

Safety of household and similar electrical appliances —

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

The European Standard EN 60335-2-24:2000, incorporating amendment A11:2004, has the status of a British Standard

ICS 97.040.30

National foreword

This British Standard is the UK implementation of EN 60335-2-24:2000, incorporating amendment A11:2004 and corrigendum July 2001. It is derived from IEC 60335-2-24, Ed. 5:2000, incorporating corrigendum March 2001. It supersedes both BS EN 60335-2-24:1999 and BS EN 60335-2-57:1992, *Ice-cream appliances with incorporated motor compressors*. Those standards will be withdrawn on 1 August 2007.

IEC corrigendum March 2001 introduces changes to 7.1 and Table 102. CENELEC corrigendum July 2001 introduces a new Annex ZA, and a reference to it in the EN foreword.

The UK participation in its preparation was entrusted by Technical Committee CPL/61, Safety of household and similar electrical appliances, to Subcommittee CPL/61/3, Refrigerators and food freezers.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users of are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

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English version

Safety of household and similar electrical appliances
Part 2-24: Particular requirements for refrigerating appliances,
ice-cream appliances and ice-makers
(IEC 60335-2-24:2000)

Sécurité des appareils
électrodomestiques et analogues
Partie 2-24: Règles particulières pour
les appareils de réfrigération,
les appareils de glaces à la crème et
les fabriques de glace
(CEI 60335-2-24:2000)

Sicherheit elektrischer Geräte für den
Hausgebrauch und ähnliche Zwecke
Teil 2-24: Besondere Anforderungen für
Kühl-/Gefriergeräte, Speiseeis- und
Eisbereiter
(IEC 60335-2-24:2000)

This European Standard was approved by CENELEC on 2000-08-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of amendment 2:1999 to IEC 60335-2-24:1997, prepared by SC 61C of the IEC Technical Committee 61, was submitted to the Unique Acceptance Procedure and was approved by CENELEC on 2000-08-01.

The text of document 61C/176/FDIS, future amendment to IEC 60335-2-24:1997 prepared by SC 61C of the IEC Technical Committee 61, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC on 2000-04-01.

The above texts were combined with the text of IEC 60335-2-24:1997 and its amendment 1:1998 into a new edition of IEC 60335-2-24, resulting in a new edition of EN 60335-2-24.

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2001-08-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2007-08-01

This European Standard replaces EN 60335-2-57:1992 and EN 60335-2-24:1999.

This standard has to be used in conjunction with EN 60335-1, Safety of household and similar electrical appliances, Part 1: General requirements. It was established on the basis of the 1994 edition of that standard. Amendments and revisions of part 1 have also to be taken into account and the dates when such changes become applicable will be stated in the relevant amendment or revision of part 1.

This part 2 supplements or modifies the corresponding clauses of EN 60335-1, so as to convert it into the European Standard: Safety requirements for 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 of part 1 is to be adapted accordingly.

Subclauses which are additional to those in part 1 are numbered starting with 101. Annexes which are additional to those in part 1 are lettered AA, BB, etc.

Special national conditions causing a deviation from this European Standard are listed in annex ZA and are in addition to those in EN 60335-1.

There are no national deviations from this European Standard, other than those listed in annex ZB to EN 60335-1.

NOTE NOTE The following print types are used:

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

Words in **bold** in the text are defined in clause 2. When a definition of part 1 concerns an adjective, the adjective and the associated noun are also in bold.

Introduction

An investigation by CENELEC TC 61 has shown that all risks from products within the scope of this standard are fully covered by the Low Voltage Directive, 73/23/EEC. If the product has mechanical moving parts, a risk assessment in accordance with the Machinery Directive, 89/392/EEC, has shown that the risks are mainly of electrical origin and consequently this directive is not applicable. However, the relevant essential safety requirements of the Machinery Directive are covered by this standard together with the principal objectives of the Low Voltage Directive.

Products within the scope of this standard may incorporate pressurized components for which the Pressure Equipment Directive, 97/23/EC, applies. Further guidance is given in Annex ZAA.

Endorsement notice

The text of the International Standard IEC 60335-2-24:2000 was approved by CENELEC as a European Standard without any modification.

Foreword to amendment A11

A proposal to amend EN 60335-2-24, document CLC/TC 61(SEC)1397, was discussed during the Brussels meeting of CENELEC TC 61 in November 2002, when it was decided to submit a draft for an amendment to the Unique Acceptance Procedure.

