

Specification for

Safety of household and similar electrical appliances

Part 2. Particular requirements

Section 2.24 Refrigerators, food-freezers and ice-makers

The European Standard EN 60335-2-24 : 1994 with the incorporation of amendments A51 : 1995, A52 : 1996 and A53 : 1997 has the status of a British Standard

ICS 97.040.30

Cooperating organizations

The European Committee for Electrotechnical Standardization (CENELEC), under whose supervision this European Standard was prepared, comprises the national committees of the following countries:

Austria	Italy
Belgium	Luxembourg
Denmark	Netherlands
Finland	Norway
France	Portugal
Germany	Spain
Greece	Sweden
Iceland	Switzerland
Ireland	United Kingdom

This British Standard, having been prepared under the direction of the Light Electrical Engineering Standards Policy Committee, was published under the authority of the Standards Board and comes into effect on 15 December 1994

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Summary of pages

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National foreword

This British Standard has been prepared under the direction of the Light Electrical Engineering Standards Policy Committee and is the English language version of EN 60335-2-24 : 1994 *Safety of household and similar electrical appliances Part 2: Particular requirements for refrigerators, food freezers and ice-makers* and Amendments A51, A52 and A53, published by the European Committee for Electrotechnical Standardization (CENELEC). It was derived by CENELEC from IEC 335-2-24 : 1992, published by the International Electrotechnical Commission (IEC).

The CENELEC common modifications have been implemented at the appropriate places in the text and are indicated by a side line in the margin. Parts of the original IEC text that have been modified by CENELEC have been quoted in national annex NA.

This British Standard is to be read in conjunction with BS 3456 : Part 201 : 1990 *General requirements* including only those amendments shown in the following table marked with an asterisk which supplement and modify BS 3456 : Part 201. The interrelationships of the amendments to IEC 335-1 : 1976, EN 60335-1 : 1988 and BS 3456 : Part 201 : 1990 are also shown in the table. The many references to Part 1 should be read as references to BS 3456 : Part 201, which is the English language version of EN 60335-1, which was derived from the 1983 reprint of IEC 335-1 : 1976 including Amendments 1, 2 and 3 to IEC 335-1 : 1976.

Amendment to BS 3456 : Part 201 : 1990	Amendment to EN 60335-1 : 1988 ¹⁾	Amendment to IEC 335-1 : 1976
Amendment No. 1 : 1990*	Amendment 2 : 1988	Amendment No. 4 : 1984
Amendment No. 2 : 1990*	Amendment 5 : 1989	Amendment No. 5 : 1986
Amendment No. 3 : 1990*	Amendment 6 : 1989	Amendment No. 6 : 1988
Amendment No. 4 : 1992*	Amendment A51 : 1991	—
Amendment No. 5 : 1992*	Amendment A52 : 1992	—
Amendment No. 6 : 1992*	Amendment A53 : 1992	—
Amendment No. 7 : 1993*	Amendment A54 : 1992	—
Amendment No. 8 : 1993*	Amendment A55 : 1993	—
Amendment No. 9 : 1993*	Corrigendum to Amendment A55 : 1993	—
Amendment No. 10 : 1994*	Corrigendum to EN 60335-1 : 1988	—
¹⁾ The first three of these amendments to EN 60335-1 implement, with additions and modifications, the corresponding amendments to IEC 335-1. All eight amendments have been specified in the foreword of EN 60335-2-24. The two corrigenda also apply.		

British Standard BS 3456 : Part 202 : Section 202.24 : 1990 will be withdrawn on 1 January 1997.

For products conforming to BS 3456 : Part 202 : Section 202.24 : 1990 before 1 January 1997, this standard may continue to apply for production until 1 January 2002.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Safety of household and similar electrical appliances Part 2: Particular requirements for refrigerators, food-freezers and ice-makers

(includes amendments A51 : 1995, A52 : 1996 and A53 : 1997)

(IEC 335-2-24 : 1992, modified)

Sécurité des appareils électrodomestiques et
analogues

Deuxième partie: Règles particulières pour les
réfrigérateurs, les congélateurs et les
fabriques de glace

(CEI 335-2-24 : 1992, modifiée)

(inclut les amendments A51 : 1995, A52 : 1996
and A53 : 1997)

Sicherheit elektrischer Geräte für den
Hausgebrauch und ähnliche Zwecke

Teil 2: Besondere Anforderungen für Kühl-
und Gefriergeräte und Eisbereiter
(IEC 335-2-24 : 1992, modifiziert)

(enthält Änderungen A51 : 1995, A52 : 1996
and A53 : 1997)

This European Standard was approved by CENELEC on 8 March 1994; amendment A51 was approved by CENELEC on 20 September 1995 and amendment A52 was approved by CENELEC on 1996-03-05. 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, 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 proposal to endorse the third edition of IEC 335-2-24, document CLC TC 61 (SEC) 825, was circulated under the enquiry procedure in February 1992. This proposal was discussed during the Pettenasco meeting in September 1992, when it was decided to submit a draft for EN 60335-2-24 to the voting procedure.

