



BS 3456 : Part 102 : Section 102.24 : 1988

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British Standard Specification for
**Safety of household and
similar electrical appliances**

**Part 102. Particular requirements
Section 102.24 Refrigerators and food freezers**

(Implementation of CENELEC HD 269 S2)

Sécurité des appareils électrodomestiques et analogues
Partie 102. Règles particulières
Section 102.24 Réfrigérateurs et congélateurs

Sicherheit von Elektrogeräten für den Haushalt und ähnliche Zwecke
Teil 102. Besondere Anforderungen
Abschnitt 102.24 Kühl- und Gefrierschränke

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BS 3456 : Part 102 : Section 102.24 : 1988

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Foreword

This Section of BS 3456 : Part 102 has been prepared under the direction of the Light Electrical Engineering Standards Committee. It is aligned with the CENELEC * Harmonization Document for refrigerators and food freezers, HD 269 S2, which in turn is based on IEC Publication † 335-2-24 (1976 – First edition). Its number is directly related to the number of the equivalent Section of the IEC publication.

It is a revision of BS 3456 : Section 3.18 : 1980 which is withdrawn in accordance with the CENELEC Internal Regulations.

It gives the particular requirements for refrigerators and food freezers and is to be read in conjunction with BS 3456 : Part 101 : 1987 'General requirements' which it supplements or modifies. The many references to Part 1 should be read as references to BS 3456 : Part 101 which is the implementation of the CENELEC Harmonization Document for the General Requirements, HD 251 S3. In the original IEC text of the particular requirements the precise line numbers in the IEC Part 1 are given. The lines in Part 101 of BS 3456 are not numbered but sufficient information has been included in these particular requirements for the relevant matter in Part 101 to be identified. For ease of production the text of the IEC standard has been used, but it has been modified as described below.

The CENELEC modifications that appear in HD 269 S2 have been included in the text in the appropriate position and are indicated by a single side line in the margin of the page. References are included to items of the original IEC text which are given in appendix X together with the justifications in the CENELEC Harmonization Document for the modifications.

The United Kingdom deviations are included in the text of the standard and are indicated by a double side line in the margin of the page. In the event of any conflict between the requirement in the Harmonization Document and the requirement in the United Kingdom deviation, the requirement in the United Kingdom deviation takes precedence and users of this British Standard should operate to the United Kingdom deviation.

* CENELEC = European Committee for Electrotechnical Standardization.

† IEC = International Electrotechnical Commission.

A complete list of all national deviations to the CENELEC Harmonization Document is given in appendix Y.

In this British Standard the following print types are used to differentiate between requirements, test specifications and explanatory matter.

Requirements: in roman type.

Test specifications: in italic type.

Explanatory matter: in small roman type.

The CENELEC Harmonization Document was approved by the CENELEC Technical Board on 9 December 1981.

A revision of IEC Publication 335-2-24 was published in 1984. It is expected that this will eventually appear, possibly with some modification, as a European Standard. Before this happens a European Standard based on IEC Publication 335-1 including Amendment 3 will have been issued in CENELEC. Revisions of the parallel British Standards will be prepared and published as required.

Cross-references

International standards

IEC 335-1 : 1976 }
HD 251 S3 : 1982 }

HD 277 S1 : 1984

IEC 85 : 1984

ISO 4046-1978

HD 21 : 1984 }
HD 22 : 1984 }

Code designation HO3VV-F

Code designation HO3VVH2-F

Corresponding British Standards

BS 3456 Specification for safety of household and similar electrical appliances
Part 101 : 1987 General requirements
(Technically equivalent)

Section 102.34 : 1987 Motor-compressors
(Identical)

BS 2757 : 1986 Method for determining the thermal classification of
electrical insulation
(Identical)

BS 3203 : 1979 Glossary of paper, board, pulp and related terms
(Identical)

BS 6500 : 1984 Specification for insulated flexible cords and cables
(Table 15 identical)

CEE Publication 15 : 1964

BS 3535 : 1962 Specification for safety isolating transformers for
industrial and domestic purposes
(Technically equivalent)

The Technical Committee has reviewed the specific provisions of ISO 7371-1985 'Performance of household refrigerating appliances—Refrigerators with or without low temperature compartment', which has replaced ISO R/824 and R 825 to which reference is made in the text, and has decided that they are acceptable for use in conjunction with this standard.

IEC 227 : 1979 and IEC 245 : 1967 are related to BS 6500 : 1984 'Specification for insulated flexible cords and cables'.

Product approval. Attention is drawn to the fact that products conforming to this British Standard may be approved by the British Electrotechnical Approvals Board for the purposes of participation in the CENELEC Certification Agreement and in the CB Scheme of the IECEE. (Details of the BEAB approval mark scheme are given on the inside back cover).

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

British Standard Specification for

Safety of household and similar electrical appliances

Part 102. Particular requirements

Section 102.24 Refrigerators and food freezers

1. Scope

This clause of Part 1 applies except as follows:

1.1 Replacement

Replace this sub-clause of Part 1 by the following:

This standard applies to electrical refrigerators, frozen food storage compartments or cabinet food freezers and their combinations available for household and similar use.

It deals with safety rules for the electrical equipment of such appliances, but does not cover features of construction and operation which are dealt with in Recommendations ISO/R 824 and R 825.

Some tests related to stability and mechanical hazards are introduced in Appendix CC. Some of these tests are taken from Recommendation ISO/R 824. The others have been introduced until ISO establishes rules concerning them.

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.

This standard does not apply to separate motor-compressors, which are covered by a separate Part 2 (HD 277 S1).

NOTE. For information see X.1.

2. Definitions

This clause of Part 1 applies except as follows:

2.2.8, 2.2.16, 2.2.17, 2.2.25, 2.2.28, 2.2.29, 2.2.30, 2.2.31, 2.2.32, 2.2.33, 2.2.34 and 2.2.46. Not applicable.

NOTE. For information see X.2 and X.3.

2.2.101 A *refrigerator* denotes an 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, at least one of the compartments being maintained at a temperatures above 0 °C and below 7 °C.

NOTE. For information see Y.B.1.

2.2.102 A *frozen food storage compartment* denotes an 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 °C, -12 °C or -18 °C according to ISO classification are maintained at this temperature.

2.2.103 A *frozen food storage cabinet* denotes an 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 °C, are maintained at this temperature.

2.2.104 A *food freezer* denotes an 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 °C.

2.2.105 A *compression-type appliance* denotes an 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 An *absorption-type appliance* denotes an 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 liquified by cooling in another heat exchanger (condenser).

2.2.107 A *condenser* denotes a heat exchanger in which after compression vaporized refrigerant is liquefied by rejecting heat to an external cooling medium.

2.2.108 An *evaporator* denotes a heat exchanger in which after pressure reduction the liquid refrigerant is vaporized by absorbing heat from the medium to be refrigerated.

2.2.109 A *free-standing appliance* denotes an appliance intended for open-type installation only.

2.2.110 *Steady state* is considered to be obtained when three successive readings of the temperature, taken at approximatively 60 min intervals, at the same point of any operating cycle, do not differ by more than 1 deg C (1 K).

3. General requirement

This clause of Part 1 applies.

4. General notes on tests

This clause of Part 1 applies except as follows:

4.2 Addition

Add the following:

Tests according to this standard may be carried out in conjunction with those of the corresponding ISO Recommendation.

Motor-compressors complying with HD 277 S1 are not subjected to the tests of Clauses 11, 19, 25, 26, 27, 28, 29, 30 and 31.

NOTE. For information see X.4.

4.3 Replacement

Replace this sub-clause by the following:

Tests according to Clause 9 are carried out after tests according to Sub-clause 11.7.

Tests according to Clause 10 are carried out after tests according to Clause 9.

Tests according to Sub-clauses 11.9 to 11.104 are carried out after tests according to Clause 10.

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

4.5 Addition

Add the following:

Tests according to Clause 9, Clause 10, Clause 11 and Clause 12 shall be carried out at an ambient temperature of $32 \pm 1^\circ\text{C}$ on appliances of temperate class, or $43 \pm 1^\circ\text{C}$ on appliances of tropical class.

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

4.13 Not applicable.

5. Rating

This clause of Part 1 applies except as follows:

5.1 Replacement

Replace the requirement by the following:

The maximum rated voltage is 250 V.

6. Classification

This clause of Part 1 applies except as follows:

6.1 Addition

Add the following:

(c) According to room temperature:

In accordance with ISO/R 824 and R 825:

- appliances of temperate class;
- appliances of tropical class.

7. Marking

This clause of Part 1 applies except as follows:

7.1 Addition

Add the following in the list of markings:

Appliances shall be marked with:

- the rated input of heating elements and any auxiliary components if greater than 100 W;
- the defrosting input, in watts, if greater than the input corresponding to the rated input;
- the letter N or T indicating the climatic class of the appliance (N = temperate, T = tropical);
- the rated maximum input of lamps in watts.
- the chemical name or formulae, or the number, of the refrigerant or, where a mixture is used, the individual chemical names or formulae, or numbers.

If compression-type refrigerating systems are provided, the appliances shall also be marked with the mass of the refrigerant, or of each refrigerant in a mixture, other than those of the azeotropic type.

NOTE. For information see X.5.

If there is a marking or claim concerning the preservation of frozen foodstuffs in the frozen food storage compartment of an appliance, this marking or claim is verified according to ISO Recommendations R 824-1968 and R 825-1968.

Moreover, if there is a marking or claim concerning food freezing in an appliance, the frozen food preservation performance is verified as for a three-star frozen food storage compartment, according to ISO Recommendations R 824-1968 and R 825-1968.

In addition, the frozen food preservation performance of a combined refrigerator/food freezer incorporating a single temperature control is verified at an ambient temperature of 10 °C.

NOTE. For information see Y.B.2.

7.2 Not applicable.

7.12 Addition

In the instruction sheet, the manufacturer shall draw attention to the fact that fizzy drinks should not be frozen and that some products, such as flavoured water ices, should not be consumed too cold.

NOTE. For information see Y.C.1.

7.14 Addition

Add the following:

In the case of free-standing appliances, the marking shall be visible if necessary, after moving the appliance away from the wall.

The marking of the input of the lamp shall be easily discernible while the lamp is being replaced.

8. Protection against electric shock

This clause of Part 1 applies except as follows:

8.1 Addition

Add the following:

Protecting covers of lamps, except those which do not need to be removed when replacing the bulb, are removed before applying the standard test finger.

8.2, 8.3 and 8.7 Not applicable.

9. Starting of motor-operated appliances

The tests in this clause are carried out at least 15 min after those of Sub-clause 11.7, but not later than 1 h after the latter.

This clause of Part 1 applies except as follows:

9.1 Replacement

Replace this sub-clause by the following:

Motors shall start under all normal voltage conditions which may occur in use.

Compliance is checked by the following test:

The appliance is started three times at 0.85 times the rated voltage at an ambient temperature of 32 °C or 43 °C according to its class (see Sub-clause 6.1, item (c)), the doors and covers being closed.

The appliance is kept switched-on after each start for a sufficient time to ensure that the motor starts properly and that there is adequate lubrication.

The interval between two successive starts shall be sufficiently long to prevent excessive overheating of the motor, and to avoid an abnormal increase in the pressure of the liquid refrigerant, as well as to reach equalization of pressure between the high-pressure and low-pressure sides.

Three chatterings of the starting relay are permitted.

The supply source is such that the drop in voltage does not exceed 1 % during the test.

Appliances incorporating only motor-compressors complying with HD 277 S1 are not subjected to this test.

NOTE. For information see X.6.

9.2 Replacement

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

The appliance is switched on at an ambient temperature of 32 °C or 43 °C according to its class (see Sub-clause 6.1, item (c)), the doors and covers being closed.

The appliance is kept switched on for a sufficient time to ensure that the motor starts properly and that there is adequate lubrication.

The interval between two successive starts shall be sufficiently long to prevent excessive overheating of the motor and to avoid an abnormal increase in the pressure of the liquid refrigerant, as well as to reach equalization of pressure between the high-pressure and low-pressure sides.

The supply source is such that the drop in voltage does not exceed 1 % during the test.

Three chatterings of the starting relay are permitted.

10. Input and current

For the sake of rational testing, it is recommended that the tests of Clause 10 should be carried out after the tests of Clause 9 and before the tests of Sub-clauses 11.9 to 11.104.

This clause of Part 1 applies except as follows:

10.1 Replacement

Replace the test specifications by the following:

Compliance is checked by measuring the input of the appliance under the following conditions:

For appliances other than those pre-set at the manufacturer's works, the thermostat is set to give the lowest temperature. The appliance is empty, with the doors and covers being closed and the lamps, if any, extinguished.

The tests are carried out at the rated voltage, the appliance being operated at an ambient temperature of 32 °C or 43 °C according to its class (see Sub-clause 6.1, item (c)).

The input is measured when steady-state conditions are established.

For a cyclic operation, the measured input is the mean value of the input between the making and the breaking of the thermostat.

10.2 Replacement

Replace the test specifications by the following:

The test is made under the conditions given in Sub-clause 10.1.

The current is measured when steady-state conditions are established.

The maximum value of the current measured between the making and the breaking of the thermostat, excluding the starting current, is considered to be the current taken by the appliance.

NOTE. For information see X.7.

10.101 Addition

The measured input, in watts, of a defrosting system shall not exceed the rated defrost wattage marked on the appliance by more than 10%.

Compliance is checked by measuring the input of the defrosting system when the appliance operates on defrosting, at rated voltage.

This compliance is checked only if the rated defrost input is marked on the appliance.

10.102 Addition

The measured input, in watts, of any auxiliary component shall not exceed the input marked on the appliance for these components by more than 20%, when such marking is given.

Compliance is checked by measuring the input of auxiliary components when operated at rated voltage, when the input is stabilized.

11. Heating

This clause of Part 1 applies except as follows:

11.2 Addition

On the third line of the test specification, add the following sentence:

If means of ventilation are supplied by the manufacturer, they shall be mounted as intended.

Add the following test specification:

Free-standing appliances are placed in a cabinet consisting of dull black painted plywood walls with a thickness of approximately 20 mm, enclosing the appliance as near to all its sides as possible, except the door, unless the manufacturer indicates in the instruction sheet that the appliance must be spaced from walls or must not be covered; the manufacturer may indicate a free distance to be respected above the appliance; this distance must be observed during the test.

The appliance is placed in a room maintained at a temperature of 32 °C or 43 °C according to its class (see Sub-clause 6.1, item (c)) with the doors or lids open until the whole assembly is at room temperature.

11.4 Replacement

Replace this sub-clause by the following:

Absorption-type appliances and heating elements, if any, are supplied at such a voltage that the input is 1.15 times maximum rated input.

11.5 Replacement

Replace this sub-clause by the following:

The resistance of windings of compressor-type appliances is measured before the test, when the appliance has reached room temperature.

The appliance is supplied at the most unfavourable voltage between 0.94 and 1.06 times the rated voltage until steady state has been reached.

For this test, heating elements are supplied under conditions indicated in Sub-clause 11.4.

11.6 Addition:

In general, the supply conditions specified for motor-operated appliances apply also to combined appliances. In cases of doubt, however, the conditions specified for combined appliances apply.

NOTE. For information see X.8.

11.7 Replacement

Replace this sub-clause by the following:

The thermostat or similar control device is short-circuited and doors or lids are closed.

The appliance is then operated until steady-state conditions are established.

Temperatures of the different parts of the appliance are then measured.

11.8 Replacement

Replace this sub-clause by the following:

The overload protection devices, if any, may operate during the test, but shall not operate when steady-state conditions are attained. Temperatures shall not exceed the values specified in the following table and sealing compound, if any, shall not flow out.

NOTE. For information see X.9.

Parts of the appliance	Temperature (°C)
<i>Windings of hermetic compressor motors:</i>	
— synthetic insulation	140
— cellulosic insulation or the like	130
<i>External enclosures of hermetic compressor motors or of any other motors</i>	150
<i>Windings with insulation and core lamination in contact therewith (not for hermetic compressor motors):</i>	
— Class A (impregnated cotton, silk, paper or similar materials)	100
— Class E (enamelled wires with resins, formalpolyvinyl, polyurethane)	115
<i>Other types of insulation:</i>	
— Class Y (natural rubber, vulcanized rubber, vinyl chloride):	
• if flexing of wiring occurs or is likely	60
• if no flexing of wiring occurs or is likely	75
• with T marking	T
— Class A (varnished textile, impregnated paper and textiles, impregnated wood, aminoplasts)	100
— Class E (phenoplasts with cellulose fillers)	115
— Class B (phenoplasts with mineral fillers, glass fibre and epoxy resin laminates)	120
— Silicone rubber	170
— glass fibre	175
<i>Outer surface of capacitors:</i>	
— with marking of maximum operating temperature (t_a)	$t_a - 10$
— without marking of maximum operating temperature, small ceramic capacitors for radio and television interference suppression	75
<i>Cores and other parts in contact with windings</i>	As for winding according to IEC Publications 227 and 245
<i>Insulated internal wiring</i>	
<i>Rubber or polyvinyl chloride insulation of internal and external wiring, including power supply cords:</i>	
— if flexing of wiring is likely to occur	60 ⁴⁾
— if flexing of wiring is unlikely to occur	75 ⁴⁾
— with T-marking	T ⁵⁾
NOTE. For information see X.10.	
Deletion.	
NOTE. For information see X.11.	
<i>Terminals of terminations for type M and type Y attachments:</i>	
— for power-supply cord without T-marking	60
— for power-supply cord with T-marking	T
<i>Wood in general</i>	90
<i>Wooden supports, walls, ceiling and floor of the test corner</i>	85
<i>Handles made of:</i>	
— metal	60
— porcelain or vitreous material	70
— moulded material, rubber or wood	85
The insulation classes are those stated in IEC Publication 85	

Because of the two classes of appliances (N and T), the values given in the table above are temperatures with which any appliance, whatever its class is, should comply.