



**SLOVENSKI STANDARD**  
**SIST EN 60335-2-24:1995/A53:1998**  
**01-junij-1998**

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**Safety of household and similar electrical appliances - Part 2: Particular requirements for refrigerators - Food freezers and ice makers - Amendment A53**

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

Sicherheit elektrischer Geräte für den Hausgebrauch und ähnliche Zwecke -- Teil 2: Besondere Anforderungen für Kühl- und Gefriergeräte und Eisbereiter

Sécurité des appareils électrodomestiques et analogues -- Partie 2: Règles particulières pour les réfrigérateurs, les congélateurs et les fabriques de glace

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**Ta slovenski standard je istoveten z: EN 60335-2-24:1994/A53:1997**

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**ICS:**

13.120	Varnost na domu	Domestic safety
97.040.30	Hladilni aparati za dom	Domestic refrigerating appliances

**SIST EN 60335-2-24:1995/A53:1998**      **en**

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EUROPEAN STANDARD

EN 60335-2-24/A53

NORME EUROPÉENNE

EUROPÄISCHE NORM

September 1997

UDC 641.546.4:64.06-83:614.8  
ICS 97.040.30

Descriptors: Household electrical appliances, household refrigerators, freezers, safety requirements, protection against electric shock, fire protection, protection against mechanical hazard

English version

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

Sécurité des appareils  
électrodomestiques et analogues  
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les réfrigérateurs, les congélateurs et  
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This amendment A53 modifies the European Standard EN 60335-2-24:1994; it was approved by CENELEC on 1997-07-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this amendment 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 amendment 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

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.



## 1 Scope

### 1.1 *Replace the second paragraph by the following:*

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.

*Replace the last note by:*

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

*Add:*

**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.

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## 4 General notes on tests

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### 4.2 *Add:*

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

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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.

### 4.10 *Add:*

*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.*

*4.102 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.

**7 Marking****7.1** *Replace the fifth dash in the addition by the following:*

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

Refrigerant numbers are given in ISO 817.

*Replace the second paragraph of the addition by the following:*

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

Add:

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Compression-type appliances which use flammable refrigerants shall also be marked with the symbol "Caution, risk of fire"

**7.6** *Addition:*

..... Caution, risk of fire

The colour and format of this sign shall be as given in ISO 3864 for symbol B.3.2.

The perpendicular height of the triangle containing the "Caution, risk of fire" sign shall be at least 15 mm.

**7.12** *Addition:*

For compression-type appliances which use flammable refrigerants, the instruction sheet shall include:

- information for handling, installation, cleaning, servicing and disposal;
- the substance of the following:
  - Warning - Keep ventilation openings in the appliance enclosure or in the structure for building in, 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.
- Warning - Do not use electrical appliances inside the food storage of the appliance, unless they are of the type recommended by the manufacturer.

The third warning is only applicable for appliances where refrigerating circuits are accessible to the user.

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

#### 7.14 Addition:

For compression-type appliances, the marking of the type of flammable refrigerant and of the flammable insulation blowing gas, as well as the sign "Caution, risk of fire" 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.

## 22 Construction

22.26 to 22.29 To be modified as follows:

22.26 and 22.27 Not applicable.

22.28 Replacement:

Compression-type appliances, including protective enclosures of a protected cooling system, using flammable refrigerants shall withstand:

- a pressure of 3,5 times the saturated vapour pressure of the refrigerant at 70 °C for parts exposed to the high side pressure during normal operation;
- a pressure of 5 times the saturated vapour pressure of the refrigerant at 20 °C for parts exposed only to low side pressure during normal operation.

Specific constructional requirements of appliances with a protected cooling system are given in 22.104.

All pressures are gauge pressures.

*Compliance is checked by the following test.*

*The appropriate part of the appliance under test is subjected to a pressure that is gradually increased hydraulically until the required test pressure is reached. This pressure is maintained for one minute. The part under test shall show no leakage.*

The test is not carried-out on motor-compressors complying with IEC 335-2-34.

22.29 Not applicable.

**Additional subclauses:**

**22.104 Compression-type appliances with a protected cooling system and which use flammable refrigerants shall be constructed to avoid any fire or explosion hazard, in the event of leakage of the refrigerant from the cooling system.**

Separate components such as thermostats which contain less than 0,5 g of flammable refrigerant are not considered to cause a fire or explosion hazard in the event of a leakage of the component itself.

Appliances with a protected cooling system are those:

- without any part of the cooling system inside a food storage compartment;
- where any part of the cooling system which is located inside a food storage compartment is constructed so that the refrigerant is contained within an enclosure with at least two layers of metallic materials separating the refrigerant from the food storage compartment. Each layer shall have a thickness of at least 0,1 mm. The enclosure has no joints other than the bonded seams of the evaporator where the bonded seam has a width of at least 6 mm;
- where any part of the cooling system which is located inside a food storage compartment has the refrigerant contained in an enclosure which itself is contained within a separate protective enclosure. If leakage from the containing enclosure occurs, the leaked refrigerant is contained within the protective enclosure and the appliance will not function as in normal use. The protective enclosure shall also withstand the test of subclause 22.28 and no critical points in the protective enclosure shall be located within the food storage compartment.

Separate compartments with a common air circuit are considered to be a single compartment.

**Compliance is checked by inspection and by the tests of 22.104.1 and 22.104.2.**

**22.104.1 A leakage is simulated at the most critical point of the cooling system.**

Critical points are only interconnecting joints between parts of the refrigerant circuit. To find the most critical point of the cooling system, it may be necessary to carry out more than one test.

**The method for simulating a leakage at the most critical point is to inject the refrigerant vapour through a capillary tube at a critical point. The capillary tube which may need to be positioned before foaming the appliance, shall have a diameter of 0,7 mm  $\pm$  0,05 mm and a length between 2 m and 3 m.**

Care should be taken that the installation of the capillary tube does not unduly influence the results of the test and that the foaming does not enter the capillary tube during foaming. The capillary tube may need to be positioned before the appliances in foamed.

**During this test the appliance is tested with doors and lids closed, and is switched off or operated whichever gives the more unfavourable result.**

**During a test in which the appliance is operated, gas injection is started at the same time as the appliance is first switched on.**

**The quantity of refrigerant of the type indicated by the manufacturer to be injected is equal to 80 % of the nominal charge of the refrigerant  $\pm$  1,5 g or the maximum which can be injected in one hour, whichever is the smaller.**

**The quantity injected is taken from the vapour side of a gas bottle which shall contain enough liquid refrigerant to ensure that at the end of the test there is still liquid refrigerant left in the bottle.**

**If a blend can fractionate, the test is carried out using the fraction that has the smallest value of the lower explosive limit.**



The gas bottle is kept at a temperature of:

- 32° C ± 1° C for leakage simulation on low-side pressure circuits;
- 70° C ± 1° C for leakage simulation on high-side pressure circuits.

The quantity of gas injected should preferably be measured by weighing the bottle.

The concentration of leaked refrigerant inside the food storage compartments and inside any internal or external electrical component compartment except those which contain only non-self resetting protective devices necessary for complying with clause 19, is measured continuously from the beginning of the test and for at least one hour after the injection of the gas has stopped.

The instrument used for monitoring gas concentration, such as those which use infra-red sensing techniques, should have a fast response, typically 2 s to 3 s and not unduly influence the result of the test.

If gas chromatography is to be used, the gas sampling in confined areas should occur at a rate not exceeding 2 ml every 30 s.

Other instruments are not precluded from being used provided that they do not unduly influence the results.

The measured value shall not exceed 75 % of the lower explosive limit of the refrigerant as specified in table 101 and shall not exceed 50 % of the lower explosive limit of the refrigerant as specified in table 101 for a period exceeding 5 min, otherwise the appliance shall be considered as having an unprotected cooling system and it shall comply with subclause 22.105.

For appliances with a protected cooling system, no additional requirements apply to electrical components located inside food storage compartments.

22.104.2 All accessible surfaces of protected cooling system components including accessible surfaces in intimate contact with protected cooling system are scratched using the tool the tip of which is shown in figure 103.

The tool is applied using the following parameters:

- force at right angles to the surface to be tested ..... 35 N ± 3 N
- force parallel to the surface to be tested ..... not exceeding 250 N

The tool is drawn across the surface to be tested at a rate of approximately 1 mm/s.

The surface to be tested is scratched at three different positions in a direction at right angles to the axis of the channel and at three 3 different positions on the channel in a direction parallel to it. In the latter case, the length of the scratch shall be approximately 50 mm.

The scratches shall not cross each other.

The appropriate part of the appliance shall withstand the test of 22.28, the test pressure being reduced by 50 %.

22.105 For compression-type appliances with an unprotected cooling systems and which use flammable refrigerants any electrical apparatus other than non-self resetting protective devices necessary for complying with clause 19, located inside the food storage compartments shall comply with at least section 3, clauses 16 and 17, and section 4 of IEC 79-15 for Group IIA gases or the refrigerant used.