This draft was circulated in August 1993 and was ratified by CENELEC as EN 60335-2-24 on 8 March 1994.

This European Standard has been prepared by the secretariat of CENELEC Technical Committee TC 61.

The following dates are applicable:

- latest date of publication
of an identical national
standard (dop) 1995-01-01
- date of withdrawal of
conflicting national
standards (dow) 1997-01-01

For products which have complied with EN 60335-2-24 : 1989 before 1997-01-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 2002-01-01.

This standard has to be used in conjunction with EN 60335-1 : 1988, Safety of household and similar electrical appliances, Part 1: General requirements, including its amendments A2 : 1988, A5 : 1989, A6 : 1989, A51 : 1991, A52 : 1992, A53 : 1992, A54 : 1992 and A55 : 1993.

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

Subclauses and figures which are in addition to those in Part 1 are numbered starting with 101, additional appendices are lettered AA, BB, etc.

Special national conditions (snc) causing a deviation from this European Standard are listed in annex ZX 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 ZY to EN 60335-1.

Other publications quoted in this standard:

- | | | |
|------------|------|--|
| EN 61058-1 | 1992 | <i>Switches for appliances —
Part 1: General requirements</i> |
| HD 277 S1 | 1985 | <i>Safety of household and
similar electrical appliances
Part 2: Particular
requirements for
motor-compressors</i> |

The following print types are used:

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

Foreword to amendment A51

A proposal to amend EN 60335-2-24 : 1994, documents CLC/TC 61(DE)455 and CLC/TC 61(FR)248, was discussed during the Oslo meeting in April 1994, when it was decided to submit a draft for an amendment to the voting procedure.

This draft was circulated as prAB in March 1995 and was ratified by CENELEC as amendment A51 on 1995-09-20.

This amendment has been prepared by the secretariat of CENELEC Technical Committee TC 61.

The following dates are applicable:

- latest date of publication
of an identical national
standard (dop) 1996-04-01
- date of withdrawal of
conflicting national
standards (dow) 1998-04-01

For products which have complied with EN 60335-2-24 : 1994 before 1998-04-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 2003-04-01.

This amendment supplements or modifies the corresponding clauses of EN 60335-2-24 : 1994.

Subclauses which are in addition to those in IEC 335-2-24 are numbered starting with 601.

There are no special national conditions causing a deviation from this amendment.

There are no national deviations from this amendment.

NOTE – Amendment numbers commencing A1 refer to the endorsement of IEC amendments, while those commencing A51 originate in CENELEC.

Foreword to amendment A52

A proposal to amend EN 60335-2-24 : 1994, document CLC/TC 61(GR)23, was discussed during the Amsterdam meeting in September 1995, when it was decided to submit a draft for an amendment to the voting procedure.

This draft was circulated as prAC in October 1995 and was ratified by CENELEC as amendment A52 on 1996-03-05.

This amendment has been prepared by the secretariat of CENELEC Technical Committee TC 61.

The following dates are applicable:

- latest date of publication of an identical national standard (dop) 1996-08-01
- date of withdrawal of conflicting national standards (dow) 1996-08-01

For products which have complied with EN 60335-2-24 : 1994 including its amendment A51 : 1995 before 1996-08-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production.

This amendment supplements or modifies the corresponding clauses of EN 60335-2-24 : 1994 and its amendment.

EN 60335-2-24 : 1994 including its amendments has to be used in conjunction with EN 60335-1 : 1988, including its amendments A2 : 1988, A5 : 1989, A6 : 1989, A51 : 1991, A52 : 1992, A53 : 1992, A54 : 1992, A55 : 1993, A56 : 1995.

There are no special national conditions causing a deviation from this amendment.

There are no national deviations from this amendment.

