrigerant charge for each refrigerating system. See Figure 101 for an example of label for field charged units. (IEC 60335-2-40:2024) | | P |
| 7.108 | For appliances using flammable refrigerants, excluding appliances with A2L refrigerant charge not exceeding m1, the flame symbol ISO 7010-W021 (2011-05) including the safety group per Annex BB described in 7.6 visible on the packaging of the appliance if the appliance is charged with refrigerant. (IEC 60335-2-40:2024) | | P |
| | The perpendicular height of the symbol at least 30 mm. (IEC 60335-2-40:2024) | | P |
| 7.109 | Appliances employing UV-C germicidal lamp systems shall be marked with ultraviolet radiation hazard symbol IEC 60417-6040 (2010-08) and the Read operator's manual symbol ISO 7000-0790 (2004-01) in the following locations: (IEC 60335-2-40:2024) | | N/A |
| | - doors and access panels that provide direct access to an area within the appliance where the measured UV-C spectral irradiance is greater than 1,7 µW/cm$^2$; (IEC 60335-2-40:2024) | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - user maintenance access panels (IEC 60335-2-40:2024) | | N/A |
| | - UV-C barriers. (IEC 60335-2-40:2024) | | N/A |
| 7.110 | For appliances that employ UV-C germicidal lamp systems, the instructions include the substance of the following: (IEC 60335-2-40:2018) (IEC 60335-2-40:2024) | | N/A |
| | - this appliance contains a UV-C lamp; (IEC 60335-2-40:2024) | | N/A |
| | - read the maintenance instructions before opening the appliance; (IEC 60335-2-40:2024) | | N/A |
| | - details for cleaning and other user maintenance of the appliance. They shall state that prior to cleaning or other maintenance, the appliance must be disconnected from the supply mains; (IEC 60335-2-40:2024) | | N/A |
| | - precautions to be taken when replacing UV-C emitters and starters, if applicable; (IEC 60335-2-40:2024) | | N/A |
| | - unintended use of the appliance or damage to the housing may result in the escape of dangerous UV-C radiation. UV-C radiation may, even in small doses, cause harm to the eyes and skin; (IEC 60335-2-40:2024) | | N/A |
| | - the appliance must be disconnected from the supply before replacing the UV-C lamp; (IEC 60335-2-40:2024) | | N/A |
| | - doors and access panels bearing the ultraviolet radiation hazard symbol which can have UV-C spectral irradiance greater than 1,7 $\mu W/cm^2$ are provided with an interlock switch to interrupt the power to the UV-C lamps for your safety. Do not over-ride; (IEC 60335-2-40:2024) | | N/A |
| | - before opening doors and access panels bearing the ultraviolet radiation hazard symbol for the conducting user maintenance, it is recommended to disconnect the power; (IEC 60335-2-40:2024) | | N/A |
| | - UV-C barriers bearing the ultraviolet radiation hazard symbol should not be removed; (IEC 60335-2-40:2024) | | N/A |
| | - for appliances with UV-C lamps, information on the replacement of UV-C lamps shall be given, including the model and/or part number; (IEC 60335-2-40:2024) | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - if field installed, the factory specified UV-C germicidal lamp systems approved for use with the appliance specified in the instructions by the specific model number; (IEC 60335-2-40:2024) | | N/A |
| | - do not operate UV-C lamps outside of the appliance. (IEC 60335-2-40:2024) | | N/A |
| 7.111 | For Appliances employing refrigerating systems with maximum allowable pressures greater than 7 MPa, marked within sight of the refrigerant service ports with the following: (IEC 60335-2-40:2024) | | P |
| | – the symbol ISO 7000-1701 (2004-01) including the text "(X) MPa", where; "X" is not less than the maximum allowable pressure. (IEC 60335-2-40:2024) | | P |
| **8** | **PROTECTION AGAINST ACCESS TO LIVE PARTS** | | - |
| 8.1 | Adequate protection against accidental contact with live parts | | P |
| 8.1.1 | Requirement applies for all positions, detachable parts removed unless otherwise specified | | P |
| | Use of test probe B of IEC 61032: | | P |
| | - force not exceeding 1 N: no contact with live parts | | P |
| | - force of 20 N: no contact with live parts | | P |
| | - lamps behind a detachable cover not removed, if conditions met | | N/A |
| | - protection against contact with live parts of the lamp cap during lamp insertion or removal | | N/A |
| | Use of test probe 18 of IEC 61032 for non-commercial appliances and commercial appliances intended for public access: | | P |
| | - force not exceeding 1 N: no contact with live parts | | P |
| | - force of 10 N: no contact with live parts | | P |
| | - appliance fully assembled as in normal use, no parts removed | | P |
| | No contact with live parts protected by materials as specified | | P |
| | Test probe 18 of IEC 61032 is not applied to parts of appliances that according to the installation instructions are required to be mounted at a height exceeding 1,8 m above the floor. (IEC 60335-2-40:2024) | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.1.2 | Use of test probe 13 of IEC 61032, with a force not exceeding 1 N, through openings in class 0 appliances and class II appliances/constructions: no contact with live parts | | N/A |
| | Test probe 13 also applied through openings in earthed metal enclosures having a non-conductive coating: no contact with live parts | | P |
| 8.1.3 | For appliances other than class II, use of test probe 41 of IEC 61032, with a force not exceeding 1 N: no contact with live parts of visible glowing heating elements or supporting parts | | N/A |
| | For a single switching action obtained by a switching device, requirements as specified | | N/A |
| | For appliances with a supply cord and without a switching device, the single switching action may be obtained by the withdrawal of the plug | | N/A |
| 8.1.4 | Appliance supplied at rated voltage (V) ..... : | | N/A |
| | Accessible part not considered live if: | | N/A |
| | - safety extra-low AC voltage: peak value not exceeding 42,4 V | | N/A |
| | - safety extra-low DC voltage: not exceeding 42,4 V | | N/A |
| | - or separated from live parts by protective impedance | | N/A |
| | If protective impedance: DC current not exceeding 2 mA, and | | N/A |
| | AC peak value not exceeding 0,7 mA | | N/A |
| | - for peak values over 42,4 V up to and including 450 V, capacitance not exceeding 0,1 μF | | N/A |
| | - for peak values over 450 V up to and including 15 kV, discharge not exceeding 45 μC | | N/A |
| | - for peak values over 15 kV, the energy in the discharge not exceeding 350 mJ | | N/A |
| 8.1.5 | Live parts protected at least by basic insulation before installation or assembly: | | N/A |
| | - built-in appliances | | N/A |
| | - fixed appliances | | N/A |
| | - appliances delivered in separate units | | N/A |
| | Dedicated installation panel or cover and which cannot be installed without them, compliance is checked according to 5.10 (IEC 60335-2-40:2024) | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.2 | Class II appliances and constructions constructed so that there is adequate protection against accidental contact with basic insulation and metal parts separated from live parts by basic insulation only | | N/A |
| | Only possible to touch parts separated from live parts by double or reinforced insulation | | N/A |
| 8.3 | For battery-operated appliances with a functional earth or supply connection, parts within a battery compartment only accessible if: | | N/A |
| | - class I, 0I and II appliances: separated from live parts by double and reinforced insulation | | N/A |
| | - class 0 appliances: separated from live parts by basic insulation | | N/A |
| | - battery compartment of class III construction, and basic insulation in addition to supply at SELV, if limits in 8.1.4 exceeded | | N/A |
| **9** | **STARTING OF MOTOR-OPERATED APPLIANCES** | | - |
| | This clause of Part 1 is not applicable.<br>(IEC 60335-2-40:2024) | | — |
| **10** | **POWER INPUT AND CURRENT** | | - |
| 10.1 | Appliance supplied at rated voltage (V): | 230 | P |
| | Power input at normal operating temperature and normal operation not deviating from rated power input by more than shown in Table 1 | (See appended table) | P |
| | If the power input varies throughout the operating cycle and its maximum value exceeds twice its arithmetic mean value occurring during a representative period, the power input is the maximum value that is exceeded for more than 10 % of the representative period if this value is greater than the arithmetic mean value, | | N/A |
| | otherwise the power input is the arithmetic mean value | | P |
| | In case of doubt, the power input of the motors may be measured separately | (See appended table) | N/A |
| | In case of measurement during a representative period, duration of the representative period……: | | N/A |
| | Test carried out at upper and lower limits of the ranges for appliances with one or more rated voltage ranges, unless | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | the rated power input is related to the arithmetic mean value of the relevant range | | P |
| | Appliance outlets accessible to the user and socket-outlets accessible to the user incorporated in appliances connected to the supply mains and operating at rated voltage are not loaded during test, | | N/A |
| | however, their contribution to the power input is considered to be the marked outlet load per appliance outlet or socket-outlet | | N/A |
| 10.2 | Appliance supplied at rated voltage (V) ..... : | Test voltage =<br>(See appended table)<br>Frequency = (maybe relevant for moa, ca, smps type | N/A |
| | Current at normal operating temperature and normal operation not deviating from rated current by more than shown in Table 2 | (See appended table) | N/A |
| | If the current varies throughout the operating cycle and its maximum value exceeds twice its arithmetic mean value occurring during a representative period, the current is the maximum value that is exceeded for more than 10 % of the representative period if this value is greater than the arithmetic mean value, | | N/A |
| | otherwise the current is the arithmetic mean value | | N/A |
| | In case of doubt, the current of the motors may be measured separately | (See appended table) | N/A |
| | In case of measurement during a representative period, duration of the representative period……: | | N/A |
| | Test carried out at upper and lower limits of the ranges for appliances with one or more rated voltage ranges, unless | | N/A |
| | the rated current is related to the arithmetic mean value of the relevant range | | N/A |
| | Appliance outlets and socket-outlets accessible to the user incorporated in appliances connected to the supply mains and operating at rated voltage are not loaded during test, | | N/A |
| | however, their contribution to the current is considered to be the marked outlet load per appliance outlet or socket-outlet | | N/A |
| **11** | **HEATING** | | - |
| 11.1 | No excessive temperatures in normal use | | P |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | If the temperature of the motor winding exceeds the value specified in Table 3 or if there is doubt with regard to the classification of the insulation system employed in a motor, compliance is checked by the tests of Annex C.<br>(IEC 60335-2-40:2024) | | N/A |
| 11.2.1 | Appliances are installed in a test room in accordance with the installation instructions. In particular, (IEC 60335-2-40:2024) | | P |
| | – clearances to adjacent surfaces specified by the manufacturer shall be maintained;<br>(IEC 60335-2-40:2024) | | P |
| | – adjustable limit controls are set at the maximum cut-out setting and the minimum differential permitted by the control adjusting means.<br>(IEC 60335-2-40:2024) | | N/A |
| | Additional test for supplementary air heaters as described in 11.2.5. (IEC 60335-2-40:2024) | | N/A |
| 11.2.2 | For heating tests of ducted appliances with supplementary air heaters, an inlet duct is connected to the inlet air opening of the appliance.<br>(IEC 60335-2-40:2024) | | N/A |
| | The duct the same size as the flanges, if flanges are provided. If flanges are not provided, the duct is the same size as the inlet opening.<br>(IEC 60335-2-40:2024) | | N/A |
| 11.2.3 | A ducted appliance which does not include supplementary air heaters is fitted with an outlet duct sized to fit the casing flanges, or opening without flanges, or locations marked for flanges, and arranged to discharge away from the return air inlet.<br>(IEC 60335-2-40:2024) | | N/A |
| | The hot air outlet duct is provided with a restricting means to obtain the maximum static pressure given in the instructions. (IEC 60335-2-40:2024) | | N/A |
| 11.2.4 | For the evaluation and testing of partial units, the following test setup and conditions are to be applied: (IEC 60335-2-40:2024) | | P |
| | - evaporator units and condenser units are tested as individual units at the maximum ambient temperature stated in the instructions. If not stated in the instructions, these units shall be tested at an ambient temperature that is equal to the saturated temperature of the refrigerant at the marked maximum allowable operating pressure (± 0,1 MPa) minus 10 K (± 1 K).<br>(IEC 60335-2-40:2024) | | P |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - condensing units are tested in the cooling mode only, at the maximum specified ambient temperature with 9 K (± 1 K) sub-cooling and the maximum specified evaporating pressure with 11 K (± 1 K) superheat. For condensing units provided with expansion device(s), the superheat/sub-cooling is to be as under the normal control of the expansion device(s). (IEC 60335-2-40:2024) | | P |
| | - evaporating units, intended for cooling only, are tested in the cooling mode only with a condensing pressure that is equal to the marked maximum allowable operating pressure (± 0,1 MPa) with 9 K (± 1 K) sub-cooling. (IEC 60335-2-40:2024) | | P |
| | - evaporating units that are intended for reverse cycle operation are tested in the heating mode only, at the maximum specified evaporating pressure. (IEC 60335-2-40:2024) | | P |
| 11.2.5 | Test casing complies as described to this clause. | | P |
| 11.3 | Temperature rises, other than of windings, determined by thermocouples. (IEC 60335-2-40:2024) | | P |
| | Temperature rises of windings determined by resistance method, unless | | P |
| | the windings are non-uniform or it is difficult to make the necessary connections | | N/A |
| | The temperature of the air measured by the thermocouple grid does not exceed 92 °C. (IEC 60335-2-40:2024) | | P |
| 11.4 | Test performed at supply voltage between 0,94 and 1,06 times the rated voltage (V) .....: (IEC 60335-2-40:2024) | | P |
| 11.5 | This subclause of Part 1 is not applicable. (IEC 60335-2-40:2024) | | N/A |
| 11.6 | This subclause of Part 1 is not applicable. (IEC 60335-2-40:2024) | | N/A |
| 11.7 | Appliance outlets and socket-outlets accessible to the user loaded with a resistive load that gives the marked outlet load | | N/A |
| | For appliances incorporating integral batteries or separable batteries not disconnected from the appliance during charging: | | N/A |
| | - the fully discharged battery is charged for 1 h, while the appliance is operated continuously performing its intended function | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - the fully discharged battery is charged for 24 h or until it is fully charged, without the appliance performing its intended function | | N/A |
| | Where an appliance can be operated in the cooling mode as well as the heating mode, a test is conducted in each mode. (IEC 60335-2-40:2024) | | N/A |
| | Appliances with defrost facilities are additionally submitted for a defrost test in the most unfavourable conditions. (IEC 60335-2-40:2024) | | N/A |
| | All appliances are operated continuously until steady conditions are achieved, except for defrost tests. (IEC 60335-2-40:2024) | | N/A |
| | Appliances are operated under normal operation with flow rates which give the most unfavourable result. (IEC 60335-2-40:2024) | | N/A |
| 11.8 | Temperature rises monitored continuously and not exceeding the values in Table 3.....: | (See appended table) | P |
| | If the temperature rise of a motor winding exceeds the value of Table 3, or | | P |
| | if there is doubt with regard to classification of insulation | | N/A |
| | tests of Annex C are carried out | | N/A |
| | Sealing compound does not flow out | | N/A |
| | Protective devices do not operate, except | | N/A |
| | components in protective electronic circuits tested for the number of cycles specified in 24.1.4 | | P |
| | Temperatures do not exceed the temperature limit according to the formula. (IEC 60335-2-40:2024) | | P |
| **12** | **CHARGING OF METAL-ION BATTERIES** | | - |
| | Charging a battery that uses metal-ion chemistry does not cause any cell to exceed its operating region for charging | | N/A |
| | Fully discharged battery is charged with the charging system indicated in the instructions at an ambient temperature of 20 °C ± 5 °C | | N/A |
| | Test repeated at: | | N/A |
| | - minimum ambient temperature, if specified to be less than 10 °C by the manufacturer (°C) ..... | | N/A |
| | - at maximum ambient temperature, if specified to be greater than 40 °C by the manufacturer (°C) .....: | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | For all individual cells, the voltage, temperature and charging current are monitored .....: | (See appended table) | N/A |
| | For parallel configuration, analysis used to avoid measuring the individual branch currents, | | N/A |
| | the test result not exceeding the specified operating region for charging | | N/A |
| | Location of thermocouples for each cell temperature measurement on the outer surface, halfway along the longest dimension of the cell | | N/A |
| | For each cell, the specified operating region for charging specified by the cell manufacturer is not exceeded at the temperature of the cell | | N/A |
| | For batteries where cells are configured in series, the test is repeated with the charge in one battery deliberately imbalanced, the imbalance being introduced into a fully discharged battery by charging one cell to: | | N/A |
| | - approximately 50 % of its full charge, or | | N/A |
| | - less than 50 % of its full charge, if it is demonstrated as specified that this would occur in normal operation | | N/A |
| **13** | **LEAKAGE CURRENT AND ELECTRIC STRENGTH AT OPERATING TEMPERATURE** | | - |
| 13.1 | Leakage current not excessive and electric strength adequate | | P |
| | Heating appliances operated at 1,15 times the rated power input (W) .....: | | N/A |
| | Motor-operated appliances and combined appliances supplied at 1,06 times the rated voltage (V) .....: | 254.4 | P |
| | Protective impedance and radio interference filters disconnected before carrying out the tests | | N/A |
| 13.2 | The leakage current is measured by means of the circuit described in Figure 4 of IEC 60990:2016 | | P |
| | For class 0I appliances and class I appliances, except parts of class II construction, C replaced by a low impedance ammeter | | P |
| | Leakage current measurements .....: | (See appended table) | P |
| 13.3 | The appliance is disconnected from the supply | | P |
| | Electric strength tests according to Table 4 .....: | (See appended table) | P |
| | No breakdown during the tests | | P |
| **14** | **TRANSIENT OVERVOLTAGES** | | - |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Appliances withstand the transient over-voltages to which they may be subjected | | N/A |
| | Clearances having a value less than specified in Table 16 subjected to an impulse voltage test, the test voltage specified in Table 6.....: | (See appended table) | N/A |
| | No flashover during the test, unless | | N/A |
| | of functional insulation if the appliance complies with clause 19 with the clearance short-circuited | | N/A |
| **15** | **MOISTURE RESISTANCE** | | - |
| 15.1 | Electrical components of appliances are protected against the ingress of water which can be present in the appliance as a result of rain, overflow from the drain pan, or defrosting. (IEC 60335-2-40:2024) | | P |
| | Compliance is checked by tests of 15.2; 15.3 11.7 and clause 16. (IEC 60335-2-40:2024) | | P |
| | Water within the enclosure did not reduce the clearances and creepage distance the values specified in clause 29. (IEC 60335-2-40:2024) | | P |
| 15.2 | Appliances other than IPX0 are subjected to the tests of IEC 60529:1989 as follows: (IEC 60335-2-40:2024) | | N/A |
| | – IPX1 appliances as described in 14.2.1; (IEC 60335-2-40:2024) | | N/A |
| | – IPX2 appliances as described in 14.2.2; (IEC 60335-2-40:2024) | | N/A |
| | – IPX3 appliances as described in 14.2.3; (IEC 60335-2-40:2024) | | N/A |
| | – IPX4 appliances as described in 14.2.4; (IEC 60335-2-40:2024) | | P |
| | – IPX5 appliances as described in 14.2.5; (IEC 60335-2-40:2024) | | N/A |
| | – IPX6 appliances as described in 14.2.6; (IEC 60335-2-40:2024) | | N/A |
| | – IPX7 appliances as described in 14.2.7. (IEC 60335-2-40:2024) | | N/A |
| 15.3 | The appliance was installed in its position of normal use; drain pan discharge pipe is blocked carefully filled to the brim without splashing; rate airflow approximately 17 $cm^3/s$ per 1 $m^3/s$; 30 min or until all water drains from the appliance (IEC 60335-2-40:2024) | | P |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 15.101 | Spillage testing of indoor floor or wall-mounted appliances accessible to the general public are tested as described in clause 15.101.<br>(IEC 60335-2-40:2024) | | N/A |
| | Appliances withstand the tests of Clause 16.<br>(IEC 60335-2-40:2024) | | N/A |
| **16** | **LEAKAGE CURRENT AND ELECTRIC STRENGTH** | | - |
| 16.1 | Leakage current not excessive and electric strength adequate | | P |
| | Protective impedance disconnected from live parts before carrying out the tests | | P |
| | Tests carried out at room temperature and not connected to the supply | | P |
| 16.2 | Single-phase appliances: test voltage 1,06 times rated voltage (V) .....: | 254.4 | P |
| | Three-phase appliances: test voltage 1,06 times rated voltage divided by √3 (V).....: | | N/A |
| | Leakage current measurements .....: | (See appended table) | P |
| | Limit values doubled if: | | N/A |
| | - all controls have an off position in all poles, or | | N/A |
| | - the appliance has no control other than a thermal cut-out, or | | N/A |
| | all thermostats, temperature limiters and energy regulators do not have an off position, or | | N/A |
| | - the appliance has radio interference filters | | N/A |
| | With the radio interference filters disconnected, the leakage current does not exceed limits specified..: | (See appended table) | N/A |
| 16.3 | Electric strength tests according to Table 7 ..... : | (See appended table) | P |
| | No breakdown during the tests. | | P |
| **17** | **OVERLOAD PROTECTION OF TRANSFORMERS AND ASSOCIATED CIRCUITS** | | - |
| | No excessive temperatures in transformer or associated circuits in event of short-circuits likely to occur in normal use .....: | (See appended table) | N/A |
| | Appliance supplied with 1,06 or 0,94 times rated voltage under the most unfavourable short-circuit or overload likely to occur in normal use (V) .....: | Test voltage =<br>Frequency = | N/A |
| | Basic insulation is not short-circuited | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Temperature rise of insulation of the conductors of safety extra-low voltage circuits not exceeding the relevant value specified in Table 3 by more than 15 K | | N/A |
| | Temperature of the winding not exceeding the value specified in Table 8 | | N/A |
| | However, limits do not apply to fail-safe transformers complying with subclause 15.5 of IEC 61558-1:2017 | | N/A |
| **18** | **ENDURANCE** | | - |
| | This clause of Part 1 is not applicable. (IEC 60335-2-40:2024) | | — |
| **19** | **ABNORMAL OPERATION** | | - |
| 19.1 | The risk of fire, mechanical damage or electric shock under abnormal or careless operation obviated | | P |
| | Electronic circuits so designed and applied that a fault will not render the appliance unsafe ……: | (See appended table) | P |
| | Failure of the transfer medium flow, or of any control devices, do not result in a hazard. (IEC 60335-2-40:2024) | | P |
| | Appliances are subjected to the tests specified in 19.2 to 19.10, 19.101, 19.102, 19.103, and 19.104 as applicable. (IEC 60335-2-40:2024) | | P |
| | Appliances incorporating heating elements subjected to the tests of 19.2 and 19.3, and | | N/A |
| | if the appliance also has a control that limits the temperature during clause 11 it is subjected to the test of 19.4, and | | N/A |
| | if applicable, to the test of 19.5 | | N/A |
| | Appliances incorporating PTC heating elements are also subjected to the test of 19.6 | | N/A |
| | Appliances incorporating motors subjected to the tests of 19.7 to 19.10, as applicable | | P |
| | Appliances incorporating electronic circuits subjected to the tests of 19.11 and 19.12, as applicable | | P |
| | Appliances incorporating contactors or relays subjected to the test of 19.14, being carried out before the tests of 19.11 | | P |
| | Appliances incorporating voltage selector switches subjected to the test of 19.15 | | N/A |
| | Appliances having a mains connection and replaceable batteries subjected to the test of 19.16 | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Appliances incorporating rechargeable batteries that use metal-ion chemistries subjected to the test of 19.17 | | N/A |
| | Unless otherwise specified, the tests are continued until a non-self-resetting thermal cut-out operates, or | | N/A |
| | until steady conditions are established | | P |
| | If a heating element or an intentionally weak part becomes open-circuited, the relevant test is repeated on a second sample, and | | N/A |
| | that same part on the second sample does also become permanently open-circuited in the second test | | N/A |
| | unless a non-self-resetting thermal cut-out operates or steady conditions are established | | N/A |
| 19.2 | This subclause of Part 1 is not applicable for appliances with supplementary air heaters. (IEC 60335-2-40:2024) | | N/A |
| 19.3 | This subclause of Part 1 is not applicable for appliances with supplementary air heaters. (IEC 60335-2-40:2024) | | N/A |
| 19.4 | Test conditions as in clause 11, any control limiting the temperature during tests of clause 11 short circuited | | N/A |
| | Conditions clause 11 at the rated voltage (V)…….: (IEC 60335-2-40:2024) | | N/A |
| | One fault condition is reproduced at a time, the tests being made consecutively. (IEC 60335-2-40:2024) | | N/A |
| | In general, tests are limited to those cases which are expected to give the most unfavourable results. (IEC 60335-2-40:2024) | | N/A |
| 19.5 | Test of 19.4 repeated on class 0I and I appliances with tubular sheathed or embedded heating elements. No short-circuiting, but one end of the element connected to the sheath | | N/A |
| | The test repeated with reversed polarity and the other end of the heating element connected to the sheath | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | The test is not carried out on appliances intended to be permanently connected to fixed wiring, on appliances where an all-pole disconnection occurs during the test of 19.4, or on appliances used in a system with polarized plugs intended for connection to polarized socket outlets | | N/A |
| 19.6 | Appliances with PTC heating elements tested at rated voltage, establishing steady conditions | Test voltage =<br>Frequency = (maybe relevant for CA or SMPS) | N/A |
| | The working voltage of the PTC heating element is increased by 5 % and the appliance is operated until steady conditions are re-established. The voltage is then increased in similar steps until 1,5 times working voltage or until the PTC heating element ruptures (V).....: | Final voltage applied = | N/A |
| 19.7 | The motors, other than motor-compressors and stationary circulation pumps in compliance with IEC 60335-2-51, are mounted on a support of wood or similar material. The motor rotors are locked; fan blades and brackets are not removed.<br>(IEC 60335-2-40:2024) | Motor-compressor approved | P |
| | The motors are supplied at their supplied voltage when the appliance is supplied at rated voltage or at the upper limit of the rated voltage range, in a circuit as shown in Figure 103.<br>(IEC 60335-2-40:2024) | | N/A |
| | The motor operates for 15 days (360 h) or until a protection device permanently opens the circuit, whichever is the shorter period.<br>(IEC 60335-2-40:2024) | | N/A |
| | During the test, the ambient temperature is maintained at 23 °C ± 5 °C.<br>(IEC 60335-2-40:2024) | | N/A |
| | If the temperature of the motor windings does not exceed 90 °C when steady conditions are established, the test is considered to be ended.<br>(IEC 60335-2-40:2024) | | N/A |
| | During the test, the temperature of the enclosure does not exceed 150 °C and the temperature of the windings does not exceed the values shown in Table 8. (IEC 60335-2-40:2024) | | N/A |
| | Three days (72 h) after the beginning of the test, the motor withstand an electric strength test as specified in 16.3. (IEC 60335-2-40:2024) | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | At the end of the test, the leakage current, when measured as specified in 16.2 but with a test voltage of twice the rated voltage between all windings and the enclosure, does not exceed 2 mA. (IEC 60335-2-40:2024) | | N/A |
| | If the motor-compressor has not been type-tested against the requirements of IEC 60335-2-34, => subjects as descripted to the test acc. clause 19.7 (IEC 60335-2-40:2024) | | P |
| | The motor compressor complies with the requirements to the test acc. clause 19.7 (IEC 60335-2-40:2024) | | P |
| 19.8 | Three phase motors other than motor compressors are operated under the conditions of Clause 11 at rated voltage or at the upper limit of the rated voltage range with one phase disconnected, until steady conditions are obtained or the protective device operates. (IEC 60335-2-40:2024) | | N/A |
| 19.9 | This subclause of Part 1 is not applicable for motor-compressors, stationary circulation pumps in compliance with IEC 60335-2-51, and fans. (IEC 60335-2-40:2024) | | N/A |
| 19.10 | Series motor operated at 1,3 times rated voltage for 1 min (V) ..... | | N/A |
| | During the test, parts not being ejected from the appliance | | N/A |
| 19.11 | Electronic circuits, compliance checked by evaluation of the fault conditions specified in 19.11.2 for all circuits or parts of circuits, unless | | P |
| | they comply with the conditions specified in 19.11.1 | | N/A |
| | Appliances incorporating an electronic circuit that relies upon a programmable component to function correctly, subjected to the test of 19.11.4.8, unless | | P |
| | restarting does not result in a hazard | | P |
| | Appliances having a device with an off position obtained by electronic disconnection, or a device placing the appliance in a stand-by mode, subjected to the tests of 19.11.4 | | N/A |
| | If the safety of the appliance under any of the fault conditions depends on the operation of a miniature fuse-link complying with IEC 60127, the test of 19.12 is carried out | | N/A |
| | During and after each test the following is checked: | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - the temperature of the windings does not exceed the values specified in Table 8 | | N/A |
| | the appliance complies with the conditions specified in 19.13 | | N/A |
| | - any current flowing through protective impedance not exceeding the limits specified in 8.1.4 | | N/A |
| | If a conductor of a printed board becomes open-circuited, the appliance is considered to have withstood the particular test, provided both of the following conditions are met: | | N/A |
| | - the base material of the printed circuit board withstands the test of normative Annex E | | N/A |
| | - any loosened conductor does not reduce clearance or creepage distances between live parts and accessible metal parts below the values specified in clause 29 | | N/A |
| 19.11.1 | Fault conditions a) to g) in 19.11.2 are not applied to circuits or parts of circuits meeting both of the following conditions: | | N/A |
| | - the electronic circuit is a low-power circuit, that is, the maximum power at low-power points does not exceed 15 W according to the tests specified with the appliance supplied at rated voltage (V) : | | N/A |
| | - the protection against electric shock, fire hazard, mechanical hazard or dangerous malfunction of other parts of the appliance does not rely on the correct functioning of the electronic circuit | | N/A |
| 19.11.2 | Fault conditions applied one at a time, the appliance operating under conditions specified in clause 11, but supplied at rated voltage duration of the tests as specified: | | P |
| | Appliance supplied at rated voltage (V) ..... : | 240 | P |
| | a) short circuit of functional insulation if clearances or creepage distances are less than the values specified in clause 29 | | P |
| | b) open circuit at the terminals of any component | | P |
| | c) short circuit of capacitors, unless | | P |
| | they comply with IEC 60384-14:2013 including IEC 60384-14:2013/AMD:2016 | | N/A |
| | d) short circuit of any two terminals of an electronic component, other than integrated circuits | | P |
| | This fault condition is not applied between the two circuits of an optocoupler | | N/A |
| | f) failure of microprocessors and integrated circuits | | N/A |
| | g) failure of an electronic power switching device | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Each low power circuit is short-circuited by connecting the low-power point to the pole of the supply source from which the measurements were made | | N/A |
| | Any cord between a battery-operated appliance consuming more than 15 W and the detachable power supply part short-circuited as specified | | N/A |
| 19.11.3 | If the appliance incorporates a protective electronic circuit that operates to ensure compliance with clause 19, the appliance is tested as specified | | N/A |
| 19.11.4 | The first paragraph of Part 1 in not applicable if unintentional operation does not cause any hazards. (IEC 60335-2-40:2024) | | P |
| | Appliances having a device with an off position obtained by electronic disconnection, or | | N/A |
| | a device that can be placed in the stand-by mode, | | N/A |
| | subjected to the tests of 19.11.4.1 to 19.11.4.7, the device being set in the off position or in the stand-by mode | | N/A |
| | Appliances incorporating a protective electronic circuit are subjected to the tests of 19.11.4.1 to 19.11.4.7. The tests are carried out after the protective electronic circuit has operated during the relevant tests of Clause 19, except 19.2, 19.6, 19.11.3, 19.102 and 19.103. (IEC 60335-2-40:2024) | | N/A |
| | If the appliance incorporates more than one protective electronic circuit, each protective electronic circuit tested individually with the appliance operated under normal operation at any temperature within the working range. (IEC 60335-2-40:2024) | | N/A |
| | It is not necessary for a component protected by a protective electronic circuit that has been previously tested and shown to comply with the requirements of 19.11.4 of its standard to be retested in the final application. (IEC 60335-2-40:2024) | | N/A |
| | Surge protective devices disconnected, unless | | N/A |
| | they incorporate spark gaps. | | N/A |
| | For these tests, it can be necessary to provide specially prepared component samples, e.g. compressors with locked rotor. (IEC 60335-2-40:2024) | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 19.11.4.1 | The appliance is subjected to electrostatic discharges in accordance with IEC 61000-4-2, test level 4 | | N/A |
| 19.11.4.2 | The appliance is subjected to radiated fields in accordance with IEC 61000-4-3, at frequency ranges as specified | | N/A |
| 19.11.4.3 | The appliance is subjected to fast transient bursts in accordance with IEC 61000-4-4, test level 3 or 4 as specified | | N/A |
| 19.11.4.4 | The power supply terminals of the appliance subjected to voltage surges in accordance with IEC 61000-4-5 as specified | | N/A |
| | An open circuit test voltage of 2 kV is applicable for the line-to-line coupling mode | | N/A |
| | An open circuit test voltage of 4 kV is applicable for the line-to-earth coupling mode | | N/A |
| | Earthed heating elements in class I appliances disconnected | | N/A |
| | For appliances having surge arresters incorporating spark gaps, tests repeated at 95 % of the flashover voltage | | N/A |
| 19.11.4.5 | The appliance is subjected to injected currents in accordance with IEC 61000-4-6, test level 3 | | N/A |
| 19.11.4.6 | Appliances having a rated current not exceeding 16 A are subjected to the class 3 voltage dips and interruptions in accordance with IEC 61000-4-11:2020 | | N/A |
| 19.11.4.7 | The appliance is subjected to mains signals in accordance with IEC 61000-4-13:2002 including IEC 61000-4-13:2002/AMD1:2009 and IEC 61000-4-13:2002/AMD2:2015, test level class 2 | | N/A |
| 19.11.4.8 | The appliance is operated under normal operation and supplied at rated voltage (V) ..... | | N/A |
| | After 60 s the power supply is reduced to a level such that the appliance ceases to respond or parts controlled by the programmable component cease to operate whichever occurs first at any temperature within the working range.<br>(IEC 60335-2-40:2024) | | N/A |
| | The appliance continues to operate normally, or | | N/A |
| | requires a manual operation to restart | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 19.12 | If the safety of the appliance for any of the fault conditions specified in 19.11.2 depends on the operation of a miniature fuse-link complying with IEC 60127, the test is repeated, measuring the current flowing through the fuse-link; measured current (A); current rating of the fuse-link (A).....: | | P |
| 19.13 | During the tests the appliance does not emit flames, molten metal, poisonous or ignitable gas in hazardous amounts | | P |
| | Temperature rises not exceeding the values shown in table 9.....: | (See appended table) | P |
| | Compliance with clause 8 not impaired | | P |
| | If the appliance can still be operated, it complies with 20.2 | | N/A |
| | Insulation, other than of class III appliances or class III constructions that do not contain live parts, withstands the electric strength test of 16.3, the test voltage as specified in Table 4: | | P |
| | basic insulation (V).....: | 1000 | P |
| | - supplementary insulation (V).....: | 1750 | P |
| | - reinforced insulation (V).....: | 3000 | P |
| | After operation or interruption of a control, clearances and creepage distances across the functional insulation withstand the electric strength test of 16.3, the test voltage being twice the working voltage | | P |
| | The appliance does not undergo a dangerous malfunction, and | | P |
| | no failure of protective electronic circuits, if the appliance is still operable | | P |
| | For accessible safety extra-low voltage outlets, connectors, or USB outlets, no increase of the no-load output voltage by more than 3 V or 10 % of the voltage in normal use, whichever higher, with a maximum/peak of 42,4 VDC/VAC | | N/A |
| | Appliances tested with an electronic switch in the off position, or in the stand-by mode: | | N/A |
| | - do not become operational, or | | N/A |
| | - if they become operational, do not result in a dangerous malfunction during or after the tests of 19.11.4 | | N/A |
| | If the appliance contains lids or doors that are controlled by one or more interlocks, one of the interlocks may be released provided that both: | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - the lid or door does not move automatically to an open position when the interlock is released, and | | N/A |
| | - the appliance does not start after the cycle in which the interlock was released | | N/A |
| 19.14 | Appliances operated under the conditions of clause 11, any contactor or relay contact operating under the conditions of clause 11 being short-circuited | | N/A |
| | For a relay or contactor with more than one contact, all contacts are short-circuited at the same time | | N/A |
| | A relay or contactor operating only to ensure the appliance is energized for normal use is not short-circuited | | P |
| | If more than one relay or contactor operates in clause 11, they are short-circuited in turn | | N/A |
| | If the appliance has several modes of operation, the tests are carried out with the appliance operating in each mode, if necessary | | N/A |
| 19.15 | For appliances with a mains voltage selector switch, the switch is set to the lowest rated voltage position and the highest value of rated voltage is applied | | N/A |
| 19.16 | Appliances having mains connection and replaceable batteries supplied at rated voltage and operated under normal operation but with batteries removed or in any position allowed by construction | | N/A |
| 19.17 | For battery-operated appliances incorporating a battery using metal-ion chemistry, the battery system is operated according to the instructions and tested under the following conditions, duration as specified | | N/A |
| | a) series configured battery: | | N/A |
| | - imbalance introduced into fully discharged battery by charging one cell to the percentage of being fully charged applied during the test of Clause 12; | | N/A |
| | - single cell or parallel only configured battery: fully discharged | | N/A |
| | b) series configured battery: imbalance introduced as specified and fully charged, if the test of clause 12 was conducted with an imbalance of less than 50 % and if a single fault in the circuitry results in the loss of maintaining balance | | N/A |
| | c) series configured battery: cells at 50 % of full charge, except one which is shortened, battery then fully charged | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | d) fully charged battery connected to the charging system: short circuit introduced to the charging system as specified to produce the most unfavourable results, and for a charging system with a cord connecting to the battery, short circuit introduced at a point producing the most adverse effects; resistance of short circuit not exceeding 10 mΩ | | N/A |
| | No explosion or ignition of the battery during or after the test. | | N/A |
| | Voltage on any cell not exceeding upper limit charging voltage by more than 150 mV, unless | | N/A |
| | charging system permanently disabled from recharging battery, checked as specified. | | N/A |
| | Recharging considered to be permanently disabled, if: | | N/A |
| | - battery discharged to approximately 50 % of full charge, by using the battery-operated appliance tested (in case of an integral battery), or | | N/A |
| | by using a new sample of the battery-operated appliance (in case of a detachable and separable battery) | | N/A |
| | - attempt made to recharge battery normally | | N/A |
| | - no charging current after 10 min or after 25 % of the nominal capacity has been delivered, whichever occurs first | | N/A |
| 19.101 | The appliance is operated under the conditions in Clause 11 at rated voltage or at the upper limit of the rated voltage range, at an ambient temperature of 23 °C ± 5 °C. (IEC 60335-2-40:2024) | | P |
| | When steady conditions are attained, the heat transfer medium flow of the outdoor heat exchanger is restricted or shut off, whichever is the most unfavourable without the appliance being non-operative. (IEC 60335-2-40:2024) | | N/A |
| | After this test, protective devices that may have operated are reset, and the test is repeated, with the heat transfer medium flow, fluid or air, of the indoor heat exchanger, restricted or shut off, whichever is the most unfavourable without the appliance being non-operative.<br>(IEC 60335-2-40:2024) | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | In the case of appliances with defrosting systems, the heat transfer medium flow rate is additionally shut off at the beginning of the defrosting phase. (IEC 60335-2-40:2024) | | N/A |
| | Appliances incorporating a motor common to both the indoor and outdoor heat exchangers are subjected to the above test, the motor being disconnected once steady conditions are attained. (IEC 60335-2-40:2024) | | N/A |
| 19.102 | The indoor heat exchanger of appliances using water as a heat transfer medium is subjected to the following test. (IEC 60335-2-40:2024) | | N/A |
| 19.103 | Air to air appliances are operated under the conditions specified in Clause 11. (IEC 60335-2-40:2024) | | P |
| | The dry-bulb temperature is then reduced to a value 5 K below the minimum value specified by the manufacturer. (IEC 60335-2-40:2024) | | N/A |
| | The test is repeated except that the dry-bulb temperature is increased to a value 10 K above the maximum temperature specified by the manufacturer, but not to exceed 55 °C. (IEC 60335-2-40:2024) | | N/A |
| | The appliances are operated at rated voltage or at the upper limit of the rated voltage range. (IEC 60335-2-40:2024) | | N/A |
| **19.104** | **Appliances with supplementary air heater** (IEC 60335-2-40:2024) | | N/A |
| **19.104.1** | **General** (IEC 60335-2-40:2024) | | N/A |
| | Appliances provided with supplementary air heaters or provisions for supplementary air heaters are subjected to the test of 19.104.2 through 19.104.8 under the conditions specified in Clause 11 unless otherwise indicated. (IEC 60335-2-40:2024) | | N/A |
| | All appliances with supplementary air heaters configured with inlet and outlet ducts as applicable and instrumented in accordance with the applicable subclauses of Clause 11. (IEC 60335-2-40:2024) | | N/A |
| | Appliances are tested in the operating state and configuration which give the most unfavourable results. (IEC 60335-2-40:2024) | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Appliances are operated at an ambient temperature of 23 °C ± 5 °C and rated voltage or at the upper limit of the rated voltage range of the supplementary air heaters (IEC 60335-2-40:2024) | | N/A |
| **19.104.2** | **Restricted inlet – 1st limit cut-out** (IEC 60335-2-40:2024) | | N/A |
| | To test limit cut-out conditions, the airflow conditions specified are established, the indoor airflow is reduced by restricting the inlet air opening to a rate resulting in not more than 1 K/min outlet air temperature rise until a self-resetting thermal cut-out device operates for the first time as a result of slowly restricting the free area of the inlet. (IEC 60335-2-40:2024) | | N/A |
| | The outlet air temperature, measured by means of the thermocouple grid, not exceed 90 °C. (IEC 60335-2-40:2024) | | N/A |
| **19.104.3** | **Restricted inlet – minimum airflow** (IEC 60335-2-40:2024) | | N/A |
| | To test heating operation conditions, after the airflow conditions specified are established, the indoor airflow is reduced by restricting the inlet air opening to such an extent that the temperature of the air in the outlet is 3 K below the temperature obtained after a self-resetting thermal cut-out device operates for the first time as a result of slowly restricting the free area of the inlet. (IEC 60335-2-40:2024) | | N/A |
| | The appliance shall be operated until steady state conditions are established or for 1 h, whichever is longer. During the test, the temperatures are monitored continuously and not exceed the values shown in Table 3 (IEC 60335-2-40:2024) | | N/A |
| | To facilitate this test, the self-resetting thermal cut-out which has operated in 19.104.2 be short-circuited, if necessary. (IEC 60335-2-40:2024) | | N/A |
| **19.104.4** | **Restricted inlet – restrict inlet to fully blocked** (IEC 60335-2-40:2024) | | N/A |
| | To test restricted inlet conditions, after the airflow conditions specified are established, the indoor airflow is reduced by restricting the inlet air opening at a rate resulting in not more than 1 K/min outlet air temperature rise until a self-resetting thermal cut-out device operates. (IEC 60335-2-40:2024) | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | The restriction halted after any protective device operates until steady state conditions are established. After steady state conditions are reached, the restriction is resumed. The test continue until the inlet is fully restricted. (IEC 60335-2-40:2024) | | N/A |
| | The temperatures are monitored continuously. Temperatures shall not exceed the values shown in (Table 3 + 30 K) during the first hour and Table 3 thereafter. (IEC 60335-2-40:2024) | | N/A |
| **19.104.5** | **Fan failure** (IEC 60335-2-40:2024) | | N/A |
| | After steady state conditions are attained, heat transfer medium flow of the indoor heat exchanger is restricted or shut off, whichever is the most unfavourable without the appliance being non-operative. (IEC 60335-2-40:2024) | | N/A |
| | Temperatures do not exceed the values in clause 19.13. (IEC 60335-2-40:2024) | | N/A |
| **19.104.6** | **Blocked outlet** (IEC 60335-2-40:2024) | | N/A |
| | To test blocked outlet conditions, when steady conditions are attained, the appliance outlet air opening is totally closed off and operation continued until maximum temperatures are determined. (IEC 60335-2-40:2024) | | N/A |
| | This test with the outlet air opening closed not be conducted on any unit with free air discharge openings located more than 1,2 m above the floor level when the unit is installed as intended. (IEC 60335-2-40:2024) | | N/A |
| | Temperatures do not exceed the values in 19.13. (IEC 60335-2-40:2024) | | N/A |
| **19.104.7** | **Curtain drape** (IEC 60335-2-40:2024) | | N/A |
| 19.104.7 | All appliances provided with supplementary air heaters and with free air discharge openings are subjected to the following test in each mode of operation. (IEC 60335-2-40:2024) | | N/A |
| **19.104.8** | **Back up protection test** (IEC 60335-2-40:2024) | | N/A |
| | If a self-resetting thermal cut-out operates during the tests of 19.104, then the self-resetting thermal cut-out by-passed and the tests of 19.104.4 through 19.104.7 repeated. (IEC 60335-2-40:2024) | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 19.105 | For dehumidifiers in which the compressor is enclosed by a non-metallic material which isolates it from the forced air stream providing air to the heat exchanger, the test applies acc. to this clause. (IEC 60335-2-40:2024) | | N/A |
| 19.106 | Double wall heat exchangers for refrigerating systems employing flammable refrigerants with refrigerant charge $m_c > m_1$ is resistant against freezing. (IEC 60335-2-40:2024) | | N/A |
| | Compliance is checked acc. to this clause. (IEC 60335-2-40:2024) | | N/A |
| **20** | **STABILITY AND MECHANICAL HAZARDS** | | - |
| 20.1 | Appliances having adequate stability | | P |
| | Tilting test through an angle of 10°, appliance placed on an inclined plane/horizontal support, not connected to the supply mains; appliance does not overturn | | P |
| | Tilting test repeated on appliances with heating elements, angle of inclination increased to 15° | | N/A |
| | Possible heating test in overturned position; temperature rise does not exceed values shown in Table 9. | | N/A |
| | Fixed appliances that are only fixed into position by water piping, refrigerant piping or other piping are also subjected to this test. (IEC 60335-2-40:2024) | | N/A |
| 20.2 | Moving parts adequately arranged or enclosed as to provide protection against personal injury | | N/A |
| | Protective enclosures, guards and similar parts are non-detachable, and | | N/A |
| | have adequate mechanical strength | | N/A |
| | Enclosures that can be opened by overriding an interlock are considered to be detachable parts | | N/A |
| | Self-resetting thermal cut outs and overcurrent protective devices not causing a hazard by unexpected closure | | N/A |
| | Test probe 18 of IEC 61032 is not applied to parts according to the installation instructions, which mounted at a height > 1,8 m above the floor. (IEC 60335-2-40:2024) | | N/A |
| | Not possible to touch dangerous moving parts with the test probes, checked by | | N/A |
| | - inspection | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - test of 21.1 | | N/A |
| | - applying a force not exceeding 5 N by means of a test probe similar to test probe B of IEC 61032 but having a circular stop face with a diameter of 50 mm, instead of the noncircular face | | N/A |
| | - applying test probe 18 of IEC 61032 with a force not exceeding 2,5 N, if appliance intended for non-commercial use or to be installed in an open to the public | | N/A |
| | For appliances provided with movable devices such as those intended for varying the tension of belts, the test with the test probe is carried out with these devices adjusted to the most unfavourable position within their range of adjustment. If necessary, belts are removed. | | N/A |
| | It is not possible to touch dangerous moving parts with the test probes. | | N/A |
| **21** | **MECHANICAL STRENGTH** | | **-** |
| 21.1 | Appliance has adequate mechanical strength and is constructed as to withstand rough handling | | P |
| | Pressure vessels comply with the requirements of ISO 5149-2:2014, 4.4.2. (IEC 60335-2-40:2024) | | P |
| | Checked by applying 3 blows to every point of the enclosure likely to be weak, in accordance with test Ehb of IEC 60068-2-75, spring hammer test, with an impact energy of 0,5 J | (See appended table) | P |
| | Appliances and parts of appliances having pins for insertion into mains socket-outlets subjected to the test, Free fall repeated, procedure 2, of IEC 60068-2-31, under the specified conditions | | N/A |
| | The appliance shows no damage impairing compliance with this standard, and | | N/A |
| | compliance with 8.1, 15.1 and clause 29 not impaired | | N/A |
| | If doubt, supplementary or reinforced insulation subjected to the electric strength test of 16.3 | | N/A |
| | If necessary, repetition of groups of three blows on a new sample | | N/A |
| 21.2 | Accessible parts of solid insulation having strength to prevent penetration by sharp implements | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Test not applicable if the thickness of supplementary insulation is at least 1 mm and reinforced insulation at least 2 mm | | N/A |
| | For accessible parts made of particle foam material used as supplementary insulation or reinforced insulation, the test is done without any consideration of the insulation thickness.<br>(IEC 60335-2-40:2024) | | N/A |
| | The insulation is tested as specified, and does withstand the electric strength test of 16.3 | | N/A |
| 21.3 | Appliances with pins for insertion into socket-outlets with a rotating plug part are provided with a mechanical stop to prevent rotation having adequate mechanical strength and constructed to withstand rough handling | | N/A |
| | Application of a torque of 2 Nm for 1 min does not result in rotation of the plug part after rotating it until the mechanical stop prevents further rotation, both directions checked | | N/A |
| 21.101 | Appliances using flammable refrigerants withstand the effects of vibration during transport.<br>(IEC 60335-2-40:2024) | | P |
| | Compliance is checked by the following: (IEC 60335-2-40:2024) | | P |
| | – the use of detection equipment having an equivalent sensitivity of 3 g/year of refrigerant reveal no leaks; (IEC 60335-2-40:2024) | | P |
| | – damage of parts other than the refrigerating circuit is allowed. (IEC 60335-2-40:2024) | | P |
| 21.102 | Double wall heat exchangers for refrigerating systems employing flammable refrigerant with refrigerant charge $m_c > m_1$ constructed in a way that they do not allow refrigerants to leak into the secondary circuit if one of the walls breaks.<br>(IEC 60335-2-40:2024) | | N/A |
| | Compliance is checked by the pressure test of Annex EE. (IEC 60335-2-40:2024) | | N/A |
| **22** | **CONSTRUCTION** | | - |
| 22.1 | Appliance marked with the first numeral or any of the additional letters of the IP system | | P |
| 22.2 | Stationary appliance: means to ensure disconnection from the supply being provided: | | N/A |
| | - a supply cord fitted with a plug, or | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - a switch providing all-pole disconnection complying with 24.3, or | | N/A |
| | - an appliance inlet | | N/A |
