SLOVENSKI STANDARD
SIST EN ISO 7371:2000

01-december-2000

Household refrigerating appliances - Refrigerators with or without low-temperature compartment - Characteristics and test methods (ISO 7371:1995)

Household refrigerating appliances - Refrigerators with or without low-temperature compartment - Characteristics and test methods (ISO 7371:1995)

Haushalts-Kühlgeräte - Kühlgeräte mit oder ohne Niedertemperaturfächern - Eigenschaften und Prüfverfahren (ISO 7371:1995)

Appareils de réfrigération ménagers - Réfrigérateurs ménagers avec ou sans compartiment basse température - Caractéristiques et méthodes d'essai (ISO 7371:1995)

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EUROPEAN STANDARD

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English version

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CEN

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

Central Secretariat: rue de Stassart,36 B-1050 Brussels

Foreword

The text of the International Standard ISO 7371:1995 has been prepared by Technical Committee ISO/TC 86 "Refrigeration" in collaboration with CEN/TC 44 "Household refrigerating appliances and commercial refrigerated cabinets".

This European Standard shall be given the status of a National Standard, either by publication of an identical text or by endorsement, at the latest by May 1996, and conflicting national standards shall be withdrawn at the latest by May 1996.

According to CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Endorsement notice

The text of the International Standard ISO 7371:1995 has been approved by CEN as a European Standard without any modification.

MODIFIED

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NOTE: Normative references to international publications are listed in annex ZA (normative).

Annex ZA (normative)
Normative references to international publications with their relevant European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

Publication	Year	Title	EN	Year
ISO 534	1988	Paper and board - Determination of thickness and Apparent bulk density or apprent sheet density	EN 20534	1993

INTERNATIONAL STANDARD

ISO 7371

Second edition
1995-11-15

Household refrigerating appliances — Refrigerators with or without low-temperature compartment — Characteristics and test methods

Appareils de réfrigération ménagers — Réfrigérateurs ménagers avec ou sans compartiment basse température — Caractéristiques et méthodes d'essai

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Contents

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Annexes

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 7371 was prepared by Technical Committee ISO/TC 86, *Refrigeration*, Subcommittee SC 5, *Construction and testing of household refrigerators*.

This second edition cancels and replaces the first edition (ISO 7371:1985), which has been technically revised.

Annexes A and B of this International Standard are for information only.

Household refrigerating appliances — Refrigerators with or without low-temperature compartment — Characteristics and test methods

1 Scope

This International Standard specifies the essential characteristics for household refrigerators, with or without a cellar or low-temperature compartment, which are wholly factory assembled, and lays down the methods of test for the checking of these characteristics.

It does not apply to food freezers, which are covered in ISO 5155, or refrigerator-freezers, which are covered in ISO 8187.

It does not include refrigerating performance characteristics and tests, or particular definitions for refrigerators cooled by internal forced air circulation, which are the subject of ISO 8561.

The tests described in this International Standard are type tests. When it is necessary to verify the performance of a refrigerator of a given type in relation to this International Standard, all the tests described should in principle be applied to one and the same unit.

These tests can also be made individually for the study of a particular characteristic.

Where no test method is specified, the particular requirement concerned is to be considered as a recommendation.

The electrical and mechanical safety requirements applicable to household refrigerators are specified in IEC 335-2-24.

Additional safety requirements applicable to mechanical refrigerating systems of household refrigerators are given in ISO 5149.

The safety requirements applicable to gaseous and liquid fuel heating equipment of absorption-type household refrigerating systems will form the subject of a future International Standard.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 534:1988, *Paper and board — Determination of thickness and apparent bulk density or apparent sheet density.*

ISO 817:—[1], *Refrigerants — Number designation.*

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

IEC 335-2-24:1992, *Safety of household and similar electrical appliances — Part 2: Particular requirements for refrigerators, food freezers and ice-makers.*

1) To be published. (Revision of ISO 817:1974)

3 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1 household refrigerator (hereinafter referred to as "refrigerator")**:** Insulated cabinet of suitable volume and equipment for household use, cooled by one or more energy-consuming means, and having one or more compartments intended for the preservation of food, one at least of which is suitable for the storage of fresh food.

NOTE 1 From the point of view of installation, there are various types of household refrigerators, for example free-standing, wall-mounted, built-in, etc.

3.2 Compartments and sections

3.2.1 fresh food storage compartment: Compartment intended for the storage of unfrozen food which may be itself divided into sub-compartments, and in which the temperatures can be maintained in accordance with 6.2.1.

3.2.2 cellar compartment: Compartment intended for the storage of particular foods or beverages at a temperature warmer than that of the fresh food storage compartment, and in which the temperatures can be maintained in accordance with 6.2.1.

3.2.3 low-temperature compartment: Compartment which may be either

— an ice-making compartment, or

— a frozen food storage compartment.

NOTE 2 A refrigerator may have one or several low-temperature compartments. Alternatively, it may have no low-temperature compartment.

3.2.4 ice-making compartment: Compartment intended specifically for the freezing and storage of water ice-cubes.

3.2.5 frozen food storage compartments: Compartments intended specifically for the storage of frozen food. They are classified according to their temperature, as follows.

3.2.5.1 "one star" compartment: Compartment in which the storage temperature (see 3.4.3.2), measured as described in clause 13, is not warmer than – 6 °C.

3.2.5.2 "two star" compartment: Compartment in which the storage temperature (see 3.4.3.2), measured as described in clause 13, is not warmer than – 12 °C.

3.2.5.3 "two star" section: Part of a "three star" compartment which is not self-contained (i.e. which does not have its own individual access door or lid), in which the storage temperature (see 3.4.3.2), measured as described in clause 13, is not warmer than – 12 °C (see 7.2.6).

3.2.5.4 "three star" compartment: Compartment in which the storage temperature (see 3.4.3.2), measured as described in clause 13, is not warmer than – 18 °C.[2)]

3.3 General definitions

3.3.1 top-opening type: Refrigerator in which the compartment(s) is (are) accessible from the top.

3.3.2 upright type: Refrigerator in which the compartment(s) is (are) accessible from the front.

3.3.3 overall dimensions (doors or lids closed)**:** Measurements of the rectangular parallelepiped, whose base is horizontal, within which the refrigerator is inscribed to include the complete appliance except for the handle, the protrusion of which, if any, is to be specified separately.

3.3.4 overall space required in use (doors or lids open)**:** Overall dimensions including the handle, increased by the space necessary for free circulation of the cooling air when the appliance is in service, plus the space necessary to allow opening of the means of access to that minimum angle permitting removal of all removable parts such as containers and shelves, including the drip tray with water if this has to be removed and emptied manually (see figure 1).

2) In certain instances, "two star" sections and/or compartments are permitted within the compartment (see 7.2.6).

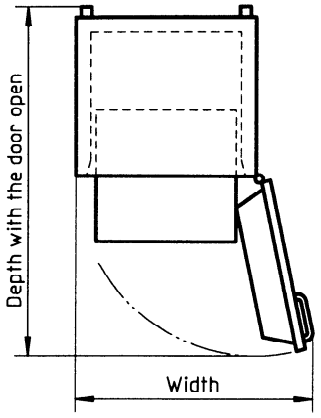

Figure 1 — Overall space required in use (upright type)

3.3.5 Volumes

3.3.5.1 gross volume: The volume within the inside walls of the appliance, or of a compartment with external door, without internal fittings, doors or lids being closed.

3.3.5.2 rated gross volume: Gross volume stated by the manufacturer.

3.3.5.3 total gross volume: Sum of the gross volumes of the fresh food storage compartment(s), low-temperature compartment(s) [including any "two star" section(s) and/or compart- ment(s) contained in a "three star" compartment], and cellar compartment(s), even if their doors or lids are independent.

3.3.5.4 rated total gross volume: Total gross volume stated by the manufacturer.

3.3.5.5 storage volume: That part of the gross volume of any compartment which remains after deduction of the volume of components and spaces recognized as unusable for the storage of food, determined by the method given in 7.2.

3.3.5.6 rated storage volume: Storage volume stated by the manufacturer.

3.3.5.7 total storage volume: Sum of the storage volumes of the appliance, comprising the storage volumes of the fresh food storage compartment(s), low-temperature compartment(s) [including any "two star" section(s) and/or compartment(s) contained in a "three star" compartment] and cellar compartment(s).

3.3.5.8 rated total storage volume: Total storage volume stated by the manufacturer.

3.3.6 Storage surfaces

3.3.6.1 shelf: For the purpose of this International Standard, a shelf is any horizontal surface (shelves, partitions, etc.) on which food can be placed.

It may be formed by one component or by components fitted side by side, which may be fixed or removable.

3.3.6.2 storage shelf area: Sum of the horizontal projections of the storage surfaces within the storage volume, including door shelves and the bottom of each compartment, determined in accordance with 7.3.

3.3.6.3 rated storage shelf area: Storage shelf area stated by the manufacturer.

3.3.7 load limit(s): Surface enveloping the frozen food storage volume(s).

3.3.8 load limit line(s): Permanent mark(s) indicating the limits of "three star" frozen food storage volume(s).

3.4 Definitions relating to some performance characteristics

3.4.1 energy consumption: Consumption of a refrigerator over a period of 24 h, running under stable operating conditions at an ambient temperature of + 25 °C (in the case of class SN, class N and class ST refrigerators) or + 32 °C (in the case of class T refrigerators) (see clause 4) and measured under the conditions specified in clause 15.

3.4.2 rated energy consumption: Energy consumption stated by the manufacturer.

3.4.3 Storage temperatures

3.4.3.1 fresh food storage temperature, t_m: Arithmetical average of the mean temperatures t_1, t_2 and t_3 which are the mean internal temperatures measured in copper or brass cylinders (see 8.4) placed at given points in the fresh food storage compartment as specified in 8.5, i.e. the arithmetical average of the extreme values at these points during a complete control cycle (see 3.4.6).

3.4.3.2 frozen food storage temperature, t^{***}, t^{**}, t^{*} (as appropriate): Maximum temperature of the warmest "M" package of a load placed in storage as specified in 8.6.

3.4.3.3 cellar compartment temperature, t_{cm}: Arithmetical average of the mean temperature t_{c1}, t_{c2} and t_{c3} (as appropriate, see figure 10), which are the mean internal temperatures measured in copper of brass cylinders (see 8.4) placed at given points in the cellar compartment as specified in 8.5, i.e. the arithmetical average of the extreme values at these points during a complete control cycle (see 3.4.6).

3.4.4 Defrosting

3.4.4.1 automatically defrosted: A compartment is automatically defrosted where no action is necessary by the user to initiate the removal of frost accumulation nor to restore normal operation, and where the disposal of the defrost water is automatic.

3.4.4.2 semi-automatically defrosted: A compartment is semi-automatically defrosted where an action is necessary by the user to initiate the removal of frost accumulation and normal operation is restored automatically, the defrost water being removed manually or removed and disposed of automatically.

A compartment is also semi-automatically defrosted where no action is necessary by the user to initiate the removal of frost accumulation nor to restore normal operation, but where the removal of the defrost water is manual.

3.4.4.3 manually defrosted: A compartment is manually defrosted where an action is necessary by the user to initiate the removal of frost acccumulation and restoration to normal operation requires a further action by the user, the defrost water being removed manually or removed and disposed of automatically.

The method of defrosting shall be specified separately for the fresh food storage compartment(s) and low-temperature compartment(s).

The means of disposal of defrost water may be any of the following types.

3.4.4.4 automatic disposal of defrost water: Disposal of defrost water is automatic where the removal and the evaporation of the defrost water does not require any action by the user.

3.4.4.5 manual removal of defrost water: Removal of defrost water is manual where an action is necessary by the user to remove the defrost water.

3.4.5 "M" package: A test package in accordance with 8.2, of dimensions 50 mm × 100 mm × 100 mm, fitted with a temperature sensor at its geometric centre.

3.4.6 control cycle: Period between two successive starts, or two successive stops, of a refrigerating system, or of a part of a system, under stable operating conditions.

3.4.7 stable operating conditions: In the case of cyclic operation of a refrigerating system, or of a part of a system, including any automatic defrost periods, stable operating conditions are deemed to be reached when, for each of the "M" packages and copper or brass cylinders, the temperatures at all corresponding points during successive operating cycles agree within ± 0,5 K and there is no marked trend away from the mean temperature during a period of 24 h.

In the case of continuous operation of a refrigerating system, or of a part of a system, stable operating conditions are deemed to be reached when, although there may be a certain variation in temperature, the increase or decrease in the temperature of all the "M" packages and copper or brass cylinders does not exceed 0,5 K during a period of 18 h.

3.4.8 percentage running time, R (apparatus with on/off control for the refrigerating source)**:** Under given conditions of ambient temperature and of internal storage temperature, the ratio

$$R = \frac{d}{D} \times 100$$

where

d is the duration of the refrigerating system operation during a whole number of cycles;

D is the total duration of the cycles.

In the case of a refrigerator having two independent refrigerating systems, there will be two values for percentage running time, one for the fresh food storage compartment and one for the low-temperature compartment.

3.4.9 ice-making capacity: Quantity of ice the refrigerator is capable of producing within 24 h, or the time necessary for the freezing of the water in the ice tray(s) supplied with the appliance.

3.4.10 ambient temperature: Temperature in the space surrounding the appliance under test. It is the arithmetical average of the mean value of temperatures t_{a1} and t_{a2}, measured (see 8.1.1) at two points located 350 mm from the vertical centreline of the side walls of the appliance at 1 m above the floor line.

3.4.11 temperature rise time: Period between the moment when, under specified test conditions, the

temperature of the warmest "M" package in the "three star" compartment reaches – 18 °C to the moment when any of the "M" packages (excluding any "two star" sections) first reaches a temperature of – 9 °C when the operation of the refrigerating system is interrupted.

3.5 Definitions relating to the refrigerating system

3.5.1 refrigerant: Fluid used for heat transfer in a refrigerating system, which absorbs heat at a low temperature and a low pressure of the fluid and rejects heat at a higher temperature and a higher pressure of the fluid, usually involving changes of state of the fluid.

3.5.2 cooling device: Device containing the evaporator or in thermal contact with the evaporator; it may be a device with fins or may be suitably shaped for the storage of frozen food or water ice-cubes.

3.6 Definitions relating to compression-type refrigerators

3.6.1 compression-type refrigerator: Refrigerator 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).

3.6.2 hermetically sealed motor-driven refrigerating compressor: Motor-compressor in which the compressor and the electric motor (or its moving parts at least) are enclosed in a shell rendered gastight by welding, brazing or other means such that dismantling is not normally possible after assembly. It does not include moving parts outside the shell.

3.6.3 hermetically sealed compressor refrigerating system: Complete system, essentially comprising a hermetically sealed motor-driven compressor, a condenser, a pressure-reducing device, an evaporator, and all other parts containing refrigerant permanently interconnected by the manufacturer by welding, brazing or other means.

3.6.4 refrigerant compressor: Mechanically operated component which withdraws refrigerant vapour from the evaporator and discharges it at a higher pressure to the condenser.

3.6.5 expansion device: Device in which the pressure of the refrigerant is reduced from that of the condensed liquid to that of the evaporator.

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

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

3.6.8 thermostat: Device which automatically regulates the operation of a refrigerating system according to the temperature of an evaporator or of a compartment.

3.7 Definitions relating to absorption-type refrigerators

3.7.1 absorption-type refrigerator: Refrigerator in which refrigeration is effected by evaporation of a liquid refrigerant in an evaporator, the vapour thus formed being then absorbed by an absorbent medium from which it is subsequently expelled at a higher partial vapour pressure by heating and then liquefied by cooling in a condenser.

3.7.2 absorption refrigerating system: Complete system essentially comprising a boiler, a condenser, an evaporator, an absorber, and all other parts containing refrigerant permanently interconnected by the manufacturer by welding, brazing or other means.

3.7.3 boiler: Heat exchanger in which the absorbed refrigerant is expelled from the absorbent medium by the application of heat.

3.7.4 absorber: Component in which the absorption of the refrigerant by an absorbent medium takes place, the heat emitted in the process being rejected to the environment.

3.7.5 condenser: Heat exchanger in which the vaporized refrigerant, after leaving the boiler, is liquefied by rejecting heat to an external cooling medium.

3.7.6 evaporator: Heat exchanger in which the liquid refrigerant, after a drop in its partial pressure, is vaporized by absorbing heat from the medium to be refrigerated.

4 Classification

With respect to the ability of appliances to operate in extreme ambient temperatures, this International Standard relates to the four climate classes given in table 1.