

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



**Household and similar electrical appliances – Safety –  
Part 2-24: Particular requirements for refrigerating appliances, ice-cream  
appliances and ice-makers**

**Appareils électrodomestiques et analogues – Sécurité –  
Partie 2-24: Règles particulières pour les appareils de réfrigération,  
les sorbetières et les fabriques de glace**



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## CONTENTS

FOREWORD.....	4
INTRODUCTION.....	7
1 Scope.....	8
2 Normative references .....	9
3 <b>Terms and definitions</b> .....	10
4 General requirement.....	12
5 General conditions for the tests .....	12
6 Classification.....	14
7 Marking and instructions.....	14
8 Protection against access to live parts.....	18
9 Starting of motor-operated appliances .....	19
10 Power input and current .....	19
11 Heating .....	20
12 Void.....	23
13 Leakage current and electric strength at operating temperature.....	23
14 Transient overvoltages .....	23
15 Moisture resistance .....	23
16 Leakage current and electric strength.....	24
17 Overload protection of transformers and associated circuits .....	25
18 Endurance.....	25
19 Abnormal operation.....	25
20 Stability and mechanical hazards .....	28
21 Mechanical strength .....	30
22 Construction.....	30
23 Internal wiring.....	40
24 Components.....	40
25 Supply connection and external flexible cords .....	42
26 Terminals for external conductors.....	43
27 Provision for earthing .....	43
28 Screws and connections .....	43
29 Clearances, creepage distances and solid insulation .....	43
30 Resistance to heat and fire.....	44
31 Resistance to rusting.....	44
32 Radiation, toxicity and similar hazards.....	44
Annexes .....	47
Annex C (normative) Ageing test on motors .....	47
Annex D (normative) Thermal motor protectors.....	47
Annex P (informative) Guidance for the application of this standard to appliances used in warm damp equable climates.....	47

Annex AA (normative) Locked-rotor test of fan motors .....	48
Annex BB (informative) Method for accumulation of frost .....	50
Annex CC (normative) Non-sparking “n” electrical apparatus .....	53
Annex DD (informative) Sound manufacturing practice for compression-type appliances which use flammable refrigerant.....	55
Bibliography.....	56
Figure 101 – Apparatus for spillage test.....	45
Figure 102 – Detail of scratching tool tip .....	46
Figure AA.1 – Supply circuit for locked-rotor test of a single-phase fan motor .....	49
Figure BB.1 – Diagram of apparatus for water evaporation for accumulation of frost.....	51
Figure BB.2 – Apparatus for water evaporation and for accumulation of frost.....	52
Table 101 – Maximum temperatures for motor-compressors .....	21
Table 102 – Refrigerant flammability parameters .....	38

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

### HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

#### Part 2-24: Particular requirements for refrigerating appliances, ice-cream appliances and ice-makers

#### FOREWORD

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**This consolidated version of IEC 60335-2-24 consists of the seventh edition (2010) [documents 61C/459/FDIS and 61C/461/RVD] and its amendment 1 (2012) [documents 61C/506/FDIS and 61C/509/RVD]. It bears the edition number 7.1.**

**The technical content is therefore identical to the base edition and its amendment and has been prepared for user convenience. A vertical line in the margin shows where the base publication has been modified by amendment 1. Additions and deletions are displayed in red, with deletions being struck through.**

This part of International Standard IEC 60335 has been prepared by subcommittee 61C: Household appliances for refrigeration, of IEC technical committee 61: Safety of household and similar electrical appliances.

This seventh edition cancels and replaces the sixth edition published in 2002 including its Amendment 1 (2005) and Amendment 2 (2007). It constitutes a technical revision.

The principal changes in this edition as compared with the previous edition of IEC 60335-2-24 are as follows (minor changes are not listed):

- aligns the text with IEC 60335-1, and its Amendments 1 and 2;
- clarifies the term “household and similar use” (1, 7.12);
- updates marking requirements for supply terminals of battery operated appliances (7.6, 7.101);
- introduces requirements for appliances using transcritical refrigerant systems (3.112, 3.113, 3.114, 3.115, 3.116, 7.1, 7.6, 7.12.1, 22.103, 24.1.4, 24.102);
- introduces an enhanced flexing test (23.3);
- introduces requirements for accessible glass panels (22.116);
- clarifies tests for appliances using flammable refrigerants (22.107, Annex DD)

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

This part 2 is to be used in conjunction with the latest edition of IEC 60335-1 and its amendments. It was established on the basis of the fourth edition (2001) of that standard.

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

This part 2 supplements or modifies the corresponding clauses in IEC 60335-1, so as to convert that publication into the IEC standard: Safety requirements for electric refrigerating appliances, ice-cream appliances and ice-makers.

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

NOTE 2 The following numbering system is used:

- subclauses, tables and figures that are numbered starting from 101 are additional to those in Part 1;
- unless notes are in a new subclause or involve notes in Part 1, they are numbered starting from 101, including those in a replaced clause or subclause;
- additional annexes are lettered AA, BB, etc.

NOTE 3 The following print types are used:

- requirements: in roman type;
- *test specifications: in italic type;*
- notes: in smaller roman type.

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

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

The committee has decided that the contents of the base publication and its amendments will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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

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

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

The following differences exist in the countries indicated below.

- 22.101 : E12 and E17 lamp holders are checked as specified for E14 and B15 lamp holders. E26 lamp holder is checked as specified for E27 and B22 lamp holders (Japan).
- 22.110 : For unsealed glass tube heaters, the temperature requirements are different (Japan).

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## INTRODUCTION

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

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

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

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

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

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

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

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

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

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

## HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

### Part 2-24: Particular requirements for refrigerating appliances, ice-cream appliances and ice-makers

#### 1 Scope

This clause of Part 1 is replaced by the following.

This International Standard deals with the safety of the following appliances, their **rated voltage** being not more than 250 V for single-phase appliances, 480 V for other appliances and 24 V d.c. for appliances when battery operated.

- **refrigerating appliances** for household and similar use;
- **ice-makers** incorporating a motor-compressor and **ice-makers** intended to be incorporated in frozen food storage compartments;
- **refrigerating appliances** and **ice-makers** for use in camping, touring caravans and boats for leisure purposes.

These appliances may be operated from the mains, from a separate battery or operated either from the mains or from a separate battery.

This standard also deals with the safety of **ice-cream appliances** intended for household use, their **rated voltage** being not more than 250 V for single-phase appliances and 480 V for other appliances.

It also deals with **compression-type appliances** for household and similar use, which use **flammable refrigerants**.

This standard does not cover features of the construction and operation of those **refrigerating appliances** which are dealt with in other IEC standards.

**Refrigerating appliances** not intended for normal household use but which nevertheless may be a source of danger to the public, such as

- **refrigerating appliances** used in staff kitchen areas in shops, offices and other working environments,
- **refrigerating appliances** used in farm houses and by clients in hotels, motels and other residential type environments,
- **refrigerating appliances** used in bed and breakfast type environments, and
- **refrigerating appliances** used in catering and similar non-retail applications

are within the scope of this standard.

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

- persons (including children) whose
  - physical, sensory or mental capabilities or
  - lack of experience and knowledgeprevents them from using the appliance safely without supervision or instruction;
- children playing with the appliance.

NOTE 1 Attention is drawn to the fact that

- for appliances intended to be used in vehicles or on board ships or aircraft, additional requirements may be necessary;
- in many countries, additional requirements are specified by national health authorities, the national authorities responsible for the protection of labour, the national water supply authorities and similar authorities.

NOTE 2 This standard does not apply to

- appliances intended to be used in the open air;
- appliances designed exclusively for industrial purposes;
- appliances intended to be used in locations where special conditions prevail, such as the presence of a corrosive or explosive atmosphere (dust, vapour or gas);
- appliances incorporating a battery intended as a power supply for the refrigerating function;
- appliances assembled on site by the installer;
- appliances with remote motor-compressors;
- motor-compressors (IEC 60335-2-34);
- commercial dispensing appliances and vending appliances (IEC 60335-2-75);
- commercial refrigerators and freezers used for the display of food products, including beverages, for retail sale (IEC 60335-2-89);
- commercial ice-cream appliances.

## 2 Normative references

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

*Addition:*

IEC 60068-2-11, *Environmental testing – Part 2 Tests. Tests Ka: Salt mist*

IEC 60079-4A, *Electrical apparatus for explosive gas atmospheres – Part 4: Method of test for ignition temperature – First supplement*

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

IEC 60079-15:2010, *Explosive atmospheres – Part 15: Equipment protection by type of protection "n"*

IEC/TR 60079-20, *Electrical apparatus for explosive gas atmospheres – Part 20: Data for flammable gases and vapours, relating to the use of electrical apparatus*

IEC 60335-2-5:2002, *Household and similar electrical appliances – Safety – Part 2-5: Particular requirements for dishwashers*

IEC 60335-2-34:2002, *Household and similar electrical appliances – Safety – Part 2-34: Particular requirements for motor-compressors*

Amendment 1 (2004)

Amendment 2 (2008)<sup>1)</sup>

ISO 209, *Aluminium and aluminium alloys - Chemical composition*

ISO 817, *Refrigerants – Designation system*

ISO 4126-2:2003, *Safety devices for protection against excessive pressure – Bursting disc safety devices*

<sup>1)</sup> There exists a consolidated edition 4.2 (2002) that includes edition 4 and its Amendment 1 and Amendment 2.

ISO 5149:1993, *Mechanical refrigerating systems used for cooling and heating – Safety requirements*

ISO 7010:2011, *Graphical symbols – Safety colours and safety signs – Registered safety signs*

### 3 Terms and definitions

This clause of Part 1 is applicable except as follows.

#### 3.1.9 Replacement:

##### normal operation

operation of the appliance under the following conditions

##### 3.1.9.101

##### normal operation of a refrigerating appliance

operation at an ambient temperature in accordance with 5.7, empty, with the doors and lids closed. User-adjustable temperature control devices which control the operation of the motor-compressor in **compression-type appliances** are short-circuited or otherwise rendered inoperative

##### 3.1.9.102

##### normal operation of an ice-maker

operation at an ambient temperature in accordance with 5.7, with the supply water at a temperature of  $15\text{ °C} \pm 2\text{ °C}$

##### 3.1.9.103

##### normal operation of an incorporated ice-maker

operation at the normal temperature of the frozen food storage compartment, with the supply water at a temperature of  $15\text{ °C} \pm 2\text{ °C}$

##### 3.1.9.104

##### normal operation of an ice-cream appliance

operation of the appliance using the maximum quantity of the mixture of ingredients indicated in the instructions; the mixture used being that which gives the most unfavourable results, the mixture being at an initial temperature of  $23\text{ °C} \pm 2\text{ °C}$

#### 3.101

##### refrigerating appliance

enclosed thermally insulated appliance of suitable volume for household use, cooled by an incorporated device and having one or more compartments intended for the preservation of foodstuffs including cooling of beverages

#### 3.102

##### compression-type appliance

appliance in which refrigeration is effected by the vaporization at low pressure in a heat exchanger (**evaporator**) of a liquid refrigerant, the vapour thus formed being restored to the original state by mechanical compression at a higher pressure and subsequent cooling in another heat exchanger (**condenser**)

#### 3.103

##### ice-maker

appliance in which ice is made by freezing water by a device consuming electrical energy and having a compartment for storing the ice

**3.104****incorporated ice-maker**

**ice-maker** specially designed to be incorporated into a frozen food storage compartment and without independent means for freezing water

**3.105****heating system**

heating element with associated components such as timers, switches, **thermostats** and other controls

**3.106****absorption-type appliance**

appliance in which refrigeration is effected by the evaporation in a heat exchanger (**evaporator**) of a liquid refrigerant, in the liquid state, the resulting vapour being then absorbed by an absorbent medium from which it is subsequently expelled at a higher partial vapour pressure by heating and liquefied by cooling in another heat exchanger (**condenser**)

**3.107****condenser**

heat exchanger in which, after compression, vaporized refrigerant is liquefied by losing heat to an external cooling medium

**3.108****evaporator**

heat exchanger in which, after pressure reduction, the liquid refrigerant is vaporized by absorbing heat from the medium to be refrigerated

**3.109****flammable refrigerant**

refrigerant with a flammability classification of group 2 or 3 in accordance with ISO 5149

NOTE For refrigerant blends which have more than one flammability classification, the most unfavourable classification is taken for the purposes of this definition.

**3.110****ice-cream appliance**

**compression-type appliance** which is used to make ice-cream

**3.111****free space**

space with a volume exceeding 60 l where a child can be entrapped and which is accessible after opening any door, lid or drawer and removing any **detachable internal part**, including shelves, containers or removable drawers which are themselves only accessible after opening any door or lid

NOTE In calculating the volume, a space with any single dimension not exceeding 150 mm or any two orthogonal dimensions, each of which do not exceed 200 mm, is ignored.

**3.112****transcritical refrigeration system**

refrigeration system where the pressure in the high pressure side is above the pressure where the vapour and liquid states of the refrigerant can coexist in thermodynamic equilibrium

**3.113****gas cooler**

heat exchanger in which, after compression the refrigerant is cooled down, by transferring heat to an external cooling medium, without changing state

NOTE A **gas cooler** is normally used in **transcritical refrigeration systems**.

**3.114****design pressure (DP)**

gauge pressure that has been assigned to the high pressure side of a **transcritical refrigeration system**

**3.115****bursting disc**

disc or foil which bursts at a predetermined pressure to reduce a pressure in a refrigeration system

**3.116****pressure relief device**

pressure sensing device, intended to reduce pressure automatically when pressures within the refrigeration system exceed the setting pressure of the device

**4 General requirement**

This clause of Part 1 is applicable except as follows.

*Addition:*

NOTE 101 The use of **flammable refrigerants** involves additional hazards which are not associated with appliances using non-flammable refrigerants.

This standard addresses the hazards due to ignition of leaked **flammable refrigerant** by potential ignition sources associated with the appliance.

The hazard due to ignition of leaked **flammable refrigerant** by an external potential ignition source associated with the environment in which the appliance is installed is compensated by the low probability of ignition.

**5 General conditions for the tests**

This clause of Part 1 is applicable except as follows.

**5.2 Addition:**

*At least one additional specially prepared sample is required for the tests of 22.107.*

NOTE 101 Unless the motor-compressor conforms to IEC 60335-2-34, at least one additional specially prepared sample may be required for the test of 19.1.

NOTE 102 At least one additional sample of the fan motor and its thermal motor protector may be required for the test of 19.1.

NOTE 103 The test of 22.7 may be performed on separate samples.

NOTE 104 Due to the potentially hazardous nature of the tests of 22.107, 22.108 and 22.109, special precautions may need to be taken when performing the tests.

**5.3 Addition:**

*Before starting the tests,*

- **ice-cream appliances** are operated empty at **rated voltage** for 1 h, or for the maximum setting of an incorporated timer, whichever is shorter;
- **other compression-type appliances** shall be operated at **rated voltage** for at least 24 h, then switched off and left to stand for at least 12 h.

*The test of 11.102 is carried out immediately after the tests of Clause 13.*