The draft was circulated in June 2003 and was approved by CENELEC as amendment A11 to EN 60335-2-24:2000 on 2004-09-22.

The following dates are applicable:

- latest date by which the amendment has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2005-10-01
- date on which national standards
conflicting with the amendment have to be withdrawn (dow) 2007-08-01

CONTENTS

Clause	Page
1 Scope.....	6
2 Definitions	7
3 General requirement	9
4 General conditions for the tests	9
5 Void	11
6 Classification	11
7 Marking and instructions	11
8 Protection against access to live parts.....	14
9 Starting of motor-operated appliances	14
10 Power input and current	14
11 Heating.....	15
12 Void	18
13 Leakage current and electric strength at operating temperature	18
14 Void	18
15 Moisture resistance.....	19
16 Leakage current and electric strength.....	20
17 Overload protection of transformers and associated circuits.....	20
18 Endurance	20
19 Abnormal operation.....	21
20 Stability and mechanical hazards	23
21 Mechanical strength.....	25
22 Construction	26
23 Internal wiring	34
24 Components	34
25 Supply connection and external flexible cords.....	35
26 Terminals for external conductors	36
27 Provision for earthing	36
28 Screws and connections	36
29 Creepage distances, clearances and distances through insulation	36
30 Resistance to heat, fire and tracking	37
31 Resistance to rusting	37
32 Radiation, toxicity and similar hazards.....	37
Annexes	40

Figure 101 – Apparatus for spillage test..... 38

Figure 102 – Detail of scratching tool tip..... 39

Figure AA.1 – Supply circuit for locked-rotor test of a single-phase fan motor 43

Figure BB.1 – Diagram of apparatus for water evaporation for accumulation of frost 45

Figure BB.2 – Apparatus for water evaporation and for accumulation of frost..... 46

Table 101 – Maximum temperatures for motor-compressors..... 17

Table 102 – Refrigerant flammability parameters 32

SAFETY OF HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES –

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

1 Scope

This clause of part 1 is replaced by:

This 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 ISO standards.

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

As far as is practicable, this standard deals with the common hazards presented by appliances which are encountered by all persons in and around the home.

This standard does not in general take into account

- the use of appliances by young children or infirm persons without supervision;
- playing with the appliance by young children.

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 and the national authorities responsible for transportation.

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 ice-cream appliances.

2 Definitions

This clause of part 1 is applicable except as follows:

2.2.9 *Replacement:*

normal operation

operation of the appliance under the following conditions:

2.2.9.1

normal operation of a refrigerating appliance

operation at an ambient temperature according to 4.7, 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

2.2.9.2

normal operation of an ice-maker

operation at an ambient temperature according to 4.7, with the supply water at a temperature of $15\text{ °C} \pm 2\text{ °C}$

2.2.9.3

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 $15\text{ °C} \pm 2\text{ °C}$

2.2.9.4

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 $23\text{ °C} \pm 2\text{ °C}$

2.101

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

2.102

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 liquid state by mechanical compression at a higher pressure and subsequent cooling in another heat exchanger (**condenser**)

2.103**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

2.104**incorporated ice-maker**

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

2.105**heating system**

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

2.106**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**)

2.107**condenser**

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

2.108**evaporator**

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

2.109**flammable refrigerant**

refrigerant with a flammability classification of group 2 or 3 according to 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.

2.110**ice-cream appliance**

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

2.111**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. 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 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.

4 General conditions for the tests

This clause of part 1 is applicable except as follows:

4.2 Addition:

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

NOTE 1 Separate samples of the motor compressors may be needed for the tests of 19.1.

NOTE 2 The test of 22.7 may be carried out on separate samples.

NOTE 3 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 carrying out the tests.

4.3 Addition:

Before starting the tests

- **ice-cream appliances** are operated empty at **rated voltage** for 1 h or 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.

The test of 15.105 is carried out immediately after the test of 11.102.

The tests of 15.102, 15.103 and 15.104 are carried out immediately after the test of 15.2.

4.4 Replacement:

Tests are carried out using each source of energy (electricity, gas or other fuel) in turn. Gas appliances are supplied at the appropriate rated pressure.

Tests are additionally carried out with all combinations of energy sources supplied simultaneously unless this is prevented by interlocking devices.