NOTE. Amendment numbers commencing A1 refer to the endorsement of IEC amendments, while those commencing A51 originate in CENELEC.

Foreword to amendment A53

A proposal to amend EN 60335-2-24 : 1994 was discussed during the Copenhagen meeting in May 1996, when it was decided to submit the IEC document 61C/98/CDV to the Unique Acceptance Procedure.

This draft was circulated as prAD in November 1996 and was approved by CENELEC as amendment A53 on 1997-07-01.

This amendment has been prepared by the secretariat of CENELEC Technical Committee TC 61.

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) 1998-02-01

- date on which national standards conflicting with the amendment have to be withdrawn (dow) 1999-02-01

For products which have complied with EN 60335-2-24 : 1994 including its amendments A51 : 1995 and A52 : 1996 before 1999-02-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 2001-08-01.

This amendment supplements or modifies the corresponding clauses of EN 60335-2-24 : 1994 and its amendments. It comprises the text of document 61C/98/CDV, which is a draft amendment to IEC 335-2-24 : 1992.

There are no special national conditions causing a deviation from this amendment.

There are no national deviations from this amendment.

Add to the list of publications quoted in this standard:

EN 50054 : 1991	Electrical apparatus for the detection and measurement of combustible gases
IEC 79-4A : 1970	Electrical apparatus for explosive atmospheres — Part 4: Method of test for ignition temperatures
IEC 79-15 : 1987	Part 15: Electrical apparatus with type of protection 'n'
IEC 79-20 : 1996	Part 20: Data for flammable gases and vapours relating to the use of electrical apparatus
ISO 817 : 1974	Organic refrigerants — Number designation
ISO 3864 : 1984	Safety colours and safety signs
ANSI/NFPA 325M : 1991	Fire hazard properties of flammable liquids, gases and volatile solids
ANSI/ASHRAE 34 : 1992	Number designation and safety classification of refrigerants

NOTE. Amendment numbers commencing A1 refer to the endorsement of IEC amendments, while those commencing A51 originate in CENELEC.

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SAFETY OF HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES

Part 2: Particular requirements for refrigerators, food-freezers and ice-makers

1 Scope

This clause of part 1 is applicable except as follows:

1.1 *Replacement:*

This part of IEC 335 applies to:

- electrical refrigerators with or without frozen food storage compartments, frozen food storage cabinets and food freezers and their combinations for household and similar use;
- ice-makers incorporating a motor-compressor and ice-makers intended to be incorporated in food freezers or frozen food storage compartments;
- refrigerators and freezers for camping use, touring caravans and for boats for leisure purposes. These appliances may be mains operated, battery operated or operated either by mains or battery. They may also be in addition energized by another source (gas or fuel).

It deals with safety rules for such appliances including those which use flammable refrigerants with a maximum mass of the refrigerant of 150 g. It does not cover features of construction and operation of refrigerators and freezers which are dealt with in ISO standards.

When the appliance has more than one refrigerating circuit, the value of 150 g is to be considered for each independent refrigerating circuit.

Some tests related to stability and mechanical hazards are introduced in appendix BB. Some of these tests are taken from ISO Standards.

Where applicable, clauses of part 1 related to safety of heating appliances apply to absorption-type refrigerators or food freezers, and to heating elements incorporated in compression-type refrigerators or food freezers.

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.

This standard does not take into account the special hazards which exist in nurseries and other places where there are young children or aged or infirm persons without supervision; in such cases additional requirements may be necessary.

This standard does not apply to:

- 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);
- separate motors.
- separate motor compressors (HD 277).

For appliances intended to be used in vehicles or on board ships or aircraft, additional requirements may be necessary.

Attention is drawn to the fact that 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.

2 Definitions

This clause of part 1 is applicable except as follows:

2.2.30 Addition:

normal load for ice-maker: Load obtained when the ice-maker is operated at the room temperature according to the climatic classes with the supply water at a temperature of $(15 \pm 2) ^\circ\text{C}$ and with any controls adjusted to their most unfavourable setting if the setting can be altered by the user.

normal load for incorporated ice-maker: Load obtained when the ice-maker is operated at the temperature of the frozen food storage compartment as prescribed by the relevant subclauses of this Standard, with the supply water at a temperature of $(15 \pm 2) ^\circ\text{C}$ and with any control adjusted to their most unfavourable setting if the setting can be altered by the user.