| | Single-pole switches and single-pole protective devices for the disconnection of heating elements in single-phase, permanently connected class 0I and class I appliances, connected to the line conductor | | N/A |
| 22.3 | Appliance provided with pins: no undue strain on socket-outlets | | N/A |
| | Means for retaining pins withstand the forces to which the pins are like to be subjected in normal use | | N/A |
| | Applied torque not exceeding 0,25 Nm, torque to keep the socket-outlet itself in the vertical plane not included in this value | | N/A |
| | Pull force of 50 N for 1 min to each pin after the appliance has being placed in the heating cabinet; when cooled to room temperature the pins are not displaced by more than 1 mm | | N/A |
| | Each pin subjected to a torque of 0,4 Nm; the pins are not rotating, unless | | N/A |
| | rotating does not impair compliance with this standard | | N/A |
| 22.4 | Appliance for heating liquids and appliance causing undue vibration not provided with pins for insertion into socket-outlets | | N/A |
| 22.5 | No risk of electric shock from charged capacitors resulting in a capacitance equal or greater than 0,1 uF when touching pins, the appliance being disconnected from the supply at the instant of voltage peak | | P |
| | Appliance supplied at rated voltage (V) ..... : | 240 | P |
| | Voltage not exceeding 34 V (V).....: | 0 | P |
| | If compliance relies on the operation of an electronic circuit, the electromagnetic phenomena tests of 19.11.4.3 and 19.11.4.4 are applied | | N/A |
| | The test for measuring the voltage between the pins of the plug is then repeated three times, voltage not exceeding 34 V (V).....: | | N/A |
| 22.6 | Electrical insulation not affected by condensing water or leaking liquid. | | P |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Electrical insulation of class II appliances not affected if a hose ruptures or seal leaks | | N/A |
| | The electrical insulation is not affected by snow which might enter the appliance enclosure. (IEC 60335-2-40:2024) | | P |
| | In case of doubt, test as described. | | N/A |
| 22.7 | Adequate safeguards against the risk of excessive pressure in appliances containing liquid or gases or having steam-producing devices. | | N/A |
| 22.8 | Electrical connections not subject to pulling during cleaning of compartments to which access can be gained without the aid of a tool, and that are likely to be cleaned in normal use. | | N/A |
| 22.9 | Insulation, internal wiring, windings, commutators and slip rings not exposed to oil, grease or similar substances, unless | | P |
| | the substance has adequate insulating properties. | | N/A |
| 22.10 | Not possible to reset voltage-maintained non-self-resetting thermal cut-outs by the operation of an automatic switching device incorporated within the appliance, if: | | N/A |
| | - a non-self-resetting thermal cut-out is required by the standard, and | | N/A |
| | - a voltage maintained non-self-resetting thermal cut-out is used to meet it | | N/A |
| | Non-self-resetting thermal motor protectors have a trip-free action, unless | | N/A |
| | they are voltage maintained. | | N/A |
| | Reset buttons of non-self-resetting controls so located or protected that accidental resetting is unlikely. | | N/A |
| 22.11 | Reliable fixing of non-detachable parts that provide the necessary degree of protection against electric shock, moisture or contact with moving parts | | N/A |
| | Obvious locked position of snap-in devices used for fixing such parts | | N/A |
| | No deterioration of the fixing properties of snap-in devices used in parts that are likely to be removed during installation or servicing | | N/A |
| | Tests as described | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 22.12 | Handles, knobs, etc. fixed in a reliable manner, if loosening could result in a hazard, including a choking hazard | | P |
| | Requirement concerning the choking hazard does not apply to commercial appliances | | N/A |
| | Removing or fixing in wrong position of handles, knobs, etc. indicating position of switches or similar components not possible, if resulting in a hazard | | N/A |
| | No use of sealing compound and similar materials, other than self-hardening resins, to prevent loosening | | N/A |
| | Axial force of 15 N applied for 1 min to parts unlikely to be subjected to axial pull in normal use | | N/A |
| | Axial force of 30 N applied for 1 min to parts likely to be subjected to axial pull in normal use | | P |
| | Loosening of removed parts not resulting in a choking hazard, checked with small parts cylinder | | N/A |
| 22.13 | Unlikely that handles, when gripped as in normal use, make the operator's hand touch parts having a temperature rise exceeding the value specified for handles which are held for short periods only | | P |
| 22.14 | No ragged or sharp edges creating a hazard for the user in normal use or during user maintenance | | N/A |
| | No exposed pointed ends of self-tapping screws or other fasteners likely to be touched by the user in normal use or during user maintenance | | N/A |
| | This requirement does not apply to the metallic fins of heat exchangers. (IEC 60335-2-40:2024) | | N/A |
| 22.15 | Storage hooks and the like for flexible cords smooth and well rounded | | N/A |
| 22.16 | Automatic cord reels cause no undue abrasion or damage to the sheath of the flexible cord, no breakage of conductor strands and no undue wear of contacts | | N/A |
| | Cord reel tested with 6 000 operations, as specified | | N/A |
| | Electric strength test of 16.3, voltage of 1 000 V applied | | N/A |
| 22.17 | Spacers not removable from the outside by hand or by means of a screwdriver or a spanner | | N/A |
| 22.18 | Current-carrying parts and other metal parts resistant to corrosion, unless | | P |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | made from stainless steel, plated steel or similar corrosion-resistant alloys | | N/A |
| 22.19 | Driving belts not relied upon to provide the required level of insulation, unless | | N/A |
| | constructed to prevent inappropriate replacement | | N/A |
| 22.20 | Direct contact between live parts and thermal insulation effectively prevented, unless | | N/A |
| | material used is non-corrosive, non-hygroscopic and non-combustible, or thermal insulation is glass-wool | | N/A |
| 22.21 | Wood, cotton, silk, ordinary paper and fibrous or hygroscopic material not used as insulation, unless | | P |
| | impregnated | | N/A |
| | Requirement not applicable to magnesium oxide and mineral ceramic fibres electrically insulating heating elements and insulating material where fibre interstices are filled with a suitable insulant | | N/A |
| 22.22 | Appliances not containing asbestos | | P |
| 22.23 | Oils containing polychlorinated biphenyl (PCB) not used | | P |
| 22.24 | Bare heating elements be supported that, in case of rupture or sagging, the heating conductor cannot come into contact with accessible metal parts nor give rise to a hazard. (IEC 60335-2-40:2024) | | N/A |
| | Bare heating elements are not made of wood or wood composite enclosures.<br>(IEC 60335-2-40:2024) | | N/A |
| 22.25 | Sagging heating conductors cannot come into contact with accessible metal parts | | N/A |
| | Requirement not applicable to class III appliances or class III constructions without live parts, appliances where a core effectively prevents sagging, or where supplementary insulation prevents contact | | N/A |
| 22.26 | For class III constructions, the insulation between parts operating at safety extra-low voltage and other live parts complies with the requirements for double or reinforced insulation | | N/A |
| 22.27 | Parts connected by protective impedance separated by double or reinforced insulation | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 22.28 | Metal parts of class II appliances conductively connected to gas pipes or in contact with water separated from live parts by double or reinforced insulation | | N/A |
| 22.29 | Class II appliances permanently connected to fixed wiring constructed so that the required degree of access to live parts is maintained after installation | | N/A |
| 22.30 | Parts serving as supplementary or reinforced insulation fixed so that they cannot be removed without being seriously damaged, or | | N/A |
| | constructed so that they cannot be replaced in an incorrect position and if omitted, the appliance is rendered inoperable or manifestly incomplete | | N/A |
| 22.31 | Neither clearances nor creepage distances over supplementary and reinforced insulation reduced below values in clause 29 as a result of wear | | P |
| | Neither clearances nor creepage distances between live parts and accessible parts reduced below values for supplementary insulation if wires, screws, etc. become loose | | P |
| 22.32 | Supplementary and reinforced insulation constructed or protected against pollution so that clearances or creepage distances are not reduced below the values in clause 29 | | N/A |
| | Supplementary insulation of natural or synthetic rubber resistant to ageing, or arranged and dimensioned so that creepage distances are not reduced below values specified in 29.2 | | N/A |
| | Ceramic material not tightly sintered, similar materials or beads alone not used as supplementary or reinforced insulation | | N/A |
| | Ceramic and similar porous material in which heating conductors are embedded is considered to be basic insulation, not reinforced insulation | | N/A |
| | No visible cracks after oxygen bomb test at 70 °C for 96 h and 16 h at room temperature | | N/A |
| 22.33 | Conductive liquids that are or may become accessible in normal use and conductive liquids that are in contact with unearthed accessible metal parts are not in direct contact with live parts, or | | N/A |
| | unearthed metal parts separated from live parts by basic insulation only | | N/A |
| | Electrodes not used for heating liquids | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | For class II constructions, conductive liquids that are or may become accessible in normal use and conductive liquids that are in contact with unearthed accessible metal parts are not in direct contact with basic or reinforced insulation, unless | | N/A |
| | the reinforced insulation consists of at least 3 layers | | N/A |
| | For class II constructions, conductive liquids which are in contact with live parts are not in direct contact with reinforced insulation, unless | | N/A |
| | the reinforced insulation consists of at least 3 layers | | N/A |
| | An air layer not used as basic or supplementary insulation in a double insulation system if likely to be bridged by leaking liquid | | N/A |
| 22.34 | Shafts of operating knobs, handles, levers etc. not live, unless | | P |
| | the shaft is not accessible when the part is removed | | N/A |
| 22.35 | For other than class III constructions, handles, levers and knobs, held or actuated in normal use, not becoming live in the event of a failure of basic insulation | | P |
| | Such parts being of metal, and their shafts or fixings are likely to become live in the event of a failure of basic insulation, are either adequately covered by insulation material or their accessible parts are separated from their shafts or fixings by supplementary insulation | | N/A |
| | This requirement does not apply to handles, levers and knobs on stationary appliances and cordless appliances, other than those of electrical components, provided they are reliably connected to an earthing terminal or earthing contact, or separated from live parts by earthed metal | | N/A |
| | Insulating material covering metal handles, levers and knobs withstands the electric strength test of 16.3 for supplementary insulation | | N/A |
| 22.36 | For appliances other than class III appliances, handles continuously held in the hand in normal use so constructed that when gripped as in normal use, the operator's hand is not likely to touch metal parts, unless | | N/A |
| | they are separated from live parts by double or reinforced insulation | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 22.37 | Capacitors in class II appliances not connected to accessible metal parts and their casings, if of metal, separated from accessible metal parts by supplementary insulation, unless | | N/A |
| | the capacitors comply with 22.42 | | N/A |
| 22.38 | Capacitors not connected between the contacts of a thermal cut-out | | N/A |
| 22.39 | Lampholders used only for the connection of lamps | | N/A |
| 22.40 | Motor-operated appliances and combined appliances intended to be moved while in operation, or having accessible moving parts, fitted with a switch to control the motor. The actuating member of the switch being easily visible and accessible. | | |
| 22.41 | No components, other than lamps, containing mercury | | P |
| 22.42 | Protective impedance consisting of at least two separate components | | P |
| | Values specified in 8.1.4 not exceeded if any one of the components are short-circuited or open-circuited | | N/A |
| | Resistors checked by the test of 14.2 a) in IEC 60065:2014 | | N/A |
| | Capacitors checked by the tests for class Y capacitors in IEC 60384-14:2013 including IEC 60384-14:2013/AMD1:2016 for rated voltage of the appliance (V) ..... : | | N/A |
| 22.43 | Appliances adjustable for different voltages, accidental changing of the setting of the voltage unlikely to occur | | N/A |
| 22.44 | Appliances not having an enclosure that is shaped or decorated like a toy, unless | | N/A |
| | a toy is shaped like the appliance | | N/A |
| 22.45 | When air is used as reinforced insulation, clearances not reduced below the values in 29.1.3 due to deformation of the enclosure, applying a force of 30 N to accessible surfaces | | P |
| 22.46 | For programmable protective electronic circuits used to ensure compliance with the standard, the software contains measures to control the fault/error conditions in Table R.1 | | N/A |
| | These requirements are not applicable to software used for functional purpose or compliance with clause 11 | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Compliance checked by evaluating the software in accordance with the relevant requirements of normative Annex R | | N/A |
| | If the software is modified, the evaluation and relevant tests are repeated if the modification influences the results of the test involving protective electronic circuits | | N/A |
| 22.47 | Appliances connected to the water mains withstand the water pressure expected in normal use | | N/A |
| | No leakage from any part, including any inlet water hose | | N/A |
| 22.48 | Appliances connected to the water mains constructed to prevent back-siphonage of non-potable water | | N/A |
| 22.50 | Controls incorporated in the appliance take priority over controls actuated by remote operation | | N/A |
| 22.52 | Socket-outlets on appliances accessible to the user in accordance with the socket-outlet system used in the country in which the appliance is sold | | N/A |
| 22.53 | Class II appliances and class III appliances that incorporate functionally earthed parts have at least double insulation or reinforced insulation between live parts and the functionally earthed parts | | N/A |
| 22.54 | Button cells and batteries designated R1 not accessible without the aid of a tool, unless | | N/A |
| | the cover of their compartment can only be opened after at least two independent movements have been applied simultaneously | | N/A |
| 22.55 | Devices operated to stop the intended function of the appliance, if any, are being distinguished from other manual devices by means of shape, size, surface texture, or position.....: | | N/A |
| | The requirement concerning position does not preclude use of a push on push off switch | | N/A |
| | An indication when the device has been operated is given by: | | N/A |
| | - tactile feedback from the actuator or from the appliance, or | | N/A |
| | - reduction in heat output, or | | N/A |
| | - audible and visible feedback | | N/A |
| 22.56 | Detachable power supply part provided with the part of class III construction | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 22.57 | The properties of non-metallic materials do not degrade from exposure to UV-C radiation, as specified in normative Annex T | | N/A |
| | This requirement does not apply to glass, ceramics or similar materials | | N/A |
| 22.58 | Appliances connected to the supply mains by an appliance inlet are provided with a cord set or a connector for attachment to a suitable flexible cord, except from | | N/A |
| | - appliances complying with IEC 60320-3, or | | N/A |
| | - single phase appliances having a rated current exceeding 16 A, connected to mains by an appliance inlet complying with IEC 60309-2, or | | N/A |
| | - multi-phase appliances connected to mains by an appliance inlet complying with IEC 60309-2 | | N/A |
| 22.59 | Protective extra-low voltage circuits separated by at least supplementary insulation from circuits operating at safety extra-low voltage | | N/A |
| 22.60 | Functional earthing terminals and functional earthing contacts not connected to the neutral terminal | | N/A |
| 22.61 | Appliance outlets complying with the standard sheets in IEC 60320-3 accessible to the user and socket outlets accessible to the user are single phase, if: | | N/A |
| | - they are incorporated in appliances connected to the supply mains, and | | N/A |
| | - they operate at rated voltage | | N/A |
| | Current rating not exceeding 16 A (A).....: | | N/A |
| | Appliance outlets accessible to the user, other than those supplying accessories, and socket-outlets accessible to the user are protected by one of the following: | | N/A |
| | - a circuit breaker for equipment complying with IEC 60934, or | | N/A |
| | - a non-user replaceable fuse-link | | N/A |
| | Current rating of protective device not exceeding current rating of the appliance outlet or socket-outlet (A).....: | | N/A |
| | Protective device placed behind a non-detachable cover | | N/A |
| | Current rating of appliance outlets and socket-outlets marked with the outlet load in watts, obtained from the market outlet load divided by the rated voltage (A).....: | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 22.62 | Remote communication through public networks does not impair compliance with this standard | | N/A |
| | The requirement does only apply to remote communication where the download of software or the transmission of data: | | N/A |
| | a) includes measures according to normative Annex R necessary for compliance with 22.46, or | | N/A |
| | Includes means necessary for compliance with Clauses 8 to 32 | | N/A |
| | b) only affects the software part that is not covered by a), but where compliance might be impaired due to improper separation of partitioning from the software or data in a) | | N/A |
| | The requirement does not apply to appliances: | | N/A |
| | - where all measures to comply with this standards are independent of software, | | N/A |
| | - using remote communication through public networks for the send-only transmission of data, or | | N/A |
| | - that only provide event driven messages or push remote monitoring | | N/A |
| | Compliance checked by inspection of the product and the technical documentation, and by the requirements and tests in normative Annex U | | N/A |
| 22.101 | Appliances intended to be fixed be so designed that they can be securely fixed and maintained in position. (IEC 60335-2-40:2024) | | N/A |
| 22.102.1 | Appliances provided with supplementary air heaters provided with at least two thermal cut-outs. The thermal cut-out intended to operate first either a self-resetting thermal cut-out or a non-self-resetting thermal cut-out; the other thermal cut-out shall be a non-self-resetting thermal cut-out. (IEC 60335-2-40:2024) | | N/A |
| 22.102.2 | Appliances provided with supplementary water heaters incorporate a non-self-resetting thermal cut-out, providing all-pole disconnection that operates separately from water thermostats. However, for appliances intended to be connected to fixed wiring, the neutral conductor need not be disconnected. (IEC 60335-2-40:2024) | | N/A |
| 22.102.3 | Thermal cut-outs of the capillary type shall be so designed that the contacts open in the event of leakage from the capillary tube. (IEC 60335-2-40:2024) | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 22.103 | The sensing and switching elements of electromechanical non-self-resetting cut-outs functionally independent of other control devices. (IEC 60335-2-40:2024) | | N/A |
| | If the switching element of a non-self-resetting cut-out is operating a relay or contactor, the relay or contactor also be operated by other control devices. Protective electronic circuits are covered by Clause 19. (IEC 60335-2-40:2024) | | N/A |
| 22.104 | Containers of sanitary hot water heat pumps withstand the water pressure occurring in normal use. (IEC 60335-2-40:2024) | | N/A |
| | 0,15 MPa in open containers (IEC 60335-2-40:2024) | | N/A |
| | twice the permissible excessive operating maximum allowable pressure for closed containers; (IEC 60335-2-40:2024) | | N/A |
| 22.105 | In the case of closed containers of sanitary hot water heat pumps, the formation of an air or vapour cushion of more than 2 % of the capacity, but not more than 10 %, as a maximum, provided. (IEC 60335-2-40:2024) | | N/A |
| 22.106 | Pressure-relief devices, whether incorporated in the container of sanitary hot water heat pumps or supplied separately, shall prevent the pressure in the container from exceeding the maximum allowable pressure by more than 0,1 MPa. (IEC 60335-2-40:2024) | | N/A |
| 22.107 | The outlet system of open containers of sanitary hot water heat pumps shall be free from obstructions that could limit the water flow to such an extent that the pressure in the container would exceed the maximum allowable pressure. (IEC 60335-2-40:2024) | | N/A |
| | Vented containers of sanitary hot water heat pumps constructed that the container is always open to the atmosphere through an aperture of at least 5 mm in diameter or 20 $mm^2$ in area, with a width of at least 3 mm. (IEC 60335-2-40:2024) | | N/A |
| 22.108 | Storage tanks of sanitary hot water heat pumps shall be resistant to vacuum pressure impulses which can occur in normal use. (IEC 60335-2-40:2024) | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 22.109 | Wiring connected to a non-self-resetting thermal cut-out designed to be replaced after its operation secured that replacement of the thermal cut-out itself or to a heating element assembly on which the thermal cut-out is mounted will not damage other connections or internal wiring. (IEC 60335-2-40:2024) | | N/A |
| 22.110 | Non-self-resetting thermal cut-outs designed to be replaced after their operation open the circuit in the intended manner without short-circuiting live parts of different potential and without causing live parts to come into contact with the enclosure. (IEC 60335-2-40:2024) | | N/A |
| | During the test, the enclosure of the appliance is connected to earth through a 3 A fuse; this fuse do not blow. (IEC 60335-2-40:2024) | | |
| | the supplementary heating elements withstand an electric strength test as specified in 16.3. (IEC 60335-2-40:2024) | | N/A |
| 22.112 | The construction of the refrigerating system comply with the requirements of ISO 5149-2:2014, 4.2, 4.3, 5.2.1, 5.2.2, 5.2.4, 5.2.5, 5.2.15, 5.2.6.1, 5.2.6.3, 5.2.7, 5.2.8, 5.2.9.1, 5.2.9.3, and 5.2.9.4, ISO 5149-2:2014 and ISO 5149-2:2014/AMD1:2020, 5.2.3, and ISO 5149-2:2014/AMD1:2020, 4.1, 5.2.9.2. (IEC 60335-2-40:2024) | | P |
| P22.113 | When a flammable refrigerant is used, refrigerant tubing piping protected or enclosed to avoid mechanical damage. (IEC 60335-2-40:2024) | | P |
| | The refrigerant piping protected to the extent that it will not be handled or used for carrying during moving of the appliance. (IEC 60335-2-40:2024) | | P |
| | Refrigerant piping located within the appliance enclosure is considered to be protected from mechanical damage. (IEC 60335-2-40:2024) | | N/A |
| 22.114 | When a flammable refrigerant is used, low temperature solder alloys, such as lead/tin alloys, not be used for pipe connections or any other refrigerant pressure containing purposes. (IEC 60335-2-40:2024) | | P |
| 22.115 | The refrigerant charge (mc) in each refrigerating system employing flammable refrigerant does not exceed $m^3$ as defined in Annex GG. (IEC 60335-2-40:2024) | | N/A |
| | The construction of the refrigerating system using flammable refrigerants comply with the requirements in Annex GG. | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 22.116 | Arcs and sparks from electric components (IEC 60335-2-40:2024) | | P |
| 22.116.1 | Appliances using flammable refrigerants shall be constructed so that any leaked refrigerant will not flow or stagnate so as to cause a fire or explosion hazard in areas within the appliance or connected ducts where electrical components, which could be a source of ignition and which could function during normal operation or as a result of a leak, are located. (IEC 60335-2-40:2024) | | P |
| | Separate components, such as thermostats, which are charged with less than 0,5 g of a flammable gas are not considered to cause a fire or explosion hazard in the event of leakage of the gas within the component itself. (IEC 60335-2-40:2024) | | P |
| | Electrical components, which are potential ignition sources that could function under normal operation or as a result of a leak, are not considered a source of ignition if they comply with at least one of the following requirements: (IEC 60335-2-40:2024) | | P |
| | a) not be located in an area where a potentially flammable gas mixture will accumulate as demonstrated by the test of Annex FF; (IEC 60335-2-40:2024) | | P |
| | b) have equipment protection level according to 22.116.2; (IEC 60335-2-40:2024) | | P |
| | c) are sealed components in compliance with the tests of 22.116.3, and protected from impact by the appliance enclosure; (IEC 60335-2-40:2024) | | N/A |
| | d) are located in an enclosure which complies with IEC 60079-15:2017, Clauses 7 through 10, for restricted breathing enclosures suitable for use with group IIA gases or the refrigerant used; (IEC 60335-2-40:2024) | | N/A |
| | e) are located in an enclosure which complies with Annex NN. Applicable to appliances with A2L refrigerants only; (IEC 60335-2-40:2024) | | N/A |
| | f) are in compliance with Annex JJ. Applicable to appliance with A2L refrigerants only (IEC 60335-2-40:2024) | | N/A |
| | g) are in compliance with 22.116.4. Applicable to appliance with A2L refrigerants only; (IEC 60335-2-40:2024) | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | h) electrostatic air cleaners or similar devices tested and found to comply with 22.116.5. Applicable to appliance with A2L refrigerants only; (IEC 60335-2-40:2024) | | N/A |
| | i) refrigerant sensors tested and found to comply with IEC TS 63542:2024. (IEC 60335-2-40:2024) | | N/A |
| 22.116.2 | Components are not considered to be ignition sources if they comply with the requirements for equipment protection level Ga, Gb, or Gc as defined in IEC 60079-14 for the refrigerant used in the appliance or the relevant gas group (IIA, IIB, or IIC) to which the refrigerant belongs. However, the following requirements do not apply: (IEC 60335-2-40:2024) | | N/A |
| | – marking requirements of the applicable standard in IEC 60079 (all parts) (IEC 60335-2-40:2024) | | N/A |
| | – the impact tests of IEC 60079-0 (IEC 60335-2-40:2024) | | N/A |
| | – the IP test of IEC 60079-0; (IEC 60335-2-40:2024) | | N/A |
| | – the drop test of IEC 60079-0; (IEC 60335-2-40:2024) | | N/A |
| | – the creepage and clearance requirements in IEC 60079-7. (IEC 60335-2-40:2024) | | N/A |
| 22.116.3 | Three samples of the component conditioned in a climate chamber for 168 h at the maximum operating temperature during the test of Clause 11 plus 12 K, but not less than 75 °C. This conditioning is followed by 24 h at the minimum operating temperature during the test of Clause 11 reduced by at least 5 K. (IEC 60335-2-40:2024) | | N/A |
| | The test temperature in the climate chamber maintained within 2 K for the duration of the test. (IEC 60335-2-40:2024) | | N/A |
| | The components shall be stabilized at a temperature of 25 °C. The entire components then be rapidly immersed in water at a temperature of (50 ± 2) °C to a depth of at least 25 mm below the surface for at least 60 s. (IEC 60335-2-40:2024) | | N/A |
| | No bubbles emerge from the inside of the samples during this test. (IEC 60335-2-40:2024) | | N/A |
| 22.116.4 | For A2L refrigerants, devices capable of 100 000 cycles per Clause 24, switching devices AC loads in compliance with all one of the following are not considered a potential ignition source: (IEC 60335-2-40:2024) | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | – for resistive loads where the impedance has a power factor higher than 0,99: Breaking current per contact is not more than 48A during normal operation; (IEC 60335-2-40:2024) | | N/A |
| | – for inductive loads where the power factor is not more than 0,99, the apparent power (S) of the switched inductive electrical load (Le) per phase in kVA is less than or equal to: (IEC 60335-2-40:2024) | | N/A |
| | • Le = 5 × (6,7/Su)4 when breaking all phases of a 3 phase load; (IEC 60335-2-40:2024) | | N/A |
| | • Le = 2,5 × (6,7/Su)4 all others.<br>(IEC 60335-2-40:2024) | | N/A |
| 22.116.5 | For appliances with A2L refrigerants, electrostatic air cleaners and similar devices which can produce electrical arcing during normal operation that could ignite the refrigerant used, and which are installed in the unit airstream or connecting ducts, are not considered as a potential ignition source if the airflow is monitored and the energy source of the electric arcing is switched off when the airflow is below the minimum airflow according to Annex GG Clause GG.9. (IEC 60335-2-40:2024) | | N/A |
| 22.116.6 | For the purpose of determining the maximum quenching diameter (dq) in Annex JJ and the maximum allowable switched inductive electrical load Le (see 22.116.4), the effect of humidity on burning velocity (Su) taken into consideration.<br>(IEC 60335-2-40:2024) | | N/A |
| | The burning velocity (Su) is the highest value of (IEC 60335-2-40:2024) | | N/A |
| | – as specified in ISO 817; or<br>(IEC 60335-2-40:2024) | | N/A |
| | – as measured in humid air at 27 °C ± 0,5 °C dew point at 101,3 kPa containing 21,0 % ± 0,1 % O2 excluding water vapour determined at the nominal composition as specified in ISO 817.<br>(IEC 60335-2-40:2024) | | N/A |
| | The burning velocity (Su) at 27 °C dew point be determined by extrapolation of the measurement at 23 °C and 50 % relative humidity and the burning velocity (Su) as provided by ISO 817. (IEC 60335-2-40:2024) | | N/A |
| | The extrapolation based on the measured value increased by the measurement uncertainty to the burning velocity (Su) at 23 °C and 50 % relative humidity. (IEC 60335-2-40:2024) | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | If the burning velocity (Su) is not measurable at dry condition, the burning velocity is measured at 27 °C dew point. (IEC 60335-2-40:2024) | | N/A |
| **22.117** | **Hot surfaces** (IEC 60335-2-40:2024) | | N/A |
| | Temperatures on surfaces that can be exposed to leakage of flammable refrigerants in excess of 25 % of LFL as determined in Annex FF not exceed the maximum allowable surface temperature given in Annex BB. (IEC 60335-2-40:2024) | | N/A |
| | For A2 and A3 refrigerants not listed in Annex BB, the maximum allowable surface temperature is the AIT. (IEC 60335-2-40:2024) | Measured surface temperature: _____ (°C) | N/A |
| | For A2L refrigerants not listed in Annex BB, the maximum allowable surface temperature is determined by the higher of AIT or, if tested per Annex KK, the hot surface ignition temperature reduced by 100 K (IEC 60335-2-40:2024) | Measured surface temperature: _____ (°C) | N/A |
| | Surfaces in compliance with 22.117 not be considered a potential ignition source. (IEC 60335-2-40:2024) | | N/A |
| | Surfaces in compliance with 22.117 not be considered a potential ignition source. (IEC 60335-2-40:2024) | | N/A |
| 22.117.2 | Temperatures on surfaces that can be exposed to leakage of A2L refrigerants may exceed the maximum allowable surface temperature in case of loss of airflow when all the following applies: (IEC 60335-2-40:2024) | | N/A |
| | - the temperatures are not exceeding the maximum allowable surface temperature with the minimum airflow; (IEC 60335-2-40:2024) | | N/A |
| | - the airflow is supervised and the heat source of the hot surface is switched off, when the airflow is below the minimum airflow. (IEC 60335-2-40:2024) | | N/A |
| 22.117.3 | Open source of ignition, including open flames, pilot flames, direct spark ignition or hot surface ignition or other similar sources of ignition in the combustion air-stream, if the combustion air is drawn from an unventilated space in which leaked refrigerant can enter through the combustion air intake, are allowed, when these appliances are provided with a flame arrest or equivalent to ensure that in the event of an ignition, the flame will not propagate. (IEC 60335-2-40:2024) | | N/A |
| 22.118 | Joints made in installation between parts of refrigerating system, with at least one part charged, made in accordance with following: (IEC 60335-2-40:2024) | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - A brazed, welded, or mechanical connection be made before opening the valves to permit refrigerant to flow between the refrigerating system parts. A vacuum valve provided to evacuate the interconnecting pipe and/or any uncharged refrigerating system part (IEC 60335-2-40:2024) | | N/A |
| | -Mechanical connectors used indoors comply with ISO 14903. When mechanical connectors are reused indoors, sealing parts renewed. When flared joints are reused indoors, the flare part re-fabricated. (IEC 60335-2-40:2024) | | N/A |
| | - Refrigerant tubing protected or enclosed to avoid damage (IEC 60335-2-40:2024) | | N/A |
| | Flexible refrigerant connectors (such as connecting lines between the indoor and outdoor unit) that can be displaced during normal operations protected against mechanical damage. (IEC 60335-2-40:2024) | | N/A |
| 22.119 | Condensing units and evaporating units are equipped with a pressure limiting device or equivalent to assure that the equipment does not exceed the maximum allowable pressure. (IEC 60335-2-40:2024) | | P |
| | For partial units, the interconnection circuits for signal communication between each unit be of the same type. (IEC 60335-2-40:2024) | | N/A |
| | SELV connection is recommended. (IEC 60335-2-40:2024) | | N/A |
| 22.120 | Partial units provided with a means of connection to the supply mains and not be powered by an electrical circuit from another appliance. (IEC 60335-2-40:2024) | | N/A |
| **22.121** | **Leak detection system sensor location** (IEC 60335-2-40:2024) | | N/A |
| 22.121.1 | For the installation condition of appliances using an A2L refrigerant and where a leak detection system is applied to fulfil the requirements of Annex GG or for the purpose of limiting releasable charge, the refrigerant sensor: (IEC 60335-2-40:2024) | | N/A |
| | - within the unit for appliances connected via an air duct system to one or more rooms, (IEC 60335-2-40:2024) | | N/A |
| | - within the ventilated enclosure if in compliance with Clause GG.4, | | N/A |
| | - within the unit where release height h0 as determined in Clause GG.2 is not more than 1,5 m, | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - where the release height h0 as determined in Clause GG.2 is more than 1,5 m, located within (IEC 60335-2-40:2024) | | N/A |
| | • the unit, or (IEC 60335-2-40:2024) | | N/A |
| | • 100 mm or less directly below the unit, or (IEC 60335-2-40:2024) | | N/A |
| | • remote located within 300 mm above the floor. If a remote located refrigerant sensor is specified by the manufacturer, the instructions state that the refrigerant sensor located within (IEC 60335-2-40:2024) | | N/A |
| | 1) 10 m horizontal distance in line sight of the unit and on a wall within the room in which the unit is installed, or (IEC 60335-2-40:2024) | | N/A |
| | 2) 7 m, if not in line sight of the unit, and on a wall within the room in which the unit is installed. The distance from the unit to the sensor is measured as the shortest horizontal unobstructed path between the unit and the nearest refrigerant sensor. (IEC 60335-2-40:2024) | | N/A |
| | For installations with field applied mechanical joints which are exposed in the occupied space, the instructions state that a refrigerant sensor be: (IEC 60335-2-40:2024) | | N/A |
| | - remote located within 2 m horizontal distance in line of sight of the unit and on a wall within the room in which the unit is installed; and (IEC 60335-2-40:2024) | | N/A |
| | - 100 mm above the floor where h0 is not more than 300 mm from the floor; or (IEC 60335-2-40:2024) | | N/A |
| | - 300 mm above the floor where h0 is greater than 300 mm from the floor. (IEC 60335-2-40:2024) | | N/A |
| | The following field applied mechanical joints do not require that sensor: (IEC 60335-2-40:2024) | | N/A |
| | - mechanical joints in compliance with ISO 14903; (IEC 60335-2-40:2024) | | N/A |
| | -joints in enclosures which vent to the unit or to the outside | | N/A |
| | – joints in enclosures which vent to a room with a minimum room area as specified in GG.2.1 (IEC 60335-2-40:2024) | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 22.121.2 | For the installation condition of appliances using an A2 or A3 refrigerant and where a leak detection system is applied to fulfil the requirements of Annex GG or for the purpose of limiting releasable charge, the refrigerant sensor within or part of the unit. (IEC 60335-2-40:2024) | | N/A |
| | For appliances with ventilated enclosure in compliance with Clause GG.4, the refrigerant sensor within the ventilated enclosure. (IEC 60335-2-40:2024) | | N/A |
| | For installations with field applied joints which are exposed in the occupied space, these joints require at least one of the following: (IEC 60335-2-40:2024) | | N/A |
| | – mechanical joints in compliance with ISO 14903; (IEC 60335-2-40:2024) | | N/A |
| | – welded or brazed joints; (IEC 60335-2-40:2024) | | N/A |
| | – joints in enclosures which vent to the unit or to the outside. (IEC 60335-2-40:2024) | | N/A |
| 22.122 | For refrigerant detection systems that are required by this standard for flammable refrigerants, the following applies: (IEC 60335-2-40:2024) | | N/A |
| | – the output signal of the refrigerant detection system activate the actions required to comply with Annex GG in the event of a leak; (IEC 60335-2-40:2024) | | N/A |
| | – where a refrigerant detection system refrigerant sensor is used to activate safety measures in multiple units in the same room, all of the detection system activated safety measures applied to those units in the room which rely on that refrigerant detection system; (IEC 60335-2-40:2024) | | N/A |
| | – If a refrigerant detection system or appliance provides notification that replacement of the refrigerant sensor is required (see IEC TS 63542:2024), then the user be notified and resetting this notification only be possible when the refrigerant sensor has been replaced. (IEC 60335-2-40:2024) | | N/A |
| | Refrigerant detection system complies with IEC TS 63542:2024. (IEC 60335-2-40:2024) | | N/A |
| 22.123 | For appliances using a flammable refrigerant according to Clause GG.9, which include a separate section with refrigerant containing components except pipes (e.g. compressors, condensers), and is located in a room smaller than Amin per Clause GG.2, that section: (IEC 60335-2-40:2024) | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | – not be isolated from the indoor air stream, where a leak will be detected, or (IEC 60335-2-40:2024) | | N/A |
| | – be ventilated to the outdoors in compliance with Clause GG.4, or (IEC 60335-2-40:2024) | | N/A |
| | – be naturally ventilated to outdoors. (IEC 60335-2-40:2024) | | N/A |
| 22.125 | Refrigerating systems that fulfil all of the following conditions be considered enhanced tightness refrigerating systems: (IEC 60335-2-40:2024) | | P |
| | a) compressors, pressure relief devices and pressure vessels of the refrigerating system located in locations other than the occupied space, (IEC 60335-2-40:2024) | | P |
| | b) refrigerant distribution assemblies meet all applicable requirements of this standard, (IEC 60335-2-40:2024) | | P |
| | c) refrigerating systems shall use only permanent joints indoors except for site-made joints directly connecting the indoor unit to the refrigerant piping, or factory-made mechanical joints in compliance with ISO 14903, (IEC 60335-2-40:2024) | | P |
| | d) refrigerant containing parts in indoor units protected from damage in the event of catastrophic failure of moving parts, e.g. fans, belts, (IEC 60335-2-40:2024) | | P |
| | e) systems where the equipment refrigerant containing pipes in the occupied space in question are installed in such a way that they are protected against accidental damage, (IEC 60335-2-40:2024) | | P |
| | f) the refrigerating system of each indoor unit tightness tested at the factory with detection equipment with a capability of 3 grams per year of refrigerant or better less under a pressure of at least 0,25 times the maximum allowable pressure. No leak detected, (IEC 60335-2-40:2024) | | P |
| | g) vibrations exceeding 0,30 G RMS, when measured with a low pass filter at 200 Hz, are not allowed in the refrigerant containing parts in the occupied space under normal operation. (IEC 60335-2-40:2024) | | N/A |
| | h) indoor heat exchangers protected from damage in the event of freezing. (IEC 60335-2-40:2024) | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | i) the maximum speed of the indoor fan, in normal operation, less than 90 % of the maximum allowable fan speed as specified by the manufacturer of the fan wheel. If the manufacturer does not specify a maximum allowable fan speed, then the fan wheel tested as follows: (IEC 60335-2-40:2024) | | N/A |
| | The maximum allowable fan speed established by running continuously at 120 % of maximum speed for 10 days. There is no structural failure of the fan. (IEC 60335-2-40:2024) | | P |
| | If non-metallic fan wheels have a minimum thermal index rating of 65 °C per ISO 2578, preconditioning is not required. (IEC 60335-2-40:2024) | | N/A |
| | If no thermal index rating for the material is available, specimens shall be aged at 90 °C for 168 h. The samples shall not have more than a 50-percent reduction of the unconditioned property values for items 1) to 4) below (IEC 60335-2-40:2024) | | N/A |
| | 1) tensile strength in accordance with ISO 527-3, (IEC 60335-2-40:2024) | | N/A |
| | 2) flexural strength in accordance with ISO 178, (IEC 60335-2-40:2024) | | N/A |
| | 3) Izod impact in accordance with ISO 180 (IEC 60335-2-40:2024) | | P |
| | 4) tensile impact in accordance with ISO 8256 (IEC 60335-2-40:2024) | | N/A |
| 22.126 | Germicidal lamps are limited to low pressure mercury lamps with a quartz envelope having a continuous spectral irradiance at 254 nm. (IEC 60335-2-40:2024) | | N/A |
| 22.127 | Appliance enclosure, UV-C lamps and UV-C barriers be located in such a manner that the UV-C spectral irradiance is not emitted outside the unit into an occupied space at a level exceeding the irradiance limit specified in 32.101.1. (IEC 60335-2-40:2024) | | N/A |
| | Appliance indoor airflow inlet and outlet be considered as possible radiation paths. The unit filters are not considered UV-C barriers. (IEC 60335-2-40:2024) | | N/A |
| 22.128 | For appliances that employ UV-C germicidal lamp systems and which have doors and/or panels that provide direct access to an area within the appliance where the measured UV-C spectral irradiance is greater than 1,7 µW/cm$^2$, the doors and/or panels be equipped with an interlock device that terminates the power to the lamps when opened. (IEC 60335-2-40:2024) | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | If a switch is used to de-energize the UV-C lamps so as to meet the requirement, it is not possible to operate the switch with test probe B of IEC 61032. (IEC 60335-2-40:2024) | | N/A |
| 22.129 | For user maintenance access areas, the UV-C spectral irradiance does not exceed the limit specified in 32.101.2 with the access panels opened or removed as needed to perform the required user maintenance. (IEC 60335-2-40:2024) | | N/A |
| | Panels that are opened or removed to perform user maintenance are required to be closed or put back in place for proper operation of the appliance. (IEC 60335-2-40:2024) | | N/A |
| 22.130 | If the replacement of the UV-C lamp is allowed by the user, the appliance be constructed so that (IEC 60335-2-40:2024) | | N/A |
| | - the replacement of the UV-C lamp is easily possible (IEC 60335-2-40:2024) | | N/A |
| | - if screws or components are omitted or incorrectly positioned or fastened, the appliance is rendered inoperable or manifestly incomplete. (IEC 60335-2-40:2024) | | N/A |
| 22.131 | Appliances that employ refrigerants in a transcritical refrigerating system are equipped with a pressure-limiting device that operates no greater than the maximum allowable pressure taking into account the tolerance of the pressure-limiting device. (IEC 60335-2-40:2024) | | P |
| 22.132 | Safety shut-off valves for flammable refrigerants for the purposes of limiting the releasable charge (IEC 60335-2-40:2024) | | P |
| | Safety shut-off valves shall default to fully closed position when the appliance is de-energised for any reason other than failure of the supply mains. (IEC 60335-2-40:2024) | | P |
| | Safety shut-off valves that are activated by a leak detection system have either (IEC 60335-2-40:2024) | | N/A |
| | – manual operation for resetting which requires the aid of a tool, or (IEC 60335-2-40:2024) | | N/A |
| | – automatically reset after the leak detection system has not detected refrigerant for at least 2 hours. (IEC 60335-2-40:2024) | | N/A |
| | For refrigerating systems using A2 or A3 refrigerants, safety shut-off valves be factory fitted in the appliance. (IEC 60335-2-40:2024) | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | The safety shut-off valves marked with information for the identification of the valve in case of replacement: (IEC 60335-2-40:2024) | | N/A |
| | – means for identification of the safety shut-off valves for facilitating correct replacement, and (IEC 60335-2-40:2024) | | N/A |
| | – arrow indicating the direction of flow, when applicable. (IEC 60335-2-40:2024) | | N/A |
| | The closing of safety shut-off valves in liquid refrigerant lines not result in pressures exceeding the maximum allowable pressure. (IEC 60335-2-40:2024) | | N/A |
| 22.133 | Particle foam material not be used outdoors without protective cover of metal or rigid plastic material if the appliance is accessible to the general public. (IEC 60335-2-40:2024) | | P |
| 22.134 | Appliances constructed so that particle foam material expanded polypropylene is separated from metallic parts containing cobalt, manganese or copper if operating at a temperature higher than 80 °C. (IEC 60335-2-40:2024) | | N/A |
| | However, this requirement is not applicable for particle foam material parts when a deterioration of 3 mm at the contact point will not cause the appliance to fail to comply with this standard. If the separation is provided by an air gap, it at least 3 mm. (IEC 60335-2-40:2024) | | N/A |
| 22.135 | Double wall heat exchangers for refrigerating systems employing flammable refrigerants with refrigerant charge $m_c > m_1$ be constructed and connected in a way that they do not allow refrigerants to leak into the secondary circuit if one of the walls breaks. (IEC 60335-2-40:2024) | | N/A |
| | The intermediate chamber is one of the following: (IEC 60335-2-40:2024) | | N/A |
| | a) vented to the outdoors; (IEC 60335-2-40:2024) | | N/A |
| | b) vented into a room that has equal or larger room area than the required minimum room area determined in Annex GG; (IEC 60335-2-40:2024) | | N/A |
| | c) for closed intermediate chamber, monitored to recognize that one of the walls is broken, and if recognize the compressor shall stop. (IEC 60335-2-40:2024) | | N/A |
| | Compliance is checked by inspection for a) and b). For c) the following tests performed (IEC 60335-2-40:2024) | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | – by applying the minimum and maximum secondary circuit pressure to the intermediate chamber. The compressor stop within 1 min;<br>(IEC 60335-2-40:2024) | | N/A |
| | – by applying the minimum and maximum refrigerant condensing pressure to the intermediate chamber. The compressor stop within 1 min.<br>(IEC 60335-2-40:2024) | | N/A |
| **23** | **INTERNAL WIRING** | | - |
| 23.1 | Wireways smooth and free from sharp edges | | P |
| | Wires protected against contact with burrs, cooling fins etc. | | P |
| | Wire holes in metal well-rounded or provided with bushings | | P |
| | Wiring effectively prevented from coming into contact with moving parts | | P |
| 23.2 | Beads etc. on live wires cannot change their position, and are not resting on sharp edges | | P |
| | Beads inside flexible metal conduits contained within an insulating sleeve | | N/A |
| 23.3 | The total seat leak rate for the refrigerant used for all the safety shut-off valves that reduce the leak into the same space no more than msv. | | N/A |
| | Flexible metallic tubes not causing damage to insulation of conductors | | N/A |
| | Open-coil springs not used | | N/A |
| | Adequate insulating lining provided inside a coiled spring, the turns of which touch one another | | N/A |
| | Appliance supplied at rated voltage ..... : | | N/A |
| | No damage after 10 000 flexings for conductors flexed during normal use, or | | N/A |
| | 100 flexings for conductors flexed during user maintenance | | N/A |
| | Electric strength test of 16.3, 1 000 V between live parts and accessible metal parts | | N/A |
| | Not more than 10 % of the strands of any conductor broken, and | | N/A |
| | not more than 30 % for wiring supplying circuits that consume no more than 15 W | | N/A |
| 23.4 | Bare internal wiring sufficiently rigid and fixed | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 23.5 | No use of a single layer of internal wiring insulation to provide reinforced insulation | | P |
| | For class II construction, the sheath of a cord complying with IEC 60227 or IEC 60245 or IEC 62821 may provide supplementary insulation | | N/A |
| | Insulation of single layer internal wiring subjected to the supply mains voltage withstands the electrical stress likely to occur in normal use, if: | | N/A |
| | - insulation of single layer internal wiring electrically equivalent to the basic insulation of cords complying with IEC 60227 or IEC 60245 or IEC 62821, or | | N/A |
| | - no breakdown when a voltage of 2 000 V is applied for 15 min between the conductor and metal foil wrapped around the insulation | | P |
| 23.6 | Sleeving used as supplementary insulation on internal wiring retained in position by clamping at both ends, or | | N/A |
| | be such that it can only be removed by breaking or cutting | | N/A |
| 23.7 | The colour combination green/yellow only used for earthing conductors | | P |
| 23.8 | Aluminium wires not used for internal wiring | | P |
| | The requirement does not apply to windings | | N/A |
| 23.9 | Stranded conductors not consolidated by soldering where they are subjected to contact pressure, unless | | P |
| | the contact pressure is provided by spring terminals | | N/A |
| | The requirement does not apply to the soldered tip of a stranded conductor | | N/A |
| 23.10 | The insulation and sheath of internal wiring, incorporated in external hoses for the connection of an appliance to the water mains, at least equivalent to that of light polyvinyl chloride sheathed flexible cord (60227 IEC 52), checked as specified | | P |
| 23.101 | Wires protected for damaging by contact with refrigerant piping. (IEC 60335-2-40:2024) | | P |
| **24** | **COMPONENTS** | | - |
| 24.1 | Components comply with safety requirements in relevant IEC standards | | P |
| | List of components .....: | (See appended table) | P |
| | Motors not required to comply with IEC 60034-1, they are tested as part of the appliance | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Relays tested as part of the appliance, or | | N/A |
| | alternatively, acc. to IEC 60730-1:2013 including IEC 60730-1:2013/AMD1:2015, and meeting the additional requirements in IEC 60335-1 | | N/A |
| | The requirements of Clause 29 apply between live parts of components and accessible parts of the appliance | | P |
| | Components can comply with the requirements for clearances and creepage distances for functional insulation in the relevant component standard | | P |
| | 30.2 of this standard applies to parts of non-metallic material in components including parts of non-metallic material supporting current-carrying connections | | P |
| | Components that have not been previously tested to comply with the IEC standard for the relevant component are tested according to the requirements of 30.2 | | P |
| | Components that have been previously tested to comply with the resistance to fire requirements in the IEC standard for the relevant component need not be retested provided that the specified conditions are met | | P |
| | If these conditions are not satisfied, the component is tested as part of the appliance | | P |
| | Power electronic converter circuits not required to comply with IEC 62477-1, they are tested as part of the appliance | | N/A |
| | If components have not been tested and found to comply with relevant IEC standard for the number of cycles specified, they are tested in accordance with 24.1.1 to 24.1.9 | | P |
| | For components mentioned in 24.1.1 to 24.1.9 no additional tests specified in the relevant component standard are necessary other than those specified in 24.1.1 to 24.1.9 | | N/A |
| | Components not tested and found to comply with relevant IEC standard and components not marked or not used according to their marking, tested under the conditions occurring in the appliance | | P |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Lampholders and starterholders not being previously tested and found to comply with the relevant IEC standard, tested as a part of the appliance and additionally complying with the gauging and interchangeability requirements of the relevant IEC standard under the conditions occurring in the appliance | | N/A |
| | No additional tests specified for nationally standardized plugs such as those detailed in IEC TR 60083 or connectors or plug connectors complying with the standard sheets of IEC 60320-3 or connectors complying with the standard sheets of IEC 60309-2 | | P |
| | Motor-compressors (IEC 60335-2-40:2024) | | P |
| | – comply with IEC 60335-2-34 (including its Annex AA), or (IEC 60335-2-40:2024) | | P |
| | – comply with IEC 60335-2-34 (without Annex AA) and comply with Clause 11 of this standard, or (IEC 60335-2-40:2024) | | N/A |
| | – comply with this standard and in addition with IEC 60335-2-34:2021, 22.9 (IEC 60335-2-40:2024) | | N/A |
| 24.1.1 | Capacitors likely to be permanently subjected to the supply voltage and used for radio interference suppression or for voltage dividing comply with IEC 60384-14:2013 including IEC 60384-14:2013/AMD1:2016 | | N/A |
| | If the capacitors have to be tested, they are tested according to normative Annex F | | N/A |
| 24.1.2 | Transformers in associated switch mode power supplies comply with Annex BB of IEC 61558-2-16:2009 including IEC 61558-2-16:2009/AMD1:2013 | | N/A |
| | Safety isolating transformers comply with IEC 61558-2-6:2009 | | N/A |
| | If they have to be tested, they are tested according to normative Annex G | | N/A |
| 24.1.3 | Switches comply with IEC 61058-1:2016, number of cycles of operation being at least 10 000, unless | | P |
| | the appliance meets the requirements of this standard when they are rendered inoperative, then the number of cycles need not to be declared for 7.4 of IEC 61058-1:2016 | | N/A |
| | If they have to be tested, they are tested according to normative Annex H | | N/A |

| IEC 60335-2-40 | | | | |
|---|---|---|---|---|
| Clause | Requirement + Test | | Result - Remark | Verdict |
| | If the switch operates a relay or contactor, the complete switching system is subjected to the test | | | N/A |
| | If the switch only operates a motor starting relay complying with IEC 60730-2-10 with the number of cycles of a least 10 000 as specified, the complete switching system need not be tested | | | N/A |
| 24.1.4 | Automatic controls comply with IEC 60730-1:2013 including IEC 60730-1:2013/AMD1:2015 together with the relevant part 2. The number of cycles of operation being at least: | | | N/A |
| | - thermostats: | 10 000 | | N/A |
| | - temperature limiters: | 1 000 | | N/A |
| | - self-resetting thermal cut-outs: | 300 | | N/A |
| | - voltage maintained non-self-resetting thermal cut-outs: | 1 000 | | N/A |
| | - other non-self-resetting thermal cut-outs: | 30 | | N/A |
| | - timers: | 3 000 | | N/A |
| | - energy regulators: | 10 000 | | N/A |
| | - self-resetting thermal cut-outs (IEC 60335-2-40:2024) | 3 000 | | N/A |
| | - other non-self-resetting thermal cut-outs (IEC 60335-2-40:2024) | 300 | | N/A |
| | - thermostats which control the motor-compressor (IEC 60335-2-40:2024) | 100 000 | | N/A |
| | - motor-compressor starting relays (IEC 60335-2-40:2024) | 100 000 | | N/A |
| | - automatic thermal motor-protectors for motor-compressors of the hermetic and semi-hermetic type (IEC 60335-2-40:2024) | Min. 2 000 (but not less than the number of operations during the locked rotor test) | | N/A |
| | - manual reset thermal motor-protectors for motor-compressors of the hermetic and semi-hermetic type (IEC 60335-2-40:2024) | 50 | | N/A |
| | - other automatic thermal motor protectors (IEC 60335-2-40:2024) | 2 000 | | N/A |

| IEC 60335-2-40 | | | | |
|---|---|---|---|---|
| Clause | Requirement + Test | | Result - Remark | Verdict |
| | - other manual reset thermal motor protectors (IEC 60335-2-40:2024) | 30 | | N/A |
| | - refrigerant detection systems self-resetting (IEC 60335-2-40:2024) | 300 | | N/A |
| | - refrigerant detection systems non-self-resetting (IEC 60335-2-40:2024) | 30 | | N/A |
| | - electromechanical proof of airflow control (IEC 60335-2-40:2024) | 100 000 | | N/A |
| | - self-resetting electrical pressure-limiting device (IEC 60335-2-40:2024) | 3 000 | | N/A |
| | - non-self-resetting electrical pressure-limiting device (IEC 60335-2-40:2024) | 300 | | N/A |
| | The number of cycles for controls operating during clause 11 need not be declared, if the appliance meets the requirements of this standard when they are short-circuited or rendered inoperative | | | N/A |
| | If automatic controls have to be tested, additionally tested in accordance with 11.3.5 to 11.3.8 and Clause 17 of IEC 60730-1:2013 including IEC 60730-1:2013/AMD1:2015 as type 1 controls, tests of Clauses 12, 13 and 14 not carried out before the test of Clause 17 | | | N/A |
| | Thermal motor protectors are tested in combination with their motor under the conditions specified in normative Annex D | | | N/A |
| | For water valves containing live parts and that are incorporated in external hoses for connection of an appliance to the water mains, degree of protection declared for 6.5.2 of IEC 60730-2-8:2018 is IPX7 | | | N/A |
| | Thermal cut-outs of the capillary type comply with the requirements for type 2.K controls in IEC 60730-2-9:2015 including 60730-2-9:2015/AMD1:2018 | | | N/A |
| 24.1.5 | Appliance couplers comply with IEC 60320-1. | | | N/A |
| | However, for appliances classified higher than IPX0, the appliance couplers comply with IEC 60320-2-3 | | | N/A |
| 24.1.6 | Small lampholders similar to E10 lampholders comply with IEC 60238, the requirements for E10 lampholders being applicable | | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 24.1.7 | For remote operation of the appliance via a telecommunication network, the relevant standard for the telecommunication interface circuitry in the appliance is IEC 62151 | | N/A |
| 24.1.8 | Thermal links comply with IEC 60691 | | N/A |
| 24.1.9 | Contactors and relays, other than motor starting relays, tested as part of the appliance | | N/A |
| | They are also tested in accordance with Clause 17 of IEC 60730-1:2013 including IEC 60730-1:2013/AMD:2015, the number of cycles of operations in 24.1.4 selected according to the contactor or relay function in the appliance.....: | | N/A |
| 24.1.10 | Lamps and lamp systems that have not been previously tested and found to comply with the exempt group classification of IEC 62471:2006 GLS regarding $E_S$ and $E_{UVA}$: | | N/A |
| | - tested as part of the appliance | | N/A |
| | - comply with the requirements of Clause 32 under the conditions occurring in the appliance | | N/A |
| | Unless otherwise specified, the following components are considered to comply with the specified GLS classification: | | N/A |
| | - visible light indicators | | N/A |
| | - infrared sources used for signalling or communication | | N/A |
| | - seven-segment indicators | | N/A |
| | - liquid crystal displays | | N/A |
| | - organic LED displays (OLED) | | N/A |
| | - plasma displays | | N/A |
| 24.1.11 | Cord sets required to be provided with the appliance comply with IEC 60799 | | N/A |
| | Cord sets with cords complying to IEC 62821-3 allowed | | N/A |
| 24.2 | Appliances not fitted with: | | P |
| | - switches, automatic controls, power supplies and the like in flexible cords | | P |
| | - devices causing the protective device in the fixed wiring to operate in the event of a fault in the appliance | | N/A |
| | - thermal cut-outs that can be reset by soldering, unless | | N/A |
| | the solder has a melting point of at least 230 °C | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 24.3 | Switches intended for all-pole disconnection of stationary appliances are directly connected to the supply terminals and have a contact separation in all poles, providing full disconnection under overvoltage category III conditions | | P |
| 24.4 | Plugs and socket-outlets for extra-low voltage circuits and heating elements, not interchangeable with plugs and socket-outlets listed in IEC TR 60083 or IEC 60906-1 or with connectors, appliance inlets, plug connectors and appliance outlets complying with the standard sheets of IEC 60320-3 | | P |
| 24.5 | Capacitors in auxiliary windings of motors marked with their voltage rating and their rated capacitance, and used accordingly | | N/A |
| | Voltage across capacitors in series with a motor winding does not exceed 1,1 times its voltage rating, when the appliance is supplied at 1,1 times rated voltage under minimum load (V) ..... : | | N/A |
| 24.6 | Working voltage of motors connected to the supply mains and having basic insulation that is inadequate for the rated voltage of the appliance, not exceeding 42 V (V) ..... : | | N/A |
| | In addition, the motors comply with the requirements of normative Annex I | | N/A |
| 24.7 | Detachable hose-sets for connection of appliances to the water mains comply with IEC 61770 | | N/A |
| | They are supplied with the appliance | | N/A |
| | Appliances intended to be permanently connected to the water mains not connected by a detachable hose-set | | N/A |
| 24.8 | Motor running capacitors in appliances for which 30.2.3 is applicable and that are permanently connected in series with a motor winding, not causing a hazard in event of a failure | | N/A |
| | One or more of the following conditions are met: | | N/A |
| | - the capacitors are of class S2 or S3 according to IEC 60252-1:2010 including IEC 60252-1:2010/AMD1:2013 | | N/A |
| | - the capacitors are housed within a metallic or ceramic enclosure | | N/A |
| | - the distance of separation of the outer surface to adjacent non-metallic parts exceeds 50 mm | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - adjacent non-metallic parts within 50 mm withstand the needle-flame test of normative Annex E | | N/A |
| | - adjacent non-metallic parts within 50 mm classified as at least V-1 according to IEC 60695-11-10 | | N/A |
| | For capacitors complying with IEC 60252-1:2010 including IEC 60252-1:2010/AMD1:2013, damp heat test for 5.14 of that standard with severity parameters as specified | | N/A |
| 24.101 | Replaceable parts of thermal control devices identified by marking. (IEC 60335-2-40:2024) | | N/A |
| 24.102 | Pressure-limiting devices used in transcritical refrigerating systems complies with IEC 60730-2-6 and (IEC 60335-2-40:2024) | | P |
| | - be of type 2A or 2B; (IEC 60335-2-40:2024) | | N/A |
| | - have a trip free mechanism of type 2 J (IEC 60335-2-40:2024) | | N/A |
| | - the deviation and drift ≤ + 0 %. (IEC 60335-2-40:2024) | | N/A |
| **25** | **SUPPLY CONNECTION AND EXTERNAL FLEXIBLE CORDS** | | - |
| 25.1 | Appliance not intended for permanent connection to fixed wiring, means for connection to the supply: | | P |
| | - supply cord fitted with a plug, the current rating and voltage rating of the plug being not less than the corresponding ratings of its associated appliance | | P |
| | - an appliance inlet having at least the same degree of protection against moisture as required for the appliance, or | | N/A |
| | - pins for insertion into socket-outlets | | N/A |
| | Appliances provided with a supply cord fitted with a plug: (IEC 60335-2-40:2024) | | N/A |
| | - Supply cord with a plug is for indoor use only, (IEC 60335-2-40:2024) | | N/A |
| | - have a marked rating of 25 A or less, and (IEC 60335-2-40:2024) | | N/A |
| | - comply with the applicable code requirements for cord-connected appliances appropriate to the specific country in which they are to be used. (IEC 60335-2-40:2024) | | N/A |
| | Appliances are not provided with an appliance inlet. (IEC 60335-2-40:2024) | | N/A |
| 25.2 | Appliance not provided with more than one means of connection to the supply mains | | P |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Stationary appliance for multiple supply may be provided with more than one means of connection, provided electric strength test of 1 250 V for 1 min between each means of connection causes no breakdown | | N/A |
| 25.3 | Appliance intended to be permanently connected to fixed wiring provided with one of the following means for connection to the supply mains | | N/A |
| | - cord anchorage and a set of terminals allowing the connection of a flexible cord | | N/A |
| | - a fitted supply cord | | N/A |
| | a set of supply leads accommodated in a suitable compartment | | N/A |
| | - a set of terminals for the connection of cables of fixed wiring, cross-sectional areas specified in 26.6, and the appliance allows the connection of the supply conductors after the appliance has been fixed to its support | | N/A |
| | - a set of terminals and cable entries, conduit entries, knock-outs or glands, allowing connection of appropriate types of cable or conduit, and the appliance allows the connection of the supply conductors after the appliance has been fixed to its support | | N/A |
| 25.4 | Cable and conduit entries, rated current of appliance not exceeding 16 A, dimension according to Table 10 (mm): | | P |
| | Introduction of conduit or cable does not reduce clearances or creepage distances below values specified in clause 29 | | N/A |
| 25.5 | Method for assembling the supply cord to the appliance: | | P |
| | - type X attachment | | N/A |
| | - type Y attachment | | P |
| | - type Z attachment, if allowed in relevant part 2 | | N/A |
| | Type X attachment, other than those with a specially prepared cord, not used for flat twin tinsel cords | | N/A |
| | For multi-phase appliances supplied with a supply cord and that are intended to be permanently connected to fixed wiring, the supply cord is assembled to the appliance by type Y attachment | | N/A |
| 25.6 | Plugs fitted with only one flexible cord | | P |
| 25.7 | Supply cords, other than for class III appliances, being one of the following types: | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - rubber sheathed (at least 60245 IEC 53), unless | | N/A |
| | The appliance is intended to be used outdoors or is liable to being exposed to ultraviolet radiation | | P |
| | - polychloroprene sheathed (at least 60245 IEC 57), | | P |
| | supply cords being allowed to be connected to appliances intended for use in low temperature | | N/A |
| | - polyvinyl chloride sheathed. Not used if they are likely to touch metal parts having a temperature rise exceeding 75 K during the test of clause 11 | | N/A |
| | •light polyvinyl chloride sheathed cord (60227 IEC 52), for appliances not exceeding 3 kg | | N/A |
| | • ordinary polyvinyl chloride sheathed cord (60227 IEC 53), for other appliances | | N/A |
| | - heat resistant polyvinyl chloride sheathed. Not used for type X attachment other than specially prepared cords | | N/A |
| | •heat-resistant light polyvinyl chloride sheathed cord (60227 IEC 56), for appliances not exceeding 3 kg cord (60227 IEC 56), for appliances not exceeding 3 kg | | N/A |
| | • ... heat-resistant polyvinyl chloride sheathed cord (60227 IEC 57), for other appliances | | N/A |
| | - halogen-free, low smoke, thermoplastic insulated and sheathed | | N/A |
| | • light duty halogen-free low smoke flexible cable (62821 IEC 101) for circular cable and (62821 IEC 101f) for flat cable | | N/A |
| | • Ordinary duty halogen-free low smoke flexible cable (62821 IEC 102) for circular cable and (62821 IEC 102f) for flat cable | | N/A |
| | Supply cords for class III appliances adequately insulated | | N/A |
| | Supply cords of parts of appliances for outdoor use are not lighter than polychloroprene sheathed flexible cord (code designation 60245 IEC 57). (IEC 60335-2-40:2024) | | N/A |
| | Test with 500 V for 2 min for supply cords of class III appliances that contain live parts | | N/A |
| 25.8 | Nominal cross-sectional area of supply cords not less than Table 11; rated current (A); cross-sectional area (mm²).....: | | P |
| 25.9 | Supply cords for class III appliances adequately insulated | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 25.10 | Supply cord of class I appliances have a green/yellow core for earthing | | P |
| | In multi-phase appliances, the colour of the neutral conductor of the supply cord is blue | | N/A |
| | Where additional neutral conductors are provided in the supply cord: | | N/A |
| | - other colours may be used for these additional neutral conductors; | | N/A |
| | - all of the neutral conductors and line conductors are identified by marking using the alphanumeric notation specified in IEC 60445 | | N/A |
| | - the supply cord is fitted to the appliance | | N/A |
| 25.11 | Conductors of supply cords not consolidated by soldering where they are subject to contact pressure, unless | | N/A |
| | the contact pressure is provided by spring terminals | | N/A |
| | The requirement does not apply to the soldered tip of a stranded conductor | | N/A |
| 25.12 | Insulation of the supply cord not damaged when moulding the cord to part of the enclosure | | P |
| 25.13 | Inlet openings so constructed as to prevent damage to the supply cord | | N/A |
| | If it is not evident that the supply cord can be introduced without risk of damage, a non-detachable lining or bushing complying with 29.3 for supplementary insulation provided | | N/A |
| | If unsheathed supply cord, a similar additional bushing or lining is required, unless the appliance is: | | N/A |
| | - a class 0 appliance, or | | N/A |
| | - a class III appliance not containing live parts | | N/A |
| 25.14 | Supply cords moved while in operation adequately protected against excessive flexing, unless | | P |
| | appliance is fitted with automatic cord reels complying with the requirement and test of 22.16 | | N/A |
| | Flexing test, as described: | | N/A |
| | Conductors supplied at rated voltage (V)..... : | | N/A |
| | Conductors loaded with rated current (A): ..... : | | N/A |
| | - applied force (N).....: | | N/A |
| | - number of flexings : | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | The test does not result in | | N/A |
| | - short-circuit between the conductors, such that the current exceeds a value of twice the rated current | | N/A |
| | - breakage of more than 10 % of the strands of any conductor | | N/A |
| | - separation of the conductor from its terminal | | N/A |
| | - loosening of any cord guard | | N/A |
| | - broken strands piercing the insulation and becoming accessible | | N/A |
| 25.15 | For appliances with supply cord and appliances to be permanently connected to fixed wiring by a flexible cord, conductors of the supply cord relieved from strain, twisting and abrasion by use of cord anchorage | | P |
| | the cord cannot be pushed into the appliance to such an extent that the cord or internal parts of the appliance can be damaged | | P |
| | Pull and torque test of supply cord: | | P |
| | - fixed appliances: pull 100 N; torque (not on automatic cord reel) (Nm).....: | | P |
| | - other appliances: values shown in Table 12: mass (kg); pull (N); torque (not on automatic cord reel) (Nm).....: | | P |
| | Cord not damaged and max. 2 mm displacement of the cord | | P |
| 25.16 | Cord anchorages for type X attachments constructed and located so that: | | N/A |
| | - replacement of the cord is easily possible | | N/A |
| | - it is clear how the relief from strain and the prevention of twisting are obtained | | N/A |
| | - they are suitable for different types of supply cord | | N/A |
| | - cord cannot touch the clamping screws of cord anchorage if these screws are accessible, unless | | N/A |
| | they are separated from accessible metal parts by supplementary insulation | | N/A |
| | - the cord is not clamped by a metal screw which bears directly on the cord | | N/A |
| | - at least one part of the cord anchorage securely fixed to the appliance, unless | | N/A |
| | it is part of a specially prepared cord | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Not applicable if the cord anchorage comprises one or more clamping members subjected to pressure by means of nuts engaging with securely attached studs, even if removal possible, or if | | N/A |
| | one clamping member is fixed to the appliance or obviously shaped insulating material is used as the surface of the appliance | | N/A |
| | - screws which have to be operated when replacing the cord do not fix any other component, unless | | N/A |
| | the appliance becomes inoperative or incomplete or the parts cannot be removed without a tool | | N/A |
| | - if labyrinths can be bypassed, the test of 25.15 is nevertheless withstood | | N/A |
| | - for class 0, 0I and I appliances, they are of insulating material or are provided with an insulating lining, unless | | N/A |
| | failure of the insulation of the cord does not make accessible metal parts live | | N/A |
| | - for class II appliances, they are of insulating material, or | | N/A |
| | if of metal, they are insulated from accessible metal parts by supplementary insulation | | N/A |
| | Compliance checked by inspection and by the test of 25.15 under the following conditions: | | N/A |
| | - carried out with lightest permissible type of cord of the smallest cross-sectional area specified in Table 13, then with next heavier type cord having the largest cross-sectional area specified, however | (See appended table) | N/A |
| | if the appliance is fitted with a specially prepared cord, test carried out with this cord | | N/A |
| | - conductors placed in the terminals and any terminal screws tightened to prevent the conductors from easily changing their position | | N/A |
| | - clamping screws of the cord anchorage tightened with two-thirds of the torque specified in 28.1 | | N/A |
| | - screws of insulating material bearing directly on the cord fastened with two-thirds of the torque specified in column I of Table 14, the length of the slot in the screw head being taken as the nominal diameter of the screw | | N/A |
| | After the test, the conductors have not moved by more than 1 mm in the terminals | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 25.17 | Adequate cord anchorages for type Y and Z attachment, test with the cord supplied with the appliance | Type Y | P |
| | For Type Z attachment compliance checked by the test of 25.15 with the cord supplied with the appliance | | N/A |
| | For Type Y attachment compliance checked by the test of 25.15 with the cord supplied with the appliance and designated alternative types (if any | (see appended table) | P |
| 25.18 | Cord anchorages only accessible with the aid of a tool, or | | P |
| | constructed so that the cord can only be fitted with the aid of a tool | | N/A |
| 25.19 | Type X attachment, glands not used as cord anchorage in portable appliances | | N/A |
| | Tying the cord into a knot or tying the cord with string not used | | N/A |
| | The conductors of the supply cord for type Y and Z attachment insulated from accessible metal parts | | P |
| 25.21 | Space for supply cord for type X attachment or for connection of fixed wiring constructed: | | N/A |
| | - to permit checking of conductors with respect to correct positioning and connection before fitting any cover | | N/A |
| | - so there is no risk of damage to the conductors or their insulation when fitting the cover | | N/A |
| | - for portable appliances, so that the uninsulated end of a conductor, if it becomes free from the terminal, prevented from contact with accessible metal parts | | N/A |
| | 2 N test to the conductor for portable appliances; no contact with accessible metal parts | | N/A |
| 25.22 | Appliance inlets: | | N/A |
| | - live parts not accessible during insertion or removal | | N/A |
| | Requirement not applicable to appliance inlets complying with IEC 60320-1 | | N/A |
| | - connector can be inserted without difficulty | | N/A |
| | - the appliance is not supported by the connector | | N/A |
| | - not for cold conditions if temp. rise of external metal parts exceeds 75 K during clause 11, unless | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | the flexible cord of the cord set is unlikely to touch such metal parts | | N/A |
| 25.23 | Interconnection cords comply with the requirements for the supply cord, except that: | | N/A |
| | - the cross-sectional area of the conductors is determined based on the maximum current during clause 10, and | | N/A |
| | - the thickness of the insulation may be reduced | | N/A |
| | for class I or class II appliance with class III construction, the cross-sectional areas of the conductors need not comply with 25.8 if specified conditions are met | | N/A |
| | If necessary, electric strength test of 16.3 | | N/A |
| 25.24 | Interconnection cords not detachable without the aid of a tool if compliance with this standard is impaired when they are disconnected | | N/A |
| 25.25 | Dimensions of pins that are inserted into socket-outlets compatible with the dimensions of the relevant socket-outlet | | N/A |
| | Dimensions of pins and engagement face in accordance with the dimensions of the relevant plug in IEC TR 60083 | | N/A |
| **26** | **TERMINALS FOR EXTERNAL CONDUCTORS** | | - |
| 26.1 | Appliances provided with terminals or equally effective devices, such as male tabs of flat quick-connect terminations (IEC 61210), screw type terminals (IEC 60998-2-1), screwless terminals (IEC 60998-2-2) and clamping units (IEC 60999-1:1999), for connection of external conductors | | P |
| | Terminals only accessible after removal of a non-detachable cover, except | | P |
| | for class III appliances that do not contain live parts | | N/A |
| | Earthing terminals and functional earthing terminals may be accessible if a tool is required to make the connections and means are provided to clamp the wire independently from its connection | | P |
| 26.2 | Appliances with type X attachment and appliances for the connection of cables of fixed wiring provided with terminals in which connections are made by means of screws, nuts or similar devices, unless | | N/A |
| | the connections are soldered | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Screws and nuts not used to fix any other component, except | | N/A |
| | internal conductors, if so arranged that they are unlikely to be displaced when fitting the supply conductors | | N/A |
| | If soldered connections used, the conductor so positioned or fixed that reliance is not placed on soldering alone, unless | | N/A |
| | barriers provided so that neither clearances nor creepage distances between live parts and other metal parts reduced below the values for supplementary insulation if the conductor becomes free at the soldered joint | | N/A |
| 26.3 | Terminals for type X attachment and for connection of cables of fixed wiring constructed so that the conductor is clamped between metal surfaces with sufficient contact pressure but without damaging the conductor | | N/A |
| | Terminals fixed so that when the clamping means is tightened or loosened: | | N/A |
| | - the terminal does not become loose | | N/A |
| | - internal wiring is not subjected to stress | | N/A |
| | - neither clearances nor creepage distances are reduced below the values in clause 29 | | N/A |
| | Compliance checked by inspection and by the test of subclause 9.6 of IEC 60999-1:1999, the torque applied being equal to two-thirds of the torque specified (Nm) .....: | | N/A |
| | No deep or sharp indentations of the conductors | | N/A |
| 26.4 | Terminals for type X attachment, except those having a specially prepared cord and those for the connection of cables of fixed wiring, no special preparation of conductors such as by soldering, use of cable lugs, eyelets or similar, | | N/A |
| | Reshaping of the conductor before its introduction into the terminal or twisting a stranded conductor to consolidate the end is not considered special preparation | | N/A |
| | Terminals constructed or placed so that conductors prevented from slipping out when clamping screws or nuts are tightened | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 26.5 | Terminals for type X attachment so located or shielded that if a wire of a stranded conductor escapes, no risk of accidental connection to other parts that result in a hazard | | N/A |
| | Stranded conductor test, 8 mm insulation removed | | N/A |
| | No contact between live parts and accessible metal parts and, | | N/A |
| | for class II constructions, between live parts and metal parts separated from accessible metal parts by supplementary insulation only | | N/A |
| 26.6 | Terminals for type X attachment and for connection of cables of fixed wiring suitable for connection of conductors with cross-sectional area according to Table 13; rated current (A); nominal cross-sectional area ($mm^2$).....: | | N/A |
| | If a specially prepared cord is used, terminals need only be suitable for that cord | | N/A |
| 26.7 | Terminals for type X attachment, except in class III appliances not containing live parts, accessible after removal of a cover or part of the enclosure | | N/A |
| 26.8 | Terminals for the connection of fixed wiring, including the earthing terminal, located close to each other | | N/A |
| 26.9 | Terminals of the pillar type constructed and located as specified | | N/A |
| 26.10 | Terminals with screw clamping and screwless terminals not used for flat twin tinsel cords, unless | | N/A |
| | ends of conductors fitted with means suitable for screw terminals | | N/A |
| | Pull test of 5 N to the connection | | N/A |
| 26.11 | For type Y and Z attachment, soldered, welded, crimped or similar connections may be used | | P |
| | For class II appliances, the conductor so positioned or fixed that reliance is not placed on soldering, welding or crimping alone | | N/A |
| | If soldering, welding or crimping alone used, barriers provided so that clearances and creepage distances between live parts and other metal parts are not reduced below the values for supplementary insulation if the conductor becomes free | | N/A |
| **27** | **PROVISION FOR EARTHING** | | - |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 27.1 | Accessible metal parts, including metal parts behind a decorative cover that does not withstand the test of 21.1, of class 0I and I appliances permanently and reliably connected to an earthing terminal or earthing contact of the appliance inlet | | P |
| | Earthing terminals and earthing contacts not connected to the neutral terminal | | P |
| | Class 0, II and III appliances have no provision for protective earthing | | P |
| | Safety extra-low voltage circuits not earthed, unless | | N/A |
| | protective extra-low voltage circuits | | N/A |
| 27.2 | Clamping means of earthing terminals adequately secured against accidental loosening | | P |
| | Terminals for the connection of external equipotential bonding conductors allow connection of conductors of 2,5 $mm^2$ to 6 $mm^2$, and | | N/A |
| | - do not provide earthing continuity between different parts of the appliance, and | | N/A |
| | - conductors cannot be loosened without the aid of a tool | | N/A |
| 27.3 | For a detachable part having an earth connection and being plugged into another part of the appliance, the earth connection is made before and separated after current-carrying connections when removing the part | | N/A |
| | For appliances with supply cords, current-carrying conductors become taut before earthing conductor, if the cord slips out of the cord anchorage | | N/A |
| 27.4 | No risk of corrosion resulting from contact between parts of the earthing terminal and the copper of the earthing conductor or other metal | | P |
| | Parts providing earthing continuity, other than parts of a metal frame or enclosure, have adequate resistance to corrosion | | P |
| | If of steel, these parts provided with an electroplated coating, thickness of at least 5 μm | | N/A |
| | Adequate protection against rusting of parts of coated or uncoated steel, only intended to provide or transmit contact pressure | | N/A |
| | In the body of the earthing terminal is a part of a frame or enclosure of aluminium or aluminium alloys, precautions taken to avoid risk of corrosion | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | In case of doubt, thickness of coating measured as described in ISO 2178 or in ISO 1463 | | N/A |
| 27.5 | Low resistance of connection between earthing terminal and earthed metal parts | | P |
| | This requirement does not apply to connections providing earthing continuity in the protective extra-low voltage circuit, provided the clearances of basic insulation are based on the rated voltage of the appliance(V) ..... : | | P |
| | Resistance not exceeding 0,1 Ω at the specified low-resistance test (Ω) .....: | | P |
| | The printed conductors of printed circuit boards not used to provide earthing continuity in hand-held appliances | | N/A |
| | They may be used to provide earthing continuity in other appliances if at least two tracks are used with independent soldering points and the appliance complies with 27.5 for each circuit | | N/A |
| **28** | **SCREWS AND CONNECTIONS** | | - |
| 28.1 | Fixings, electrical connections and connections providing earthing continuity withstand mechanical stresses | | P |
| | Screws not of soft metal liable to creep, such as zinc or aluminium | | P |
| | Diameter of screws of insulating material min. 3 mm | | P |
| | Screws of insulating material not used for any electrical connections or connections providing earthing continuity | | N/A |
| | Screws used for electrical connections or connections providing earthing continuity screwed into metal | | P |
| | Screws not of insulating material if their replacement by a metal screw can impair supplementary or reinforced insulation | | N/A |
| | For type X attachment, screws to be removed for replacement of supply cord or for user maintenance, not of insulating material if their replacement by a metal screw impairs basic insulation | | N/A |
| | For screws and nuts; torque-test as specified in Table 14.....: | (See appended table) | P |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 28.2 | Electrical connections and connections providing earthing continuity constructed so that contact pressure is not transmitted through non-ceramic insulating material liable to shrink or distort, unless | | P |
| | there is resiliency in the metallic parts to compensate for shrinkage or distortion of the insulating material | | N/A |
| | This requirement does not apply to electrical connections in circuits of appliances for which: | | N/A |
| | - 30.2.2 is applicable and that carry a current not exceeding 0,5 A | | N/A |
| | - 30.2.3 is applicable and that carry a current not exceeding 0,2 A | | N/A |
| 28.3 | Space-threaded (sheet metal) screws only used for electrical connections if they clamp the parts together | | N/A |
| | Thread-cutting (self-tapping) screws and thread rolling screws only used for electrical connections if they generate a full form standard machine screw thread | | N/A |
| | Thread-cutting (self-tapping) screws not used if they are likely to be operated by the user or installer | | N/A |
| | Thread-cutting, thread rolling and space threaded screws may be used in connections providing earthing continuity provided it is not necessary to disturb the connection: | | N/A |
| | - in normal use, | | N/A |
| | - during user maintenance, | | N/A |
| | - when replacing a supply cord having a type X attachment, or | | N/A |
| | - during installation | | N/A |
| | At least two screws being used for each connection providing earthing continuity, unless | | N/A |
| | the screw forms a thread having a length of at least half the diameter of the screw | | N/A |
| 28.4 | Screws and nuts that make mechanical connection secured against loosening by means such as spring washer, lock washers and crown type locks, if they also make electrical connections or connections providing earthing continuity | | N/A |
| | For screw connections not subjected to torsion, sealing compound that softens on heating allowed to be used to provide security against loosening | | |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | This requirement does not apply to screws in the earthing circuit if at least two screws are used, or | | N/A |
| | if an alternative earthing circuit is provided | | N/A |
| | Rivets for electrical connections or connections providing earthing continuity secured against loosening if the connections are subjected to torsion | | N/A |
| | If connections subjected to torsion, a rivet having a non-circular shank or an appropriate notch allowed to be used to secure against loosening | | N/A |
| **29** | **CLEARANCES, CREEPAGE DISTANCES AND SOLID INSULATION** | | - |
| | Clearances, creepage distances and solid insulation withstand electrical stress | | P |
| | For coatings used on printed circuits boards to protect the microenvironment (type 1) or to provide basic insulation (type 2), normative Annex J applies .....: | | P |
| | The microenvironment is pollution degree 1 under type 1 protection | | N/A |
| | For type 2 protection, the spacing between the conductors before the protection is applied is not less than the values specified in Table 1 of IEC 60664-3:2016 | | P |
| | These values apply to functional, basic, supplementary and reinforced insulation .....: | | N/A |
| | Compliance is not checked on parts relating to motor-compressors if the motor-compressor complies with IEC 60335-2-34.<br>(IEC 60335-2-40:2024) | | P |
| | For motor-compressors not complying with IEC 60335-2-34, the additions and modifications specified in IEC 60335-2-34:2021, Clause 29, are applicable. (IEC 60335-2-40:2024) | | P |
| 29.1 | Clearances not less than the values specified in Table 16, taking into account the rated impulse voltage for the overvoltage categories of Table 15, unless .....: | (See appended table) | P |
| | for basic insulation and functional insulation, they comply with the impulse voltage test of clause 14 | | P |
| | For appliances intended for use at altitudes exceeding 2 000 m, the clearances in Table 16 are increased according to the altitude correction factor in Table A.2 of IEC 60664-1:2007 | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | However, the impulse voltage test is not applicable if the construction is such that the distances could be affected by any of the following: | | N/A |
| | - distortion | | N/A |
| | - movement of parts | | N/A |
| | - assembly of parts | | N/A |
| | - wear of basic insulation | | N/A |
| | - wear of functional insulation | | N/A |
| | In this case, the clearances for rated impulse voltages of 1 500 V and above specified in Table 16 are increased by 0,5 mm | | N/A |
| | Impulse voltage test is not applicable: | | N/A |
| | - when the microenvironment is pollution degree 3, or | | N/A |
| | - for basic insulation of class 0 and class 0I appliances, or | | N/A |
| | - to appliances intended for use at altitudes exceeding 2 000 m | | N/A |
| | Appliances are in overvoltage category II | | N/A |
| | A force of 2 N is applied to bare conductors, other than heating elements | | N/A |
| | A force of 30 N is applied to accessible surfaces | | N/A |
| 29.1.1 | Clearances of basic insulation withstand the overvoltages, taking into account the rated impulse voltage | | P |
| | The values of Table 16 or the impulse voltage test of clause 14 are applicable.....: | (See appended table) | P |
| | Clearance at the terminals of tubular sheathed heating elements may be reduced to 1,0 mm, if the microenvironment is pollution degree 1 | | N/A |
| | Lacquered conductors of windings considered to be bare conductors | | N/A |
| 29.1.2 | Clearances of supplementary insulation not less than those spec. for basic insulation in Table 16 ..: | (See appended table) | P |
| 29.1.3 | Clearances of reinforced insulation not less than those specified in Table 16, using the next higher step for rated impulse voltage ..... : | (See appended table) | P |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | For double insulation, with no intermediate conductive part between basic and supplementary insulation, clearances are measured between live parts and the accessible surface, and the insulation system is treated as reinforced insulation | | P |
| 29.1.4 | Clearances for functional insulation are the largest values determined from: | | P |
| | - Table 16 based on the rated impulse voltage.....: | (See appended table) | P |
| | - Table F.7a in IEC 60664-1:2007, frequency not exceeding 30 kHz | | N/A |
| | - clause 4 of IEC 60664-4:2005, frequency exceeding 30 kHz | | N/A |
| | If values of Table 16 are largest, the impulse voltage test of clause 14 may be applied instead, unless | | N/A |
| | the microenvironment is pollution degree 3, or | | N/A |
| | the distances can be affected by wear, distortion, movement of the parts or during assembly | | N/A |
| | However, clearances are not specified if the appliance complies with clause 19 with the functional insulation short-circuited | | N/A |
| | Lacquered conductors of windings considered to be bare conductors | | N/A |
| | However, clearances at crossover points are not measured | | N/A |
| | Clearance between surfaces of PTC heating elements may be reduced to 1 mm | | N/A |
| 29.1.5 | Appliances having higher working voltages than rated voltage, clearances for basic insulation are the largest values determined from: Working voltage >…….V | | N/A |
| | - Table 16 based on the rated impulse voltage.....: | | N/A |
| | - Table F.7a in IEC 60664-1:2007, frequency not exceeding 30 kHz | | N/A |
| | - clause 4 of IEC 60664-4:2005, frequency exceeding 30 kHz | | N/A |
| | If clearances for basic insulation are selected from Table F.7a of IEC 60664-1:2007 or Clause 4 of IEC 60664-4:2005, the clearances of supplementary insulation are not less than those specified for basic insulation | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | If clearances for basic insulation are selected from Table F.7a of IEC 60664-1:2007, the clearances of reinforced insulation dimensioned as specified in Table F.7a are to withstand 160 % of the withstand voltage required for basic insulation | | N/A |
| | If clearances for basic insulation are selected from Clause 4 of IEC 60664-4:2005<br>, the clearances of reinforced insulation are twice the value required for basic insulation | | N/A |
| | If the secondary winding of a step-down transformer is earthed, or if there is an earthed screen between the primary and secondary windings, clearances of basic insulation on the secondary side not less than those specified in Table 16, but using the next lower step for rated impulse voltage | | N/A |
| | Circuits supplied with a voltage lower than rated voltage, clearances of functional insulation are based on the working voltage used as the rated voltage in Table 15 | | N/A |
| 29.2 | Creepage distances not less than those appropriate for the working voltage, taking into account the material group and the pollution degree.....: | (See appended table) | P |
| | Pollution degree 2 applies, unless | | N/A |
| | - precautions taken to protect the insulation; pollution degree 1 | | N/A |
| | - insulation subjected to conductive pollution; pollution degree 3 | | P |
| | For insulation located in any airflow, the micro-environment is pollution degree 3 unless the insulation is enclosed or located so that it is unlikely to be exposed to pollution due to normal use of the appliance. (IEC 60335-2-40:2024) | | N/A |
| | A force of 2 N is applied to bare conductors, other than heating elements | | P |
| | A force of 30 N is applied to accessible surfaces | | P |
| | In a double insulation system, the working voltage for both the basic and supplementary insulation is taken as the working voltage across the complete double insulation system | | N/A |
| 29.2.1 | Creepage distances of basic insulation not less than specified in Table 17 .....: | (See appended table) | P |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | However, if the working voltage is periodic and has a frequency exceeding 30 kHz, the creepage distances are also determined from Table 2 of IEC 60664-4:2005, these values being used if exceeding the values in Table 17 .....: | | N/A |
| | Except for pollution degree 1, corresponding creepage distance not less than the minimum specified for the clearance in Table 16, if the clearance has been checked according to the test of clause 14 .....: | | N/A |
| | Creepage distances of supplementary insulation at least those specified for basic insulation in Table 17, excluding NOTE 1 and NOTE 2, or.....: | (See appended table) | N/A |
| | Table 2 of IEC 60664-4:2005, as applicable : | | N/A |
| 29.2.3 | Creepage distances of reinforced insulation at least double those specified for basic insulation in Table 17, excluding NOTE 1 and NOTE 2, or.....: | (See appended table) | P |
| | Table 2 of IEC 60664-4:2005, as applicable .....: | | N/A |
| 29.2.4 | Creepage distances of functional insulation not less than specified in Table 18 .....: | (See appended table) | P |
| | However, if the working voltage is periodic and has a frequency exceeding 30 kHz, the creepage distances are also determined from Table 2 of IEC 60664-4:2005, these values being used if exceeding the values in Table 18 .....: | | N/A |
| | Creepage distances may be reduced if the appliance complies with clause 19 with the functional insulation short-circuited | | N/A |
| 29.3 | Supplementary and reinforced insulation have adequate thickness, or a sufficient number of layers, to withstand the electrical stresses | | P |
| | Compliance checked: | | P |
| | - by measurement, in accordance with 29.3.1, or | | P |
| | for insulation, other than single layer internal wiring insulation, by an assessment of the thermal quality of the material combined with an electric strength test, in accordance with 29.3.3, and | | N/A |
| | for accessible parts of reinforced insulation consisting of a single layer, by measurement in accordance with 29.3.4, or | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - by an assessment of the thermal quality of the material according to 29.3.3 combined with an electric strength test in accordance with 23.5, for each single layer internal wiring insulation touching each other, or | | N/A |
| | - as specified in subclause 6.3 of IEC 60664-4:2005 for insulation that is subjected to any periodic voltage having a frequency exceeding 30 kHz | | N/A |
| 29.3.1 | Supplementary insulation; thickness at least 1 mm | | P |
| | Reinforced insulation; thickness of at least 2 mm | | P |
| 29.3.2 | Each layer of material withstands the electric strength test of 16.3 for supplementary insulation | | N/A |
| | Supplementary insulation consists of at least 2 layers | | N/A |
| | Reinforced insulation consists of at least 3 layers | | N/A |
| 29.3.3 | The insulation is subjected to the dry heat test Bb of IEC 60068-2-2, followed by | | N/A |
| | the electric strength test of 16.3 | | N/A |
| | If the temperature rise during the tests of clause 19 does not exceed the value specified in Table 3, the test of IEC 60068-2-2 is not carried out | | N/A |
| 29.3.4 | Thickness of accessible parts of reinforced insulation consisting of a single layer not less than specified in Table 19.....: | | N/A |
| **30** | **RESISTANCE TO HEAT AND FIRE** | | - |
| 30.1 | External parts of non-metallic material, | | P |
| | parts supporting live parts, and | | P |
| | parts of thermoplastic material providing supplementary or reinforced insulation | | P |
| | sufficiently resistant to heat | | P |
| | This requirement does not apply to: | | N/A |
| | - the insulation or sheath of flexible cords or internal wiring | | N/A |
| | - those parts of coil formers that do not support or retain terminals in position | | N/A |
| | - parts of ceramic material | | N/A |
| | Ball-pressure test according to IEC 60695-10-2 | | N/A |
| | Particle foam material of external parts made of: (IEC 60335-2-40:2024) | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | – expanded polypropylene (EPP), or (IEC 60335-2-40:2024) | | N/A |
| | – expanded polystyrene (EPS) (IEC 60335-2-40:2024) | | N/A |
| | Compliance is checked by test acc. 30.101. (IEC 60335-2-40:2024) | | N/A |
| | External parts tested at 40 °C plus the maximum temperature rise determined during the test of clause 11, or at 75 °C, whichever is the higher; temperature (°C).....: | (See appended table 30.1) | P |
| | Parts of thermoplastic material providing supplementary or reinforced insulation tested at 25 °C plus the maximum temperature rise determined during clause 19, if higher; temperature (°C) .....: | (See appended table 30.1) | P |
| 30.2 | Parts of non-metallic material resistant to ignition and spread of fire | | P |
| | This requirement does not apply to: | | N/A |
| | - parts of a mass not exceeding 0,5 g, provided the cumulative effect is unlikely to propagate flames that originate inside the appliance by propagating flames from one part to another, or | | N/A |
| | - decorative trims, knobs and other parts unlikely to be ignited or to propagate flames that originate inside the appliance | | N/A |
| | Compliance checked by the test of 30.2.1, and in addition: | | N/A |
| | - for attended appliances, 30.2.2 applies | | N/A |
| | - for unattended appliances, 30.2.3 applies | | P |
| | For appliances for remote operation, 30.2.3 applies | | P |
| | For parts of appliances connected to the supply mains during charging, 30.2.3 applies | | P |
| | For base material of printed circuit boards, 30.2.4 applies | | N/A |
| 30.2.1 | Parts of non-metallic material subjected to the glow-wire test of IEC 60695-2-11:2014 at 550 °C | (See appended table 30.2) | P |
| | However, test not carried out if the material is classified as having a glow-wire flammability index according to IEC 60695-2-12 of at least 550 °C, or | | P |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | the material is classified at least HB40 according to IEC 60695-11-10 | | N/A |
| | Parts for which the glow-wire test cannot be carried out need to meet the requirements in ISO 9772 for material classified HBF | | N/A |
| 30.2.3 | Appliances operated while unattended, tested as specified in 30.2.3.1 and 30.2.3.2 | | P |
| | The tests are not applicable to conditions as specified .....: | | |
| 30.2.3.1 | Parts of non-metallic material supporting connections, such as switch contacts and the like in other components, carrying a current exceeding 0,2 A during normal operation,<br>Note: Appliance supplied at rated voltage (V)..... :<br>and | | P |
| | parts of non-metallic material, other than small parts, within a distance of 3 mm, | | P |
| | subjected to the glow-wire test of IEC 60695-2-11:2014 with a test severity of 850 °C | (See appended table 30.2) | P |
| | Glow-wire applied to an interposed shielding material, if relevant | | N/A |
| | The glow-wire test is not carried out on parts of material classified as having a glow-wire flammability index according to IEC 60695-2-12 of at least 850 °C | | N/A |
| 30.2.3.2 | Parts of non-metallic material supporting connections, such as switch contacts and the like in other components, and | | P |
| | parts of non-metallic material within a distance of 3 mm, | | P |
| | subjected to the glow-wire test of IEC 60695-2-11:2014 with appropriate severity level: | (See appended table 30.2) | P |
| | - 750 °C, for connections carrying a current exceeding 0,2 A during normal operation<br>Note: Appliance supplied at rated voltage (V)..... : | | P |
| | - 650 °C, for other connections | | N/A |
| | Glow-wire applied to an interposed shielding material, if relevant | | N/A |
| | However, the glow-wire test of 750 °C or 650 °C as appropriate, is not carried out on parts of material fulfilling both or either of the following classifications: | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - a glow-wire ignition temperature according to IEC 60695-2-13 of at least: | | N/A |
| | 775 °C, for connections carrying a current exceeding 0,2 A during normal operation<br>Note: Appliance supplied at rated voltage (V)..... : | Test voltage =<br>Frequency = (maybe relevant for moa ca and smps) | N/A |
| | 675 °C, for other connections | | N/A |
| | - a glow-wire flammability index according to IEC 60695-2-12 of at least: | | N/A |
| | 750 °C, for connections carrying a current exceeding 0,2 A during normal operation<br>Note: Appliance supplied at rated voltage (V)..... : | Test voltage =<br>Frequency = (maybe relevant for moa ca and smps) | N/A |
| | 650 °C, for other connections | | N/A |
| | The glow-wire test is also not carried out on small parts. These parts are to: | | N/A |
| | - comprise material having a glow-wire ignition temperature of at least 775 °C or 675 °C as appropriate, or | | N/A |
| | - comprise material having a glow-wire flammability index of at least 750 °C or 650 °C as appropriate, or | | N/A |
| | - comply with the needle-flame test of normative Annex E, or | | N/A |
| | - comprise material classified as V-0 or V-1 according to IEC 60695-11-10 | | N/A |
| | The consequential needle-flame test of Annex E applied to non-metallic parts that encroach within the vertical cylinder placed above the centre of the connection zone and on top of the non-metallic parts supporting current-carrying connections, and parts of non-metallic material within a distance of 3 mm of such connections if these parts are those: | | N/A |
| | - parts that withstood the glow-wire test of IEC 60695-2-11:2014 of 750 °C or 650 °C as appropriate, but produce a flame that persist longer than 2 s, or | | N/A |
| | - parts that comprised material having a glow-wire flammability index of at least 750 °C or 650 °C as appropriate, or | | N/A |
| | - small parts, that comprised material having a glow-wire flammability index of at least 750 °C or 650 °C as appropriate, or | | N/A |
| | - small parts for which the needle-flame test of normative Annex E was applied, or | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - small parts for which a material classification of V-0 or V-1 was applied | | N/A |
| | However, the consequential needle-flame test is not carried out on non-metallic parts, including small parts, within the cylinder that are: | | N/A |
| | - parts having a glow-wire ignition temperature of at least 775 °C or 675 °C as appropriate, or | | N/A |
| | parts comprising material classified as V-0 or V-1 according to IEC 60695-11-10, or | | N/A |
| | - parts shielded by a flame barrier that meets the needle-flame test of normative Annex E or that comprises material classified as V-0 or V-1 according to IEC 60695-11-10 | | N/A |
| | No battery in the area of the vertical cylinder used for the consequential needle flame test, unless | | N/A |
| | battery shielded by a barrier that meets the needle flame test of normative Annex E or that comprises material classified as V-0 or V-1 according to IEC 60695-11-10 | | N/A |
| 30.2.4 | Base material of printed circuit boards subjected to the needle-flame test of normative Annex E. | (See appended table 30.2/30.2.4) | N/A |
| 30.101 | The ball pressure test for particle foam material is carried out using the apparatus specified in IEC 60695-10-2:2014, Clause 5 using the loading device shown in Figure 1a with additional dimensions and shape as shown in Figure 105. (IEC 60335-2-40:2024) | | P |
| | The size of test specimen at least 60 mm × 60 mm. (IEC 60335-2-40:2024) | | P |
| | The weight applied to the outer surface of the part, and not to a cut-away exposing an interior substrate for the purposes of sample preparation. (IEC 60335-2-40:2024) | | P |
| | The test specimen stored for at least 24 h before the test in an atmosphere having a temperature between 15 °C and 35 °C and a relative humidity between 45 % and 75 %. (IEC 60335-2-40:2024) | | P |
| | Place the test specimen in the approximate centre of the test specimen support ensuring that its upper surface is horizontal. (IEC 60335-2-40:2024) | | P |
| | Gently lower the pressure ball of the loading device on to the approximate centre of the test specimen. (IEC 60335-2-40:2024) | | P |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Ensure that no conditions exist that will cause the pressure ball to move other than in a downward direction during the test. (IEC 60335-2-40:2024) | | |
| | The installation of the test specimen and application of the weight performed within 30 s. (IEC 60335-2-40:2024) | | P |
| | The test chamber return to the specified temperature (± 2 °C) within 5 min and without any overshoot exceeding 5 °C. (IEC 60335-2-40:2024) | | P |
| | The test specimen with the loading device remain for a period of 60 +20 min in the test chamber. (IEC 60335-2-40:2024) | | P |
| | The thickness of the sample at the point of contact with the loading device shall be measured before and immediately after the conditioning in the chamber according to Figure 106. (IEC 60335-2-40:2024) | | P |
| | The test performed at a temperature (40 ± 2) K above the maximum temperature rise measured at accessible surface during the test in Clause 11, but not less than 75 °C. (IEC 60335-2-40:2024) | | P |
| | However, for parts providing supplementary insulation or reinforced insulation, the test performed at a temperature, which is (25 ± 2) K above the maximum temperature rise measured during the test in Clause 19, if this is higher. (IEC 60335-2-40:2024) | | P |
| | The temperature rises of Clause 19 are not considered, provided the tests of Clause 19 are terminated by a non-self-resetting protective device. The resetting of the non-self-resetting protective device shall require removal of a cover or the using of a tool. (IEC 60335-2-40:2024) | | P |
| | After the test, the thickness of the material not less than 50 % of the original material thickness but not less than 4 mm. (IEC 60335-2-40:2024) | | P |
| **31** | **RESISTANCE TO RUSTING** | | - |
| | Relevant ferrous parts adequately protected against rusting. | | N/A |
| | Compliance is checked by the salt mist test. (IEC 60335-2-40:2024) | | N/A |
| **32** | **RADIATION, TOXICITY AND SIMILAR HAZARDS** | | - |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 32.1 | Appliance does not emit harmful radiation or present a toxic or similar hazard due to their operation in normal use. | | P |
| | Compliance is checked by the limits or tests specified in part 2, if relevant | | P |
| 32.2 | Appliance do not present an optical radiation hazard due to their operation in normal use | | N/A |
| | Requirement does not apply to lamps and lamp systems that comply with 24.1.10 | | N/A |
| | Compliance checked as follows | | N/A |
| | appliance supplied at rated voltage (V) ..... :<br>Note: Generally, 50 Hz is the most unfavourable frequency. | Test voltage =<br>Frequency = | N/A |
| | - Radiation assessment at or recalculated to 200 mm distance or at fixed use distance, measurement as described in IEC 62471:2006 | | N/A |
| | - For lamps or lamp systems intended to illuminate objects, tested at the GLS assessment distance producing 500 lux as described in IEC 62471:2006 | | N/A |
| | - Appliance complies with exempt group classification requirements of IEC 62471:2006 regarding actinic ultraviolet hazard ($E_S$) and near-UV hazard ($E_{UVA}$) | | N/A |
| **32.101** | **UV-C irradiance test (IEC 60335-2-40:2024)** | | N/A |
| 32.101.1 | For the occupied space outside the unit, a test be performed to determine the UV-C spectral irradiance. (IEC 60335-2-40:2024) | | N/A |
| | Emissions from the equipment does not exceed a UV-C spectral irradiance limit of 0,2 µW/cm$^2$ (IEC 60335-2-40:2024) | | N/A |
| 32.101.2 | For areas inside the unit that are accessible for anticipated user maintenance and are not equipped with the interlock required by Subclause 22.128, there be no UV-C spectral irradiance greater than 1,7 µW/cm$^2$. (IEC 60335-2-40:2024) | | N/A |
| | UV-C spectral irradiance is measured at any point of accessibility required for user maintenance. (IEC 60335-2-40:2024) | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | When determining user accessibility, consideration should be given to the maximum exposure time of 60 min/day at 1,7 µW/cm2 spectral irradiance that the user would experience in performing his duties. (IEC 60335-2-40:2024) | | N/A |
| | Compliance is determined by measuring the UV-C irradiance per IEC 62471:2006, Clause 5 and Annex B. (IEC 60335-2-40:2024) | | N/A |
| 32.101.3 | UV-C irradiance is measured at the location in Table 102. (IEC 60335-2-40:2024) | | N/A |
| 32.101.4 | When conducting UV-C spectral irradiance tests: IEC 60335-2-40:2024 | | N/A |
| | - the UV-C spectral irradiance measurements are conducted with a scanning spectroradiometer, or a narrow band range radiometer; (IEC 60335-2-40:2024) | | N/A |
| | - all panels and components are positioned or adjusted in the most severe position (IEC 60335-2-40:2024) | | N/A |
| | - removable air filters are removed; (IEC 60335-2-40:2024) | | N/A |
| | - measurements are made at the worst-case location and angle of incidence; (IEC 60335-2-40:2024) | | N/A |
| | - the minimum specified duct and configuration, including any duct liners, specified by the manufacturer be in place and the measurements taken at the opening at the end of the duct. (IEC 60335-2-40:2024) | | N/A |
| **B** | **ANNEX B (NORMATIVE) BATTERY-OPERATED APPLIANCES, SEPARABLE BATTERIES AND DETACHABLE BATTERIES FOR BATTERY-OPERATED APPLIANCES** | | - |
| | The following modifications to this standard are applicable to: | | N/A |
| | - battery-operated appliances and remote controls employing non-rechargeable batteries (primary batteries) | | N/A |
| | - battery-operated appliances and remote controls employing rechargeable batteries (secondary batteries) | | N/A |
| | - detachable and separable batteries for battery-operated appliances | | N/A |
| B.3.1.1 | Battery-operated appliance operated under the following conditions: | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - for appliances operated with detachable or separable batteries disconnected from the appliance for charging, appliance operated to perform its intended function with a fully charged battery, the battery being the model or type reference of the battery provided or indicated in the instructions | | N/A |
| | - for appliances operated with integral or separable batteries not disconnected from the appliance for charging, and that cannot perform their intended function while batteries are being charged, appliance operated to perform its intended function with a fully charged battery | | N/A |
| | - for appliances operated with replaceable batteries, including integral replaceable batteries, or non-rechargeable batteries, appliance operated to perform its intended function with the artificial source described in B5.3, upper limit short circuit current capacity specified in Table B.1 | | N/A |
| B.3.6.1 | Non-rechargeable battery: battery is supplied in a fully charged state and cannot be recharged after | | N/A |
| 5.2 | Tests of B.19.1 to B.19.6 carried out on separate samples | | N/A |
| 5.8.1 | This subclause is not applicable | | N/A |
| 5.8.2 | This subclause is not applicable | | N/A |
| 5.8.3 | This subclause is not applicable | | N/A |
| 5.8.4 | This subclause is not applicable | | N/A |
| B.5.1 | Before starting a test requiring a fully charged battery, battery fully charged, disconnected from source and allowed to rest between 2 h and 6 h | | N/A |
| B.5.2 | Specification of a rated voltage implies the use of a fully charged battery | | N/A |
| | For battery-operated appliances, where the supply terminal connecting the battery have no indication of polarity, the more unfavourably polarity applied, unless | | N/A |
| | such a connection unlikely to occur due to the construction of the appliance | | N/A |
| B.5.3 | When specified that a battery provided with or intended for the appliance may be replaced by an artificial source, that source consists of a DC power supply or a specially constructed battery, output of each as described in Table B.1 for the relevant battery type | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 6.1 | Battery-operated appliances without a supply connection or a functional earth connection not classified with respect to protection against electric shock | | N/A |
| 7.1 | Battery-operated appliances and remote controls containing batteries marked with the: | | N/A |
| | - name, trademark or identification mark of the manufacturer or responsible vendor | | N/A |
| | - model or type reference | | N/A |
| | - IP number according to degree of protection against ingress of water, other than IPX0 .....: | | N/A |
| | - type reference of the battery, if battery either not recharged in the appliance or non-rechargeable | | N/A |
| | Appliances incorporating replaceable batteries marked with: | | N/A |
| | - battery type reference | | N/A |
| | - battery voltage (V).....: | | N/A |
| | - polarity of the terminals, unless | | N/A |
| | incorrect insertion of battery by the user unlikely to occur due to the construction of the appliance | | N/A |
| | If more than one battery type can be used with the appliance, appliance marked with the type reference of at least one of the battery types that can be used, together with: | | N/A |
| | - symbol ISO 7000-0790 (2004-01), or | | N/A |
| | - the substance of the following: | | N/A |
| | See instruction manual for additional battery types. | | N/A |
| | If appliances use more than one battery, appliance marked to indicate correct polarity connection of the batteries | | N/A |
| | If relevant, positive terminal indicated by symbol IEC 60417-5005 (2002-10), and | | N/A |
| | negative terminal indicated by symbol IEC 60417-5006 (2002-10) | | N/A |
| | Detachable and separable batteries marked with: | | N/A |
| | - name, trade mark or identification mark of the manufacturer or responsible vendor | | N/A |
| | - model or type reference | | N/A |
| | - IP number according to degree of protection against ingress of water, other than IPX0 .....: | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Detachable and separable batteries disconnected from the appliance for charging the battery marked with: | | N/A |
| | - symbol ISO 7000-0790 (2004-01) | | N/A |
| | - symbol IEC 60417-6413 (2019-05) | | N/A |
| | - model or type reference of the battery charger, or the substance of the following: | | N/A |
| | Use only with <model or type reference> battery charger. .....: | | N/A |
| | If more than one battery charger can be used to charge a detachable and separable battery disconnected from the appliance for charging, battery marked with the type reference of at least one of the battery charges that can be used, together with | | N/A |
| | either symbol ISO 7000-0790 (2004-01), or the substance of the following: | | N/A |
| | See instruction manual for additional battery chargers. | | N/A |
| | Batteries that are user replaceable, other than general purpose batteries, marked with the: | | N/A |
| | - name, trademark or identification mark of the manufacturer or responsible vendor | | N/A |
| | - model or type reference | | N/A |
| | - nominal voltage (V) .....: | | N/A |
| 7.6 | Additional symbols | | N/A |
| 7.12 | Instructions provided with the appliance | | N/A |
| | For appliances intended for use at altitudes exceeding 2 000 m, maximum altitude stated | | N/A |
| | If necessary, appropriate details on precautions during user maintenance stated | | N/A |
| | The instructions state the substance of the following: | | N/A |
| | This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.<br>Children should be supervised to ensure that they do not play with the appliance. | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | For appliances incorporating batteries intended to be removed for charging or intended to be replaced by the user and that can be contained in the small parts cylinder, the instructions state the substance of the following: | | N/A |
| | WARNING: Keep out of reach of children. Swallowing can lead to chemical burns, perforation of soft tissue, and death. Severe burns can occur within 2 h of ingestion. Seek medical attention immediately. | | N/A |
| | For appliances intended for use with batteries that use metal-ion chemistries, the instructions state the normal temperature range for charging | | N/A |
| | For battery-operated appliances, the instructions contain the following information, as applicable: | | N/A |
| | - battery type | | N/A |
| | - details regarding safe disposal of used batteries | | N/A |
| | - how to deal with leaking batteries | | N/A |
| | For battery-operated appliances, the instructions contain the substance of the following: | | N/A |
| | - do not expose the appliance or battery to excessive temperatures | | N/A |
| | - be aware of the risk of terminals of the battery-operated appliance or battery being short-circuited by metal objects | | N/A |
| | For battery-operated appliances containing non-rechargeable batteries, the instructions state the substance of the following: | | N/A |
| | This appliance contains non-rechargeable batteries, these batteries are not to be recharged. | | N/A |
| | For battery-operated appliances containing non-user-replaceable batteries, the instructions state the substance of the following: | | N/A |
| | This appliance contains batteries that are only replaceable by skilled persons. | | N/A |
| | For battery-operated appliances containing non-replaceable batteries, the instructions state the substance of the following: | | N/A |
| | This appliance contains batteries that are non-replaceable. When the battery is at end of life, the appliance shall be properly disposed of. | | N/A |
| | For battery-operated appliances incorporating batteries intended to be removed for charging or replaced by the user, the instructions include, as applicable, the substance of the following: | | N/A |
| | - rechargeable batteries are to be removed from the appliance before being charged | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - different types of batteries or new and used batteries are not to be mixed | | N/A |
| | - exhausted batteries are to be removed from the appliance and safely disposed of | | N/A |
| | - if the appliance is to be stored unused for a long period, the batteries should be removed | | N/A |
| | - do not use non-rechargeable batteries in place of rechargeable batteries | | N/A |
| | - do not use modified or damaged batteries | | N/A |
| | For battery-operated appliances incorporating batteries intended to be removed for charging or replaced by the user, the instructions include, as applicable, the following information: | | N/A |
| | battery type reference | | N/A |
| | - orientation of the battery with regard to polarity | | N/A |
| | - method of replacing batteries including maintaining correct polarity | | N/A |
| | For battery-operated appliances incorporating batteries intended to be removed prior to disposal of the appliance, the instructions include details regarding their safe removal and disposal | | N/A |
| | For battery-operated appliances that use detachable and separable batteries disconnected from the appliance for charging, the instructions include the model or type reference of the battery charger to be used, along with the substance of the following: | | N/A |
| | WARNING: Use only with <model or type reference> battery charger. | | N/A |
| | If the symbol for battery charger is used, its meaning is explained | | N/A |
| 7.15 | Markings specified for batteries intended to be replaced by the user are in or adjacent to the battery compartment | | N/A |
| | Marking to indicate correct polarity connection of the batteries specified for appliances using more than one general purpose battery is in or adjacent to the battery compartment | | N/A |
| | Type reference of battery charger placed next to symbol IEC 60417-6413 (2019-05) | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 8 | This clause is not applicable to the appliance functional part of a battery-operated appliance and its batteries, providing the battery circuits do not have an earth or mains connection | | N/A |
| 10.1 | This subclause is not applicable | | N/A |
| 10.2 | This subclause is not applicable | | N/A |
| 11.1 | Battery operated appliances, their surroundings, and batteries not attaining excessive temperatures in normal use | | N/A |
| | Compliance tested under the conditions specified in B.11.1, 11.2, 11.3, 11.7 and 11.8 | | N/A |
| 11.4 | This subclause is not applicable | | N/A |
| 11.5 | This subclause is not applicable | | N/A |
| 11.6 | This subclause is not applicable | | N/A |
| B.11.1 | Battery-operated appliances tested under the conditions of normal operation | | N/A |
| | For appliances operated with detachable or separable batteries disconnected for charging, appliance operated until depletion of battery and test repeated with fully charged battery until it depletes or until temperature rises have stabilized as specified, whichever occurs first | | N/A |
| | For appliances incorporating integral or separable batteries not disconnected for charging, and that cannot perform while batteries are being charged, appliance operated until depletion of batteries | | N/A |
| | For appliances operated with replaceable or non-rechargeable batteries, appliance operated until the minimum capacity of the battery as specified in Table B.1 has been delivered or until steady conditions are established, whichever occurs first | | N/A |
| 19.1 | For battery-operated appliances, instead of the tests specified, tests of 19.2, 19.4, 19.7, 19.9, 19.11, 19.12, 19.14, 19.15, B.19.1 to B.19.5 | | N/A |
| | Detachable and separable batteries also subjected to the test of B.19.6 | | N/A |
| | For battery-operated appliances, tests carried out under normal operation | | N/A |
| 19.2 | Appliances with heating elements tested under the conditions specified in Clause 11 but with restricted heat dissipation | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 19.7 | Battery-operated appliance switched on and operated under stalled conditions by: | | N/A |
| | - locking the rotor of appliances for which the locked rotor torque is smaller than the full load torque | | N/A |
| | - locking moving parts of other appliances | | N/A |
| | If an appliance has more than one motor, test carried out for each motor separately | | N/A |
| | Test conducted at both $I_{sc}$ (high) and $I_{sc}$ (low), if testing with the artificial source described in B.5.3 | | N/A |
| | Test conducted: | | N/A |
| | - until the test sample achieves a steady condition, including returning to room temperature, or | | N/A |
| | - until at a time period of at least 3 h has elapsed | | N/A |
| 19.11 | Electronic circuits checked by evaluation of the fault conditions specified in 19.11.2 for all circuits or parts of circuits, unless they comply with the conditions specified in 19.11.1 | | N/A |
| | Appliances having a device with an off position obtained by electronic disconnection, or a device that can place the appliance in a stand-by mode, subjected to the tests of 19.11.4 | | N/A |
| | If the safety of the appliance under any of the fault conditions depends on the operation of a miniature fuse-link complying with IEC 60127, test of 19.12 carried out, and | | N/A |
| | the appliance complies with the conditions specified in 19.13 | | N/A |
| | If a conductor of a printed circuit board becomes open-circuited, the appliance is considered to have withstood the particular test, provided that the base material of the printed circuit board withstands the test of normative Annex E | | N/A |
| 19.11.2 | When any of the fault conditions simulated, duration of test until steady conditions | | N/A |
| 19.11.4 | Appliances having a device with an off position obtained by electronic disconnection, or a device that can be placed in the stand-by mode, subjected to the tests of 19.11.4.1 and 19.11.4.2 | | N/A |
| | Tests carried out with the appliance supplied by a fully charged battery, the device being set in the off position or in the stand-by mode | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Appliances incorporating a protective electronic circuit subjected to the tests of 19.11.4.1 and 19.11.4.2 | | N/A |
| | Tests carried out after the protective electronic circuit has operated during the relevant tests of Clause 19 except 19.2 and 19.11.3 | | N/A |
| 19.11.4.8 | Battery operated appliances are supplied with a fully charged battery, operated under normal operation for 60 s, and then subjected to a 60 s interruption of the battery current | | N/A |
| | When battery current restored, the appliance: | | N/A |
| | - continues to operate normally from the same operation cycle point reached before the battery supply was interrupted, or | | N/A |
| | - does not continue operating without requiring manual intervention to restart from the same operating cycle point reached before the battery supply was interrupted, or | | N/A |
| | - does not continue operating without requiring manual intervention to restart from the part of the cycle selected by the user | | N/A |
| 19.13 | During tests, no flames, molten metal or poisonous or ignitable gas in hazardous amounts and temperature rises not exceeding the values shown in Table 9.....: | | N/A |
| | No explosion or ignition of the battery during or after the test | | N/A |
| | Venting of cells permitted through their vents | | N/A |
| | After the tests, and when the appliance has cooled to room temperature, compliance with B.22.3 and B.22.5 not impaired and the appliance complies with 20.2 and Clause 29, if still operable | | N/A |
| | For appliances immersed in or filled with conducting liquid in normal use, appliance immersed in or filled with water for 24 h before the test of B.22.5 | | N/A |
| | No dangerous malfunction and no failure of protective electronic circuits, if still operable | | N/A |
| | Appliances tested with an electronic switch in the off position: | | N/A |
| | - do not become operational, or | | N/A |
| | - do not result in a dangerous malfunction during or after the tests of 19.11.4, if they become operational | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | In an appliance containing lids or doors controlled by one or more interlocks, one of the interlocks may be released if both of the following conditions are fulfilled: | | N/A |
| | - no movement to an open position when released | | N/A |
| | - no restart after the cycle in which it was released | | N/A |
| 19.15 | For battery-operated appliances incorporating a manual voltage selector switch intended to select battery voltage, switch set to lowest voltage position and highest voltage applied | | N/A |
| B.19.1 | Supply terminals of a battery-operated appliance having an indication of polarity connected to the battery terminals of opposite polarity, unless | | N/A |
| | connection by the user unlikely to occur | | N/A |
| B.19.2 | For battery-operated appliances with provision for multiple batteries, one or more of the batteries reversed and appliance operated, if reversal by the user of battery polarity allowed by the construction | | N/A |
| B.19.3 | For battery-operated appliances with motor(s), terminals of each motor short circuited one at a time, where the resistance of the short-circuit does not exceed 10 mΩ and while operated under the conditions of Clause 11 | | N/A |
| | Test conducted until steady conditions are achieved, including returning to room temperature or until a time period of at least 3 h | | N/A |
| B.19.4 | Test conducted with all the cells of the battery fully charged and, for batteries consisting of more than one cell, one cell fully discharged on a detachable or separable battery connected to the appliance or on an appliance containing an integral battery | | N/A |
| | Main discharge connections of the battery shorted with a resistance not to exceed 10 mΩ, conducted until a non-self-resetting protection device operates or an intentionally weak part becomes permanently open-circuited or until the test sample returns to room temperature | | N/A |
| B.19.5 | Battery-operated appliance and any cords except supply cords, as appropriate, tested with the battery connected, under the following fault conditions applied one at a time: | | N/A |
| | - any cord provided between the battery-operated appliance and a separable battery is short-circuited at the point along its length likely to produce the most adverse effects | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - for appliances having replaceable batteries that are replaceable and that can be removed without the aid of a tool, and having terminals that can be short-circuited by a thin straight bar, the terminals of the battery are short-circuited | | N/A |
| | - charging terminals of the battery-operated appliance that are simultaneously accessible with the test probe 13 of IEC 61032 are short circuited so as to produce the most unfavourable result | | N/A |
| | Battery-operated appliance switched on and no additional mechanical load applied | | N/A |
| | Tests conducted until the test sample achieves a steady condition, including returning to room temperature or, until a time period of at least 3 h | | N/A |
| | Resistance of short circuit not exceeding 10 mΩ | | N/A |
| B.19.6 | For detachable and separable batteries, combinations of terminals simultaneously accessible by applying the test probe 13 of IEC 61032 short circuited so as to produce the most unfavourable result | | N/A |
| B.20.1 | The enclosure of a battery-operated appliance incorporating an integral battery that uses metal-ion chemistry withstands the pressure generated when a cell vents during failure | | N/A |
| | Compliance checked by inspection after the tests of Clause 19 for batteries with a capacity less than 0,2 Ah, and measurement or test as specified | | N/A |
| B.20.2 | The enclosure of detachable and separable batteries that use metal-ion chemistries withstands the pressure generated when a cell vents during failure; tests as specified | | N/A |
| | Compliance checked by inspection after the tests of Clause 19 for batteries with a capacity less than 0,2 Ah, and measurement or test as specified | | N/A |
| 21.1 | Battery-operated appliances have adequate mechanical strength and are constructed to withstand rough handling expected in normal use | | N/A |
| | Appliance fitted with fully charged batteries and rigidly supported subjected to test Ehb of IEC 60068-2-75, three blows of 0,5 J applied to every point of the appliance enclosure likely to be weak | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | If necessary, blows also applied to handles, levers, knobs and similar parts and to signal lamps and their covers, but only if the lamps or covers protrude from the enclosure by more than 10 mm or if their surface area exceeds 4 $cm^2$ | | N/A |
| | Lamps within the appliance and their covers only tested if likely to be damaged in normal use | | N/A |
| | When applying the release cone to the guard of a visibly glowing heating element, the hammer head passing through the guard does not strike the heating element | | N/A |
| | In case of doubt, defect neglected and the group of three blows applied to the same place on a new sample which then withstands the test | | N/A |
| | Hand-held battery-operated appliances also subjected to test free-fall - procedure 1, of IEC 60068-2-31, under the specified conditions | | N/A |
| | Free-fall test does not cause the appliance to catch fire, leak fluid visible from the outside or explode and meets the requirements of Clause 20, Clause 29, B.22.3 and B.22.5 where short circuit of functional insulation will impair compliance with this standard | | N/A |
| B.21.1 | Separable and detachable batteries, when not connected to the appliance, have adequate mechanical strength and are constructed to withstand rough handling expected in normal use | | N/A |
| | Fully charged battery, rigidly supported, subject to test Ehb of IEC 60068-2-75, three blows of 0,5 J applied to every point of the battery enclosure likely to be weak | | N/A |
| | In case of doubt, defect neglected and the group of three blows applied to the same place on a new sample which then withstands the test | | N/A |
| | Detachable and separable batteries subjected to the test free-fall - procedure 1, of IEC 60068-2-31, under the conditions as specified | | N/A |
| | Free-fall test does not damage the battery or cause it to catch fire, leak fluid visible from the outside or explode and meets the requirements of Clause 20, Clause 29, B.22.4 and B.22.5 where short circuit of functional insulation will impair compliance with this standard | | N/A |
| | For batteries using metal-ion chemistry: | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - open circuit voltage of the battery 24 h after the tests not less than 90 % of the voltage measured immediately prior to the tests | | N/A |
| | - cells only vented through their vents | | N/A |
| 22.11 | Non-detachable parts that protect against electric shock, moisture or contact with moving parts reliably are fixed and withstand the mechanical stress occurring during normal use | | N/A |
| | Snap-in devices used for fixing such parts have an obvious locked position | | N/A |
| | Fixing properties of snap-in devices used in parts that are likely to be removed during installation or servicing reliable | | N/A |
| 22.20 | Direct contact between current carrying parts and thermal insulation that would impair compliance with this standard effectively prevented, unless | | N/A |
| | such material is noncorrosive, non-hygroscopic and non-combustible | | N/A |
| | Not applicable to glass-wool thermal insulation | | N/A |
| 22.24 | Not applicable to battery-operated appliances that do not contain parts requiring protection against simultaneous contact according to B.22.3 | | N/A |
| 22.25 | Not applicable to battery-operated appliances that do not contain parts requiring protection against simultaneous contact according to B.22.3 | | N/A |
| 22.26 | This subclause is not applicable | | N/A |
| 22.27 | This subclause is not applicable | | N/A |
| 22.28 | This subclause is not applicable | | N/A |
| 22.29 | This subclause is not applicable | | N/A |
| 22.30 | This subclause is not applicable | | N/A |
| 22.31 | This subclause is not applicable | | N/A |
| 22.32 | This subclause is not applicable | | N/A |
| 22.33 | Conductive liquids that are or may become accessible in normal use and conductive liquids that are in contact with accessible metal parts are not in direct contact with current carrying parts or unearthed metal parts that are separated from current carrying parts by basic insulation only or with other current carrying parts such that compliance with B.22.3 and B.22.4 would be impaired | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 22.34 | This subclause is not applicable | | N/A |
| 22.35 | This subclause is not applicable | | N/A |
| 22.36 | This subclause is not applicable | | N/A |
| 22.37 | This subclause is not applicable | | N/A |
| B.22.1 | User accessible interfaces between elements of a battery system (not mains connections) do not employ appliance couplers according to IEC 60320 (all parts) or IEC 60309-2 | | N/A |
| | User accessible interfaces between elements of a battery system (not mains connections) do not employ connectors of the following types unless the battery system is adequately protected against the use of an incorrect supply: | | N/A |
| | - barrel connectors with outside diameters of 6,5 mm or less | | N/A |
| | - concentric connectors with a diameter of 3,5 mm or less according to IEC 60603-11 | | N/A |
| | Compliance checked by inspection, measurement and for determining adequacy of protection against use of an incorrect supply, by the test as specified | | N/A |
| | Source selected such that its current capability does not limit the charging of the battery | | N/A |
| | During the application of incremental voltages, the appliance is either operating normally or, if not, does not emit flames, molten metal, or poisonous or ignitable gas in hazardous amounts and temperature rises do not exceed the values shown in Table 9 | | N/A |
| | No explosion or ignition of the battery during or after the test | | N/A |
| | Venting of cells permitted through their vents | | N/A |
| B.22.2 | External surfaces of detachable and separable batteries protected against excessive heat from heat sources (directly or via heated discharge air) present during operation of the appliance | | N/A |
| B.22.3 | Battery-operated appliances so constructed and enclosed that there is adequate protection against simultaneous contact with two or more conductive parts where the: | | N/A |
| | - voltage between them exceeds 42,4 V | | N/A |
| | - current between the conductive parts exceeds 2 mA for DC or 0,7 mA peak for when ripple exceeds 10 % | | N/A |
| | Compliance checked with test probe B and test probe 18 of IEC 61032 as described | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Detachable parts except lamps behind a detachable cover removed during the tests with test probe B, however | | N/A |
| | during insertion or removal of lamps located behind a detachable cover, protection against simultaneous contact with parts having a voltage between them exceeding 42,4 V ensured | | N/A |
| | During the tests with test probe 18, appliance fully assembled as in normal use, no parts removed | | N/A |
| | However, test probe 18 not applied to appliances for commercial use, unless | | N/A |
| | intended to be installed in an area open to the public | | N/A |
| | Not possible to touch two or more conductive parts of opposite polarity with the probes if the voltage between them exceeds 42,4 V and the current between them exceeds 2 mA for DC or 0,7 mA peak for when ripple exceeds 10 % | | N/A |
| | Current measured using the circuit in Figure 4 of IEC 60990:2016 | | N/A |
| B.22.4 | Separable and detachable batteries so constructed and enclosed that there is adequate protection against simultaneous contact with two or more conductive parts where the: | | N/A |
| | - voltage between them exceeds 42,4 V | | N/A |
| | - current between the conductive parts exceeds 2 mA | | N/A |
| | Compliance checked with test probe B and test probe 18 of IEC 61032 as described | | N/A |
| | During the tests with: | | N/A |
| | - test probe B, all detachable parts removed | | N/A |
| | - test probe 18, no parts removed | | N/A |
| | However, test probe 18 not applied to appliances for commercial use, unless | | N/A |
| | intended to be installed in an area open to the public | | N/A |
| | Not possible to touch two or more conductive parts of opposite polarity with the probes if the voltage between them exceeds 42,4 V and the current between them exceeds 2 mA | | N/A |
| | Current measured using the circuit in Figure 4 of IEC 60990:2016 | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| B.22.5 | Insulating materials providing protection against simultaneous contact with two or more conductive parts are adequate when: | | N/A |
| | - they are within 1,0 mm of the conductive parts | | N/A |
| | - the voltage between the conductive parts exceeds 42,4 V peak | | N/A |
| | - the current between the conductive parts exceeds 2 mA for DC or 0,7 mA peak for when ripple exceeds 10 % | | N/A |
| | Insulating material subjected to voltage test as specified at 750 V or 1,2 times the working voltage plus 700 V, whichever greater, in accordance with IEC 61180 (V).....: | | N/A |
| | No breakdown during the test | | N/A |
| | Current measured using the circuit in Figure 4 of IEC 60990:2016 | | N/A |
| B.22.6 | Vents of cells not obstructed such that their operation is defeated if venting is relied upon compliance with this standard | | N/A |
| 23.3 | Instead of the electric strength test of 16.3, battery-operated appliances comply with B.22.3 | | N/A |
| 23.5 | For battery-operated appliances compliance is checked by the test of B.22.5 | | N/A |
| 24.1 | Batteries are not required to comply with IEC 62133-1:2017 or IEC 62133-2:2017, they are tested as part of the appliance according to this standard | | N/A |
| 24.1.1 | This subclause is not applicable | | N/A |
| 24.1.3 | Switches in battery-operated appliances have adequate breaking capacity and withstand, without excessive wear or other harmful effect, the mechanical, electrical, and thermal stresses occurring in the battery-operated appliance | | N/A |
| | Tests as described and according to the relevant standard for switches, IEC 61058-1-1:2016 for mechanical switches and IEC 61058-1-2:2016 for electronic switches | | N/A |
| | Required cycles of operation completed, no electrical or mechanical failure | | N/A |
| | At the end of the tests: | | N/A |
| | - switch contacts operating properly in the "on" and "off" positions | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - temperature rise of the switch terminals not increased by more than 30 K above the temperature rise measured in Clause 11 | | N/A |
| B.24.1 | The relevant standards for non-acid based electrolyte cells employed in batteries are IEC 62133-1:2017 for nickel systems and IEC 62133-2:2017 for lithium systems | | N/A |
| | A battery that uses metal-ion chemistry is additionally subjected to the tests of subclauses 7.3.8.1 (vibration) and 7.3.8.2 (mechanical shock) of IEC 62133-2:2017 | | N/A |
| 25.9 | The requirement also applies to interconnection cords of battery-operated appliances | | N/A |
| 25.14 | The requirement also applies to interconnection cords of battery-operated appliances | | N/A |
| 25.15 | The requirement also applies to interconnection cords of battery-operated appliances | | N/A |
| B.25.1 | Insulated conductors of interconnection cords of battery-operated appliances comply with the requirements for internal wiring and are provided with at least 0,5 mm thick outer sheath made of insulating material equivalent to that of supply cords described in 25.7 | | N/A |
| B.26.1 | Terminal devices in an appliance for the connection of the flexible leads or flexible cord connecting a separable battery so located or shielded that there is no risk of incorrect connection | | N/A |
| 27.1 | The battery-operated appliance does not have a provision for a protective earth but may incorporate a functional earth. | | N/A |
| 29.1 | Clearances not less than the values specified in Table 16, taking into account the rated impulse voltage | | N/A |
| | For battery-operated appliances, the rated impulse voltage is 500 V for working voltages less than 50 V and 1 500 V for all other working voltages | | N/A |
| | However, if the construction, including between parts of opposite polarity for connecting the battery, is such that the distances could be affected by wear, by distortion, by movement of the parts or during assembly, the clearances for rated impulse voltages of 1 500 V are increased by 0,5 mm and the impulse voltage test is not applicable | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| B.29.1.1 | For parts requiring protection against simultaneous contact according to B.22.3 and B.22.4, the sum total of the clearances between each of these parts and their nearest accessible surface is not less than two times the Table 16 clearance taking into account the rated impulse voltage | | N/A |
| | For the purpose of this determination, at least one of the clearances is not less than 1,0 mm. | | N/A |
| B.29.2.1 | For parts requiring protection against simultaneous contact according to B.22.3 and B.22.4, the sum total of the creepage distances between each of these parts and their nearest accessible surface is not less than two times the Table 17 creepage distances. | | N/A |
| | For the purpose of this determination, at least one of the creepage distances is not less than 1,0 mm | | N/A |
| 30.1 | External parts of non-metallic material, the deterioration of which might cause the battery-operated appliance, separable battery or detachable battery to fail to comply with this annex, are sufficiently resistant to heat | | N/A |
| **C** | **ANNEX C (NORMATIVE)**<br>**AGEING TEST ON MOTORS** | | - |
| | Tests, as described, carried out when doubt with regard to the temperature classification of the insulation of a motor winding | | N/A |
| | Test conditions as specified. | | N/A |
| **D** | **ANNEX D (NORMATIVE)**<br>**THERMAL MOTOR PROTECTORS** | | - |
| | This annex of Part 1 is not applicable.<br>(IEC 60335-2-40:2024) | | — |
| **E** | **ANNEX E (NORMATIVE)**<br>**NEEDLE-FLAME TEST** | | - |
| | Needle-flame test carried out in accordance with IEC 60695-11-5:2016, with the following modifications: | | N/A |
| 7 | Flame application times | | N/A |
| | The duration of application of the test flame is 30 s ± 1 s | | N/A |
| **9** | **Test procedure** | | N/A |
| 9.2 | The specimen so arranged that the flame can be applied to a vertical or horizontal edge as shown in the examples of Figure 2 | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 9.3 | The first paragraph does not apply | | N/A |
| | If possible, the flame is applied at least 10 mm from a corner | | N/A |
| 9.4 | The test is carried out on one specimen | | N/A |
| | If the specimen does not withstand the test, the test may be repeated on two additional specimens, both withstanding the test | | N/A |
| **11** | **Evaluation of test results** | | N/A |
| | The duration of burning not exceeding 30 s | | N/A |
| | However, for printed circuit boards, the duration of burning not exceeding 15 s | | N/A |
| **F** | **ANNEX F (NORMATIVE) - CAPACITORS** | | - |
| | Capacitors likely to be permanently subjected to the supply voltage, and used for radio interference suppression or voltage dividing, comply with the following clauses of IEC 60384-14:2013 including IEC 60384-14:2013/AMD1:2016, with the following modifications: | | N/A |
| **1.5** | **Terms and definitions** | | N/A |
| 1.5.3 | Class X capacitors tested according to subclass X2 | | N/A |
| 1.5.4 | Class Y capacitors tested according to subclass Y2 | | N/A |
| **1.6** | **Marking** | | N/A |
| | Items a) and b) are applicable | | N/A |
| **3.4** | **Approval testing** | | N/A |
| 3.4.3.2 | Table 3 is applicable as described | | N/A |
| 4.1 | Visual examination and check of dimensions | | N/A |
| | This subclause is applicable | | N/A |
| **4.2** | **Electrical tests** | | N/A |
| 4.2.1 | This subclause is applicable | | N/A |
| 4.2.5 | This subclause is applicable | | N/A |
| 4.2.5.2 | Only Table 11 is applicable | | N/A |
| | Values for test A apply | | N/A |
| | However, for capacitors in heating appliances the values for test B or C apply | | N/A |
| **4.12** | **Damp heat, steady state** | | N/A |
| | This subclause is applicable | | N/A |
| | Only insulation resistance and voltage proof are checked | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| **4.13** | **Impulse voltage** | | N/A |
| | This subclause is applicable | | N/A |
| **4.14** | **Endurance** | | N/A |
| | Subclauses 4.14.1, 4.14.3, 4.14.4 and 4.14.7 are applicable | | N/A |
| 4.14.7 | Only insulation resistance and voltage proof are checked | | N/A |
| | No visible damage | | N/A |
| **4.17** | **Passive flammability test** | | N/A |
| | This subclause is applicable | | N/A |
| **4.18** | **Active flammability test** | | N/A |
| | This subclause is applicable | | N/A |
| **G** | **ANNEX G (NORMATIVE) - SAFETY ISOLATING TRANSFORMERS** | | - |
| | The following modifications to this standard are applicable for safety isolating transformers: | | N/A |
| **7** | **Marking and instructions** | | N/A |
| 7.1 | Transformers for specific use marked with the: | | N/A |
| | - name, trademark or identification mark of the manufacturer or responsible vendor ..... : | | N/A |
| | - model or type reference ..... : | | N/A |
| **17** | **Overload protection of transformers and associated circuits** | | N/A |
| | Fail-safe transformers comply with subclause 15.5 of IEC 61558-1:2017 | | N/A |
| **22** | **Construction** | | N/A |
| | Subclauses 19.1 and 19.1.2 of IEC 61558-2-6:2009 are applicable | | N/A |
| **29** | **Clearances, creepage distances and solid insulation** | | - |
| 29.1, 29.2, 29.3 | The distances specified in Table 20, Table 21 and Table 22 of IEC 61558-1:2017 apply | | N/A |
| | For insulated winding wires complying with subclause 19.12.3 of IEC 61558-1:2017 there are no requirements for clearances or creepage distances | | N/A |
| | For windings providing reinforced insulation, the distances specified in Table 20 and Table 21 of IEC 61558-1:2017 are not assessed | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | For safety isolating transformers subjected to periodic voltages with a frequency exceeding 30 kHz, the clearances, creepage distances and solid insulation values specified in IEC 60664-4:2005 are applicable, if greater than the values specified in Table 20, Table 21 and Table 22 of IEC 61558-1:2017 | | N/A |
| **H** | **ANNEX H (NORMATIVE) - SWITCHES** | | - |
| | Switches comply with the following clauses of IEC 61058-1:2016 and IEC 61058-1-1:2016, as modified below: | | N/A |
| | The tests carried out under the conditions occurring in the appliance | | N/A |
| | Before being tested, switches are operated 20 times without load | | N/A |
| **8** | **Marking and documentation** | | N/A |
| | Switches are not required to be marked | | N/A |
| | However, a switch that can be tested separately from the appliance marked with the manufacturer's name or trademark and the type reference | | N/A |
| **13** | **Mechanism** | | N/A |
| | The tests can be carried out on a separate sample | | N/A |
| 15 | Insulation resistance and dielectric strength | | N/A |
| 15.1 | Not applicable | | N/A |
| 15.2 | Not applicable | | N/A |
| 15.3 | Applicable for full disconnection and micro-disconnection, test carried out immediately after the humidity test of subclause 15.3 of IEC 60335-1 | | N/A |
| **17** | **Endurance** | | N/A |
| | Compliance is checked on three separate appliances or switches | | N/A |
| | For 17.5.4 of IEC 61058-1-1:2016, the number of cycles of actuation declared according to 7.4 is 10 000, unless | | N/A |
| | otherwise specified in 24.1.3 of IEC 60335-1.....: | | N/A |
| | Switches for operation under no load and which can be operated only by a tool, and | | N/A |
| | switches operated by hand that are interlocked so that they cannot be operated under load, | | N/A |
| | are not subjected to the tests | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | However, switches without this interlock are subjected to the test of 17.5.4 of IEC 61058-1-1:2016 for 100 cycles of operation | | N/A |
| | Subclauses 17.3 and 17.6.2 of IEC 61058-1-1:2016 not applicable | | N/A |
| | The ambient temperature during the test is that occurring in the appliance during the test of Clause 11 in IEC 60335-1 | | N/A |
| | The temperature rise of the terminals not more than 30 K above the temperature rise measured in clause 11 of IEC 60335-1 (K) .....: | | N/A |
| **20** | **Clearances, creepage distances, solid insulation and coatings of rigid printed board assemblies** | | N/A |
| | Clause 20 of IEC 61058-1:2016 is applicable to clearances across full disconnection and micro-disconnection | | N/A |
| | It is also applicable to creepage distances for functional insulation, across full disconnection and micro-disconnection, as stated in Table 14 | | N/A |
| **I** | **ANNEX I (NORMATIVE)<br>MOTORS HAVING BASIC INSULATION THAT IS INADEQUATE FOR THE RATED VOLTAGE OF THE APPLIANCE** | | - |
| | This annex of Part 1 is not applicable.<br>(IEC 60335-2-40:2024) | | — |
| **J** | **ANNEX J (NORMATIVE) - COATED PRINTED CIRCUIT BOARDS** | | - |
| | Testing of protective coatings of printed circuit boards carried out in accordance with IEC 60664-3 with the following modifications: | | N/A |
| **5.7** | **Conditioning of the test specimens** | | N/A |
| | When production samples are used, three samples of the printed circuit board are tested. | | N/A |
| **5.7.1** | **Cold** | | N/A |
| | The test is carried out at -25 °C | | N/A |
| **5.7.3** | **Rapid change of temperature** | | N/A |
| | Severity 1 is specified. | | N/A |
| **5.9** | **Additional tests** | | N/A |
| | This subclause is not applicable. | | N/A |
| **N** | **ANNEX N (NORMATIVE) - PROOF TRACKING TEST** | | - |
| **7** | **Test apparatus** | | P |
| **7.3** | **Test solutions** | | P |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Test solution A is used | | P |
| **10** | **Determination of proof tracking index (PTI)** | | P |
| **10.1** | **Procedure** | | P |
| | Proof voltage of 100 V, 175 V, 400 V or 600 V .....: | | P |
| | The test is carried out on five specimens | | P |
| | In case of doubt, additional test with proof voltage reduced by 25 V, the number of drops increased to 100 | | P |
| **10.2** | **Report** | | N/A |
| | The report states if the PTI value was based on a test using 100 drops with a test voltage of (PTI-25) V | | N/A |
| **R** | **ANNEX R (NORMATIVE) - SOFTWARE EVALUATION** | | - |
| | Programmable electronic circuits requiring software incorporating measures to control the fault/error conditions specified in Table R.1 or R.2 validated in accordance with the requirements of this annex | | N/A |
| **R.1** | **Programmable electronic circuits using software** | | N/A |
| | Programmable electronic circuits requiring software incorporating measures to control the fault/error conditions specified in Table R.1 or R.2 constructed so that the software does not impair compliance with the requirements of this standard | | N/A |
| **R.2** | **Requirements for the architecture** | | N/A |
| **R.2.1** | **General** | | N/A |
| R.2.1.1 | Programmable electronic circuits requiring software incorporating measures to control the fault/error conditions specified in Table R.1 or R.2 use measures to control and avoid software-related faults/errors in safety-related data and safety-related segments of the software | | N/A |
| R.2.1.2 | Programmable electronic circuits requiring software incorporating measures to control the fault/error conditions specified in Table R.2 have one of the following structures: | | N/A |
| | - single channel with periodic self-test and monitoring | | N/A |
| | - dual channel (homogenous) with comparison | | N/A |
| | - dual channel (diverse) with comparison | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Programmable electronic circuits requiring software incorporating measures to control the fault/error conditions specified in Table R.1 have one of the following structures: | | N/A |
| | - single channel with functional test | | N/A |
| | - single channel with periodic self-test | | N/A |
| | - dual channel without comparison | | N/A |
| **R.2.2** | **Measures to control faults/errors** | | N/A |
| R.2.2.1 | When redundant memory with comparison is provided on two areas of the same component, the data in one area is stored in a different format from that in the other area | | N/A |
| R.2.2.2 | Programmable electronic circuits with functions requiring software incorporating measures to control the fault/error conditions specified in Table R.2 and that use dual channel structures with comparison, have additional fault/error detection means for any fault/errors not detected by the comparison | | N/A |
| R.2.2.3 | For programmable electronic circuits with functions requiring software incorporating measures to control the fault/error conditions specified in Table R.1 or R.2, means are provided for the recognition and control of errors in transmissions to external safety-related data paths | | N/A |
| R.2.2.4 | For programmable electronic circuits with functions requiring software incorporating measures to control the fault/error conditions specified in Table R.1 or R.2, the programmable electronic circuits incorporate measures to address the fault/errors in safety-related segments and data indicated in Table R.1 and R.2 as appropriate | | N/A |
| R.2.2.5 | For programmable electronic circuits with functions requiring software incorporating measures to control the fault/error conditions specified in Table R.1 or R.2, detection of a fault/error occurs before compliance with clause 19 is impaired | | N/A |
| | For appliances intended for remote communication through public networks, where normative Annex U is applicable as determined by 22.62, detection of a fault/error occurs before compliance with normative Annex U is impaired | | N/A |
| R.2.2.6 | The software is referenced to relevant parts of the operating sequence and the associated hardware functions | | N/A |
| R.2.2.7 | Labels used for memory locations are unique | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| R.2.2.8 | The software is protected from user alteration of safety-related segments and data | | N/A |
| R.2.2.9 | Software and safety-related hardware under its control is initialized and terminates before compliance with clause 19 is impaired | | N/A |
| | For appliances intended for remote communication through public networks where normative Annex U is applicable as determined by 22.62, the software and safety-related hardware under its control is initialized and terminates before compliance with normative Annex U is impaired | | N/A |
| **R.3** | **Measures to avoid errors** | | N/A |
| **R.3.1** | **General** | | N/A |
| | For programmable electronic circuits with functions requiring software incorporating measures to control the fault/error conditions specified in Table R.1 or R.2, the following measures to avoid systematic faults in the software are applied | | N/A |
| | Software that incorporates measures used to control the fault/error conditions specified in Table R.2 is inherently acceptable for software required to control the fault/error conditions specified in Table R.1 | | N/A |
| **R.3.2** | **Specification** | | N/A |
| R.3.2.1 | Software safety requirements: | Software Id: | N/A |
| | The specification of the software safety requirements includes the descriptions listed | | N/A |
| **R.3.2.2** | **Software architecture** | | N/A |
| R.3.2.2.1 | The specification of the software architecture includes the aspects listed<br>- techniques and measures to control software faults/errors (refer to R.2.2);<br>- interactions between hardware and software;<br>- partitioning into modules and their allocation to the specified safety functions;<br>- hierarchy and call structure of the modules (control flow);<br>- interrupt handling;<br>- data flow and restrictions on data access;<br>- architecture and storage of data;<br>- time-based dependencies of sequences and data | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| R.3.2.2.2 | The architecture specification is validated against the specification of the software safety requirements by static analysis | | N/A |
| **R.3.2.3** | **Module design and coding** | | N/A |
| R.3.2.3.1 | Based on the architecture design, software is suitably refined into modules | | N/A |
| | Software module design and coding is implemented in a way that is traceable to the software architecture and requirements | | N/A |
| | The module design specifies: | | N/A |
| | - function(s) | | N/A |
| | - interfaces to other modules | | N/A |
| | - data | | N/A |
| R.3.2.3.2 | Software code is structured | | N/A |
| R.3.2.3.3 | Coded software is validated against the module specification by static analysis | | N/A |
| | The module specification is validated against the architecture specification by static analysis | | N/A |
| **R.3.3** | **Software validation** | | N/A |
| | The software is validated with reference to the requirements of the software safety requirements specification | | N/A |
| | Compliance is checked by simulation of: | | N/A |
| | - input signals present during normal operation | | N/A |
| | - anticipated occurrences | | N/A |
| | - undesired conditions requiring system action | | N/A |
| **R.3.4** | **Management items** | | N/A |
| **R.3.4.1** | **Management of software versions** | | N/A |
| | A software version management system at the module level is put in place | | N/A |
| **R.3.4.2** | **Software modification** | | N/A |
| R.3.4.2.1 | Software modifications are based on a modification request which details the following: | | N/A |
| | - the hazards which may be affected | | N/A |
| | - the proposed change | | N/A |
| | - the reasons for change | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| R.3.4.2.2 | An analysis is carried out to determine the impact of the proposed modification on functional safety | | N/A |
| R.3.4.2.3 | A detailed specification for the modification is generated including the necessary activities for verification and validation, such as a definition of suitable test cases | | N/A |
| R.3.4.2.4 | The modification is carried out as planned | | N/A |
| R.3.4.2.5 | The assessment of the modification is carried out based on the specified verification and validation activities, which may include: | | N/A |
| | - a reverification of changed software modules | | N/A |
| | - a reverification of affected software modules | | N/A |
| | - a revalidation of the complete system | | N/A |
| | All details of modification activities are documented | | N/A |
| R.3.4.2.6 | - a reverification of changed software modules | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

**TABLE R.1 – GENERAL FAULT/ERROR CONDITIONS**

| Component [a] | Fault/error | Acceptable measures [b, c] | Definitions | Document reference for applied measure | Document reference for applied test | Ver-dict |
|---|---|---|---|---|---|---|
| 1 CPU<br>1.1 Registers | Stuck at | Functional test, or<br>periodic self-test using either:<br>– static memory test, or<br>– word protection with single bit redundancy | H.2.16.5<br>H.2.16.6<br>H.2.19.6<br>H.2.19.8.2 | | | N/A |
| 1.2 VOID | | | | | | N/A |
| 1.3 Programme counter | Stuck at | Functional test, or<br>periodic self-test, or<br>independent time-slot monitoring, or<br>logical monitoring of the programme sequence | H.2.16.5<br>H.2.16.6<br>H.2.18.10.4<br>H.2.18.10.2 | | | N/A |
| 2 Interrupt handling and execution | No interrupt or too frequent interrupt | Functional test, or<br>time-slot monitoring | H.2.16.5<br>H.2.18.10.4 | | | N/A |
| 3 Clock | Wrong frequency (for quartz synchronized clock: harmonics/ sub-harmonics only) | Frequency monitoring, or<br>time slot monitoring | H.2.18.10.1<br>H.2.18.10.4 | | | N/A |
| 4 Memory<br>4.1 Invariable memory | All single bit faults | Periodic modified checksum, or<br>multiple checksum, or<br>word protection with single bit redundancy | H.2.19.3.1<br>H.2.19.3.2<br>H.2.19.8.2 | | | N/A |
| 4.2 Variable memory | DC fault | Periodic static memory test, or<br>Word protection with single bit redundancy | H.2.19.6<br>H.2.19.8.2 | | | N/A |

| IEC 60335-2-40 | | | | | | |
|---|---|---|---|---|---|---|
| Clause | Requirement + Test | | Result - Remark | | | Verdict |
| 4.3 Addressing (relevant to variable and invariable memory) | Stuck at | Word protection with single bit redundancy including the address | H.2.19.8.2 | | | N/A |
| 5 Internal data path | Stuck at | Word protection with single bit redundancy | H.2.19.8.2 | | | N/A |
| 5.1 VOID | | | | | | N/A |
| 5.2 Addressing | Wrong address | Word protection with single bit redundancy including the address | H.2.19.8.2 | | | N/A |
| 6 External communication | | | | | | N/A |
| 6.1 Data | Data corruption of up to Hamming distance 3 | Word protection with multi-bit redundancy, or<br>CRC – single word, or<br>transfer redundancy, or<br>protocol test | H.2.19.8.1<br>H.2.19.4.1<br>H.2.18.2.2<br>H.2.18.14 | | | |
| 6.2 Addressing | Wrong address | Word protection with multi-bit redundancy including the address, or<br>CRC – single word including the address, or<br>transfer redundancy, or<br>protocol test | H.2.19.8.1<br>H.2.19.4.1<br>H.2.18.2.2<br>H.2.18.14 | | | N/A |
| 6.3 Timing | Wrong point in time<br>Wrong sequence | Time-slot monitoring, or<br>scheduled transmission<br>Logical monitoring, or<br>time-slot monitoring, or<br>scheduled transmission | H.2.18.10.4<br>H.2.18.18<br>H.2.18.10.2<br>H.2.18.10.4<br>H.2.18.18 | | | N/A |
| 7 Input/output periphery | Fault conditions specified in 19.11.2 | Plausibility check | H.2.18.13 | | | N/A |
| 7.1 VOID | | | | | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | | | | | | |
|---|---|---|---|---|---|---|
| 7.2<br>Analog I/O<br>7.2.1<br>A/D and D/A converter | Fault conditions specified in 19.11.2 | Plausibility check | H.2.18.13 | | | N/A |
| 7.2.2<br>Analog multiplexer | Wrong addressing | Plausibility check | H.2.18.13 | | | N/A |
| 8 VOID | | | | | | N/A |
| 9 Custom chips [d] e.g. ASIC, GAL, gate array | Any output outside the static and dynamic functional specification | Periodic self-test | H.2.16.6 | | | N/A |
| NOTE A Stuck-at fault model denotes a fault model representing an open circuit or a non-varying signal level. A DC fault model denotes a stuck-at fault model incorporating short circuits between signal lines. | | | | | | |

[a] For fault/error assessment, some components are divided into their sub-functions.
[b] For each sub-function in the table, the Table R.2 measure will cover the software fault/error.
[c] Where more than one measure is given for a sub-function, these are alternatives.
[d] To be divided as necessary by the manufacturer into sub-functions.

**TABLE R.2 – SPECIFIC FAULT/ERROR CONDITIONS**

| Component [a] | Fault/error | Acceptable measures [b, c] | Definitions | Document reference for applied measure | Document reference for applied test | Ver-dict |
|---|---|---|---|---|---|---|

| IEC 60335-2-40 | | | | | | |
|---|---|---|---|---|---|---|
| Clause | Requirement + Test | | Result - Remark | | | Verdict |
| 1 CPU | | | | | | N/A |
| 1.1 Registers | DC fault | Comparison of redundant CPUs by either: | | | | |
| | | – reciprocal comparison | H.2.18.15 | | | |
| | | – independent hardware comparator, or | H.2.18.3 | | | |
| | | internal error detection, or | H.2.18.9 | | | |
| | | redundant memory with comparison, or | H.2.19.5 | | | |
| | | periodic self-tests using either | | | | |
| | | – walkpat memory test | H.2.19.7 | | | |
| | | – Abraham test | H.2.19.1 | | | |
| | | – Transparent GALPAT test; or | H.2.19.2.1 | | | |
| | | word protection with multi-bit redundancy, or | H.2.19.8.1 | | | |
| | | static memory test and | H.2.19.6 | | | |
| | | word protection with single bit redundancy | H.2.19.8.2 | | | |
| 1.2 Instruction decoding and execution | Wrong decoding and execution | Comparison of redundant CPUs by either: | | | | N/A |
| | | – reciprocal comparison | H.2.18.15 | | | |
| | | – independent hardware comparator, or | H.2.18.3 | | | |
| | | internal error detection, or | H.2.18.9 | | | |
| | | periodic self-test using equivalence class test | H.2.18.5 | | | |
| 1.3 Programme counter | DC fault | Periodic self-test and monitoring using either: | H.2.16.7 | | | N/A |
| | | – independent time-slot and logical monitoring | H.2.18.10.3 | | | |
| | | – internal error detection, or | H.2.18.9 | | | |
| | | comparison of redundant functional channels by either: | | | | |
| | | – reciprocal comparison | H.2.18.15 | | | |
| | | – independent hardware comparator | H.2.18.3 | | | |

| IEC 60335-2-40 | | | | | | |
|---|---|---|---|---|---|---|
| Clause | Requirement + Test | | Result - Remark | | | Verdict |
| 1.4 Addressing | DC fault | Comparison of redundant CPUs by either:<br>– reciprocal comparison<br>– independent hardware comparator; or<br>internal error detection; or<br>periodic self-test using<br>– a testing pattern of the address lines; or<br>– a full bus redundancy<br>– a multi bus parity including the address | <br>H.2.18.15<br>H.2.18.3<br>H.2.18.9<br>H.2.16.7<br>H.2.18.22<br>H.2.18.1.1<br>H.2.18.1.2 | | | N/A |
| 1.5 Data paths instruction decoding | DC fault and execution | Comparison of redundant CPUs by either:<br>– reciprocal comparison, or<br>– independent hardware comparator, or<br>– internal error detection, or<br>– periodic self-test using a testing pattern, or<br>– data redundancy, or<br>– multi-bit bus parity | <br>H.2.18.15<br>H.2.18.3<br>H.2.18.9<br>H.2.16.7<br>H.2.18.2.1<br>H.2.18.1.2 | | | N/A |
| 2 Interrupt handling and execution | No interrupt or too frequent interrupt related to different sources | Comparison of redundant functional channels by either<br>– reciprocal comparison,<br>– independent hardware comparator, or<br>– independent time-slot and logical monitoring | <br>H.2.18.15<br>H.2.18.3<br>H.2.18.10.3 | | | N/A |
| 3 Clock | Wrong frequency (for quartz synchronized clock: harmonics/ sub-harmonics only) | Frequency monitoring, or<br>time-slot monitoring, or<br>comparison of redundant functional channels by either:<br>– reciprocal comparison<br>– independent hardware comparator | H.2.18.10.1<br>H.2.18.10.4<br><br>H.2.18.15<br>H.2.18.3 | | | N/A |

| IEC 60335-2-40 | | | | | | |
|---|---|---|---|---|---|---|
| Clause | Requirement + Test | | Result - Remark | | | Verdict |
| 4 Memory | | | | | | N/A |
| 4.1 Invariable memory | 99,6 % coverage of all information errors | Comparison of redundant CPUs by either:<br>– reciprocal comparison<br>– independent hardware comparator, or<br>redundant memory with comparison, or<br>periodic cyclic redundancy check, either<br>– single word<br>– double word, or<br>word protection with multi-bit redundancy | <br>H.2.18.15<br>H.2.18.3<br>H.2.19.5<br><br>H.2.19.4.1<br>H.2.19.4.2<br>H.2.19.8.1 | | | |
| 4.2 Variable memory | DC fault and dynamic cross links | Comparison of redundant CPUs by either:<br>– reciprocal comparison<br>– independent hardware comparator, or<br>redundant memory with comparison, or<br>periodic self-tests using either:<br>– walkpat memory test<br>– Abraham test<br>– transparent GALPAT test, or<br>word protection with multi-bit redundancy | <br>H.2.18.15<br>H.2.18.3<br>H.2.19.5<br><br>H.2.19.7<br>H.2.19.1<br>H.2.19.2.1<br>H.2.19.8.1 | | | N/A |
| 4.3 Addressing (relevant to variable and invariable memory) | DC fault | Comparison of redundant CPUs by either:<br>– reciprocal comparison, or<br>– independent hardware comparator, or<br>full bus redundancy<br>testing pattern, or<br>periodic cyclic redundancy check, either:<br>– single word<br>– double word, or<br>word protection with multi-bit redundancy including the address | <br>H.2.18.15<br>H.2.18.3<br>H.2.18.1.1<br>H.2.18.22<br><br>H.2.19.4.1<br>H.2.19.4.2<br>H.2.19.8.1 | | | N/A |

| IEC 60335-2-40 | | | | | | |
|---|---|---|---|---|---|---|
| Clause | Requirement + Test | | | Result - Remark | | Verdict |
| 5 Internal data path | | | | | | N/A |
| 5.1 Data | DC fault | Comparison of redundant CPUs by either | | | | |
| | | – reciprocal comparison | H.2.18.15 | | | |
| | | – independent hardware comparator, or | H.2.18.3 | | | |
| | | word protection with multi-bit redundancy | H.2.19.8.1 | | | |
| | | including the address, or data redundancy, or | H.2.18.2.1 | | | |
| | | testing pattern, or | H.2.18.22 | | | |
| | | protocol test | H.2.18.14 | | | |
| 5.2 Addressing | Wrong address and multiple addressing | Comparison of redundant CPUs by: | | | | N/A |
| | | – reciprocal comparison | H.2.18.15 | | | |
| | | – independent hardware comparator, or | H.2.18.3 | | | |
| | | word protection with multi-bit redundancy, including the address, or | H.2.19.8.1 | | | |
| | | full bus redundancy; or | H.2.18.1.1 | | | |
| | | testing pattern including the address | H.2.18.22 | | | |
| 6 External communication | | | | | | N/A |
| 6.1 Data | Data corruption of up to Hamming distance 4 | CRC – double word, or | H.2.19.4.2 | | | |
| | | data redundancy or | H.2.18.2.1 | | | |
| | | comparison of redundant functional channels by either | | | | |
| | | – reciprocal comparison; or | H.2.18.15 | | | |
| | | – independent hardware comparator | H.2.18.3 | | | |

| IEC 60335-2-40 | | | | | | |
|---|---|---|---|---|---|---|
| Clause | Requirement + Test | | Result - Remark | | | Verdict |
| 6.2 Addressing | Wrong address and multiple addressing | CRC – double word, including the address, or<br>full bus redundancy of data and address, or<br>comparison of redundant communication channels by either:<br>– reciprocal comparison; or<br>– independent hardware comparator | H.2.19.4.2<br>H.2.18.1.1<br><br><br>H.2.18.15<br>H.2.18.3 | | | N/A |
| 6.3 Timing | Wrong point in time | Time-slot and logical monitoring, or<br>comparison of redundant communication channels by either:<br>– reciprocal comparison; or<br>– independent hardware comparator | H.2.18.10.3<br><br><br>H.2.18.15<br>H.2.18.3 | | | N/A |
| | Wrong sequence | Time-slot and logical monitoring, or<br>comparison of redundant communication channels by either:<br>– reciprocal comparison; or<br>– independent hardware comparator | H.2.18.10.3<br><br><br>H.2.18.15<br>H.2.18.3 | | | |
| 7 Input/output periphery<br>7.1 Digital I/O | Fault conditions specified in 19.11.2 | Comparison of redundant CPUs by either:<br>– reciprocal comparison<br>– independent hardware comparator, or<br>input comparison, or<br>multiple parallel outputs, or<br>output verification, or<br>testing pattern, or<br>code safety | <br><br>H.2.18.15<br>H.2.18.3<br><br>H.2.18.8<br>H.2.18.11<br>H.2.18.12<br>H.2.18.22<br>H.2.18.2 | | | N/A |

| IEC 60335-2-40 | | | | | | |
|---|---|---|---|---|---|---|
| Clause | Requirement + Test | | Result - Remark | | | Verdict |
| 7.2<br>Analog I/O<br>7.2.1<br>A/D and D/A converter | Fault conditions in 19.11.2 | Comparison of redundant CPUs by either:<br>– reciprocal comparison<br>– independent hardware comparator, or<br>input comparison, or<br>multiple parallel outputs, or<br>output verification, or<br>testing pattern | <br>H.2.18.15<br>H.2.18.3<br>H.2.18.8<br>H.2.18.11<br>H.2.18.12<br>H.2.18.22 | | | N/A |
| 7.2.2<br>Analog multiplexer | Wrong addressing | Comparison of redundant CPUs by either:<br>– reciprocal comparison<br>– independent hardware comparator, or<br>input comparison or<br>testing pattern | <br>H.2.18.15<br>H.2.18.3<br>H.2.18.8<br>H.2.18.22 | | | N/A |
| 8 Monitoring devices and comparators | Any output outside the static and dynamic functional specification | Tested monitoring, or<br>redundant monitoring and comparison, or<br>error recognizing means | H.2.18.21<br>H.2.18.17<br>H.2.18.6 | | | N/A |
| 9 Custom chips [d] e.g. ASIC, GAL, gate array | Any output outside the static and dynamic functional specification | Periodic self-test and monitoring,<br>dual channel (diverse) with comparison, or<br>error recognizing means | H.2.16.7<br>H.2.16.2<br>H.2.18.6 | | | N/A |
| NOTE A DC fault model denotes a stuck-at fault model incorporating short circuits between signal lines. | | | | | | |
| [a] For fault/error assessment, some components are divided into their sub-functions.<br>[b] For each sub-function in the table, the software measure will cover the Table R.1 fault/error.<br>[c] Where more than one measure is given for a sub-function, these are alternatives.<br>[d] To be divided as necessary by the manufacturer into sub-functions. | | | | | | |

| **T** | **ANNEX T (NORMATIVE)**<br>**UV-C RADIATION EFFECT ON NON-METALLIC MATERIALS** | - |
|---|---|---|

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | This annex provides requirements for non-metallic materials subject to direct or reflected UV-C radiation (100 nm to 280 nm) exposure and whose mechanical and electrical properties are relied upon for compliance with this standard | | N/A |
| | This annex does not apply to glass, ceramic and similar materials | | N/A |
| | The conditioning and tests are carried out on non-metallic material specimens prepared according to the relevant standard for the test method | | N/A |
| | The conditioning apparatus and test procedure are as specified in ISO 4892-1 and ISO 4892-2 | | N/A |
| | **Modifications to the clauses of ISO 4892-1:2016:** | | N/A |
| **5.1** | **Irradiance** | | N/A |
| 5.1.1 | The UV-C emitter is a low pressure mercury lamp with a quartz envelope having a continuous spectral irradiance of 10 W/m$^2$ at 254 nm | | N/A |
| **5.2** | **Temperature** | | N/A |
| 5.2.5 | The black-panel temperature is 63 °C ± 3 °C | | N/A |
| **5.3** | **Humidity and wetting** | | N/A |
| 5.3.1 | Humidification of the chamber air is specified in part 2 when necessary | | N/A |
| **9** | **Test report** | | N/A |
| | This clause is not applicable | | N/A |
| | **Modifications to the clauses of ISO 4892-2:2013:** | | N/A |
| **7** | **Procedure** | | N/A |
| **7.1** | **General** | | N/A |
| | At least three test specimens of each non-metallic material providing mechanical support or impact resistance are exposed in each run | | N/A |
| | Ten samples of the insulated internal wiring are exposed in each run | | N/A |
| | When the internal wiring is provided in more than one colour, the colour having the heaviest organic pigment loading is used | | N/A |
| **7.2** | **Mounting the test specimens** | | N/A |
| | The specimens are attached to the specimen holders such that they are not subject to any applied stress | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| **7.3** | **Exposure** | | N/A |
| | Before placing the specimens in the test chamber, the apparatus is operating under the specified exposure conditions and programmed to operate continuously, conditions are maintained throughout the exposure | | N/A |
| **7.4** | **Measurement of radiant exposure** | | N/A |
| | If used, a radiometer is mounted and calibrated such that it measures the irradiance at the exposed surface of the test specimen | | N/A |
| 7.5 | Determination of changes in properties after exposure | | N/A |
| | The non-metallic material properties and test methods for parts providing mechanical support or impact resistance are specified in Table T.1 | | N/A |
| | The non-metallic material properties and test method for electrical insulation of internal wiring are specified in Table T.2 | | N/A |
| **8** | **Exposure report** | | N/A |
| | This clause is not applicable. | | N/A |
| **U** | **ANNEX U (NORMATIVE)<br>APPLIANCES INTENDED FOR REMOTE COMMUNICATION THROUGH PUBLIC NETWORKS** | | - |
| | The measures given in this annex are intended to avoid unauthorized access and the effects of transmission failures via remote communication through public networks, where compliance with this standard could be impaired | | N/A |
| | However, in general, it does not cover aspects concerning confidentiality of data and consumer privacy | | N/A |
| **U.1** | **Terms and definitions** | | N/A |
| **U.1.1** | **Definitions relating to remote functionality** | | N/A |
| | Definitions used in this appendix as described | | N/A |
| **U.2** | **Marking and instructions** | | N/A |
| U.2.1 | If there is provision for software download, instructions are provided on how or where to obtain the unique name or code given by the manufacturer, that identifies the current version of the software running in the appliance | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | The instructions also include the necessary steps the user must follow for the software update procedure | | N/A |
| **U.3** | **Construction** | | N/A |
| U.3.1 | Software enabling communication with a public network is partitioned into modules separate from software which is necessary to comply with the other requirements of this standard | | N/A |
| U.3.2 | Remote communication is established, implemented and terminated by the appliance via software that provides: | | N/A |
| | - data integrity protection concerning: | | N/A |
| | data corruption | | N/A |
| | address corruption | | N/A |
| | wrong timing or sequence | | N/A |
| | permanent "auto-sending" or repetition | | N/A |
| | interruption of data transfer | | N/A |
| | - means to detect and respond to communication in which, for any reason, a message being communicated is incomplete, truncated, contains errors or has the correct format but delivers information that is outside the range expected for that type of message | | N/A |
| | - means to detect and respond to communication in which, for any reason, a message being communicated is incomplete, truncated, contains errors or has the correct format but delivers information that is outside the range expected for that type of message | | N/A |
| | - measures to control the fault/error conditions specified in Table R.1 | | N/A |
| U.3.3 | Measures provided to protect against hazards arising from the reception of messages from several sources simultaneously or sequentially | | N/A |
| U.3.4 | Remote communication is not enabled prior to authorization | | N/A |
| | Authorization is based on authentication using cryptographic techniques to ensure the identity of both parties | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | For the purposes of this requirement, communication between two entities for preparation of the authentication and authorization process is not considered remote communication | | N/A |
| U.3.5 | Measures are taken to prevent unauthorized access and to detect transmission faults/errors in the remote communication | | N/A |
| U.3.6 | The safe operation of an appliance does not depend on remote communication | | N/A |
| | In case of doubt, remote communication rendered inoperative for the relevant tests of this standard | | N/A |
| U.3.7 | Cryptographic techniques are implemented to provide data integrity protection once authorization for remote communication is established | | N/A |
| | Cryptographic techniques employed are part of the appliance including its accessories, do not rely upon part of the router or similar data transmission device, and are performed prior to transmission | | N/A |
| U.3.8 | Provisions are taken to ensure that software updates provided by the manufacturer and transmitted to the appliance via remote communication are verified prior to its installation: | | N/A |
| | - against corruption through communication | | N/A |
| | - that the software version is compatible with the appliance for which the software version was designed | | N/A |
| | The software which performs the above-mentioned checks contains measures to control the fault/error conditions specified in Table R.1 | | N/A |
| U.3.9 | Permission for each installation of software in the appliance is given by the person responsible for the appliance | | N/A |
| | User activation of a mode that enables automatic software updates is permitted | | N/A |
| U.3.10 | The installation of software does not impair compliance with the requirements of this standard during or after installation | | N/A |
| **DD** | **ANNEX DD (NORMATIVE) - REQUIREMENTS FOR INSTALLATION, SERVICE, MAINTENANCE AND REPAIR, AND DECOMMISSIONING MANUALS OF APPLIANCES USING FLAMMABLE REFRIGERANTS** (IEC 60335-2-40:2024) | | - |
| **DD.1** | **General** | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Each manual include requirements of clauses according to Table DD.1. Different manuals can be combined into one manual. | | N/A |
| | Numerical values needed for proper installation, service, maintenance, and repair, and decommissioning in the form of a single figure or a table without reference to a formula. | | N/A |
| | For factory sealed single package units, the installation manual does not need to include material from DD.4.8 and Clause DD.9. | | N/A |
| **DD.2** | **Symbols** | | N/A |
| | The symbols referred to in 7.6 (without colours is permitted) and the information of the warning marking shall be provided as follows: | | N/A |
| | WARNING<br>Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer. | | N/A |
| | The appliance shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater. | | N/A |
| | Do not pierce or burn. | | N/A |
| | Be aware that refrigerants may not contain an odour. | | N/A |
| | The manufacturer may provide other suitable examples or may provide additional information about the refrigerant odour. | | N/A |
| **DD.3** | **Information in manual** | | N/A |
| **DD.3.1** | **General** | | N/A |
| | The following information specified in the manual where the information is needed for the function of the manual and as applicable to the appliance: | | N/A |
| | 1) information for spaces where field-installed refrigerant pipes are allowed, including statements | | N/A |
| | a) that the installation of pipe-work shall be kept to a minimum; | | N/A |
| | b) that pipe-work securely mounted and guarded from physical damage; | | N/A |
| | c) that pipe-work not be installed in an unventilated space, if that space is smaller than Amin in Annex GG, except for A2L refrigerants where installed pipe-work has no connecting joints or is connected with at least one of the following: | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | i) joints in compliance with ISO 14903, | | N/A |
| | ii) joints in enclosures which vent to the unit or to the outside, | | N/A |
| | iii) joints in enclosures which vent to a room with a room area of at least Amin as specified in GG.2.1; | | N/A |
| | d) that compliance with national gas regulations observed; | | N/A |
| | e) that mechanical connections made in accordance with 22.118 accessible for maintenance purposes; | | N/A |
| | 2) where addition of charge is required to complete installation, instructions on how to determine the additional refrigerant charge and how to complete the refrigerant charge on the label provided by the manufacturer considering the requirements in 7.107. Interconnecting refrigerant piping length and diameter taken into consideration; | | N/A |
| | 3) where safety shut-off valves are installed, instructions on how to determine the releasable charge, mrl. Safety shut-off valve location and refrigerant piping volume between safety shut-off valve and the indoor unit taken into consideration; | | N/A |
| | 4) detailed instructions on how to correctly install the appliance including piping and safety shut-off valves for every space in which refrigerant can leak into, where applicable. | | N/A |
| | a) minimum room area, Amin, or minimum room area of conditioned space TAmin, as a function of the refrigerant charge, mc, or as a function of the releasable charge, mrl. If the releasable charge, mrl, has been used, a warning that the minimum room area or minimum room area of conditioned space is based on releasable charge and is not related to total system refrigerant charge; | | N/A |
| | b) refrigerant charge, mc, and, if the releasable charge, mrl, has been determined, the releasable charge, mrl. The effect on refrigerant charge shall be considered from field-installed piping, field charging, or both, if applicable; | | N/A |
| | c) required installed height, hinst; | | N/A |
| | d) minimum ventilation airflow volume Qmin; | | N/A |
| | e) minimum opening area for natural ventilation Anv,min | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Additional minimum room area data may be provided based on other installed heights and/or charge levels; | | N/A |
| | 5) information for handling, installation, cleaning, servicing and disposal; | | N/A |
| | 6) for appliances intended for use at altitudes 2 000 m and above, the instructions shall include how to adjust minimum room area, Amin, and minimum room area of conditioned space, TAmin, as applicable from Annex GG, based on the building site ground level altitude; | | N/A |
| | 7) a warning to keep any required ventilation openings clear of obstruction | | N/A |
| | 8) a notice that servicing performed only as recommended by the manufacturer; | | N/A |
| | 9) a warning that ducts connected to an appliance not contain a potential ignition source; | | N/A |
| | 10) instructions for wiring to external zoning dampers and/or mechanical ventilation, if required to comply with Clause GG.9, to ensure that upon detection of a leak, the zoning dampers are driven fully open and additional mechanical ventilation is activated; | | N/A |
| | 11) for mechanical ventilation as specified in GG.8.3 or for enhanced tightness refrigerating systems GG.11.3, information on installation of the mechanical ventilation air extracted and air intake openings per GG.8.3.3 or for enhanced tightness refrigerating systems GG.11.3.3; | | N/A |
| | 12) for appliances relying on safety measures according to GG.8.3 or for enhanced tightness refrigerating systems GG.11.3, instructions for wiring to mechanical ventilation; | | N/A |
| | 13) for appliances using a remote located refrigerant sensor, how and where to install and connect the refrigerant sensor in compli | | N/A |
| | 14) when a remote located refrigerant sensor is specified by the manufacturer, the instructions state the recommended periodic service and maintenance procedures; | | N/A |
| | 15) when a limited life refrigerant sensor is employed, the life of the refrigerant sensor and instruction on how to replace it; | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | 16) for appliances using A2L refrigerants, connected via an air duct system to one or more rooms, the supply and return air directly ducted to the space. Open areas such as false ceilings not be used as a return air duct; | | N/A |
| | 17) a warning that precautions taken to avoid excessive vibration or pulsation to refrigerating piping; | | N/A |
| | 18) a warning that protection devices, piping and fittings shall be protected as far as possible against adverse environmental effects, for example the danger of water collecting and freezing in relief pipes or the accumulation of dirt and debris; | | N/A |
| | 19) a warning that provision made for expansion and contraction of long runs of piping; | | N/A |
| | 20) a warning that piping in refrigerating systems so designed and installed as to minimize the likelihood of hydraulic shock damaging the system; | | N/A |
| | 21) a warning that solenoid valves correctly positioned in the piping to avoid hydraulic shock and not block in liquid refrigerant unless adequate relief is provided; | | N/A |
| | 22) a warning that steel pipes and components protected against corrosion with a rustproof coating before applying any insulation; | | N/A |
| | 23) where field installed safety shut-off valves are specified for refrigerating systems, a warning that only safety shut-off valves specified by the appliance manufacturer used; | | N/A |
| | 24) where safety shut-off valves are to be field installed, information on where and how the safety shut-off valves shall be installed; | | N/A |
| | 25) information that safety shut-off valves only be replaced with valves specified by the appliance manufacturer; | | N/A |
| | 26) field-made refrigerant joints indoors shall be tightness tested. The test method have a sensitivity of 5 grams per year of refrigerant or better under a pressure of at least 0,25 times the maximum allowable pressure. No leak detected; | | N/A |
| | 27) where remote refrigerant detection systems are specified, a warning that only refrigerant sensors specified by the appliance manufacturer used; | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | 28) information that the refrigerant detection system refrigerant sensorsl only be replaced with refrigerant sensors specified by the appliance manufacturer; | | N/A |
| | 29) for appliances with a leak detection system, safety shut-off valves not be reset until the room has been ventilated, because resetting can result in additional flammable refrigerant released into the space; | | N/A |
| | 30) electrical components that can arc or spark, which are not considered ignition sources due to compliance with 22.116.1 points b), c), d), or f) only be replaced with parts specified by the appliance manufacturer. Replacement with other parts may result in the ignition of refrigerant in the event of a leak; | | N/A |
| | 31) Where openings according to GG.1.4 are applied, information that these openings not be blocked. | | N/A |
| **DD.3.2** | **Unventilated areas** | | N/A |
| | For appliances containing more than m1 for any refrigerating circuit, the manual shall include a statement advising that an unventilated area where the appliance is installed so constructed that should any refrigerant leak, it will not stagnate so as to create a fire or explosion hazard. This shall include: | | N/A |
| | - for appliances which are not fixed appliances, a warning that the appliance stored in an well-ventilated area where the room size corresponds to the room area as specified for operation; | | N/A |
| | - for appliances which are not fixed appliances, a warning that the appliance stored in a room without continuously operating open flames (for example an operating gas appliance) and or other potential ignition sources (for example an operating electric heater, hot surfaces); | | N/A |
| | - a warning that if appliances connected via an air duct system to one or more rooms are installed in a room with an area less than Amin as determined in Clause GG.2, that room without continuously operating open flames (for example an operating gas appliance) or other potential ignition sources (for example an operating electric heater, hot surfaces). A flame-producing device may be installed in the same space if the device is provided with an effective flame arrest; | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - for appliances connected via an air duct system to one or more rooms, a warning with the substance of the following: “Auxiliary devices which may be a potential ignition source shall not be installed in the duct work. Examples of such potential ignition sources are hot surfaces with a temperature exceeding X°C and electric switching devices”; | | N/A |
| | - for appliances connected via an air duct system to one or more rooms, a warning that only auxiliary devices approved by the appliance manufacturer or declared suitable with the refrigerant installed in connecting ductwork. The manufacturer can list in the instructions all approved auxiliary devices by the manufacturer and model number for use with the specific appliance. | | N/A |
| | The manufacturer should specify other potential continuously operating sources known to cause ignition of the refrigerant used. | | N/A |
| **DD.3.3** | **Qualification of workers** | | N/A |
| | The instructions contain specific information about the required qualification of the working personnel for maintenance, service and repair operations. Every working procedure that affects safety means shall only be carried out by competent persons. | | N/A |
| | Examples for such working procedures are: | | N/A |
| | breaking into the refrigerating circuit; | | N/A |
| | opening of sealed components; | | N/A |
| | opening of ventilated enclosures. | | N/A |
| **DD.4** | **Information on servicing** | | N/A |
| **DD.4.1** | **General** | | N/A |
| | The instructions contain specific information for service personnel according to DD.4.2 to DD.4.10. | | N/A |
| **DD.4.2** | **Checks to the area** | | N/A |
| | Prior to beginning work on systems containing flammable refrigerants, safety checks are necessary to ensure that the risk of ignition is minimised. For repair to the refrigerating system, DD.4.3 to DD.4.7 shall be completed prior to conducting work on the system. | | N/A |
| **DD.4.3** | **Work procedure** | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Work shall be undertaken under a controlled procedure so as to minimise the risk of a flammable gas or vapour being present while the work is being performed. | | N/A |
| **DD.4.4** | **General work area** | | N/A |
| | All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out. Work in confined spaces shall be avoided. | | N/A |
| **DD.4.5** | **Checking for presence of refrigerant** | | N/A |
| | The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially toxic or flammable atmospheres. Ensure that the leak detection equipment being used is suitable for use with all applicable refrigerants, i.e. non-sparking, adequately sealed or intrinsically safe. | | N/A |
| **DD.4.6** | **Presence of fire extinguisher** | | N/A |
| | If any hot work is to be conducted on the refrigerating equipment or any associated parts, appropriate fire extinguishing equipment shall be available to hand. Have a dry powder or CO2 fire extinguisher adjacent to the charging area. | | N/A |
| **DD.4.7** | **No ignition sources** | | N/A |
| | No person carrying out work in relation to a refrigerating system which involves exposing any pipe work use any sources of ignition in such a manner that it can lead to the risk of fire or explosion. | | N/A |
| | All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing and disposal, during which refrigerant can possibly be released to the surrounding space. | | N/A |
| | Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks. “No Smoking” signs displayed. | | N/A |
| **DD.4.8** | **Ventilated area** | | N/A |
| | Ensure that the area is in the open or that it is adequately ventilated before breaking into the system or conducting any hot work. | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | A degree of ventilation shall continue during the period that the work is carried out. | | N/A |
| | The ventilation should safely disperse any released refrigerant and preferably expel it externally into the atmosphere. | | N/A |
| **DD.4.9** | **Checks to the refrigerating equipment** | | N/A |
| | Where electrical components are being changed, they fit for the purpose and to the correct specification. | | N/A |
| | At all times the manufacturer's maintenance and service guidelines shall be followed. If in doubt, consult the manufacturer's technical department for assistance. | | N/A |
| **DD.4.10** | **Checks to electrical devices** | | N/A |
| | Repair and maintenance to electrical components shall include initial safety checks and component inspection procedures. | | N/A |
| | If a fault exists that could compromise safety, then no electrical supply connected to the circuit until it is satisfactorily dealt with. If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used. This shall be reported to the owner of the equipment so all parties are advised. | | N/A |
| | Initial safety checks shall include: | | N/A |
| | -that capacitors are discharged: this shall be done in a safe manner to avoid possibility of sparking; | | N/A |
| | -that no live electrical components and wiring are exposed while charging, recovering or purging the system; | | N/A |
| | -that there is continuity of earth bonding. | | N/A |
| **DD.5** | **Repairs to sealed components** | | N/A |
| | Sealed electrical components not be repaired | | N/A |
| **DD.6** | **Cabling** | | N/A |
| | Check that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects. | | N/A |
| | The check shall also take into account the effects of aging or continual vibration from sources such as compressors or fans. | | N/A |
| **DD.7** | **Detection of flammable refrigerants** | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Under no circumstances potential sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) not be used. | | N/A |
| | Electronic leak detectors used to detect refrigerant leaks but, in the case of flammable refrigerants, the sensitivity can be inadequate or can require re-calibration. | | N/A |
| | Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used. Leak detection equipment be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed, and the appropriate percentage of gas (25 % maximum) is confirmed. | | N/A |
| | Leak detection fluids are also suitable for use with most refrigerants but the use of detergents containing chlorine avoided as the chlorine can react with the refrigerant and corrode the copper pipe-work. | | N/A |
| | If a leak is suspected, all naked flames be removed/extinguished. | | N/A |
| | If a leakage of refrigerant is found which requires brazing, all of the refrigerant recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak. Removal of refrigerant shall be according to Clause DD.8. | | N/A |
| **DD.8** | **Removal and evacuation** | | N/A |
| | When breaking into the refrigerant circuit to make repairs – or for any other purpose – conventional procedures used. | | N/A |
| | However, for flammable refrigerants it is important that best practice is followed since flammability is a consideration. | | N/A |
| | The following procedure adhered to: | | N/A |
| | -safely remove refrigerant local and national regulations can apply | | N/A |
| | -evacuate; | | N/A |
| | -purge the circuit with inert gas | | N/A |
| | -evacuate (optional for A2L); | | N/A |
| | -continuously flush with inert gas when using flame to open circuit; | | N/A |
| | -open the circuit | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | The refrigerant charge recovered into the correct recovery cylinders. | | N/A |
| | The manufacturer specify the inert gases that can be used. Compressed air or oxygen not be used for purging refrigerant systems. | | N/A |
| | Purging of the refrigerant circuit achieved by breaking the vacuum in the system with inert gas and continuing to fill until the working pressure is achieved, then releasing to atmosphere, and finally pulling down to a vacuum. This process shall be repeated until no refrigerant is within the system. | | N/A |
| | This process repeated until no refrigerant is within the system. | | N/A |
| | The system vented down to atmospheric pressure to enable work to take place | | N/A |
| | Ensure that the outlet of the vacuum pump is not close to any potential ignition sources and that ventilation is available. | | N/A |
| **DD.9** | **Charging procedures** | | N/A |
| | In addition to conventional charging procedures, the following requirements shall be followed. | | N/A |
| | Ensure that contamination of different refrigerants does not occur when using charging equipment. Hoses or lines shall be as short as possible to minimise the amount of refrigerant contained in them. | | N/A |
| | Cylinders shall be kept in an appropriate position according to the instructions. | | N/A |
| | Ensure that the refrigerating system is earthed prior to charging the system with refrigerant. | | N/A |
| | Label the system when charging is complete (if not already). | | N/A |
| | Extreme care shall be taken not to overfill the refrigerating system. | | N/A |
| | Prior to recharging the system, it shall be pressure-tested with the appropriate purging gas. | | N/A |
| | The system shall be leak-tested on completion of charging but prior to commissioning. A follow up leak test shall be carried out prior to leaving the site. | | N/A |
| **DD.10** | **Decommissioning** | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its detail. | | N/A |
| | It is recommended good practice that all refrigerants are recovered safely. Prior to the task being carried out, an oil and refrigerant sample be taken in case analysis is required prior to re-use of recovered refrigerant. It is essential that electrical power is available before the task is commenced. | | N/A |
| | a) Become familiar with the equipment and its operation. | | N/A |
| | b) Isolate system electrically. | | N/A |
| | c) Before attempting the procedure, ensure that: | | N/A |
| | mechanical handling equipment is available, if required, for handling refrigerant cylinders; | | N/A |
| | all personal protective equipment is available and being used correctly; | | N/A |
| | the recovery process is supervised at all times by a competent person; | | N/A |
| | recovery equipment and cylinders conform to the appropriate standards. | | N/A |
| | d) Pump down refrigerant system, if possible. | | N/A |
| | e) If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system. | | N/A |
| | f) Make sure that cylinder is situated on the scales before recovery takes place. | | N/A |
| | g) Start the recovery machine and operate in accordance with instructions. | | N/A |
| | h) Do not overfill cylinders (no more than 80 % volume liquid charge). | | N/A |
| | i) Do not exceed the maximum working pressure of the cylinder, even temporarily. | | N/A |
| | j) When the cylinders have been filled correctly and the process completed, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off. | | N/A |
| | k) Recovered refrigerant not be charged into another refrigerating system unless it has been cleaned and checked. | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| **DD.11** | **Labelling** | | N/A |
| | Equipment labelled stating that it has been de-commissioned and emptied of refrigerant. | | N/A |
| | The label shall be dated and signed. | | N/A |
| | For appliances containing flammable refrigerants, ensure that there are labels on the equipment stating the equipment contains flammable refrigerant. | | N/A |
| **DD.12** | **Recovery** | | N/A |
| | When removing refrigerant from a system, either for servicing or decommissioning, it is required to follow good practice that all refrigerants are removed safely. | | N/A |
| | When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge is available. All cylinders to be used are designated for the recovered refrigerant and labelled for that refrigerant (i.e. special cylinders for the recovery of refrigerant). Cylinders shall be complete with pressure-relief valve and associated shut-off valves in good working order. Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs. | | N/A |
| | The recovery equipment in good working order with a set of instructions concerning the equipment that is at hand and suitable for the recovery of the flammable refrigerant. Consult manufacturer if in doubt. In addition, a set of calibrated weighing scales available and in good working order. Hoses complete with leak-free disconnect couplings and in good condition | | N/A |
| | The recovered refrigerant processed in the correct recovery cylinder, and the relevant waste transfer note arranged. Local legislation can apply. Do not mix refrigerants in recovery units and especially not in cylinders | | N/A |
| | If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. | | N/A |
| | The compressor body not be heated by an open flame or other ignition sources to accelerate this process | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Draining of oil from a system, it carried out safely. | | N/A |
| **EE** | **ANNEX EE - PRESSURE TESTS** (IEC 60335-2-40:2024) | | - |
| **EE.1** | **General** | | N/A |
| | All refrigerating system parts shall withstand the maximum pressure in normal operation, abnormal operation, and standstill. | | N/A |
| | The maximum allowable pressure marked on the system not less than the maximum pressure developed during operation under Clause 11, under Clause 19 and during standstill, see Clause EE.2. | | N/A |
| | It is not necessary for a compressor tested and found to comply with IEC 60335-2-34 to be additionally tested. | | N/A |
| **EE.2** | **Determination of standstill pressure** | | N/A |
| | In order to determine the standstill pressure, the appliance shall be soaked in the highest operating temperature specified by the manufacturer for 1 h with power off. | | N/A |
| | A refrigerating system component that is exposed only to low side pressure can be exposed to a higher pressure under the condition of standstill than under normal operation. | | N/A |
| **EE.3** | The test pressure at least three times the marked maximum allowable pressure. | | N/A |
| **EE.4** | **Fatigue test** | | N/A |
| | The components subjected to a test at 66,7 % of the test pressure determined by Clauses EE.2, EE.3 or EE.4, provided the components comply with the fatigue test in Clause EE.5. This test is conducted on a separate sample. | | N/A |
| | Three samples of each refrigerant-containing part shall be tested. The total number of cycles 250 000. | | N/A |
| | The test samples filled with fluid, and shall be connected to a pressure driving source. The pressure shall be raised and lowered between the upper and lower cyclic values at a rate specified by the manufacturer. The pressure shall reach the specified upper and lower values during each cycle. The shape of the pressure cycle shall be such that the upper and lower pressure values shall be maintained for at least 0,1 s. | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | the operating temperatures of the appliance under the conditions of steady state operation of Clause 11 are less than or equal to 125 °C for copper or aluminium, or 200 °C for steel, the test temperature of the component part or assembly at least 20 °C. | | N/A |
| | If the continuous operating temperature of the component exceeds 125 °C for copper or aluminium, or 200 °C for steel, the test temperature of the parts or assemblies that are at these temperatures, and subjected to the pressure, shall be at least 25 °C greater than the temperature of the part measured during the test of Clause 11 for copper or aluminium and 60 °C higher for steel. | | N/A |
| | For other materials, the effects of temperature on the material fatigue characteristics evaluated by conducting the test at the higher temperatures and considering the material characteristics at the higher temperatures. | | N/A |
| | The pressure for the test cycles as follows: | | N/A |
| | a) For components subject to high side pressures, the upper pressure value not be less than the saturated vapour pressure of the refrigerant at 50 °C and the lower pressure value not be greater than the saturated vapour pressure of the refrigerant at 5 °C. For sanitary hot water heat pumps, the upper pressure not be less than 80 % of the marked maximum allowable pressure under the conditions of Clause 11. | | N/A |
| | b) For components subjected to only low side pressures, the upper pressure value not less than the saturated vapour pressure of the refrigerant at 30 °C and the lower pressure value shall be between 0 bar and the greater of 4,0 bar or the saturated vapour pressure of the refrigerant at –13 °C. | | N/A |
| | For the final test cycle, the test pressure to two times the pressure determined in a) or b). | | N/A |
| **FF** | **ANNEX FF (NORMATIVE) - LEAK SIMULATION TESTS** (IEC 60335-2-40:2024) | | - |
| **FF.1** | **General** | | P |
| | A leakage of refrigerant is simulated in the refrigerating system at the potential leak points. | | P |
| | The method to simulate a leakage at the potential leak points is to inject refrigerant vapour through a suitable capillary tube at that point | | P |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Where LFL is referenced in this annex, the LFL shall be taken at the nominal composition as specified in Annex BB. | | N/A |
| | Piping are not considered to be potential leak points within the area of the appliance to be evaluated if they comply with all of the following | | N/A |
| | – are protected from potential damage during normal operation, service and maintenance; | | N/A |
| | – have no connecting joints; | | N/A |
| | – have no bends with centreline bend radius less than 2,5 times the external pipe diameter | | N/A |
| **FF.2** | **Test methods** | | P |
| **FF.2.1** | The appliance is modified by introducing a simulated leak through a capillary tube. | | N/A |
| | The quantity of refrigerant leaked, mFF, is equal to smallest of: | | N/A |
| | – the refrigerant charge, mc; | | N/A |
| | – the releasable charge, mrl, as determined by Annex QQ; | | N/A |
| | – for parts of enhanced tightness refrigerating systems which can leak into an indoor space using A2L refrigerant, 10 kg; | | N/A |
| | – for parts of enhanced tightness refrigerating systems which can leak into an indoor space using A2 or A3, the amount that will leak during 1 hour with the leak rate $\dot{m}$leak of GG.14.3. | | N/A |
| | The leak rate shall be maintained at 25 % ± 5 % of the refrigerant leaked, mFF, per minute | | N/A |
| | For parts of enhanced tightness refrigerating systems which can leak into an indoor space, the leak rate maintained at 10 kg per hour for A2L refrigerants or the leak rate $\dot{m}$leak of GG.14.3 for A2 and A3 refrigerants. | | N/A |
| | The leak maintained until the quantity of refrigerant leaked, mFF, has leaked | | N/A |
| | The refrigerant is injected at the most unfavourable potential leak point and the most unfavourable direction at ambient temperature (15 °C to 35 °C). | | N/A |
| **FF.2.2** | During this test, the appliance is switched off or operated under normal operation at rated voltage | | P |
| | If airflow is activated before any potential ignition sources are activated, then the test is not conducted with the appliance switched off. | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | During a test where the appliance is operating, refrigerant gas injection is started at the same time as the appliance is switched on | | N/A |
| | In "switched off" mode, the appliance remain connected to the mains and safety mitigation controls, such as refrigerant detection system and circulation airflow or safety shut-off valves, shall be allowed to function as intended | | P |
| **FF.2.3** | For refrigerant blends, the test carried out using the nominal composition as defined in Annex BB. | | N/A |
| **FF.2.4** | The test is conducted in a room that is draught-free and of sufficient size to conduct the test. | | N/A |
| | The minimum volume (V) is: V = (15 x mc)/LFL | | N/A |
| | Care taken that the installation of the capillary tube does not unduly influence the results of the test and that the structure of the appliance does not unduly influence the results of the test. | | N/A |
| | The instrument used for monitoring the refrigerant gas concentration shall have a t(90) response time of faster than 30 seconds and located so as to not unduly influence the results of the test. | | N/A |
| | If gas chromatography is used to measure the refrigerant gas concentrations, the gas sampling in confined areas shall not exceed 2 ml every 30 s. | | N/A |
| **FF.2.5** | The measured concentration of refrigerant gas surrounding the any component that can be an ignition source not exceed 25 % of the LFL of the refrigerant gas, and shall not exceed 15 % of the LFL of the refrigerant gas for a time period of 5 min or the duration of the test if less than 5 min during and after the amount has been injected. | | N/A |
| **GG** | **ANNEX GG (NORMATIVE) - CHARGE LIMITS, VENTILATION REQUIREMENTS AND REQUIREMENTS FOR SECONDARY CIRCUITS** (IEC 60335-2-40:2024) | | - |
| **GG.1** | **Requirements for refrigerant charge limits** | | N/A |
| **GG.1.1** | **General** | | N/A |
| | When a flammable refrigerant is used, the requirements for installation space of appliance and/or ventilation requirements are determined according to | | N/A |
| | - the refrigerant charge (M) (mc) used in the appliance, | | N/A |
| | – the releasable charge (mrl), | | N/A |
| | - the installation location, | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - the type of ventilation of the location or of the appliance. | | N/A |
| | For appliances with multiple refrigerating systems, each refrigerating system shall be evaluated independently | | N/A |
| | Where multiple values of Amin are found based on different operating states, the highest value Amin for the appliance | | N/A |
| | Where the parameters lower flammability limit (LFL) and molecular weight (M) are referenced in Annex GG, the values used shall be based on WCF – Worst Case Formulation as specified in Annex BB. | | N/A |
| | Toxicity charge limits determined per ISO 5149-1:2014, ISO 5149-1:2014/AMD1:2015, and ISO 5149-1:2014/AMD2:2021. If the toxicity-based charge limits are less than the flammability based charge limits, the toxicity charge limits take precedence. | | N/A |
| | For appliances with a refrigerant charge of mc ≤ m1, no minimum room area is required and Clause GG.6 does not apply. | | N/A |
| | For appliances where leaked refrigerant does not enter the indoor space, no minimum room area is required. | | N/A |
| | If releasable charge is determined by Annex QQ: | | N/A |
| | – for releasable charge mrl ≤ m1, there is no requirement for minimum room area, Amin, and Clause GG.6 does not apply | | N/A |
| | – for releasable charge mrl > m1, each operating state of the refrigerating system comply with at least one of the clauses: GG.2, GG.3, GG.4, GG.7, GG.9, and GG.14. The refrigerant charge mc may be replaced by the releasable charge mrl in the formulae of Annex GG. | | N/A |
| **GG.1.2** | **Determination of the case applicable** | | N/A |
| | Determination of the case applicable refrigerant capped quantity limit | | N/A |
| | For A2 and A3 refrigerants, m1, m2, m3 are defined as follows: | | N/A |
| | m1 = 4 × LFL | | N/A |
| | m2 = 26 × LFL | | N/A |
| | m3 = 130 × LFL | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | where *LFL* is the lower flammability limit in kg/m3 for the refrigerant used. | | N/A |
| | For A2L refrigerants, m1, m2, m3 is defined as follows: | | N/A |
| | m1 = 6 × LFL | | N/A |
| | m2 = 52 × LFL | | N/A |
| | m3 = 260 × LFL | | N/A |
| | where LFL is the lower flammable limit in kg/m3 for the refrigerant used. | | N/A |
| **GG.1.3** | **Determination of unventilated room area** | | N/A |
| **GG.1.3.1** | General | | N/A |
| | For the purpose of determination of room area (A) when used to calculate the maximum allowable refrigerant charge (mmax) in an unventilated space, the following apply. | | N/A |
| | The room area (A) defined as the room area enclosed by the projection to the floor of the walls, partitions and doors of the space in which the appliance is installed. | | N/A |
| | Spaces connected by only drop ceilings, ductwork, or similar connections not be considered a single space. | | N/A |
| **GG.1.3.2** | Determination of unventilated room area for appliances using A2L refrigerant | | N/A |
| | For units mounted higher than 1,6 m, and in compliance with GG.2.2, spaces divided by partition walls which are no higher than 1,6 m considered a single space. | | N/A |
| | For fixed appliances, rooms on the same floor and connected by an open passageway between the spaces can be considered a single room when determining compliance to Amin, if the passageway complies with all of the following: | | N/A |
| | – it is a permanent opening; | | N/A |
| | – it extends to the floor; | | N/A |
| | – it is intended for people to walk through. | | N/A |
| | For fixed appliances, the area of the adjacent rooms, on the same floor, connected by permanent opening in the walls and/or doors between occupied spaces, including gaps between the wall and the floor, can be considered a single room when determining compliance to Amin, provided all of the following are met. | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | • The space have appropriate openings according to GG.1.4. | | N/A |
| | • The minimum opening area for natural ventilation, Anv,min, shall not be less than the following: | | N/A |
| **GG.1.3.3** | Determination of unventilated room area for appliances using A2 and A3 refrigerant | | N/A |
| | For determining compliance to Amin for fixed appliances with release height, h0, according to GG.2.1, not less than 1,6 m, rooms on the same floor and connected by an open passageway between the spaces can be considered a single room if the passageway complies with all of the following: | | N/A |
| | – it is a permanent opening; | | N/A |
| | – it extends to the floor; | | N/A |
| | – it is intended for people to walk through. | | N/A |
| | For determining compliance to Amin for fixed appliances and with release height, h0, according to GG.2.1, less than 1,6 m or fixed appliances with circulation airflow at any release height, h0, rooms on the same floor and connected by an open passageway between the spaces can be considered a single room with an area of the space that the refrigerant can leak directly into plus half of the area of the connected space, if all of the following is complied with: | | N/A |
| | – the area of the space in which the unit is installed not be less than 20 % of Amin; | | N/A |
| | – the passageway is a permanent opening; | | N/A |
| | – the passageway extends to the floor; | | N/A |
| | – the passageway is intended for people to walk through. | | N/A |
| **GG.1.4** | **Opening conditions for connected rooms and natural ventilation for appliances using A2L refrigerants** | | N/A |
| | When the openings for connected rooms or natural ventilation are required, the following conditions shall be applied for the lower opening. | | N/A |
| | -The area of any openings above 300 mm from the floor shall not be considered in determining compliance with Anvmin. The area of any openings above 300 mm from the floor shall not be considered in determining compliance with Anv,min. | | N/A |
| | -At least 50 % of the required opening area Anv,min. shall be below 200 mm from the floor. | | N/A |
| | The bottom of the lowest openings shall not be higher than the point of release when the unit is installed and not more than 100 mm from the floor. | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | For openings extending to the floor, the height not be less than 20 mm above the surface of the floor covering. | | N/A |
| | A second higher opening shall be provided. The total size of the second opening shall not be less than 50 % of minimum opening area for Anv,min and at least 1,5 m above the floor. | | N/A |
| | Openings shall be permanent openings which cannot be close | | N/A |
| **GG.2** | **Requirements for charge limits in unventilated areas** | | N/A |
| **GG.2.1** | **General** | | N/A |
| | Clause GG.2 is applicable for appliances with a refrigerant charge m1 < mc ≤ m2 and for factory sealed single package units which are not fixed appliances with a refrigerant charge of m1 < mc ≤ 2 × m1: | | N/A |
| | For factory sealed single package units which are not fixed appliances with a refrigerant charge of m1 < mc ≤ 2 × m1, the requirements of Clause GG.7 apply. | | N/A |
| | For systems using A2L refrigerants with a refrigerant charge of m1 < mc ≤ m3 that comply with the conditions in 22.125, the requirements of Clause GG.10 can apply. | | N/A |
| | For systems using A2 or A3 refrigerants with a refrigerant charge of m1 < mc ≤ m2 that comply with the conditions in 22.125, the requirements of Clause GG.14 can apply. | | N/A |
| | For other appliances with a refrigerant charge of m1 < mc ≤ m2: | | N/A |
| | The maximum refrigerant charge in a room shall be in accordance with the following: | | N/A |
| | mmax = 2,5 × (LFL)(5/4) × h0 × (A)1/2, not to exceed mmax = CF × LFL × h0 × A (GG.8) | | N/A |
| | or the required minimum room area Amin to install an appliance with refrigerant charge mc (kg) shall be in accordance with following: | | N/A |
| | Amin = (mc / (2,5 × (LFL)(5/4) × h0)) 2, not less than Amin = mc / (CF × LFL × h0) (GG.9) | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | If the minimum installed height given by the manufacturer is higher than the reference installed height, then in addition Amin and mmax for the reference installed height given by the manufacturer. An appliance may have multiple reference installed heights. In this case, Amin and mmax calculations shall be provided for all applicable reference installed heights. | | N/A |
| | For appliances serving one or more rooms with an air duct system, the lowest opening of the duct connection to each conditioned space or any opening of the indoor unit greater than 5 cm2, at the lowest position to the space, used for h0. However, h0 shall not be less than 0,6 m. Amin shall be calculated as a function of the opening heights of the duct to the spaces and the refrigerant charge for the spaces where leaked refrigerant can flow to, considering where the unit is located. Amin shall be calculated for the spaces where a duct is connected or an indoor unit is located. If all spaces have room area more than respective Amin, no further measure is required. If any room area of spaces is below Amin, measures according to Clause GG.8 or GG.9 provided for appliances using A2L refrigerants. | | N/A |
| **GG.2.2** | **Appliances using A2L refrigerants with circulation airflow** | | N/A |
| **GG.2.2.1** | **General** | | N/A |
| | When the fan integrated into an appliance is continuously operated or operation is initiated by a leak detection system with a sufficient circulation airflow rate (see also Table GG.2), the maximum refrigerant charge can be increased or minimum room area can be reduced according to the following: | | N/A |
| | The maximum refrigerant charge in a room in accordance with $m_{max}$ | | N/A |
| | or the required minimum room area Amin of installed appliance with refrigerant charge mc(kg) in accordance with Amin | | N/A |
| | Operation of circulation airflow comply with either GG.2.2.2 or GG.2.2.3. | | N/A |
| **G.2.2.2** | **Continuous circulation airflow** | | N/A |
| | The fan shall run continuously, other than for short periods for maintenance and service. The airflow shall be monitored continuously. Within 10 s in the event that the airflow is reduced below Qmin, the following actions taken: | | N/A |
| | – warn user that airflow is reduced; | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | – disable the compressor operation unless the compressor operation reduces the leak rate or the total amount released to the indoor space. | | N/A |
| **GG.2.2.3** | **Circulation airflow activated by a detection system** | | N/A |
| | If a leak detection system is activated, the following actions shall be taken and continue for at least 5 min after the detection system has reset: | | N/A |
| | – energize the fan(s) of the appliance to deliver indoor airflow at or above the minimum airflow Qmin; | | N/A |
| | – disable the compressor operation unless the compressor operation reduces the leak rate or the total amount released to the indoor space. | | N/A |
| **GG.2.3** | **Fixed appliances using A2/A3 refrigerants with integral circulation airflow** | | N/A |
| **GG.2.3.1** | **General** | | N/A |
| | When the fan integrated into an appliance is continuously operated or operation is initiated by a leak detection system with sufficient airflow rate, the maximum refrigerant charge can be increased or minimum room area can be reduced according to following.<br>mmax = CF × LFL × A × 2,2<br>Amin = mc/(CF × LFL × 2,2) | | N/A |
| | The fan integrated into an appliance shall have a minimum circulation airflow according to Qmin | | N/A |
| | Operation of circulation airflow comply with either GG.2.3.2 or GG.2.3.3. | | N/A |
| **GG.2.3.2** | **Continuous circulation airflow** | | N/A |
| | The indoor fan shall run continuously, other than for short periods for maintenance and service. The airflow monitored continuously. Within 10 seconds in the event that the airflow is reduced below Qmin, the following actions taken | | N/A |
| | – warn user that airflow is reduced; | | N/A |
| | – disable the compressor operation unless the compressor operation reduces the leak rate or the total amount released to the indoor space. | | N/A |
| **GG.2.3.3** | **Circulation airflow activated by a leak detection system** | | N/A |
| | If a leak detection system is activated, the following actions shall be taken and continued for at least 5 min after the leak detection system has reset: | | N/A |
| | – energize the fan(s) of the appliance to deliver indoor airflow at or above the minimum airflow Qmin; | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | – disable the compressor operation unless the compressor operation reduces the leak rate or the total amount released to the indoor space. | | N/A |
| **GG.3** | **Requirements for charge limits in areas with mechanical ventilation** | | N/A |
| | Mechanical ventilation applies to fixed appliances only. | | N/A |
| | Mechanical ventilation occurs when the appliance enclosure or the room is provided with a ventilating system that, in the event of a leak, is intended to vent refrigerant into an area where there is not a potential ignition source and the gas can be readily dispersed. | | N/A |
| | The appliance enclosure have a ventilation system that produces airflow within the appliance enclosure and meets the requirements of Clause GG.4 or is intended to be installed in a room that meets the requirements of Clause GG.5. | | N/A |
| **GG.4** | **Requirements for mechanical ventilation within the appliance enclosure** | | N/A |
| | The refrigerating circuit is provided with a separate enclosure that does not allow flow from inside the enclosure to the room. | | N/A |
| | The appliance enclosure have a ventilation system that produces airflow from the appliance interior to the outside through an exhaust ventilation shaft duct. | | N/A |
| | The manufacturer specify the exhaust ventilation duct dimensions, the maximum length and number of bends. | | N/A |
| | The negative pressure measurement in the interior of the appliance enclosure shall be 20 Pa or more and the flow rate to the exterior with open enclosure and attached maximum ventilation duct at least Qmin. | | N/A |
| | For refrigerating systems which are not enhanced tightness refrigerating systems, the leak rate, $\dot{m}$leak | | N/A |
| | For enhanced tightness refrigerating systems, the leak rate, $\dot{m}$leak, determined as: | | N/A |
| | – for A2L refrigerants $\dot{m}$leak = 0,002 78 kg/s, | | N/A |
| | – for A2 and A3 refrigerants, the values of GG.14.3.1, Table GG.6 in kg/s | | N/A |
| | Ventilation shall be to the outside or to a room with a minimum volume as specified in Clause GG.2, Formula (GG.9). | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | The ventilation run continuously, other than for short periods for maintenance and service. The airflow monitored continuously. Within 10 seconds in the event that the airflow is reduced below Qmin, the following actions taken: | | N/A |
| | – warn user that airflow is reduced; | | N/A |
| | – disable the compressor operation unless the compressor operation reduces the leak rate or the total amount released into the enclosure. Or | | N/A |
| | The ventilation is switched on by a leak detection system and the following actions taken and continued for at least 5 min after the leak detection system has reset: | | N/A |
| | – energize the fan(s) of the appliance to deliver airflow at or above the minimum airflow Qmin; | | N/A |
| | – disable the compressor operation unless the compressor operation reduces the leak rate or the total amount released to the enclosure. | | N/A |
| **GG.5** | **Requirements for mechanical ventilation for rooms complying with ISO 5149** | | N/A |
| | Machinery rooms shall meet the requirements of Clause 5 of ISO 5149-3:2014. | | N/A |
| **GG.6** | **Requirements for refrigerating systems employing secondary heat exchangers** | | N/A |
| | If a flammable refrigerant is used and the system contains a secondary heat exchanger, the heat exchanger not allow the release of refrigerant into areas served by the secondary heat exchanger fluid Compliance met by at least one of the following: | | N/A |
| | - an open loop secondary system vented to the outside; or | | N/A |
| | - an automatic air/refrigerant separator and pressure relief valve is placed in the secondary circuit on the outlet pipe from the evaporator or the condenser. The air/refrigerant separator and pressure relief valve is at a high level relative to the outlet of the heat exchanger where leaked refrigerant can accumulate. The pressure relief valve shall have a flow rating rated to discharge the refrigerant that can be released through the heat exchanger. The air/refrigerant separator and pressure relief valve shall discharge the refrigerant into a space compliant with the charge limitations in Annex GG or to the outside; or | | N/A |
| | - a double wall heat exchanger, or | | N/A |
| | - a refrigerant system where the pressure of the secondary circuit is always greater than the pressure of the primary circuit in the area of contact, or | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - the bursting of the secondary heat exchanger is avoided by | | N/A |
| | 1) specifying requirements for specific properties of the secondary heat exchanger fluid to prevent corrosion, including: | | N/A |
| | • water: the manufacturer specify in the installation instructions the water quality necessary for the specified heat exchanger; | | N/A |
| | • brine: the manufacturer specify in the installation instructions the type of brine and its permitted concentration range for which the heat exchanger is suitable. | | N/A |
| | 2) the use of a freezing protection device which considers | | N/A |
| | • fluid freezing point; | | N/A |
| | • distribution through the heat exchanger; | | N/A |
| | • glide of the evaporating refrigerant; | | N/A |
| | • service procedures that could lead to freeze damage, for example adding or removing the refrigerant in liquid phase from a heat exchanger containing standing water; | | N/A |
| **GG.7** | **Factory sealed single package units with a refrigerant charge of $m1 < mc \leq 2 \times m1$** | | N/A |
| **GG.7.1** | **Determination of refrigerant charge** | | N/A |
| | For factory sealed single package units (i.e. one functional unit in one enclosure) with a refrigerant charge amount of m1 < M mc ≤ 2 × m1, the maximum refrigerant charge in a room in accordance with $m_{max}$ | | N/A |
| | or the required minimum floor area, Amin, to install an appliance with refrigerant charge mc in accordance with $A_{min}$ | | N/A |
| | When the appliance is switched on, a fan operate continuously supplying a minimum airflow as under normal steady state conditions, even when the compressor is switched off by the thermostat. | | N/A |
| **GG.7.2** | **Mechanical requirements** | | N/A |
| **GG.7.2.1** | **General** | | N/A |
| | The appliance shall withstand the effects of dropping and vibration during transport and normal use without leaking refrigerant. | | N/A |
| **GG.7.2.2** | **Drop test with packaging** | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | The appliance is tested in its final packaging for transport and shall withstand the following number of drops on a horizontal hardwood board 20 mm thick placed on a concrete or similar hard surface: | | N/A |
| | one with the appliance held upright; | | N/A |
| | one for each of the four edges of the bottom side, with the bottom side forming an angle of about 30° to the horizontal. | | N/A |
| **GG.7.2.3** | **Drop test without packaging** | | N/A |
| | The tests of GG.7.2.3 are repeated on the appliance without its packaging and with the drop height according to the Table GG.4 | | N/A |
| **GG7.2.4** | **Test after installation** | | N/A |
| | The appliance is installed in accordance with the installation instructions. It is supplied at rated voltage or at the upper limit of the rated voltage range and operated at ambient temperature. | | N/A |
| **GG.7.3** | **Vibration test** | | N/A |
| | Vibrations exceeding 0,30 G RMS, when measured with a low pass filter at 200 Hz, are not allowed in the refrigerant containing pipes under normal operation | | N/A |
| **GG.8** | **Ventilated area requirements for appliances using A2L refrigerants** | | N/A |
| **GG.8.1** | **General** | | N/A |
| | Clause GG.8 is applicable for appliances with a refrigerant charge m1 < mc ≤ m3 | | N/A |
| | Ventilation provided when refrigerant charge is mc > mmax. | | N/A |
| | Natural and mechanical ventilation apply to fixed appliances only. | | N/A |
| **GG.8.2** | **Natural ventilation requirements for appliances using A2L refrigerants** | | N/A |
| **GG.8.2.3** | **Natural ventilation to outdoors** | | N/A |
| | If natural ventilation to outdoors is applied, all of the following shall be met. | | N/A |
| | - Natural ventilation to outdoors is not allowed below ground level. | | N/A |
| | – Natural ventilation from an occupied space shall not be made to outdoors. | | N/A |
| | - The openings for natural ventilation comply with GG.1.4. | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | – The maximum refrigerant charge of a system, mmax, and minimum opening area, Anv,min, for natural ventilation to outdoors shall be calculated | | N/A |
| **GG.8.3** | **Mechanical ventilation requirements for rooms with appliances using A2L refrigerants** | | N/A |
| **GG.8.3.1** | **Operation of mechanical ventilation system** | | N/A |
| **GG.8.3.1.1** | **General** | | N/A |
| | Mechanical ventilation in compliance with GG.8.3.1.2 or GG.8.3.1.3 provided. | | N/A |
| **GG.8.3.1.2** | **Continuous operation of mechanical ventilation system** | | N/A |
| | The mechanical ventilation system run continuously, other than for short periods for maintenance and service. The airflow monitored continuously. Within 10 s in the event that the airflow is reduced, below Qmin, the following actions taken: | | N/A |
| | – warn user that airflow is reduced; | | N/A |
| | – disable the compressor operation unless the compressor operation reduces the leak rate or the total amount released to the indoor space. | | N/A |
| **GG.8.3.1.3** | **Mechanical ventilation system activated by a leak detection system** | | N/A |
| | If a leak detection system is activated, the following actions taken and continued for at least 5 min after the leak detection system has reset: | | N/A |
| | – energize the mechanical ventilation system of the appliance to deliver indoor airflow at or above the minimum airflow Qmin; | | N/A |
| | – disable the compressor operation unless the compressor operation reduces the leak rate or the total amount released to the indoor space. | | N/A |
| **GG.8.3.2** | **Required airflow** | | N/A |
| | The airflow shall be calculated using of the formula below. Losses caused by ducts or other components in the air stream considered. | | N/A |
| **G.8.3.3** | **Requirement for opening** | | N/A |
| | For mechanical ventilation as specified in GG.8.3, the lower edge of openings extracting air from the room not be more than 100 mm above the floor. | | N/A |
| | The openings extracting air from the room positioned relative to the openings supplying air to the room such that the supplied makeup air mixes with the leaked refrigerant. | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | The openings exhausting air from the room positioned relative to the intake openings supplying air to the room to prevent re-circulation back to the room. | | N/A |
| **GG.9** | **Charge limits for appliances using A2L refrigerants connected via an air duct system to one or more rooms** | | N/A |
| **GG.9.1** | **General** | | N/A |
| | Clause GG.9 is applicable for appliances with a refrigerant charge 0 < mc ≤ m3..The maximum refrigerant charge can be increased or the minimum room area can be reduced if the following requirements are met. | | N/A |
| | The appliances connected via an air duct system to one or more rooms, the supply and return air shall be directly ducted to the space. Open areas such as false ceilings not be used as a return air duct | | N/A |
| | Operation of circulation airflow comply with either GG.9.2 or GG.9.3. | | N/A |
| | mmax determined based on the total area of the conditioned space (TA) connected by ducts taking into consideration that the circulation airflow distributed to all the rooms by the appliance integral indoor fan will mix and dilute the leaking refrigerant before entering any room. In the case when no refrigerant detection system is provided then, spaces where the airflow can be limited by zoning dampers not be included in the determination of TA. | | N/A |
| **GG.9.2** | **Continuous circulation airflow** | | N/A |
| | The fan shall run continuously, other than for short periods for maintenance and service. The airflow monitored continuously. Within 10 s in the event that the airflow is reduced below Qmin, the following actions taken: | | N/A |
| | - warn user that airflow is reduced. | | N/A |
| | – disable the compressor operation unless the compressor operation reduces the leak rate or the total amount released to the indoor space. | | N/A |
| **GG.9.3** | **Circulation airflow activated by a refrigerant detection system** | | N/A |
| | If a leak detection system is activated, the following actions shall be taken and continued for at least 5 min after the leak detection system has reset: | | N/A |
| | – energize the fan(s) of the appliance to deliver indoor airflow at or above the minimum airflow Qmin; | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | – disable the compressor operation unless the compressor operation reduces the leak rate or the total amount released to the indoor space | | N/A |
| | – fully open all zoning dampers of the appliance and energize control signals to open any external zoning dampers if applicable; | | N/A |
| | – activate additional mechanical ventilation, if required by GG.8.3. | | N/A |
| **GG.10** | **Allowable charge for enhanced tightness refrigerating systems** | | N/A |
| **GG.10.1** | **General** | | N/A |
| | Clause GG.10 is applicable to enhanced tightness refrigerating systems using A2L refrigerants with refrigerant charge m1 < mc ≤ m3 | | N/A |
| | For individual indoor units, when tested in accordance with ISO 5151, ISO 13253, or ISO 15042 | | N/A |
| | – the cooling capacity ≤ 35 kW at T1 conditions; | | N/A |
| | – for heating only appliances, the heating capacity ≤ 35 kW at H1 conditions. | | N/A |
| | The applicable measures to be taken shall be ventilation (natural or mechanical), safety shut-off valves and safety alarm, in conjunction with leak detection systems as specified in GG.10.2. | | N/A |
| | A safety alarm alone shall not be considered as an appropriate measure where occupants are restricted in their movement (see Clause GG.13). | | N/A |
| **GG.10.2** | **Required measures for allowable refrigerant charge** | | N/A |
| **GG.10.2.1** | **General** | | N/A |
| | For appliances where the refrigerant charge does not exceed maximum refrigerant charge in GG.10.3.1, no additional measures are required. | | N/A |
| **GG.10.2.2** | **Spaces except lowest underground floor of the building** | | N/A |
| | For appliances with release height, h0, as determined in Clause GG.2, equal to or greater than 1,8 m or with integral circulation airflow (see GG.10.4), where the refrigerant charge does not exceed maximum refrigerant charge in GG.10.3.2, no additional measures are required. | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | For appliances without integral circulation airflow and having release height, h0, less than 1,8 m, where the refrigerant charge exceeds the maximum refrigerant charge in GG.10.3.1, but is less than or equal to the maximum refrigerant charge in GG.10.3.2, one additional measure shall be taken in accordance with Clause GG.11, GG.12 or GG.13. | | N/A |
| | Where the refrigerant charge exceeds the maximum refrigerant charge in GG.10.3.2, a safety alarm shall be employed in accordance with Clause GG.13, and one additional measure taken in accordance with Clause GG.11 or GG.12. | | N/A |
| **GG.10.2.3** | **Lowest underground floor of the building** | | N/A |
| | For appliances without integral circulation airflow and having release height, h0, as determined in Clause GG.2, less than 1,8 m, where the refrigerant charge exceeds the maximum refrigerant charge in GG.10.3.1, but is less than or equal to the maximum refrigerant charge in GG.10.3.2, a safety alarm shall be employed in accordance with Clause GG.13, and one additional measure taken in accordance with Clause GG.11 or GG.12. | | N/A |
| | For appliances with release height, h0, equal to or greater than 1,8 m or with integral circulation airflow (see GG.10.4), where the refrigerant charge exceeds the maximum refrigerant charge in GG.10.3.1, but is less than or equal to the maximum refrigerant charge in GG.10.3.2, one additional measure taken in accordance with Clause GG.11, GG.12 or GG.13. | | N/A |
| | The refrigerant charge not exceed the maximum refrigerant charge in GG.10.53.2. | | N/A |
| **GG.10.3** | **Maximum refrigerant charge** | | N/A |
| **GG.10.3.1** | **Maximum refrigerant charge limit A** | | N/A |
| | The maximum refrigerant charge mmax in a room and the required minimum room area Amin of the installed appliance with refrigerant charge mc | | N/A |
| | The effective height, Hr, of the unit is determined as follows: | | N/A |
| | – Where the release height, h0, as determined in Clause GG.2 is equal to or greater than 1,8 m or the appliance is with integral circulation airflow, the effective height, Hr, is the room height in m but not more than 2,2 m unless h0 is higher than 2,2 m. | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | – In all other cases, the effective height, Hr, is the release height, h0, as determined in Clause GG.2. | | N/A |
| | For room areas exceeding 250 m2, mmax calculated with a room area (A) of 250 m2. | | N/A |
| **GG.10.3.2** | **Maximum refrigerant charge limit B** | | N/A |
| | The maximum refrigerant charge, mmax, in a room and the minimum room area, Amin are calculated, of the installed appliance with refrigerant charge. | | N/A |
| | The effective height, Hr, of the unit is determined as follows: | | N/A |
| | – Where the release height, h0, as determined in Clause GG.2, is equal to or greater than 1,8 m or the appliance is with integral circulation airflow, the effective height, Hr, is the room height in m but not more than 2,2 m unless h0 is higher than 2,2 m. | | N/A |
| | – In all other cases, the effective height, Hr, is the release height, h0, as determined in Clause GG.2. | | N/A |
| | For room areas exceeding 250 m2, mmax calculated with a room area (A) of 250 m2 | | N/A |
| **GG.10.4** | **Requirement for units with integral circulation airflow** | | N/A |
| **GG.10.4.1** | **General** | | N/A |
| | The minimum air velocity and minimum airflow as follows: | | N/A |
| | – Minimum airflow = 240 m3/h | | N/A |
| | – There is no minimum circulation airflow velocity requirement for downwards airflow. | | N/A |
| | – Minimum air velocity for upwards airflow | | N/A |
| | – The unit air velocity (v) calculated as airflow divided by the nominal face area of the outlet. The grille area shall not be deducted. | | N/A |
| | As an alternative, for airflow angles between 15 degrees and 90 degrees, the minimum air velocity (vmin) can be determined by linear interpolation of the values included in Table GG.5. | | N/A |
| | Operation of circulation airflow comply with either GG.10.4.2 or GG.10.4.3. | | N/A |
| **GG.10.4.2** | **Continuous circulation airflow** | | N/A |
| | The indoor fan run continuously, other than for short periods for maintenance and service. The airflow shall be detected continuously or monitored continuously. Within 10 seconds in the event that the airflow is reduced below Qmin, the following actions taken: | | N/A |
| | – warn user that airflow is reduced | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | – disable the compressor operation unless the compressor operation reduces the leak rate or the total amount released to the indoor space. | | N/A |
| **GG.10.4.3** | **Circulation airflow activated by a refrigerant leak detection system** | | N/A |
| | If a leak detection system is activated, the following actions taken and continued for at least 5 min after the leak detection system has reset: | | N/A |
| | – energize the fan(s) of the appliance to deliver indoor airflow at or above the minimum airflow Qmin; | | N/A |
| | – disable the compressor operation unless the compressor operation reduces the leak rate or the total amount released to the indoor space. | | N/A |
| **GG.11** | **Ventilation for enhanced tightness refrigerating systems using A2L refrigerants** | | N/A |
| **GG.11.1** | **General** | | N/A |
| | Ventilation shall be made to a place where sufficient air is available to dilute the leaked refrigerant such as outdoors or a large space. | | N/A |
| | Where ventilation is to an indoor space, the total area of that space and the space in which the appliance is installed shall have a total room area not less than Amin according to the Formula (GG.32). If the opening area in GG.11.2 is not large enough, the measure of GG.11.3 taken with ventilation to the outdoors. | | N/A |
| | The effective height, Hr, of the unit is determined as follows: | | N/A |
| | – Where the release height, h0, as determined in Clause GG.2, is equal to or greater than 1,8 m or the appliance is with integral circulation airflow, the effective height, Hr, is the room height in m but not more than 2,2 m unless h0 is higher than 2,2 m; | | N/A |
| | – In all other cases, the effective height, Hr, is the release height, h0, as determined in Clause GG.2. | | N/A |
| **GG.11.2** | **Natural ventilation** | | N/A |
| | If natural ventilation is applied, the following met. | | N/A |
| | – Openings for natural ventilation comply with GG.1.4. | | N/A |
| | – Natural ventilation to outdoors is not allowed below ground level. | | N/A |
| | – Natural ventilation from an occupied space not be made to outdoors. | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | The minimum opening area for natural ventilation (Anv,min) to an indoor space | | N/A |
| | The minimum opening area for natural ventilation (Anv,min) to an outdoor space | | N/A |
| **G.11.3** | **Mechanical ventilation** | | N/A |
| **GG.11.3.1** | **Operation of mechanical ventilation** | | N/A |
| | Mechanical ventilation operated continuously or shall be switched on by a leak detection system. | | N/A |
| | Operation shall be according to GG.8.3.1 | | N/A |
| **GG.11.3.2** | **Required airflow** | | N/A |
| | For (Q × 0,25*LFL)/10 < 1, the airflow of the mechanical ventilation shall be at least the quantity that satisfies the following formula for $m_c$ | | N/A |
| | For (Q × 0,25*LFL)/10 ≥ 1, the airflow shall be determined according the following formula for Q | | N/A |
| **GG.11.3.3** | **Mechanical ventilation openings** | | N/A |
| | The upper edge of the air extraction opening from the room located at a height equal to or below the refrigerant release point | | N/A |
| | The mechanical ventilation air extracted from the space positioned relative to the mechanical ventilation air intake openings such that the makeup air will mix with the leaked refrigerant. | | N/A |
| | Where circulation airflow according to GG.10.4 is not provided, the openings shall comply with GG.8.3.3. | | N/A |
| **GG.12** | **Safety shut-off valves for enhanced tightness refrigerating systems using A2L refrigerants** | | N/A |
| | Safety shut-off valves positioned to enable access for maintenance by an authorized person. | | N/A |
| | For appliances which are not on the lowest underground floor, where the release height, h0, as determined in Clause GG.2 is equal to or greater than 1,8 m or the appliance is with integral circulation airflow, the releasable charge as determined by Annex QQ | | N/A |
| **GG.13** | **Safety alarms for enhanced tightness refrigerating systems using A2L refrigerants** | | N/A |
| **GG.13.1** | **General** | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | If an alarm is employed to warn of a leak in the occupied space, the alarm shall warn of a refrigerant leak in accordance with GG.13.2. The alarm shall be turned on by the signal from the leak detection system. The alarm also alert an authorized person to take appropriate action. | | N/A |
| **GG.13.2** | **Alarm system warning** | | N/A |
| **GG.13.2.1** | **General** | | N/A |
| | The alarm system warn both audibly and visibly, such as both a loud (15 dBA above the background level) buzzer and a flashing light. | | N/A |
| **GG.13.2.2** | **Alarm for general occupancy** | | N/A |
| | At least one alarm inside the occupied space be installed. For the occupancy listed below, the alarm system shall also warn at a supervised location, such as the night porter's location, as well as the occupied space. | | N/A |
| | Rooms, parts of buildings, building where | | N/A |
| | sleeping facilities are provided, | | N/A |
| | people are restricted in their movement, | | N/A |
| | an uncontrolled number of people are present, or | | N/A |
| | to which any person has access without being personally acquainted with the necessary safety precautions. | | N/A |
| **GG.14** | **Allowable charge for enhanced tightness refrigerating systems using A2 or A3 refrigerant** | | N/A |
| **GG.14.1** | **General** | | N/A |
| | Clause GG.14 is applicable to enhanced tightness refrigerating systems in compliance with 22.125 using A2 or A3 refrigerants with refrigerant charge m1 < mc ≤ m2. | | N/A |
| **GG.14.2** | **Requirement for enhanced tightness units without integral circulation airflow** | | N/A |
| | For enhanced tightness refrigerating systems, the maximum refrigerant charge in a room in accordance with the following: | | N/A |
| | mmax = CF × LFL × A × h0 | | N/A |
| | or the required minimum room area Amin of installed appliance with refrigerant charge mc in accordance with the following; | | N/A |
| | Amin = mc / (CF × LFL × h0) | | N/A |
| **GG.14.3** | **Requirement for enhanced tightness units with integral circulation airflow** | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| **GG.14.3.1** | **General** | | N/A |
| | When the fan integrated into an appliance is continuously operated or operation is initiated by a leak detection system with sufficient airflow rate, the maximum refrigerant charge can be increased or minimum room area can be reduced according to the following. | | N/A |
| | For enhanced tightness refrigerating systems, the maximum refrigerant charge in a room in accordance with the following: | | N/A |
| | mmax = CF × LFL × A × 2,2 | | N/A |
| | or the required minimum room area Amin of installed appliance with refrigerant charge mc in accordance with the following; | | N/A |
| | Amin = mc / (CF × LFL × 2,2) | | N/A |
| | The minimum circulation airflow determined as: | | N/A |
| | $Q_{min} = 3\,600 \frac{5Y\sqrt{A_o}\,\dot{m}_{leak}^{3/4}}{h_o^{1/4}\,[LFL\times(1-CF)]^{5/8}}$ | | N/A |
| | For refrigerants not listed in Table GG.6, leak mass flow rate (ṁleak) is calculated from: | | N/A |
| | $\dot{m}_{leak} = \left(\frac{167}{432}\right)\dot{M}_S$ | | N/A |
| | The choked flow mass flux, Ṁs, is: | | N/A |
| | $\dot{M}_S = 0{,}61\times\sqrt{k\rho_0 p_0\left(\frac{2}{k+1}\right)^{\frac{k+1}{k-1}}}$ | | N/A |
| | Operation of circulation airflow comply with either GG.14.3.2 or GG.14.3.3. | | N/A |
| **GG.14.3.** | **Continuous circulation airflow** | | N/A |
| | The indoor fan run continuously, other than for short periods for maintenance and service. The airflow monitored continuously. Within 10 seconds in the event that the airflow is reduced below Qmin, the following actions taken: | | N/A |
| | – warn user that airflow is reduced; | | N/A |
| | – disable the compressor operation unless the compressor operation reduces the leak rate or the total amount released to the indoor space. | | N/A |
| **GG.14.3.3** | **Circulation airflow activated by a leak detection system** | | N/A |
| | If a leak detection system is activated, the following actions taken and continued for at least 5 min after the leak detection system has reset: | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | – energize the fan(s) of the appliance to deliver indoor airflow at or above the minimum airflow Qmin; | | N/A |
| | – disable the compressor operation unless the compressor operation reduces the leak rate or the total amount released to the indoor space. | | N/A |
| **JJ** | **ANNEX JJ (NORMATIVE)- ALLOWABLE OPENING OF RELAYS AND SIMILAR COMPONENTS TO PREVENT IGNITION OF A2L REFRIGERANTS** (IEC 60335-2-40:2024) | | - |
| **JJ.1** | **General** | | N/A |
| | Annex JJ is applicable to electric components or devices of appliances using A2L refrigerants. | | N/A |
| | Annex JJ defines the maximum size of openings in relays and similar components that prevents flame propagation to outside. A relay and similar components that comply with the requirements of this annex are not considered as a potential ignition source for A2L refrigerants. | | N/A |
| **JJ.2** | **Definition of the opening** | | N/A |
| | The effective diameter is the equivalent diameter of a circular opening that has the same quenching effect to an opening of any shape. The effective diameter of the opening of relays and similar components is defined as $d_{eff}$ | | N/A |
| **JJ.3** | **Determination of maximum allowable opening** | | N/A |
| | Relays and similar components not be considered as a potential ignition source if the effective diameter of all holes complies with the following equation: | | N/A |
| | Alternatively, a type test can be used to determine if relays and similar components are not a potential ignition source. This type test show that there is no propagation of a flame from any contact inside of the relay to the outside, for the concentration of the refrigerant as used for determining the maximum burning velocity. Where the type test is used, the effective diameter limit is 12 mm. | | N/A |
| **KK** | **ANNEX KK (NORMATIVE) - TEST METHOD FOR HOT SURFACE IGNITION TEMPERATURE FOR A2L** (IEC 60335-2-40:2024) | | - |
| **KK.1** | **General** | | N/A |
| | The hot surface ignition temperature of A2L refrigerants shall be determined according to Annex KK. The refrigerants shall be sprayed onto a horizontal flat plate surface which is set at the test temperature. | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | The test system consists of a hot plate, a spray tube and a chimney. Figure KK.1, Figure KK.2 and Figure KK.3 display the set-up of the test apparatus. | | N/A |
| **KK.2** | **Test equipment requirements** | | N/A |
| | The hot plate shall have the following characteristics. The hot plate shall consist of a flat stainless steel plate with the dimensions: | | N/A |
| | Diameter: 50 mm ± 2,0 mm | | N/A |
| | Thickness: 6 mm –0/+2,0 mm | | N/A |
| | Surface texture: ISO 1302 | | N/A |
| | The hot plate positioned horizontally. The heaters shall provide uniform heating of the plate. All surfaces other than the test surface should be thermally insulated using ceramic fibre board capable to withstand 815 °C. This insulation shall be such that vapours cannot be ignited by other than the hot plate top surface. | | N/A |
| | Spray system shall consist of a liquid supply, two valves (trap liquid volume of 1,0 cm3 ± 0,2 cm3), tubing for directing the spray. The spray tube from valve to the end have the following dimensions: | | N/A |
| | Length: 250 mm ± 5,0 mm | | N/A |
| | Outer diameter: ≤ 4 mm | | N/A |
| | Inner diameter: 1,6 mm ± 0,1 mm | | N/A |
| | Use a type K thermocouple with the individual wires spot welded on opposite sides of the centre of the upper surface of the hot plate. | | N/A |
| | A borosilicate or quartz glass chimney shall be 230 mm ± 10 mm long and 70 mm ± 10 mm inner diameter . The chimney shall be supported so that it is vertically mounted and has a gap of 2,5 mm ± 0,2 mm between its bottom edge and the top on the insulation. | | N/A |
| **KK.3** | **Procedure** | | N/A |
| | The ambient conditions of the test shall be set at 23 °C ± 3 °C and 50 % RH ± 5 % RH. The chimney and hot plate establishes a constant air velocity during the test. This airflow dilutes the vapours so that an optimum (near stoichiometric) concentration for ignition develops over the hot surface. | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | The test performed in a laboratory fume hood. The test apparatus including the chimney top shall be located in the laminar flow region of the laboratory fume hood so the chimney flow is not disturbed. | | N/A |
| | The end of the spray refrigerant line placed 40 mm ± 10 mm above the hot plate and shall point at the centre of the hot plate. The tube shall be perpendicular to the horizontal plate. | | N/A |
| | Operating steps: | | N/A |
| | 1) The hot plate heated until a steady test temperature is maintained for 5 min. The plate temperature kept within ±15 °C of the set-point during the test. | | N/A |
| | 2) Refrigerant used for the test the nominal composition (NC) per ISO 817. Refrigerant from the liquid phase shall be trapped between valve 1 and valve 2. Open valve C to spray the liquid refrigerant onto the centre of the hot plate. | | N/A |
| | 3) Observe and record if ignition (flames) occurs or does not occur within 3 min after release. | | N/A |
| | Care shall be given to avoid vapours getting under the insulation, any ignition outside of the chimney is due to ignition on surfaces hotter than the test surface. | | N/A |
| | 4) A minimum of 5 min of ventilation shall be allowed between runs to clear out reaction products and residual refrigerant. | | N/A |
| | 5) Perform a minimum of 5 repetitions trials at each temperature being tested. | | N/A |
| | 6) The temperature of the hot plate shall be set at 800 °C, if ignition occurs, then the plate temperature is to be reduced in increments of 20 °C until no ignition occurs in five trials. This temperature is to be recorded as the hot surface ignition temperature (HSIT). | | N/A |
| **KK.4** | **Test report** | | N/A |
| | The results shall be recorded in a test report. The report shall include all the information necessary for the interpretation of the test and all information required by the method used. The report include: | | N/A |
| | documentation with the sample identity and composition, | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | temperature where ignition did not occur and where ignition did occur if applicable. | | N/A |
| | The reported hot surface ignition temperature shall be highest temperature with no ignition in five trials. | | N/A |
| **MM** | **ANNEX MM (NORMATIVE) - REFRIGERANT SENSOR LOCATION CONFIRMATION TEST** (IEC 60335-2-40:2024) | | - |
| **MM.1** | **General** | | N/A |
| | This test is applicable to appliances with refrigerant detection systems other than remote detection | | N/A |
| | The purpose of this test is to demonstrate that the refrigerant sensor(s) of the refrigerant detection system(s), where required, will adequately detect refrigerant, in the event of a leak when installed in the location specified by the manufacturer. Compliance will be determined by measurement of the refrigerant concentration in the location of the refrigerant sensor. | | N/A N/A |
| **MM.2** | **Test methods** | | N/A |
| **MM.2.1** | **General** | | N/A |
| **MM.2.2** | **Test with fan OFF** | | N/A |
| **MM.2.3** | **Test with fan ON** | | N/A |
| **MM.2.4** | **Test set-up** | | N/A |
| **MM.2.5** | **Instrumentation** | | N/A |
| **MM.2.6** | **Compliance criteria** | | N/A |
| **NN** | **ANNEX NN - FLAME ARREST ENCLOSURE VERIFICATION TEST FOR A2L REFRIGERANTS** (IEC 60335-2-40:2024) | | - |
| **NN.1** | **General** | | N/A |
| | Annex NN is applicable to appliances using A2L refrigerants | | N/A |
| | A flame arrest enclosure is a device or assembly enclosing components with electrical contacts that are made and broken, or similar devices which can become a source of ignition which will withstand an internal ignition of a A2L refrigerant vapour which can enter it without suffering damage and without transmission of flame from the internal ignition to an external A2L refrigerant vapour of the same refrigerant. | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Electrical components enclosed in a flame arrest enclosure in compliance with the test procedures below shall not be considered as a source of ignition. | | N/A |
| | If all openings in the enclosure comply with Annex JJ, the enclosure is deemed to comply. | | N/A |
| **NN.2** | **Test method** | | N/A |
| **PP** | **ANNEX PP - LEAK DETECTION SYSTEM CONFIRMATION TEST FOR FLAMMABLE REFRIGERANTS** (IEC 60335-2-40:2024) | | - |
| **PP.1** | **General** | | N/A |
| | This test is applicable to appliances using flammable refrigerants with leak detection systems which initiate safety measures upon detection when required according to Annex GG. This test is not applicable to refrigerant detection systems using remote refrigerant sensors. | | N/A |
| | The leak detection system comply with the following: | | N/A |
| | – for leak detection systems using refrigerant detection systems, the requirements in Clause PP.2 shall apply; | | N/A |
| | – for leak detection systems using ultrasonic based detection systems, the requirements of Clause PP.2 apply; | | N/A |
| | – for leak detection systems using system parameter-based detection systems, the requirements of Clause PP.3 apply. | | N/A |
| | For the low leak rate of PP.2.2.2 and the leak rate of PP.2.2.3 and the small leak orifice of PP.3.2, the actions required by Annex GG completed within 90 seconds of the initiation of the simulated leak. | | N/A |
| | For the high leak rate of PP.2.2.2 and the large leak orifice of PP.3.3, the actions required by Annex GG shall be completed within 30 seconds of the initiation of the simulated leak. For appliances where the release height h0 as determined in Clause GG.2 is less than 1 m, the actions required by Annex GG completed within 15 seconds of the initiation of the simulated leak. | | N/A |
| **PP.2** | **Test method for leak detection systems using refrigerant detection systems and ultrasonic based detection systems** | | N/A |
| **PP.2.1** | **Test set-up** | | N/A |
| **PP.2.1.1** | **General** | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| **PP.2.1.2** | **Simulation of leak** | | N/A |
| **PP.2.1.3** | **Installation conditions** | | N/A |
| **PP.2.1.4** | **Test room** | | N/A |
| **PP.2.2** | **Test procedure** | | N/A |
| **PP.2.2.1** | **General** | | N/A |
| **PP.2.2.2** | **Fan OFF** | | N/A |
| **PP.2.2.3** | **Fan ON** | | N/A |
| **PP.2.2.3.1** | **General** | | N/A |
| **PP.2.2.3.2** | **Enhanced tightness refrigerating systems** | | N/A |
| **PP.2.2.3.3** | **Enhanced tightness refrigerating systems** | | N/A |
| **PP.3** | **Test method for leak detection systems using system parameter based detection** | | N/A |
| **QQ** | **ANNEX QQ - METHODS FOR DETERMINING RELEASABLE CHARGE** (IEC 60335-2-40:2024) | | N/A |
| **QQ.1** | **General** | | N/A |
| **QQ.2** | **Determination of releasable charge by a simulated lea** | | N/A |
| **QQ.2.1** | **Test set-up** | | N/A |
| **QQ.2.2** | **Test method** | | N/A |
| **QQ.3** | Determination of releasable charge by a simulated leak for refrigerating systems complying with Clause GG.10 | | N/A |
| **QQ.3.1** | **General** | | N/A |
| | The releasable charge, mrl, determined by the test of QQ.3.2 and QQ.3.3. | | N/A |
| **QQ.3.2** | **Test set-up** | | N/A |
| | Install the appliance, including safety shut-off valves, according to the instructions, in the smallest room as specified by the instructions, with the set-up that will create the largest releasable charge for that room. | | N/A |
| | The refrigerating system evacuated prior to each test, and then charged with refrigerant equal to mc, where mc is the refrigerant charge in kg. | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | A calibrated leak opening installed in the refrigerating system that would result in the greatest amount of refrigerant released in the occupied space. A valve to enable opening and closing of the calibrated leak opening installed between the appliance and the calibrated leak opening. The calibrated leak shall be at the point in the circuit that has the highest saturated pressure in the indoor unit during steady state operation. | | N/A |
| | The calibrated leak opening vent into a volume at atmospheric pressure. | | N/A |
| | The calibrated opening a capillary or orifice that leaks at 2,8 g/s from saturated liquid at a saturated pressure of 63 °C. | | N/A |
| **QQ.3.3** | **Test method** | | N/A |
| | The refrigerating system operate according to the operating state until steady state is reached for at least 30 minutes, prior to opening the valve of the calibrated leak opening. | | N/A |
| | The test repeated at least 3 times and the releasable charge 2 standard deviations above the mean result | | N/A |
| | The valve to the calibrated leak opening is opened. | | N/A |
| | The refrigerating system shall operate normally for tr1 time with the calibrated leak open, where tr1 is the time before leak is detected as determined in Clause QQ.5. | | N/A |
| | After the tr1 time, the refrigerant charge limited system simulate a detected leak. | | N/A |
| | After the safety shut-off valves are closed, the remaining charge mrm contained in the part of the refrigerating system which is closed by the safety shut-off valves is measured. | | N/A |
| | The releasable charge (in kg) is:<br>mrl = mc – mrm | | N/A |
| **QQ.4** | **Determination of releasable charge by calculation and test for refrigerating systems complying with Clause GG.10** | | N/A |
| **QQ.4.1** | **General** | | N/A |
| | The releasable charge, mrl, calculated as the sum of the refrigerant released in the separate stages according to the following:<br>mrl = tr1 × 0,002 8 + mr2 + mr3 | | N/A |
| **QQ.4.2** | **Refrigerant release between detection and closing the safety shut-off valves** | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | The refrigerant amount released between the leak detection system giving an output signal and closing the safety shut-off valves, mr2, determined as:<br>mr2 = 0,002 8 × tcl | | N/A |
| **QQ.4.3** | **Determination of mr3** | | N/A |
| **QQ.4.3.1** | **General** | | N/A |
| | To determine the releasable charge after closing the shut-off valves, mr3, which can leak into the occupied space, determine the releasable charge for each part (unit or piping), mr3,i, that can leak into the occupied space after closing the shut-off valves by one of the following methods: | | N/A |
| | – determine apparent density, ρpart,i, by measuring the pressure according to QQ.4.3.2 | | N/A |
| | – determine apparent density, ρpart,i, by applying default values according to QQ.4.3.3; | | N/A |
| | – determine apparent density, ρpart,i, according to QQ.4.3.4. | | N/A |
| | A part shall be the piping or the indoor unit between the field connection points. | | N/A |
| | The releasable charge after closing the shut-off valves, mr3, the sum of the charge of each part that can leak into the occupied space after closing the shut-off valves:<br>mr3 = ∑ Vpart,i × ρpart,i | | N/A |
| **QQ.4.3.2** | **Determine apparent density, ρpart,i, by measuring the pressure** | | N/A |
| | To determine the apparent density, ρpart,i, of the releasable charge after closing the shut-off valves for the evaluated part of the system by measuring the pressure, the following procedure applied. | | N/A |
| **QQ.4.3.3** | **Determine apparent density, ρpart,i, by default values** | | N/A |
| | When no test is executed, the following method applied. | | N/A |
| | The refrigerant state (liquid, gas or mixture) for the evaluated part of the system determined. | | N/A |
| | The apparent density for the evaluated part of the system, ρpart,i, shall be determined as: | | N/A |
| | – for liquid piping: the density of saturated liquid at 10 °C; | | N/A |
| | – for gas piping: the density of saturated gas at 42 °C; | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | – for piping containing mixture of gas and liquid: the density of saturated liquid at 10 °C; | | N/A |
| | – for indoor units: the density of saturated liquid at 10 °C. | | N/A |
| **QQ.4.3.4** | **Determine apparent density, ρpart,i, by measuring the recovered refrigerant amount from the unit or piping** | | N/A |
| | To determine the apparent density, ρpart,i, of the releasable refrigerant after closing the shut-off valves for the evaluated indoor unit or piping by measuring the recovered refrigerant amount, the following procedure applied. | | N/A |
| | Shut-off valves for testing installed upstream and downstream of the part where the apparent density is measured. Shut-off valves for testing shall be of the same type as the safety shut-off valves used for the appliances. The action to shut-off made in accordance with the normal operation of the safety shut-off valves. | | N/A |
| **QQ.5** | **Time before the leak is detected, tr1** | | N/A |
| **QQ.5.1** | **General** | | N/A |
| | The time before a leak is detected, tr1, in seconds (s) is determined by one of the following: | | N/A |
| | – where the refrigerant sensor location is in compliance with Annex MM when tested at the maximum airflow for the operating state, QQ.5.2 applies; | | N/A |
| | – where the leak detection system is in compliance with Annex PP, QQ.5.2 applies; | | N/A |
| | – for all other cases, QQ.5.3 applies. | | N/A |
| **QQ.5.2** | **Determination of tr1 by default time** | | N/A |
| | The time before a leak is detected, tr1, in seconds (s) is determined by one of the following: | | N/A |
| | – where the refrigerant sensor location is in compliance with Annex MM when tested at the maximum airflow for the operating state, QQ.5.2 applies; | | N/A |
| | – where the leak detection system is in compliance with Annex PP, QQ.5.2 applies; | | N/A |
| | – for all other cases, QQ.5.3 applies. | | N/A |
| **QQ.5.2** | **Determination of tr1 by default time** | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | The time for the leak detection system to give an output signal, tr1, 120 s. | | N/A |
| **QQ.5.3** | **Determination of tr1 based on effective room concentration** | | N/A |
| | The time for the refrigerant detection system to give an output signal, tr1, in seconds determined as:<br>tr1 = (Hr × Amin × LFL × Cset / 0,002 8) + 30 | | N/A |
| **QQ.6** | **Test conditions for releasable charge limited systems** | | N/A |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| **10.1** | **TABLE: Power input deviation** | | | | | | |
|---|---|---|---|---|---|---|---|
| **Power deviation at voltage** | **Voltage value (V)** | **P rated (W)** | **P measured (W)** | **Outlet marking (W)** | **ΔP** | **Required ΔP** | **Remark** |
| One Rated voltage | | | | | | | |
| Mean of voltage range of ≤ 10%<br>With one power input relating to the mean | 230 V, 50 Hz | 440 | 436.2 | - | -0.9 % | 15 % | pass |
| Mean of voltage range of ≤ 10%<br>With one power input relating to the mean | 230 V, 60 Hz | 440 | 431.5 | - | -1.9% | 15 % | pass |
| Upper limit for other cases | | | | | | | |
| Lower limit for other cases | | | | | | | |
| Supplementary information:<br>For combined appliance power to motor or motors = | | | | | | | |

| **10.2** | **TABLE: Current deviation** | | | | | | **N/A** |
|---|---|---|---|---|---|---|---|
| **Current deviation at voltage:** | **Voltage value (V)** | **I rated (A)** | **I measured (A)** | **Outlet marking (A)** | **ΔI** | **Required ΔI** | **Remark** |
| One Rated voltage | | | | | | | |
| Mean of voltage range of ≤ 10%<br>With one rated current relating to the mean | | | | | | | |
| Upper limit for other cases | | | | | | | |
| Lower limit for other cases | | | | | | | |
| Supplementary information:<br>For combined appliance current to motor or motors = | | | | | | | |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | | | |
|---|---|---|---|
| **11.8** | **TABLE: Heating Test (Heating appliances)** | | **N/A** |
| | **Test voltage (V) :**<br>**Test input power (W) :**<br>**Frequency (Hz) :** | | **—** |
| | **Ambient (°C) :** | | **—** |

| **Thermocouple locations**** | **Max. temperature rise measured, ΔT (K)** | **Max. temperature rise limit, ΔT (K)** |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |

Supplementary information: ** If a thermocouple is used to measure winding temperature the insulation class shall be reported next to the ΔT (K) limit

| | | | |
|---|---|---|---|
| | **If the resistance method is used to measure winding temperature** | | |
| | **Ambient, $t_1$ (°C) :** | | **—** |
| | **Ambient, $t_2$ (°C) :** | | **—** |

| **Temperature rise of winding** | **$R_1$ (Ω)** | **$R_2$ (Ω)** | **ΔT (K)** | **Max. ΔT (K)** | **Insulation class** |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |

Supplementary information: Test voltage for the results reported =

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | | | |
|---|---|---|---|
| **11.8** | **TABLE: Heating Test (Motor-operated appliances and combined appliances)** | | **P** |
| | **Test voltage (V) ……:**<br>R = One Rated Voltage (V) ……..:<br>U = Upper limit of range (V)……..:<br>L =Lower limit of range (V) ……...:<br>Frequency (Hz)……: | 254.4 | |
| | **Ambient (°C) :** | | |

| **Thermocouple locations**** | **Max. temperature rise measured, ΔT (K)** | | | | **Max. temperature rise limit, ΔT (K)** |
|---|---|---|---|---|---|
| | **R** | **U** | **M** | **L** | |
| Supply cord | | 6.5 | * | | 50 |
| Internal wire | | 28.2 | * | | 175 |
| Fan motor winding | | 41.5 | | | 85 |
| X-cap. | | 31.4 | * | | 85 |
| Switch | | 8.5 | * | | 100 |
| Plastic enclosure (Inner) | | 10.1 | * | | cl.30 |
| Plastic enclosure (outer) | | 7.9 | * | | Ref. |
| Tested corner | | 5.9 | * | | 65 |

Supplementary information: * In general it will only be necessary to conduct the test at either the U or L condition whichever gives the higher current

** If a thermocouple is used to measure winding temperature the insulation class shall be reported next to the ΔT (K) limit

| | | | |
|---|---|---|---|
| | **If the resistance method is used to measure winding temperature** | | |
| | **Ambient, t1 (°C)……:** | | — |
| | **Ambient, t2 (°C)……:** | | — |

| **Temperature rise of winding** | **R1 (Ω)** | **R2 (Ω)** | **ΔT (K)** | **Max. ΔT (K)** | **Insulation class** |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |

Supplementary information: Test voltage for the results reported =

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| 12 | TABLE: Charging of metal-ion batteries | | | | | | N/A |
|---|---|---|---|---|---|---|---|
| **Battery type** | **Imbalance** | **$T_{meas}$ (°C)** | **$T_{cell}$ (°C)** | **$T_{amb(max)}$ (°C)** | **$T_{amb(min)}$ (°C)** | **$T_{amb(test)}$ (°C)** | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Supplementary information:

$T_{meas}$ Cell surface temperature measured during the test
$T_{cell}$ Cell surface temperature specified by the cell manufacturer
$T_{amb(max)}$ Maximum ambient temperature for charging specified by the manufacturer
$T_{amb(min)}$ Minimum ambient temperature for charging specified by the manufacturer
$T_{amb(test)}$ Ambient temperature of the test room during the test

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | | | |
|---|---|---|---|
| **13.2** | **TABLE: Leakage current** | | **P** |
| | **Heating appliances: 1,15 x rated input (W)…….:** | - | **—** |
| | **Motor-operated and combined appliances: 1,06 x rated voltage (V)……:** | 254.4 | **—** |

| **Leakage current between:** | **I (mA)** | **Max. allowed I (mA)** |
|---|---|---|
| L/N and accessible metal enclosure | 0.031 | 0.75 |
| L/N and accessible plastic enclosure | 0.027 | 0.35 peak |
| | | |
| | | |
| | | |
| | | |

Supplementary information: Voltage used for Rated power input limit for stationary class I heating appliances =

| **13.3** | **TABLE: Dielectric Strength** | |
|---|---|---|
| **Test voltage applied between:** | **Test potential applied (V)** | **Breakdown / flashover (Yes/No)** |
| Live part and accessible metal enclosure | 1000 | No |
| Live part and accessible plastic enclosure | 3000 | No |
| | | |
| | | |

Supplementary information:

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| 14 | TABLE: Transient overvoltages | | | | | N/A |
|---|---|---|---|---|---|---|
| **Clearance between:** | **Cl (mm)** | **Required Cl (mm)** | **Rated impulse voltage (V)** | **Impulse test voltage (V)** | **Flashover (Yes/No)** | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| Supplementary information: | | | | | | |

| 16.2 | TABLE: Leakage current | | | P |
|---|---|---|---|---|
| | **Single phase appliances: 1,06 x rated voltage (V)……:** | 254.4 | | — |
| | **Three phase appliances: 1,06 x rated voltage divided by √3 (V)……..:** | Test voltage =<br>Frequency = | | — |
| **Leakage current between:** | | **I (mA)** | **Max. allowed I (mA)** | |
| Live part and accessible metal enclosure | | 0.028 | 0.75 | |
| Live part and accessible plastic enclosure | | 0.023 | 0.25 | |
| | | | | |
| | | | | |
| Supplementary information: Voltage used for Rated power input limit for stationary class I heating appliances =…… | | | | |

| 16.3 | TABLE: Dielectric Strength | | P |
|---|---|---|---|
| **Test voltage applied between:** | | **Test potential applied (V)** | **Breakdown / flashover (Yes/No)** |
| Live part and accessible metal enclosure | | 1000 | No |
| Live part and accessible plastic enclosure | | 3000 | No |
| | | | |
| | | | |
| Supplementary information: | | | |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | | | |
|---|---|---|---|
| **17** | **TABLE: Overload protection** | | **N/A** |
| | **Test voltage (V)……..:**<br>R = One Rated Voltage (V)……**:**<br>U = Upper limit of range (V)……...**:**<br>L = Lower limit of range* (V) ……**:**<br>**Frequency (Hz)……...:** | | — |
| | **Ambient (°C) :** | | — |

| **Thermocouple locations**** | **Max. temperature rise measured, ΔT (K)** | | | **Max. temperature rise limit, ΔT (K)** |
|---|---|---|---|---|
| | **R** | **U** | **L** | |
| | | | * | |
| | | | * | |
| | | | * | |
| | | | * | |

Supplementary information: * Only when a protection system actuates at Upper limit of the range
** If a thermocouple is used to measure winding temperature the insulation class shall be reported next to the ΔT (K) limit

| | | | |
|---|---|---|---|
| | **If the resistance method is used to measure winding temperature** | | |
| | **Ambient, $t_1$ (°C)……:** | | — |
| | **Ambient, $t_2$ (°C)……:** | | — |

| **Temperature rise of winding** | **$R_1$ (Ω)** | **$R_2$ (Ω)** | **ΔT (K)** | **Max. ΔT (K)** | **Insulation class** |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |

Supplementary information: Test voltage for the results reported =

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | | | |
|---|---|---|---|
| **17** | **TABLE: Short-circuit protection** | | **N/A** |
| | **Test voltage (V)……..:**<br>R = One Rated Voltage (V)……**:**<br>U = Upper limit of range (V)……..**:**<br>L = Lower limit of range* (V)……..**:**<br>**Frequency (Hz)……..:** | | — |
| | **Ambient (°C) ……..:** | | — |

| **Thermocouple locations**** | **Max. temperature rise measured, ΔT (K)** | | | **Max. temperature rise limit, ΔT (K)** |
|---|---|---|---|---|
| | **R** | **U** | **L** | |
| | | | * | |
| | | | * | |
| | | | * | |
| | | | * | |

Supplementary information: * Only when a protection system actuates at Upper limit of the range
** If a thermocouple is used to measure winding temperature the insulation class shall be reported next to the ΔT (K) limit

| | | | |
|---|---|---|---|
| | **If the resistance method is used to measure winding temperature** | | |
| | **Ambient, $t_1$ (°C)……:** | | — |
| | **Ambient, $t_2$ (°C)……:** | | — |

| **Temperature rise of winding** | **$R_1$ (Ω)** | **$R_2$ (Ω)** | **ΔT (K)** | **Max. ΔT (K)** | **Insulation class** |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |

Supplementary information: Test voltage for the results reported =

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| 19 | TABLE: Abnormal operation conditions | | P |
|---|---|---|---|
| **Operational characteristics** | | **YES/NO** | **Operational conditions** |
| **Are there electronic circuits to control the appliance operation?** | | **Yes** | **-** |
| **Are there “off” or “stand-by” position?** | | **Yes** | **-** |
| **The unintended operation of the appliance results in dangerous malfunction?** | | **Yes** | **-** |

| Sub-clause | Operating conditions description | Test results description | PEC description | EMP 19.11.4 | Software type required | 19.11.3 PEC | Final result |
|---|---|---|---|---|---|---|---|
| **19.2** | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| **19.3** | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| **19.4** | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| **19.5** | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| **19.6** | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| **19.7** | see cl.19.7 detail informal | no hazard | N.A. | N.A. | N.A. | N.A. | pass |
| **19.8** | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| **19.9** | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| **19.10** | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| **19.11.1** | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| **19.11.2** | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| **19.11.4** | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| **19.11.4.8** | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| **19.14** | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| **19.15** | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| **19.16** | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| **19.17** | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| Supplementary information: * Only when a non-self-resetting thermal cut-out or a intentionally weak part actuate at upper limit and does not at a lower limit | | | | | | | |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | | | |
|---|---|---|---|
| **19.7** | **TABLE: Abnormal operation, locked rotor/moving parts** | | **P** |
| | **Test voltage (V)……:** | 254.4 | — |
| | **Ambient, $t_1$ (°C)……:** | | — |
| | **Ambient, $t_2$ (°C)……:** | | — |

| **Temperature rise of winding** | **$R_1$ (Ω)** | **$R_2$ (Ω)** | **ΔT (K)** | **T (°C)** | **Max. T (°C)** |
|---|---|---|---|---|---|
| Fan motor winding | - | - | - | 94.5 | 225 |
| | | | | | |
| | | | | | |
| | | | | | |

Supplementary information:

| | | | |
|---|---|---|---|
| **19.7** | **TABLE: Abnormal operation, locked rotor/moving parts** | | **N/A** |
| | **Test voltage (V)……:** | Test voltage =<br>Frequency =<br>U = Upper limit of the range | — |
| | **Ambient, $t_1$ (°C)……:** | | — |
| | **Ambient, $t_2$ (°C)……:** | | — |

| **Temperature rise of winding** | **$R_1$ (Ω)** | **$R_2$ (Ω)** | **ΔT (K)** | **T (°C)** | **Max. T (°C)** |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Supplementary information:

| | | | |
|---|---|---|---|
| **19.7** | **TABLE: Abnormal operation, locked rotor/moving parts** | | **N/A** |
| | **Test voltage (V)……:** | Test voltage =<br>Frequency =<br>M = Mean of range* | — |
| | **Ambient, $t_1$ (°C)……:** | | — |
| | **Ambient, $t_2$ (°C)……:** | | — |

| **Temperature rise of winding** | **$R_1$ (Ω)** | **$R_2$ (Ω)** | **ΔT (K)** | **T (°C)** | **Max. T (°C)** |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| |
|---|
| Supplementary information: * Only when a non-self resetting thermal cut-out or a intentionally weak part actuate at upper limit of the range and does not at a lower limit |

| **19.7** | **TABLE: Abnormal operation, locked rotor/moving parts** | | | | | **N/A** |
|---|---|---|---|---|---|---|
| | **Test voltage (V)……:** | | | Test voltage =<br>Frequency =<br>L = Lower limit of the range* | | — |
| | **Ambient, $t_1$ (°C)……:** | | | | | — |
| | **Ambient, $t_2$ (°C)……:** | | | | | — |
| **Temperature rise of winding** | **$R_1$ (Ω)** | **$R_2$ (Ω)** | **ΔT (K)** | **T (°C)** | **Max. T (°C)** | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| Supplementary information: * Only when a non-self resetting thermal cut-out or a intentionally weak part actuate at upper limit of the range and does not at a lower limit | | | | | | |

| **19.9** | **TABLE: Abnormal operation, running overload** | | | | | **N/A** |
|---|---|---|---|---|---|---|
| | **Test voltage (V)……:** | | | Test voltage =<br>Frequency =<br>R = One rated voltage | | — |
| | **Ambient, $t_1$ (°C)……:** | | | | | — |
| | **Ambient, $t_2$ (°C)……:** | | | | | — |
| **Temperature rise of winding** | **$R_1$ (Ω)** | **$R_2$ (Ω)** | **ΔT (K)** | **T (°C)** | **Max. T (°C)** | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| Supplementary information: | | | | | | |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | | | |
|---|---|---|---|
| **19.9** | **TABLE: Abnormal operation, running overload** | | **N/A** |
| | **Test voltage (V)……:** | Test voltage =<br>Frequency =<br>L = Lower limit of the range* | — |
| | **Ambient, $t_1$ (°C)……:** | | — |
| | **Ambient, $t_2$ (°C)……:** | | — |

| **Temperature rise of winding** | **$R_1$ (Ω)** | **$R_2$ (Ω)** | **ΔT (K)** | **T (°C)** | **Max. T (°C)** |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Supplementary information: * Only when a non-self resetting thermal cut-out or a intentionally weak part actuate at upper limit of the range and does not at a lower limit

| | | | |
|---|---|---|---|
| **19.9** | **TABLE: Abnormal operation, running overload** | | **N/A** |
| | **Test voltage (V)……:** | Test voltage =<br>Frequency =<br>U = Upper limit of the range | — |
| | **Ambient, $t_1$ (°C)……:** | | — |
| | **Ambient, $t_2$ (°C)……:** | | — |

| **Temperature rise of winding** | **$R_1$ (Ω)** | **$R_2$ (Ω)** | **ΔT (K)** | **T (°C)** | **Max. T (°C)** |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Supplementary information:

| | | |
|---|---|---|
| **19.13** | **TABLE: Abnormal operation, temperature rises** | **P** |

| **Thermocouple locations** | **Max. temperature rise measured, ΔT (K)** | **Max. temperature rise limit, ΔT (K)** |
|---|---|---|
| Supply cord | 11.5 | 150 |
| Tested corner | 10.3 | 150 |
| | | |
| | | |

Supplementary information:

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| 21.1 | TABLE: Impact resistance | | P |
|---|---|---|---|
| **Impacts per surface** | **Surface tested** | **Impact energy (Nm)** | **Comments** |
| 3 times | Enclosure | 0.5 J | pass |
| | | | |
| | | | |
| | | | |
| Supplementary information: | | | |

| 24.1 | TABLE: Critical components information | | | | P |
|---|---|---|---|---|---|
| **Object / part No.** | **Manufacturer/ trademark** | **Type / model** | **Technical data** | **Standard** | **Mark(s) of conformity[1)]** |
| Supply plug | Unirise Electric Wire & Cable Co., Ltd. | UE-312 | 250 V, 16 A | DIN VDE 0620-2-1 | VDE 40013356 |
| Supply cord | Ningbo Qiaopu Electric Co., Ltd. | 60227IEC 53 (H05VV-F) | 3G×1.5 mm$^2$ | K60227-5 | KC SU01035-5002B |
| -Alt. | Unirise Electric Wire & Cable Co., Ltd. | 60227IEC 53 (H05VV-F) | 3G×1.5 mm$^2$ | EN 50525-2-11 | VDE 40017449 |
| Fuses link | DELIXI Group Co., Ltd. | RT18-32 | 380 V, 10 A | IEC 60269-1 IEC 60269-2 | CQC CB (CN40495) |
| Switch | YUEQING DAHE ELECTRIC CO., LTD | HB | 250 V, 50/60 Hz, T55, 10000 cycles | IEC/EN 61058-1 | TUV Mark R 50332493 |
| Motor compressor | NIDEC GLOBAL APPLIANCE BRASIL LTDA | EGAS 90HLR | 220-240 V~, 50-60 Hz, R-134a | IEC 60335-2-34 | VDE 40018017 |
| -Alt. | NIDEC GLOBAL APPLIANCE BRASIL LTDA | FFI 10HAK | 220-230 V~, 50-60 Hz, R 134a | IEC 60335-2-34 | VDE 40005568 |
| Peristaltic motor | Chongqing Jieheng Peristaltic Pumps Co., Ltd. | 683K/BT | DC 24 V, 1905 ml/min, Class B | IEC 60335-2-75 | Tested with appliance |
| Agitator motor | YOU CHENG INDUSTRIAL Co., LTD | VN-C6-24V | DC 24 V, 7 L/MIN, Class B | IEC 60335-2-75 | Tested with appliance |
| Internal wire | JIANG MEN JIA CHUAN ELECTRIC & CABLE CO LTD | 1007 | Min. 20 AWG, 80 ℃, 300 V | IEC 60335-2-75 | Tested with appliance UL E315723 |
| Heat shrinkable tube | GUANGZHOU KAIHENG NEW MATERIAL CO LTD | K-102 (CB) | 300 V, 125 ℃ | IEC 60335-2-75 | Tested with appliance UL E321827 |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | | | | | |
|---|---|---|---|---|---|
| Relay | IDEC CORPORATION | RJ2S-CL-D24 | 24 VDC, 8 A | IEC 61810-1 | VDE 40015055 |
| Relay | Zhejiang Chint Electrics, Co., Ltd | JQX/024-2Z6 | 24 VDC, 20 A | IEC 61810-1 | VDE 40054247 |
| Temperature controller (NTC) | Shenzhen Kedite Electronics Co., Ltd. | MF52 | 10K, 3950, 70 ℃ | IEC 60335-2-43 | Tested with appliance |
| Fan motor | DONGGUAN SHI XIANG YUE JI DIAN CO., LTD | XY12038H | 220-240 V, 50/60 Hz, 2900 r/min Class B | IEC 60335-2-75 | Tested with appliance |
| Power terminal block | Shanghai Upun Electric Co., Ltd. | UKJ-6 | 800 V, 57 A, V-0, 125 ℃, 0.2-10 $mm^2$ | IEC/EN 60947-7-1 | VDE 40012860 |
| PCB | KINGBOARD LAMINATES HOLDINGS LTD | KB-5150 | V-0, 130 ℃ | IEC 60335-2-75 | Tested with appliance UL E123995 |
| Plastic enclosure (control panel etc.) | KINGFA SCI & TECH CO LTD | PCS-FNT9(S)4 | PC, V-0 | IEC 60335-2-75 | Tested with appliance UL E171666 |
| Supplementary information:<br>[1]) Provided evidence ensures the agreed level of compliance. See OD-CB2039. | | | | | |

| **25.16** | **TABLE:** | | | **P** |
|---|---|---|---|---|
| **Supply Cord Designation**<br>**Lightest permissible type** | **Smallest cross-sectional area ($mm^2$)** | **Supply Cord Designation**<br>**Next heavier permissible type** | **Largest cross-sectional area ($mm^2$)** | **Verdict** |
| Type Y | 0.75 | - | - | pass |
| | | | | |
| | | | | |
| | | | | |
| Supplementary information: For Type X attachment the appliance was supplied with supply cord (See 25.7)<br>Type =……cross-sectional area = $mm^2$ | | | | |

| **25.17** | **TABLE:** | | | | **P** |
|---|---|---|---|---|---|
| **Supply Cord Designation**<br>**Supplied type**<br>**(See 25.7)** | **Cross-sectional area ($mm^2$)** | **Verdict** | **Supply Cord Designation**<br>**Listed alternative type in 24.1 Table** | **cross-sectional area ($mm^2$)** | **Verdict** |
| Type Y | 0.75 | pass | 60245 IEC57 | 0.75 | pass |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| Supplementary information: For Type Y attachment the appliance was supplied with supply cord (See 25.7)<br>Type =……cross-sectional area = mm$^2$ | | | | | |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| 28.1 | TABLE: Threaded part torque test | | P |
|---|---|---|---|
| **Threaded part identification** | **Diameter of thread (mm)** | **Column number (I, II, or III)** | **Applied torque (Nm)** |
| Screw for enclosure | 2.8 | II | 0.4 |
| | | | |
| | | | |
| | | | |
| Supplementary information: | | | |

| 29 | TABLE: Clearance and creepage distance measurements | | | | | P |
|---|---|---|---|---|---|---|
| **Clearance cl and creepage distance dcr at/of:** | **Up (V)** | **U r.m.s. (V)** | **Required cl (mm)** | **cl (mm)** | **Required dcr (mm)** | **dcr (mm)** |
| Basic insulation | 2500 | 240 | 1.5 | ＞2.0 | 4.0 | ＞5.2 |
| Reinforced insulation | 2500 | 240 | 3.0 | ＞3.9 | 8.0 | ＞11.0 |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| Supplementary information: | | | | | | |

| 30.1 | TABLE: Ball pressure test of thermoplastics | | P |
|---|---|---|---|
| **Allowed impression diameter (mm).....:** | | | — |
| **Object/ Part No./ Material** | **Manufacturer/ trademark** | **Test temperature (°C)** | **Impression diameter (mm)** |
| Enclosure | see table 24.1 | 75 | 1.2 |
| | | | |
| | | | |
| | | | |
| Supplementary information: | | | |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| 30.2 | TABLE: Resistance to heat and fire - Glow wire tests | | | | | | | P |
|---|---|---|---|---|---|---|---|---|
| **Object/ Part No./ Material** | **Manufacturer / trademark** | **Glow wire test (GWT); (°C)** | | | | | | **Verdict** |
| | | **550** | **650** | | **750** | | **850** | |
| | | | **te** | **ti** | **te** | **ti** | | |
| Enclosure | see table 24.1 | √ | | | 0 | 0 | √ | pass |
| Switch | see table 24.1 | | | | 0 | 0 | √ | pass |
| | | | | | | | | |
| **Object/ Part No./ Material** | **Manufacturer / trademark** | **Glow-wire flammability index (GWFI), °C** | | | | **GW ignition temp. (GWIT), °C** | | **Verdict** |
| | | **550** | **650** | **750** | **850** | **675** | **775** | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| The test specimen passed the glow wire test (GWT) with no ignition [(te – ti) ≤ 2s] (Yes/No)……: | | | | | | | | Yes |
| If no, then surrounding parts passed the needle-flame test of annex E (Yes/No)……: | | | | | | | | N/A |
| The test specimen passed the test by virtue of most of the flaming material being withdrawn with the glow-wire (Yes/No)? : | | | | | | | | Yes |
| Ignition of the specified layer placed underneath the test specimen (Yes/No)……..: | | | | | | | | No |
| Supplementary information:<br>550 °C GWT not relevant (or applicable) to parts of material classified at least HB40 or if relevant HBF<br>The GWIT pre-selection option, the 850 °C GWFI pre-selection option, and the 850 °C GWT are not relevant (or applicable) for attended appliances.<br>Indicate the voltage for obtaining the current upon which the GWT severity is based:<br>If marked with a rated voltage: Rated voltage ☐<br>If marked with a rated voltage range:<br>Lower limit of voltage range; ☐<br>Upper limit of voltage range ☐ | | | | | | | | |

| IEC 60335-2-40 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| **30.2/30.2.4** | **TABLE: Needle-flame test (NFT)** | | | | **N/A** |
|---|---|---|---|---|---|
| **Object/ Part No./ Material** | **Manufacturer/ trademark** | **Duration of application of test flame (ta); (s)** | **Ignition of specified layer Yes/No** | **Duration of burning (tb) (s)** | **Verdict** |
| | | | | | |
| | | | | | |
| | | | | | |

Supplementary information:

**NFT not relevant (or applicable) for Parts of material classified as V-0 or V-1**
**NFT not relevant (or applicable) for Base material of PCBs classified as V-0 or if relevant VTM-0**

**Attachment No.1** **ATTACHMENT** to TRF IEC60335_2_40X

| Clause | Requirement - Test | Result - Remark | Verdict |
|---|---|---|---|

**IEC 60335-1:2010, IEC 60335-1:2010/AMD1:2013, IEC 60335-1:2010/AMD2:2016**
**IEC 60335-2-40:2022**

**EUROPEAN GROUP DIFFERENCES AND EUROPEAN NATIONAL DIFFERENCES**

Household and similar electrical appliances – Safety –
Part 2-40: Particular requirements for electrical heat pumps, air-conditioners and dehumidifiers

| | |
|---|---|
| **Differences according to**.....: | EN IEC 60335-2-40:2024 + A11:2024 used in conjunction with EN 60335-1:2012 + A11:2014 + A13:2017 + A1:2019 + A14:2019 + A2:2019 + A15:2021 + A16:2023<br>EN 62233:2008 |
| **TRF template used .....:** | IECEE OD-2020-F2:2024, Ed. 2 |
| **Attachment Form No**.....: | EU_GD_IEC60335_2_40X |
| **Attachment Originator .....**: | Nemko Group AS |
| **Master Attachment**.....: | 2025-04-16 |



| | | | |
|---|---|---|---|
| | CENELEC COMMON MODIFICATIONS | | P |
| 6.1 | Delete “class 0” and “class 01” | | P |
| 7.1 | Single-phase appliances to be connected to the supply mains: 230 V covered | | P |
| | Multi-phase appliances to be connected to the supply mains: 400 V covered | | N/A |
| 7.12 | The instructions include the substance of the following: | | P |
| | - this appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved | | P |
| | - children shall not play with the appliance | | P |
| | - cleaning and user maintenance shall not be made by children without supervision | | P |

**Attachment No.1** **ATTACHMENT** to TRF IEC60335_2_40X

| Clause | Requirement - Test | Result - Remark | Verdict |
|---|---|---|---|
| 7.12.1 | The installation instructions for appliances that are intended to be permanently connected to fixed wiring, and have a leakage current not exceeding 10 mA, state that the installation of a residual current device (RCD) having a rated residual operating current not exceeding 30 mA is advisable | | N/A |
| | For appliances not accessible to the public and which are intended to be permanently connected to fixed wiring and which may have a leakage current exceeding 10 mA, the installation instructions specify the rating of the residual current device (RCD) to be installed | | N/A |
| | For appliances not accessible to the general public the restrictions for the installation location are described in the installation instructions | | N/A |
| 8.1.1 | Also test probe 18 of EN 61032 is applied | | P |
| | The appliance being in every possible position during the test, except that | | N/A |
| | appliances normally used on the floor and having a mass exceeding 40 kg are not tilted | | N/A |
| | The force on the probe in the straight position is increased to 10 N when probe 18 is used | | N/A |
| | When using test probe 18 the appliance is fully assembled as in normal use without any parts removed, and | | N/A |
| | parts intended to be removed for user maintenance are also not removed | | N/A |
| | Test probe 18 of EN 61032 is not applied to appliances not accessible to the general public | | N/A |
| 8.1.3 | Instead of test probe B, test probe 18 and test probe 13, for appliances other than those of class II, test probe 41 of IEC 61032 is applied with a force not exceeding 1 N to live parts of visibly glowing heating elements, all poles of which can be disconnected by a single switching action | | P |
| 8.2 | Compliance is checked by inspection and by applying the test probes of EN 61032 in accordance with the conditions specified in 8.1.1 | | P |
| | Test probe B and probe 18 of EN 61032 are applied to built-in appliances and fixed appliances only after installation | | P |

**Attachment No.1** **ATTACHMENT** to TRF IEC60335_2_40X

| Clause | Requirement - Test | Result - Remark | Verdict |
|---|---|---|---|
| 15.1.2 | Appliances with an automatic cord reel tested with the cord in the most unfavourable position so that the reeling of the wet cord may affect electrical insulation during operation, the cord not being dried before reeling | | P |
| 20.2 | For appliances having hazardous moving parts, due to their working function, e.g. the needle of a sewing machine, tools of kitchen machines or the blade of an electrical knife, full protection is not possible for performing their intended use | | N/A |
| | When using a test probe similar to test probe B of EN 61032, having a circular stop face and applied with a force of 5N, the accessories and detachable covers are removed | | N/A |
| | When using test probe 18 it is applied with a force of 2,5N on the appliance fully assembled | | N/A |
| | Test probe 18 of EN 61032 is not applied to appliances not accessible to the general public | | N/A |
| 22.12 | Other parts intended to be detached during use, maintenance or cleaning (e.g. batteries, battery covers, lids, attachments, steam nozzles) are not considered as parts providing a similar function as handles, knobs, grips, levers | | N/A |
| 22.17 | The requirement is not applicable to built-in appliances | | N/A |
| 22.44 | An appliance is child-appealing if one of the following criteria is present: | | N/A |
| | - appliance decorated using faces, cartoon like characters, or similar images | | N/A |
| | - appliance using shapes representing animals, characters, persons or scale models | | N/A |
| | An appliance is child-appealing if more than one of the following criteria are present: | | N/A |
| | - using non-functional light (functional light is e.g. illumination of an object or area, signal indicating status of an appliance) | | N/A |
| | - using non-functional sound (e.g. music) | | N/A |
| | - using non-functional movement | | N/A |
| | If the appliance is child-appealing and | | N/A |
| | - has a mass less than 4 kg, and | | N/A |
| | - is mounted or normally intended for use at a height less than 850 mm, | | N/A |
| | the following conditions are met: | | N/A |

**Attachment No.1** **ATTACHMENT** to TRF IEC60335_2_40X

| Clause | Requirement - Test | Result - Remark | Verdict |
|---|---|---|---|
| | - surface temperature rise requirements not exceeded | | N/A |
| | - hazardous moving parts not accessible | | N/A |
| | - live parts not accessible | | N/A |
| | - liquid temperature requirement not exceeded, | | N/A |
| | unless for vessels in which two independent and sequential actions are needed to access the liquid | | N/A |
| | - the requirement of 22.12 is applicable for all accessible parts of the appliance | | N/A |
| 24.1 | Components comply with the safety requirements specified in the relevant EN standards as far as they reasonably apply | | P |
| | Motors are not required to comply with EN 60034-1, but tested as part of the appliance according to this standard | | P |
| | Relays are tested as part of the appliance according to this standard | | P |
| | Relays may be alternatively tested to EN 60730-1 and the additional requirements in EN 60335-1 | | P |
| | The requirements of Clause 29 of this standard apply between live parts of components and accessible parts of the appliance | | P |
| | Components may comply with the requirements for clearances and creepage distances for functional insulation as specified in the relevant component standard | | P |
| | The requirements of 30.2 of this standard apply to parts of non-metallic material in components including parts of non-metallic material supporting current-carrying connections inside components | | P |
| | Components that have not been tested and shown to comply with the EN standard for the relevant component are tested according to the requirements of 30.2 of this standard | | P |
| | Components that have been tested and shown to comply with the resistance to fire requirements in the EN standard for the relevant component need not be retested provided that: | | P |
| | - the severity specified in the component standard is not less than the severity specified in 30.2, and | | P |
| | - the test report for the component states the values of $t_e$ and $t_i$ acc. to EN 60695-2-11 | | N/A |

**Attachment No.1** **ATTACHMENT** to TRF IEC60335_2_40X

| Clause | Requirement - Test | Result - Remark | Verdict |
|---|---|---|---|
| | If the above two conditions are not satisfied, the component is tested as part of the appliance | | N/A |
| | Power electronic converter circuits are not required to comply with EN 62477-1, but tested as part of the appliance according to this standard | | N/A |
| | Unless components have been tested and found to comply with the relevant EN standard for the number of cycles specified, they are tested in accordance with 24.1.1 to 24.1.9 | | P |
| | For components mentioned in 24.1.1 to 24.1.9, no additional tests specified in the relevant EN standard for the component are necessary other than those specified in 24.1.1 to 24.1.9 | | P |
| | Components that have not been tested and found to comply with the relevant EN standard, and | | P |
| | components that are not marked or not used in accordance with their marking, | | P |
| | are tested in accordance with the conditions occurring in the appliance, the number of samples being that required by the relevant standard | | N/A |
| | Lamp-holders and starter-holders that have not been tested and found to comply with the relevant EN standard are tested as a part of the appliance and additionally comply with the gauging and interchangeability requirements of the relevant EN standard under the conditions occurring in the appliance | | N/A |
| | Where the relevant EN standard specifies these gauging and interchangeability requirements at elevated temperatures, the temperatures measured during the tests of Clause 11 are used | | N/A |
| | There are no additional tests specified for nationally standardized plugs such as those detailed in IEC/TR 60083 or connectors complying with the standard sheets of EN 60320-1 and EN 60309, unless they are specifically mentioned in the text of this standard | | N/A |
| | Plugs and socket-outlets and other connecting devices of interconnection cords are not interchangeable with plugs and socket-outlets listed in IEC/TR 60083 or IEC 60906-1, or | | N/A |
| | with connectors and appliance inlets complying with the standard sheets of EN 60320-1, if | | N/A |

**Attachment No.1** **ATTACHMENT** to TRF IEC60335_2_40X

| Clause | Requirement - Test | Result - Remark | Verdict |
|---|---|---|---|
| | direct supply to these parts from the supply mains gives rise to a hazard | | N/A |
| | For plugs used in CENELEC countries Annex ZH applies | | |
| 24.Z1 | Type S2 and S3 capacitors according to EN 60252-1 are not required to undergo the testing as required by 30.2.2 and 30.2.3.1 | | N/A |
| 25.1 | Plugs and pins for insertion into socket outlets follow the relevant standards sheets in Annex ZH | | P |
| 25.7 | Rubber sheathed cords (60245 IEC 53) are not suitable for appliances intended to be used outdoors, or | | N/A |
| | when they are liable to be exposed to significant amount of ultraviolet radiation | | N/A |
| 25.25 | Instead of IEC/TR 60083, dimensions of the pins and engagement face of plugs of appliances that are inserted into socket-outlets are in accordance with the dimensions of the relevant plug standard | | P |
| | Common plugs and socket-outlets types in CENELEC countries as shown in Annex ZH | | N/A |
| 26.11 | Conductors connected by soldering are not considered to be positioned or fixed so that reliance is not placed upon the soldering alone to maintain them in position, | | N/A |
| | unless they are held in place near the terminals independently of the solder | | N/A |
| 29.3.Z1 | Appliance constructed so that if there is a possibility of damaging the insulation during installation, the insulation withstands the scratch and penetration test of 21.2 | | N/A |
| 32 | Compliance regarding electromagnetic fields is checked according to EN 62233 | | P |
| Annex I, 19.I.101 | The appliance is supplied at rated voltage and operated under normal operation with each of the fault conditions specified | | N/A |
| | The duration of any of the tests is as specified in 19.7 | | N/A |
| | | | |
| **ZA** | **ANNEX ZA (**NORMATIVE)<br>**SPECIAL NATIONAL CONDITIONS (EN)** | | N/A |
| | | | |
| | **Denmark, Sweden, Norway and Finland** | | N/A |

**Attachment No.1** **ATTACHMENT** to TRF IEC60335_2_40X

| Clause | Requirement - Test | Result - Remark | Verdict |
|---|---|---|---|
| 7.12.8 | The maximum inlet water pressure is at least 1,0 MPa ..... .....: | | N/A |
| | | | N/A |
| | **Norway** | | N/A |
| 19.5 | The test is also applicable to appliances intended to be permanently connected to fixed wiring | | N/A |
| | | | |
| | **Norway** | | N/A |
| 22.2 | The second paragraph of this subclause, dealing with single-phase, permanently connected class I appliances having heating elements, is not applicable due to the supply system | | N/A |
| | | | |
| | **Denmark** | | N/A |
| 22.47 | The maximum inlet water pressure is at least 1,0 MPa ..... .....: | | N/A |
| | | | N/A |
| | **Ireland, United Kingdom and Cyprus** | | N/A |
| 25.8 | In the table, the line >10 A and ≤16 A is replaced with: | | N/A |
| | > 10 and ≤ 13 1,25 (1,0)[b] | | N/A |
| | > 13 and ≤ 16 1,5 (1,0)[b] | | N/A |
| | | | |
| **ZB** | **ANNEX ZB** (INFORMATIVE)<br>**A-DEVIATIONS** | | N/A |
| | | | |
| | **Ireland** | | N/A |
| 25.1 and 25.25 | These regulations apply to all plugs for domestic use at a voltage of not less than 200 V and in general allow only plugs complying with I.S. 401:1997, or equivalent, to be fitted to domestic appliances | | N/A |
| | | | |
| | **United Kingdom** | | N/A |
| 25.1 and 25.25 | These regulations apply to all plugs for domestic use at a voltage of not less than 200 V and in general allow only plugs to BS 1363 to be fitted to domestic appliances. | | N/A |

**Attachment No.1** **ATTACHMENT** to TRF IEC60335_2_40X

| Clause | Requirement - Test | Result - Remark | Verdict |
|---|---|---|---|
| | It also allows plugs to BS 4573 and EN 50075 to be fitted to shavers and toothbrushes | | N/A |
| | | | |
| **ZC** | **ANNEX ZC** (NORMATIVE)<br>**NORMATIVE REFERENCES TO INTERNATIONAL PUBLICATIONS WITH THEIR CORRESPONDING EUROPEAN PUBLICATIONS** | | N/A |
| | A list of documents referred to in the text of this standard in such a way that some or all of their content constitutes requirements of this document | | N/A |
| | | | |
| **ZD** | **ANNEX ZD** (INFORMATIVE)<br>**IEC and CENELEC CODE DESIGNATIONS FOR FLEXIBLE CORDS** | | N/A |
| | List of IEC and CENELEC code designations for flexible cords | | N/A |
| | | | |
| **ZE** | **ANNEX ZE** (NORMATIVE)<br>**SPECIFIC ADDITIONAL REQUIREMENTS FOR APPLIANCES AND MACHINES WITH MOTORIZED PARTS AND INTENDED FOR COMMERCIAL USE** | | N/A |
| 5.7 | The tests are carried out in a draught-free location at an ambient temperature of 20 °C ± 5 °C | | N/A |
| | The tests and test conditions of Clauses 10 and 11 are carried out under the most severe operating conditions within the operating temperature range specified by the manufacturer | | N/A |
| 7.1 | Business name and full address of the manufacturer and, where applicable, his authorized representative.....: | | N/A |
| | Model or type reference .....: | | N/A |
| | Serial number, if any | | N/A |
| | Production year | | N/A |
| | Designation of the appliance.....: | | N/A |
| 7.12 | Instructions provided with the appliance so that the appliance can be used safely | | N/A |
| | The instructions contain at least the following information: | | N/A |
| | - the business name and full address of the manufacturer and, where applicable, his authorized representative | | N/A |

**Attachment No.1** **ATTACHMENT** to TRF IEC60335_2_40X

| Clause | Requirement - Test | Result - Remark | Verdict |
|---|---|---|---|
| | - model or type reference of the appliance as marked on the appliance itself, except for the serial number | | N/A |
| | - the designation of the appliance together with its explanation in case it is given by a combination of letters and/or numbers | | N/A |
| | - the general description of the appliance, when needed due to the complexity of the appliance | | N/A |
| | - specific precautions required during installation, operation, adjusting, user maintenance, cleaning, repairing or moving | | N/A |
| | - when needed drawings, diagrams, descriptions and explanations necessary for the safe use and user maintenance of the appliance | | N/A |
| | - the possible reasonably foreseeable misuse and, whenever relevant, a warning against the effects it may have on the safe use of the appliance | | N/A |
| | The words “Original instructions” appear on the language version(s) verified by the manufacturer or by the authorized representative | | N/A |
| | When a translation of the original instructions has been provided by a person introducing the appliance on the market; the meaning of the sentence “Translation of the original instructions” appear in the relevant instructions delivered with the appliance | | N/A |
| | The instructions for maintenance/service to be done by specialized personnel, mandated by the manufacturer or the authorized representative may be supplied in only one Community language which the specialized personnel understand | | N/A |
| | The instructions indicate the type and frequency of inspections and maintenance required for safe operation including the preventive maintenance measures | | N/A |
| 7.12.ZE1 | If needed for specific appliances, the following information to be given: | | N/A |
| | - on use, transportation, assembly, dismantling when out of service, testing or foreseeable breakdowns, if these operations have consequences on stability of the appliance in order to avoid overturning, falling or uncontrolled movements of the appliance or of its component parts | | N/A |

**Attachment No.1** **ATTACHMENT** to TRF IEC60335_2_40X

| Clause | Requirement - Test | Result - Remark | Verdict |
|---|---|---|---|
| | - on how to maintain adequate mechanical stability when in use, during transportation, assembly, dismantling, scrapping and any other action involving the appliance | | N/A |
| | - on the protective measures to be taken by the user, including, where appropriate, the personal protective equipment to be provided | | N/A |
| | - on the operating method to be followed in the event of accident or breakdown; if a blockage is likely to occur the operating method to safely unblock the appliance | | N/A |
| | - on the specifications on the spare parts to be used, when these affect the health and safety of the operator | | N/A |
| | - on airborne noise emissions, determined and declared in accordance with Annex ZAB, which includes: | | N/A |
| | - the A-weighted emission sound pressure level at workstations, where this exceeds 70 dB(A) .....; | | N/A |
| | - If the A-weighted emission sound pressure level is ≤ 70 dB, no value needs to be given, but the instructions state that the A-weighted emission sound pressure level is ≤ 70 dB | | N/A |
| | - the A-weighted sound power level emitted by the machinery, where the A-weighted emission sound pressure level at workstations exceeds 80 dB(A) .....: | | N/A |
| 7.12.ZE2 | The instructions include a warning to disconnect the appliance from its power source during service and when replacing parts | | N/A |
| | If the removal of the plug is foreseen, it is clearly indicated that the removal of the plug is such that an operator can check from any of the points to which he has access that the plug remains removed | | N/A |
| | If this is not possible, due to the construction of the appliance or its installation, a disconnection with a locking system in the isolated position is provided | | N/A |
| 19.11.4 | Delete the 5th paragraph beginning with “Components” | | N/A |

**Attachment No.1** **ATTACHMENT** to TRF IEC60335_2_40X

| Clause | Requirement - Test | Result - Remark | Verdict |
|---|---|---|---|
| 19.11.4.8 | The appliance continues to operate, without causing any hazard to the user, from the same point in its operating cycle at which the voltage fluctuation occurred, or | | N/A |
| | a manual operation is required to restart it | | N/A |
| 20.1 | Appliances and their components and fittings have adequate mechanical stability during transportation, assembly, dismantling and any other action involving the appliance | | N/A |
| 20.2 | Dangerous moving transmission parts safeguarded either by design or guards | | N/A |
| | When guards are used, they are fixed guards, interlocking movable guards or protective devices | | N/A |
| | Moving parts directly involved in the function of the appliance which cannot be made completely inaccessible fitted with: | | N/A |
| | - fixed guards or interlocking movable guards preventing access to those sections of the parts that are not used in the work, and | | N/A |
| | - adjustable guards restricting access to those sections of the moving parts where access is necessary | | N/A |
| | Interlocking movable guards used where frequent access is required | | N/A |
| 21.1 | Appliances and their components and fittings have adequate mechanical strength and is constructed to withstand such rough handling that may be expected in normal use, during transportation, assembly, dismantling, scrapping and any other action involving the appliance | | N/A |
| 22.ZE.1 | For appliances provided with a seat, the seat gives adequate stability | | N/A |
| | The distance between the seat and the control devices capable of being adapted to the operator | | N/A |
| 22.ZE.2 | For appliances provided with separate devices for the start and the stop functions, the stop function is unambiguously identifiable and does always override the start function | | N/A |
| | For appliances provided with one device performing the start and the stop function, the stop function is unambiguously identifiable and does always override the start function | | N/A |

**Attachment No.1** **ATTACHMENT** to TRF IEC60335_2_40X

| Clause | Requirement - Test | Result - Remark | Verdict |
|---|---|---|---|
| 22.ZE.3 | Appliances designed in such a way that incorrect mounting is avoided, if this can lead to an unsafe situation | | N/A |
| | If this is not possible, information on the correct mounting is given directly on the part and/or the enclosure | | N/A |
| 22.ZE.4 | Where the weight, size or shape prevents appliances from being moved manually, they are fitted with attachments for lifting gear, or | | N/A |
| | so designed that they can be fitted with such attachments, or | | N/A |
| | be shaped in such a way that standard lifting gear can easily be used | | N/A |
| | Appliances to be moved manually are constructed or equipped so that they can be moved easily and safely | | N/A |
| 22.ZE.5 | The fixing systems of fixed guards which prevent access to hazardous moving transmission parts only removable with the use of tools | | N/A |
| | If such guards have to be removed by the user for routine cleaning or maintenance their fixing systems remain attached to the fixed guards or to the machine after removal | | N/A |
| | Where possible, guards are incapable of remaining in place without their fixings | | N/A |
| | This does not apply if, after removal of the screws, or if the component is incorrectly repositioned, the appliance becomes inoperative | | N/A |
| | Movable guards are interlocked | | N/A |
| | The interlocking devices prevent the start of hazardous appliance functions until the guards are fixed in their position, and give a stop command whenever they are no longer closed | | N/A |
| | Where it is possible for an operator to reach the danger zone before the risk due to hazardous appliance functions has ceased, movable guards associated with a guard locking device in addition to an interlocking device that: | | N/A |
| | - prevents the start of hazardous appliance functions until the guard is closed and locked, and | | N/A |
| | - keeps the guard closed and locked until the risk of injury from the hazardous appliance functions has ceased | | N/A |

**Attachment No.1** **ATTACHMENT** to TRF IEC60335_2_40X

| Clause | Requirement - Test | Result - Remark | Verdict |
|---|---|---|---|
| | Interlocking movable guards remain attached to the appliance when open, and | | N/A |
| | they are designed and constructed in such a way that they can be adjusted only by means of an intentional action | | N/A |
| 22.ZE.6 | Interlocking movable guards designed in such a way that the absence or failure of one of their components prevents starting or stops the hazardous appliance functions | | N/A |
| | The guard is opened to the extent needed to cause the interlocking to operate and is then closed. This operation is carried out for 5 000 cycles at a rate of 5 cycles per min. | | N/A |
| | After this test any defect that may be expected in normal use is applied to the interlock system, including interruption of the supply, only one defect being simulated at a time | | N/A |
| | After these tests the interlock system is fit for further use | | N/A |
| 22.ZE.7 | Adjustable guards restricting access to areas of the moving parts strictly necessary for the work are: | | N/A |
| | - adjustable manually or automatically, depending on the type of work involved, and | | N/A |
| | - readily adjustable without the use of tools | | N/A |
| 22.ZE.8 | In case of interruption, re-establishment after an interruption or fluctuation in whatever manner of the power supply, the appliance does not restart | | N/A |
| | However, automatic restarting of the operation is allowed if the appliance may continue to operate, without causing any hazard to the user, from the same point in its operating cycle at which the voltage interruption or fluctuation occurred | | N/A |
| 22.ZE.9 | Appliances fitted with means to isolate them from all energy sources | | N/A |
| | Such isolators are clearly identified, and | | N/A |
| | they are capable of being locked if reconnection endanger persons | | N/A |
| | After the energy source is disconnected, it is possible to dissipate any energy remaining or stored in the circuits of the appliance without risk to persons | | N/A |

**Attachment No.1** **ATTACHMENT** to TRF IEC60335_2_40X

| Clause | Requirement - Test | Result - Remark | Verdict |
|---|---|---|---|
| 22.46 | Delete the last sentence of the addition | | N/A |
| 22.ZE.10 | Noise reduction is an integral part of the design process and is achieved by particularly applying measures at source to control noise, see for example EN ISO 11688-1:2009. The success of the applied noise reduction measures is assessed based on the actual noise emission values, determined according to Annex ZAB, in relation to other machines of the same type with comparable non-acoustical technical data | | N/A |
| | Main sources of noise for appliances covered by this document: | | N/A |
| | - fans and airflow outlets causing direct generated airborne noise, | | N/A |
| | - indirect generated airborne noise by radiated structure borne sound in fan blades and housings as well as in gearbox housings, pumps or metal casing plates | | N/A |
| | | | |
| **ZF** | **ANNEX ZF** (INFORMATIVE)<br>**CRITERIA APPLIED FOR THE ALLOCATION OF PRODUCTS COVERED BY STANDARDS IN THE EN 60335 SERIES UNDER LVD OR MD** | | N/A |
| | List of standards under CENELEC/TC61 with the allocation under the LVD (Low Voltage Directive) or the MD (Machinery Directive).....: | | N/A |
| | | | |
| **ZG** | **ANNEX ZG** (NORMATIVE)<br>**UV APPLIANCES** | | N/A |
| | The following modifications to this standard apply to appliances having UV emitters | | N/A |
| | This annex is not applicable to appliances covered by the scopes of IEC 60335-2-27, IEC 60335-2-59 or IEC 60335-2-109 | | N/A |
| 7.12.ZG | The instructions for appliances incorporating UVC emitters include the substance of the following: WARNING — This appliance contains a UV emitter. Do not stare at the light source | | N/A |
| 32 | For appliances incorporating UV emitters the manufacturer delivers a declaration providing evidence that the plastic material exposed to the radiation is UV resistant | | N/A |
| | | | |

**Attachment No.1** **ATTACHMENT** to TRF IEC60335_2_40X

| Clause | Requirement - Test | Result - Remark | Verdict |
|---|---|---|---|
| **ZH** | **ANNEX ZH** (INFORMATIVE)<br>**Common plug and socket-outlet types in CENELEC countries** | | N/A |
| | In general, supply cords of single-phase appliances having a rated current not exceeding 16 A are fitted with a plug complying with the following standard sheets: | | N/A |
| | - for class I appliances or class II appliances with functional earth, standard sheet EU2, EU3 or EU4 .....: | | N/A |
| | - for class II appliances, standard sheet EU5, EU6 or EU7 .....: | | N/A |
| | There are exemptions or differences in certain CENELEC countries | | N/A |
| | | | |
| **ZI** | **ANNEX ZI** (INFORMATIVE)<br>**Information on the application of A11:2014 to EN 60335-1:2012**<br>**CENELEC CLC/TC 61(SEC)2096A** | | N/A |
| | Clarification of the application of parts 2 in conjunction with the 2002 or 2012 version of EN 60335-1 | | N/A |
| | | | |
| **ZAA** | **ANNEX ZAA** (INFORMATIVE)<br>**THE RELEVENCE OF THE PRESSURE EQUIPMENT DIRECTIVE** | | N/A |
| | Refrigerating systems having a pressure greater than 0,05 MPa are considered to be assemblies falling within the scope of the Pressure Equipment Directive, 2014/68/EU. However, according to Article 1, item (f) of the Directive, equipment classified no higher than category I and covered by the Low Voltage Directive 2014/35/EU or the Machinery Directive 2006/42/EC is excluded from its scope | | N/A |
| | According to guideline 1/39 of the Directive, this exclusion applies to both components and assemblies (refrigeration circuits). This applies to appliances containing vessels (e.g. compressors, receivers) or piping with limits in accordance with the following: | | N/A |
| | Vessels | | N/A |
| | - dangerous fluids (Annex II, Table 1) | | N/A |
| | - volume not exceeding 1 l, or | | N/A |
| | - pressure PS x volume not exceeding 5 MPa l | | N/A |
| | - non-dangerous fluids (Annex II, Table 2) | | N/A |
| | - volume not exceeding 1 l, or | | N/A |

**Attachment No.1** **ATTACHMENT** to TRF IEC60335_2_40X

| Clause | Requirement - Test | Result - Remark | Verdict |
|---|---|---|---|
| | - pressure PS x volume not exceeding 20 MPa l | | N/A |
| | Piping | | N/A |
| | - dangerous fluids (Annex II, Table 6) | | N/A |
| | - nominal diameter DN not exceeding 25, or | | N/A |
| | - pressure PS not exceeding 1 MPa and nominal diameter DN not exceeding 100, or | | N/A |
| | - pressure PS exceeding 1 MPa and pressure x nominal diameter DN not exceeding 100 MPa | | N/A |
| | - non-dangerous fluids (Annex II, Table 7) | | N/A |
| | - nominal diameter DN not exceeding 100, or | | N/A |
| | - pressure PS x nominal diameter DN not exceeding 350 MPa | | N/A |
| | For other components, the most onerous limit of the two applies | | N/A |
| | The volume is the internal volume of the vessel and includes the volume of pipework up to the first connection. It excludes the volume of fixed internal parts. | | N/A |
| | The pressure PS is the maximum allowable pressure the vessel or piping is exposed to, as specified by the manufacturer of the appliance | | N/A |
| | Nominal size (DN)' means a numerical designation of size which is common to all components in a piping system other than components indicated by outside diameters or by thread size. It is a convenient round number for reference purposes and is only loosely related to manufacturing dimensions. The nominal size is designated by DN followed by a number. In the absence of a DN designation, it shall be assumed that DN corresponds to the internal diameter (for circular products) or the comparative diameter determined from the equivalent flow section (for non-circular products) | | N/A |
| | If any component exceeds the limits given above, the appliance is expected to comply with the Directive. The technical requirements are given in Annex I and the conformity assessment tables and procedures in Annexes II and III of the Directive | | N/A |

**Attachment No.1** **ATTACHMENT** to TRF IEC60335_2_40X

| Clause | Requirement - Test | Result - Remark | Verdict |
|---|---|---|---|
| | Commonly used refrigerants, classified as dangerous fluids of Fluid Group 1 in the Directive, are listed in Table ZAA.1. | | N/A |
| | Commonly used refrigerants, classified as non-dangerous fluids of Fluid Group 2 in the Directive, are listed in Table ZAA.2. | | N/A |
| | | | |
| **ZAB** | **ANNEX ZAB** (NORMATIVE)<br>**NOISE TEST CODE FOR APPLIANCES COVERED BY ANNEX ZE** | | N/A |
| ZAB.1 | Emission sound pressure level determination | | N/A |
| | The A-weighted emission sound pressure level is determined in accordance with | | N/A |
| | - EN ISO 11201:2010, grade 2 or | | N/A |
| | - EN ISO 11202:2010, grade 2 or | | N/A |
| | If it is required according to 7.12.ZE1 to determine the A-weighted sound power level the A-weighted emission sound pressure level shall be calculated according to EN ISO 11203:2009. In such a case 6.2.3 d) of EN ISO 11203:2009 is applied with the surface S being the measurement surface used for the sound power level determination. If the sound power level determination is based on a measurement method requiring a reverberant sound field, the surface S to define Q, is a parallelepiped measurement surface at a distance of 1 m from the reference box enclosing the source and assuming only one reflecting surface i.e the floor | | N/A |
| ZAB.2 | Sound power level determination | | N/A |
| | If the determination of the A-weighted sound power level is required according to 7.12.ZE1 it is determined in accordance with EN 12102‑1:2022 or EN 12102‑2:2019, whichever is applicable. The preferred measurements methods are of grade 2. Only in cases where such a measurement method cannot be applied a grade 3 measurement method is used for determining the A-weighted sound power level. In that case the reasons are explicitly mentioned | | N/A |
| ZAB.3 | Operation conditions | | N/A |
| | The operating conditions defined in EN 12102‑1:2022 or EN 12102‑2:2019, whichever is applicable, apply | | N/A |

**Attachment No.1** **ATTACHMENT** to TRF IEC60335_2_40X

| Clause | Requirement - Test | Result - Remark | Verdict |
|---|---|---|---|
| | The operating conditions are identical for the determination of both the A-weighted sound power level and the A-weighted emission sound pressure level | | N/A |
| ZAB.4 | Installation and mounting conditions | | N/A |
| | The Installation and mounting conditions defined in EN 12102‑1:2022 or EN 12102‑2:2019, whichever is applicable, apply. They are identical for the determination of both the A-weighted sound power level and the A-weighted emission sound pressure level | | N/A |
| ZAB.5 | Measurement uncertainties | | N/A |
| | The total measurement uncertainties of the noise emission values determined according to this document are depending on the standard deviation of reproducibility $\sigma_{R0}$ given by the applied basic noise emission measurement method and the uncertainty associated with the instability of the operating and mounting conditions $\sigma_{omc}$ | | N/A |
| | The resulting total uncertainty is then calculated from:<br>$\sigma_{tot} = \sqrt{\left(\sigma_{R0}^2 + \sigma_{omc}^2\right)}$<br>(EN IEC 60335-2-40) | | N/A |
| | The upper bound value of $\sigma_{R0}$ is 1,5 dB for grade-2-measurement methods, and 3 dB for grade-3-methods, assuming noise sources which emit sound without significant tones. These values apply for both the determined A-weighted emission sound pressure level and the A-weighted sound power level | | N/A |
| | The expanded measurement uncertainty U, in decibels, is calculated from:<br>$U = k \cdot \sigma_{tot}$<br>where k is the coverage factor | | N/A |
| | The expanded measurement uncertainty U as described in this European Standard does not include the standard deviation of production which is used in EN ISO 4871:2009 for the purpose of making a noise emission declaration for batches of machines | | N/A |

**Attachment No.1** **ATTACHMENT** to TRF IEC60335_2_40X

| Clause | Requirement - Test | Result - Remark | Verdict |
|---|---|---|---|
| | In the case of preparing a noise emission declaration for batches of machines $\sigma_{tot}$ is replaced by $\sigma_t$, the total standard deviation defined in EN ISO 4871:2009. $\sigma_t$ can be calculated by using the equation $\sigma_t = \sqrt{\sigma_{R0}^2 + \sigma_{omc}^2 + \sigma_P^2} = \sqrt{\sigma_{tot}^2 + \sigma_P^2}$ with $\sigma_P$ the standard deviation of production | | N/A |
| ZAB.6 | Information to be recorded | | N/A |
| | The information to be recorded covers all the technical requirements of this noise test code. Any deviations from this noise test code or from the basic standards upon which it is based are to be recorded together with the technical justification for such deviations | | N/A |
| ZAB.7 | Information to be reported | | N/A |
| | The information to be given in the test report includes: | | N/A |
| | - the data required by the manufacturer for inclusion in the noise emission declaration | | N/A |
| | - the data required by the user to verify the declared values | | N/A |
| | Thus, the following information is included: | | N/A |
| | - reference to the noise test code and the basic noise emission standards used | | N/A |
| | - description of the installation, mounting and operation conditions used | | N/A |
| | - location of specified positions | | N/A |
| | - the noise emission values obtained | | N/A |
| | The test report states that all requirements of the noise test code have been fulfilled, or, if this is not the case, it shall identify any unfulfilled requirements | | N/A |
| | Deviations from the requirements are stated and a technical justification for these deviations is given | | N/A |
| ZAB.8 | Declaration and verification of noise emission values | | N/A |

**Attachment No.1** **ATTACHMENT** to TRF IEC60335_2_40X

| Clause | Requirement - Test | Result - Remark | Verdict |
|---|---|---|---|
| | The declaration of noise emission values is a two-number declaration according to EN ISO 4871:2009. It includes the A-weighted emission sound pressure level $L_{pA}$ respectively if additionally required according to 7.12.ZE1 the A-weighted sound power level $L_{WA}$ including the associated uncertainties K ($K_{pA}$ and $K_{WA}$) | | N/A |
| | The noise emission declaration states that the noise emission values have been obtained according to this noise test code | | N/A |
| | Any deviations from this noise test code, from EN 12102‑1:2022 or EN 12102‑2:2019 or from the basic standards upon which they are based are clearly indicated | | N/A |
| | Additional noise emission values can also be given in the declaration | | N/A |
| | If undertaken, verification of the noise emission values is conducted according to EN ISO 4871:2009, using the same mounting and operating conditions as those used for the initial determination | | N/A |
| | | | |
| **ZZA** | **ANNEX ZZA** (INFORMATIVE)<br>**RELATIONSHIP BETWEEN THIS EUROPEAN STANDARD AND THE SAFETY OBJECTIVES OF DIRECTIVE 2014/35/EU [2014 OJ L96} AIMED TO BE COVERED** | | N/A |
| | This standard provides one means of conforming to safety objectives of Directive 2014/35/EU | | N/A |
| | When cited in the Official Journal under that Directive, compliance with the normative clauses of this standard given in Table ZZA.1 confers a presumption of conformity with the safety objectives of that Directive and associated EFTA regulations | | N/A |
| | Compliance with this Part 1 when used together with the relevant Part 2 provides one means of conformity with the safety objectives | | N/A |
| | | | |
| **ZZB** | **ANNEX ZZB** (INFORMATIVE)<br>**RELATIONSHIP BETWEEN THIS EUROPEAN STANDARD AND THE ESSENTIAL REQUIREMENTS OF DIRECTIVE 2006/42/EC AIMED TO BE COVERED** | | N/A |

**Attachment No.1** **ATTACHMENT** to TRF IEC60335_2_40X

| Clause | Requirement - Test | Result - Remark | Verdict |
|---|---|---|---|
| | This standard provides one means of conforming to essential requirements of EU Directive 2006/42/EC | | N/A |
| | When cited in the Official Journal under that Directive, compliance with the normative clauses of this standard given in Table ZZB.1 confers a presumption of conformity with the essential requirements of that Directive and associated EFTA regulations | | N/A |
| | Compliance with this Part 1 when used together with the relevant Part 2 provides one means of conformity with the essential health and safety requirements | | N/A |
| | | | N/A |
| | **ANNEX EN 62233:2008 + AC:2008**<br>**EMF- ELECTROMAGNETICS FIELDS** | | N/A |
| | The tested product also complies with the requirements of EN 62233:2008 | | P |
| | Limit ……100% | Measured max. :0.02….% | |
| | | | |

**Attachment No.2** **Product Photos**

Details of: Fig. 1


Details of: Fig. 2

**Attachment No.2** **Product Photos**

Details of: Fig. 3

**- End of report -**