4.7 Addition:

*For **ice-cream appliances**, tests specified in clauses 10, 11 and 13 are carried out at an ambient temperature of $23\text{ °C} \pm 2\text{ °C}$.*

For other appliances, tests specified in clauses 10, 11, 13 and subclause 19.103 are carried out at an ambient temperature of

32 °C ± 1 °C on appliances of extended temperate (SN) and temperate (N) classes;

38 °C ± 1 °C on appliances of subtropical (ST) class;

43 °C ± 1 °C on appliances of tropical (T) class.

Before starting these tests, the appliance with the doors or lids open is brought to within 2 K of the ambient temperature specified.

Appliances classified for several climatic classes are tested at the ambient temperature relevant to the highest climatic class.

Other tests are carried out at an ambient temperature of 20 °C ± 5 °C.

NOTE Steady conditions are considered to be established when three successive readings of the temperature, taken at approximately 60 min intervals, at the same point of any operating cycle, do not differ by more than 1 K.

4.8.1 Addition:

Appliances which can be battery operated are tested at the more unfavourable polarity when the supply terminals or terminations for the connection of the battery have no indication for polarity.

4.9 Addition:

*Appliances incorporating an **ice-maker** are tested with the **ice-maker** operating to give the most unfavourable results.*

4.10 Addition

For the tests of 22.107, 22.108 and 22.109, the appliance is empty and installed as outlined below:

Built-in appliances are installed in accordance with the instructions for installation.

Other appliances are placed in a test enclosure, the walls enclosing the appliance as near to all its sides and the top of the appliance as possible, unless the manufacturer indicates in the instructions for installation that a free distance shall be observed from the walls or the ceiling, in which case this distance is observed during the test.

NOTE Commonly available fixing hardware, such as screws and bolts, need not be delivered with a fixed appliance.

4.101 *Appliances which are constructed so that an **ice-maker** may be incorporated are tested with the intended **ice-maker**.*

4.102 ***Compression-type appliances with heating systems** and Peltier-type appliances are tested as **combined appliances**.*

4.103 ***Compression-type appliances which use flammable refrigerants** and which, according to the instructions, may be used with other electrical appliances inside a food storage compartment are tested with such recommended appliances incorporated and being operated as in normal use.*

NOTE Examples of such electrical appliances are ice-cream makers and deodorizers.

5 Void

6 Classification

This clause of part 1 is applicable except as follows:

6.101 Appliances, other than **ice-cream appliances**, shall be of one or more of the following climatic classes:

- appliances of extended temperate class (SN);
- appliances of temperate class (N);
- appliances of subtropical class (ST);
- appliances of tropical class (T).

Compliance is checked by inspection.

NOTE The climatic classes are specified in ISO standards.

7 Marking and instructions

This clause of part 1 is applicable except as follows:

7.1 Addition:

Appliances shall also be marked with

- the power input, in watts, of **heating systems**, if greater than 100 W;
- the defrosting input, in watts, if greater than the input corresponding to the **rated power input**;
- **rated power input** in watts or **rated current** in amperes, except that **compression-type appliances**, other than **ice-cream appliances**, shall be marked with the **rated current** in amperes;
- the letters SN, N, ST or T indicating the climatic class of the appliance;
- the maximum rated wattage of lamps, in watts;
- the total mass of the refrigerant;

NOTE 101 For **absorption-type appliances** using ammonia, the total mass of the refrigerant is considered to be the mass of ammonia used.

- for a single component refrigerant, at least one of the following:
 - the chemical name,
 - the chemical formula,
 - the refrigerant number;
- for a blended refrigerant, at least one of the following:
 - the chemical name and nominal proportion of each of the components,
 - the chemical formula and nominal proportion of each of the components,
 - the refrigerant number and nominal proportion of each of the components,
 - the refrigerant number of the refrigerant blend.

- the chemical name or refrigerant number of the principal component of the insulation blowing gas.

NOTE 102 Refrigerant numbers are given in ISO 817.

For **compression-type appliances**, the defrosting power input in watts shall be marked separately if the current corresponding to the defrosting power input is greater than the **rated current** of the appliance.

Appliances which can be mains and battery operated shall be marked with the battery voltage.

Appliances which can be battery operated shall be marked with the type of battery, distinguishing between rechargeable and non-rechargeable batteries, if necessary, unless the type is irrelevant for the operation of the appliance.

The means provided for connection of any additional electrical supply shall be marked with the voltage and nature of the supply.

Appliances designed for incorporating an **ice-maker** shall be marked with the maximum power input for an **incorporated ice-maker**, if greater than 100 W.

Ice-makers without automatic water level control shall be marked with the maximum permissible water level.

Appliances shall be marked with details of the source of supply other than electrical, if any.

For **compression-type refrigerating systems**, the appliance shall also be marked with the mass of the refrigerant for each separate refrigerant circuit.

Compression-type appliances which use **flammable refrigerants** shall be marked with warning sign B.3.2 from ISO 3864.

7.6 Addition:

The perpendicular height of the triangle containing the warning sign B.3.2 from ISO 3864 shall be at least 15 mm.

7.10 Addition:

NOTE 101 As an alternative, temperature values in degrees Celsius may be indicated on a control scale.

7.12 Addition:

The instructions for **refrigerating appliances** and **ice-makers** for camping or similar use shall include the substance of the following:

- suitable for camping use;
- the appliance may be connected to more than one source of energy;

NOTE 101 This item is not applicable to appliances which are intended to be supplied by electricity only.

- the appliance shall not be exposed to rain

NOTE 102 This item is not applicable to appliances with a degree of protection against harmful ingress of water of at least IPX4.

The instructions for **ice-makers** not intended to be connected to the water supply shall state the substance of the following warning:

WARNING – fill with potable water only.

For **compression-type appliances** which use **flammable refrigerants**, the instructions shall include information pertaining to the installation, handling, servicing and disposal of the appliance.

The instructions shall also include the substance of the warnings listed below:

WARNING – keep ventilation openings, in the appliance enclosure or in the built-in structure, clear of obstruction.

WARNING – do not use mechanical devices or other means to accelerate the defrosting process, other than those recommended by the manufacturer.

WARNING – do not damage the refrigerant circuit.

NOTE 103 This warning is only applicable to appliances with refrigerating circuits which are accessible to the user.

WARNING – do not use electrical appliances inside the food storage compartments of the appliance, unless they are of the type recommended by the manufacturer.

For appliances which use flammable insulation blowing gases, the instructions shall include information regarding disposal of the appliance.

The instructions for **ice-cream appliances** shall include the ingredients and maximum quantity of mixtures that can be used in the appliance.

7.12.1 Addition:

Instructions shall include the method for replacing illuminating lamps.

For appliances designed for incorporating **ice-makers**, the instructions shall include the types of **ice-makers** which can be incorporated.

The instructions shall include information on the installation of **incorporated ice-makers** which are available as optional accessories and intended to be installed by the user. If it is intended that **incorporated ice-makers** are to be installed only by the manufacturer or its service agent, this shall be stated.

The instructions for **ice-makers** intended to be connected to the water supply shall state

- the maximum permissible inlet water pressure, in pascals or bars;
- the minimum permissible inlet water pressure, in pascals or bars, if this is necessary for the correct operation of the appliance;
- the substance of the following warning:

WARNING – connect to potable water supply only.

The instructions for **fixed appliances** shall include the substance of the following warning:

WARNING – to avoid a hazard due to instability of the appliance, it must be fixed according to the instructions.

7.12.4 Modification:

This subclause is also applicable to **fixed appliances**.

7.15 Addition:

The marking of the maximum rated wattage of illuminating lamps shall be easily discernible while the lamp is being replaced.

For **compression-type appliances** the marking of the type of **flammable refrigerant** and of the flammable insulation blowing gas, as well as the warning sign B.3.2 from ISO 3864, shall be visible when gaining access to the motor-compressors.

For other appliances the marking of the type of flammable insulation blowing gas shall be on the external enclosure.

7.101 For appliances which can be battery operated the supply terminals or terminations for connections to the battery shall be clearly indicated by the symbol "+" or the colour red for the positive polarity, and by the symbol "-" or the colour black for the negative polarity, unless the polarity is irrelevant.

Compliance is checked by inspection.

8 Protection against access to live parts

This clause of part 1 is applicable except as follows:

8.1.1 Modification:

Replace the second paragraph of the test specification by the following:

*Lamps are not removed, provided that the appliance can be isolated from the supply by means of a plug or an all-pole switch. However, during the insertion or removal of lamps, protection against contact with **live parts** of the lamp cap shall be ensured.*

9 Starting of motor-operated appliances

This clause of part 1 is not applicable.

10 Power input and current

This clause of part 1 is applicable except as follows:

10.1 Modification:

Replace the third dashed item of the first paragraph of the test specification by the following:

- *the appliance being operated under **normal operation** except that user adjustable temperature controls are set to give the lowest temperature.*

Addition:

The power input is considered to be stabilized when steady conditions are established or when any incorporated timer operates, whichever occurs first.