Additional definitions:

2.2.101 refrigerator: Enclosed thermally insulated appliance of suitable volume and equipment for household use, cooled by a device consuming electric energy and having one or more compartments intended for the preservation of foodstuffs, one of them at least being maintained at a temperature above $0 ^\circ\text{C}$.

2.2.102 frozen food storage compartment: Enclosed thermally insulated compartment of a refrigerator whose temperature is such that under the ambient reference conditions foodstuffs placed in it at a temperature of $-6 ^\circ\text{C}$, $-12 ^\circ\text{C}$ or $-18 ^\circ\text{C}$ according to ISO classification are maintained at this temperature or below.

2.2.103 frozen food storage cabinet: Enclosed thermally insulated appliance or cabinet suitable for household use, cooled by means of a device consuming electric energy and having one or more compartments whose temperature is such that under ambient reference conditions foodstuffs placed therein, at a temperature equal to or below $-18 ^\circ\text{C}$, are maintained at this temperature or below.

2.2.104 food freezer: Enclosed thermally insulated appliance or cabinet of suitable volume and equipment for household use, cooled by means of a device consuming electric energy, and furnished with one or more compartments intended for the freezing of foodstuffs and suitable for the preservation of such foodstuffs at a temperature equal to or below $-18 ^\circ\text{C}$.

2.2.105 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 to a higher pressure and subsequent cooling in another heat exchanger (condenser).

2.2.106 Ice-maker: Appliance in which ice is made by freezing water by a device consuming electric energy and having a compartment for storing the ice.

2.2.107 Incorporated Ice-maker: Ice-maker specially designed to be incorporated into food freezer or a frozen food storage compartment and without means for freezing water.

2.2.108 ancillary heating element: Heating device such as a defrost heater, door heater, anti-condensation heater, etc, which performs an auxiliary function.

2.2.109 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 absorbant medium from which it is subsequently expelled at a higher partial vapour pressure by heating and liquefied by cooling in another heat exchanger (condenser).

2.2.110 condenser: Heat exchanger in which after compression, vaporized refrigerant is liquefied by rejecting heat to an external cooling medium.

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

2.2.112 free-standing appliance: Appliance intended for open-type installation only.

2.2.113 steady-state: Considered to be obtained 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 °C (1 K).

2.2.114 flammable refrigerant: Refrigerant with a flammability classification of Class 2 or 3 according to ANSI/ASHRAE 34.

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

3 General requirement

This clause of part 1 is applicable.

4 General notes on tests

This clause of part 1 is applicable except as follows:

4.2 Addition:

Tests on separate motor-compressors are given in HD 277.

At least one additional specially prepared sample is required for the tests of 22.104.

The test of 22.28 may be carried out on separate samples.

Due to the potentially hazardous nature of the tests of 22.104, 22.105 and 22.106, special precautions may need to be taken when carrying-out the tests.

4.3 *Replacement:*

Tests of clauses and subclauses 11.7, 9, 10, 11.9 to 11.103 are carried out in this order after tests of clause 8.

Before testing, the appliance shall be operated at rated voltage for 24 h.

4.5 *Addition:*

Tests according to clauses 9, 10, 11 and 12 are carried out at an ambient temperature of

- $(32 \pm 1) ^\circ\text{C}$, for appliances of extended temperate (SN) and temperate (N) temperature class;
- $(38 \pm 1) ^\circ\text{C}$, for appliances of subtropical (ST) temperature class;
- $(43 \pm 1) ^\circ\text{C}$, for appliances of tropical (T) temperature class.

Other tests are carried out at an ambient temperature of $(20 \pm 5) ^\circ\text{C}$.

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

4.6 *Addition:*

Tests are carried out with each source of energy (electricity, gas or fuel) in turn. Tests are additionally carried out with all combinations of sources supplied simultaneously unless this is prevented by interlocking devices.

For the purpose of tests the optional electric supply ($<42 \text{ V}$) is considered to be extra-low voltage supply.

4.7 *Addition:*

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

4.10 *Addition:*

For the tests of 22.104, 22.105 and 22.106, the appliance is empty and installed as follows:

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 above 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.

4.13 *Not applicable.*

Additional subclause:

4.101 Appliances which are so designed that an ice-maker may be incorporated in it are tested with the intended ice-makers.

4.102 *Compression-type appliances which use flammable refrigerants and which, according to the manufacturers' 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.*

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

5 Rating

This clause of part 1 is applicable.

6 Classification

This clause of part 1 is applicable except as follows:

