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Household refrigerating appliances — Frozen food storage cabinets and food freezers — Characteristics and test methods

Appareils de réfrigération à usage ménager — Conservateurs de denrées congelées et congélateurs — Caractéristiques et méthodes d'essai

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Contents

Page

1 Scope 1

2 Normative references 1

3 Definitions 2

4 Classification 5

5 Materials, design and manufacture 5

6 Required characteristics 6

7 Determination of linear dimensions, volumes and areas 7

8 General test conditions 9

9 Testing the airtightness of door or lid seal(s) 12

10 Testing the opening force of door(s) or lid(s) 13

11 Testing the durability of hinges and handles of door(s) and lid(s) 13

12 Testing the mechanical strength of shelves and baskets 14

13 Testing the storage temperatures 14

14 Water vapour condensation test 16

15 Energy-consumption test 17

16 Temperature rise test (if applicable) 18

17 Freezing test (only for freezers) 18

18 Final test report 21

19 Designation 22

20 Marking 22

21 Technical and advertising literature 24

22 Instructions for use and maintenance 24

Annexes

A Particular conditions for various countries 38

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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 5155 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 5155:1983), which has been technically revised.

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

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Household refrigerating appliances — Frozen food storage cabinets and food freezers — Characteristics and test methods

1 Scope

This International Standard specifies the essential characteristics for household frozen food storage cabinets and food freezers which are wholly factory assembled, and lays down the methods of test for the checking of these characteristics.

It does not apply to low-temperature compartments ("one-", "two-" and "three-star" compartments) which are covered in ISO 7371, or freezer compartments incorporated in refrigerators, which are covered in ISO 8187.

It does not include refrigerating performance characteristics and tests, or particular definitions for appliances 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 freezer 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 frozen food storage cabinets and food freezers are specified in IEC 335-2-24.

Additional safety requirements applicable to mechanical refrigerating systems of household frozen food storage cabinets and food freezers 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)

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3 Definitions

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

3.1 Appliances

NOTES

1 From the point of view of installation, there are various types of household refrigerator-freezers and their combinations: free-standing, built-in, etc.

2 Definitions 3.1.1 and 3.2.2 are in line with those for a "three star" compartment and food freezer compartment given in ISO 8187.

3.1.1 household frozen food storage cabinet (hereinafter referred to as "three star" cabinet): Insulated cabinet of suitable volume and equipment for household use, cooled by energy-consuming means and having one or more compartments. The storage temperature of the compartments, measured as described in clause 13, is not warmer than − 18 °C.

3.1.2 household food freezer (hereinafter referred to as freezer): Insulated cabinet of suitable volume and equipment for household use, cooled by energy-consuming means and having one or more compartments for freezing fresh food. The freezer is suitable for freezing, from + 25 °C to − 18 °C for class SN, N and ST appliances, and from + 32 °C to − 18 °C for class T appliances (see clause 4), a quantity of at least 4,5 kg of test packages per 100 l of its storage volume in 24 h, and in no case less than 2 kg, under the test conditions specified in clause 17, and is also suitable for the storage of frozen food under storage conditions (see 3.1.1).

3.2 "two star" section: Part of a freezer or of a cabinet 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), measured as described in clause 13, is not warmer than − 12 °C. (See also 7.2.4.)

3.3 General definitions

3.3.1 top-opening type: A "three star" cabinet or freezer whose compartment(s) is (are) accessible from the top.

3.3.2 upright type: A "three star" cabinet or freezer whose 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 "three star" cabinet or freezer 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 up to that minimum angle permitting removal of all removable parts such as containers and shelves. (See figure 1.)

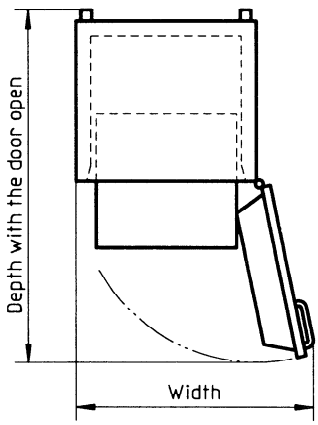

Figure 1 — Overall space required in use (upright type)

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 "three star" cabinets and freezer compartments [including any "two star" section(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, de-

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termined by the method given in 7.2, and also after deduction of the volume of any "two star" section.

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 [including any "two star" section(s)], comprising storage volumes of "three star" cabinets and freezer compartments.

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

3.3.6 Storage surface

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 "three star" cabinet volume(s).

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

3.4 Definitions relating to some performance characteristics

3.4.1 energy consumption: Consumption of a "three star" cabinet and freezer 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 appliances) or + 32 °C (in the case of class T "three star" cabinet and freezer) (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 frozen food storage temperature, t^{***}, t^{**} (as appropriate)**:** Maximum temperature of the warmest "M" package of a load placed in storage as specified in 8.5.

3.4.4 freezing capacity (applicable only to freezers)**:** Mass of test packages whose temperature (taken as the instantaneous arithmetical mean temperature of all the "M" packages) can be lowered from the loading temperature of + 25 °C or + 32 °C (see 8.1.1) to − 18 °C in 24 h under the test conditions specified in clause 17. The freezing capacity is expressed in kilograms.

3.4.5 rated freezing capacity (applicable only to freezers)**:** Freezing capacity stated by the manufacturer.

3.4.6 "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.

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

3.4.8 stable operating conditions: In the case of cyclic operation of a refrigerating system, stable operating conditions are deemed to be reached when, for each of the "M" packages, 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 about 24 h.

In the case of continuous operation of a refrigerating 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 does not exceed 0,5 K during a period of 18 h.

3.4.9 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 unit operation during a whole number of cycles;

D is the total duration of the cycles.

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

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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" cabinet or freezer 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 "three star" cabinets or freezers

3.6.1 compression-type "three star" cabinet or freezer: "Three star" cabinet or freezer 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 "three star" cabinets or freezers

3.7.1 absorption-type "three star" cabinet or freezer: "Three star" cabinet or freezer 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.

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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.

Table 1 — Climate classes

Values in degrees Celsius

Class	Symbol	Range of ambient temperatures in which the appliances are intended to be used, and for which the required storage temperatures shall be fulfilled (see 6.2.1)
Extended temperate	SN	+ 10 to + 32
Temperate	N	+ 16 to + 32
Subtropical	ST	+ 18 to + 38
Tropical	T	+ 18 to + 43

5 Materials, design and manufacture

5.1 General

"Three star" cabinets and freezers shall be constructed in such a manner as to ensure adequate performance and durability in use. Their performance in use is checked by applying a series of relevant tests.

This clause defines some characteristics which are not tested but to which the attention of the manufacturer is drawn.

5.2 Materials and finishes

Materials used inside "three star" cabinets and freezers shall not contaminate food placed in contact with them nor transmit poisonous substances to food. They shall be resistant to the action of moisture and food acids.

All surface finishes shall, for the purpose intended, be resistant to impact, sufficiently hard, colour-fast, smooth, easily washable, and resistant to damage by moisture and by food acids.

5.3 Thermal insulation and airtightness

The thermal insulation of "three star" cabinets and food freezers should be efficient and permanently maintained. In particular, the insulating material shall not be subject to shrinkage and shall not allow, under normal working conditions, an excessive accumulation of moisture.

No running water shall appear externally when the "three star" cabinet or freezer is subjected to the water vapour condensation test specified in clause 14.

When the door or lid is closed, there shall be no abnormal ingress of air into the interior.

A strip of paper shall not slide freely when door or lid seals are subjected to the airtightness test specified in clause 9.

5.4 Doors, lids and fittings

Hinges and handles shall be strong and resistant to corrosion.

External doors and lids of "three star" cabinets and freezers shall withstand 10 000 openings and closings without deterioration which may be prejudicial to the airtightness of the "three star" cabinet or freezer when subjected to the durability test of clause 11.

The fastening system shall be such as to enable the door or lid to be easily closed and opened. It shall be efficient and capable of maintaining its proper function.

For "three star" cabinets and freezers having any compartment or section with a volume equal to or greater than 60 l, it shall be possible to open the door or lid of that compartment from the inside with a force not exceeding 70 N when subjected to the test specified in clause 10. The volume of any compartment or section shall be determined when all shelves, partitions and other internal components removable without the aid of a tool have been removed. However, if the door or lid is provided with a mechanical latch which can be locked by a removable key, and the door or lid cannot be closed with the key turned to the locked position, this requirement applies only when the latch is unlocked, provided that the appliance is accompanied by an instruction stating that the key shall be kept out of the reach of children and not kept in the vicinity of the appliance.

5.5 Shelves and containers

Shelves, containers and similar components shall have adequate mechanical strength. Those used for storing food shall withstand the loading test specified in clause 12 without showing such distortion that they could no longer fulfil their intended function. In

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particular, sliding or revolving components shall be capable of their full movement when loaded.

Shelves, containers and similar components which are intended to be removable should be easily removable.

5.6 Refrigerating system

5.6.1 The mechanical operation of "three star" cabinets or freezers should not give rise to undue noise or vibration.

5.6.2 The design of the condenser should be such as to reduce to a minimum the accumulation of dust.

5.6.3 The evaporator shall be so designed or protected so that it will not suffer any damage during the normal use of the appliance.

The heat exchange surfaces shall be made of corrosion-resistant material, or shall be finished with a corrosion-proof non-poisonous coating resistant to temperature changes and defrosting.

5.6.4 The means of adjustment of temperature control devices, if intended to be adjusted by the user, should be readily accessible, and their function shall be such as to enable the appliance to meet the requirements of the performance tests.

5.6.5 Pipes and connections to moving or resiliently mounted parts should be arranged so as not to generate noise, not to touch nor to transmit vibrations to other parts, and should be so designed as to prevent failure due to fatigue. All other pipes and connections should be securely anchored. Where necessary, pipes and valves should be properly insulated.

5.6.6 Suitable means should be provided to prevent water condensed on cold parts from affecting the operation of the unit or its controls, or from causing any other damage to the "three star" cabinet or freezer and its surroundings.

6 Required characteristics

6.1 Volumes and areas

6.1.1 Rated gross volume

The measured gross volume shall not be less than the rated gross volume by more than 3 % of the latter or 1 litre, whichever is the greater value.

6.1.2 Rated storage volume

The measured storage volume shall not be less than the rated storage volume by more than 3 % of the latter or 1 litre, whichever is the greater value.

6.1.3 Rated storage shelf area

The measured storage shelf area shall not be less than the rated storage shelf area by more than 3 % of the latter.

6.2 Performance characteristics

6.2.1 Storage temperatures

Under the conditions specified in clause 13, the appliance shall be capable of maintaining, simultaneously, the required storage temperatures as shown in table 2 for the appropriate climate class.

Table 2 — Storage temperatures for all climate classes (see clause 4)

Values in degrees Celsius

Climate class	Test ambient temperature	Freezer and "three star" cabinet t^{***}	"Two star" sections (see 7.2.4) t^{**}
SN	+ 32	⩽ − 18	⩽ − 12
N	+ 32		
ST	+ 38		
T	+ 43		

6.2.2 Freezing capacity (applicable only to freezers)

The freezing capacity measured in accordance with clause 17 on the first appliance tested shall not be less than the rated freezing capacity by more than 15 % of the latter.

If the result of the test carried out on the first appliance is less than the declared value minus 15 %, the test shall be carried out on a further three appliances.

The arithmetical mean of the freezing capacity values of these three appliances shall be equal to or greater than the declared value minus 10 %.

The value of the freezing capacity obtained either on the first appliance tested or the arithmetical mean value obtained on a further three appliances shall not be less than 4,5 kg per 100 l of the total storage vol-

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ume of the freezer (see 7.2.3) nor less than 2 kg (irrespective of storage volume).

The requirements of 17.1.3 shall be taken into account if appropriate.

6.2.3 Energy consumption

If energy consumption is stated by the manufacturer, the value measured in accordance with clause 15 on the first appliance tested shall not be greater than the rated energy consumption by more than 15 %, of the latter.

If the result of the test carried out on the first appliance is greater than the declared value plus 15 %, the test shall be carried out on a further three appliances.

The arithmetical mean of the energy consumption values of these three appliances shall be equal to or less than the declared value plus 10 %.

6.2.4 Temperature rise time

If the temperature rise time is stated by the manufacturer, the value measured in accordance with clause 16 on the first appliance tested shall not be shorter than the declared value by more than 15 % of the latter.

If the result of the test on the first appliance is less than the declared value minus 15 %, the test shall be carried out on a further three appliances. The arithmetical mean of the periods of temperature rise of these three appliances shall be equal to or greater than the declared value minus 10 %.

7 Determination of linear dimensions, volumes and areas

The measurements are carried out on the appliance as delivered and not operating.

7.1 Determination of linear dimensions

Linear dimensions shall be measured to the nearest millimetre.

7.2 Determination of volumes

Volumes shall be expressed in a whole number of cubic decimetres or of litres.

7.2.1 Determination of gross volume

The gross volume shall be calculated by dividing the total volume into convenient units of volumes of geometric shapes which can easily be measured.

When the gross volume is determined, internal fittings such as shelves, removable partitions, containers, evaporators, thermostats and interior light housings shall be considered as not being in place. However, the gross volume shall take into account the exact shapes of the walls if they contain depressions or projections (for example, see figure 16).

7.2.2 Determination of the total storage volume

The total storage volume of the "three star" cabinet or freezer shall be the sum of the storage volumes of all compartments, including "two star" section(s), as applicable.

For the determination of storage volumes, the total volume of devices and of spaces considered unusable for the storage of food shall be deducted from the gross volume calculated in accordance with 7.2.1 (see 7.2.3).

7.2.3 Storage volume of frozen food storage cabinets and freezers

The storage volume of these appliances shall be the gross volume minus the following (for example, see figure 17):

a) the volume of spaces situated outside any load limit (natural or marked by the manufacturer);

b) the volume of spaces provided specifically for making and storing ice, except in the case of appliances fitted with automatic icemakers, when the volume occupied by a removable storage bucket shall be included in the storage volume unless it is specified in the instructions for use that this volume is suitable for the storage of ice only;

c) the volume of spaces between the front stack(s) of the test package load (see 13.1.2) and the inner vertical surface of the door or any projection from the door where the horizontal distance between the front face of the stack(s) and the inner door surface or projection exceeds 15 mm;

d) the volume of all fixed components within the load limits;

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e) the volume of spaces which are to be kept free for the good performance of the refrigerating system;

f) the total volume of the removable parts and of the space rendered unusable by the use of the parts which are stated by the manufacturer as necessary for the proper functioning of the appliance and for meeting all the required characteristics (see clause 6 and 8.3.4) except shelves and partitions whose thickness is not greater than 13 mm (see 7.2.5.1);

g) the storage volume of any "two star" section(s);

h) any volume where the vertical clearance is less than 52 mm [see also figure 17 a)];

i) any volume where it is impossible to place an "M" package of nominal dimensions.

NOTE 3 There is no equivalence between the value of the storage volume determined in accordance with the principles mentioned above and the volume of the packages loaded into the appliance for the storage and freezing tests. The free spaces specified in the test methods could be utilized in normal use and their volume should not be deducted from the gross volume when calculating the storage volume.

7.2.4 "Two star" section(s) in freezers and in "three star" cabinets

"Two star" section(s) is (are) permitted both in the door and in the remaining storage volume when all the following conditions are met:

a) the "two star" section(s) is (are) marked with the appropriate identification symbol;

b) the "two star" section(s) is (are) separated from the "three star" volume by a partition, container, or similar construction;

c) the rated total "two star" storage volume does not exceed 20 % of the storage volume of the cabinet or 30 l, whichever is the smaller value;

d) the instructions for use give clear guidance regarding the "two star" section(s);

e) the storage volume of the "two star" section(s) is stated separately and is not included in the storage volume.

7.2.5 Volumes of shelves and partitions (for examples, see figure 18)

7.2.5.1 Thickness

The thickness of a shelf or partition shall be the mean distance between its outer surfaces.

Where the surface of a shelf or partition is corrugated or fitted with external pipe grids, the surface shall be the plane joining the outer apices of the corrugations or pipes, unless the distance between adjacent corrugations or pipes is greater than 100 mm.

7.2.5.2 Full shelves and partitions

The volume of a full shelf or partition shall be the product of its thickness and its depth, width or height, whichever two of these are applicable. The depth, width and height shall be those dimensions of the enclosed space of the cabinet which apply in the plane of the shelf or partition.

7.2.5.3 Fractional shelves and partitions (if applicable)

The volume of a fractional shelf or partition shall be the product of its thickness and its depth, width or height, whichever two of these are applicable.

The depth, width or height shall be the distances from the adjacent surfaces of the enclosed space of the cabinet, and normal to those surfaces, to the further edges of the shelf or partition, or to the evaporator in cases where the fractional shelf or partition touches it.

A horizontal shelf or partition, the edges of which are more than 70 mm from the surfaces of the enclosed space of the cabinet, shall be regarded as a fractional shelf or partition. A vertical partition, the edges of which are more than 100 mm from the surfaces of the enclosed space of the cabinet, shall be regarded as a fractional partition.

7.3 Determination of storage shelf area

The area shall be expressed in square decimetres.

7.3.1 Determination of the area of shelves

7.3.1.1 Full shelves composed of a single part

In the case of a full shelf composed of a single part, the area shall be the product of the width and depth. These two dimensions shall be determined as follows.

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— Width: mean distance measured parallel to the surface of the shelf between the inner surfaces of the side walls of the enclosed space of the cabinet, where this dimension does not exceed the actual width of the shelf by more than 20 mm [see figure 12 a)].

— Depth: mean distance measured parallel to the surface of the shelf (or of the bottom of the appliance) between the inner surfaces of the front and rear walls of the enclosed space of the cabinet, where this dimension does not exceed the actual depth of the shelf by more than 20 mm [see figure 12 b)]. When the door of an upright-type appliance is provided with shelves, this distance shall be determined by analogy [see figures 12 c) and 12 d)].

7.3.1.2 Fractional shelves

For the purpose of calculating the area of fractional shelves, the width and depth shall be measured parallel to the surface of the shelves in a similar way to that for full shelves (see 7.3.1.1), but taking into account figure 12 e).

7.3.1.3 Cut-away shelves

When a shelf is cut away, the area of the portion cut out shall be deducted.

7.3.1.4 Juxtaposed shelves

In the case of juxtaposed shelves, the depth shall be determined in accordance with figure 12 d).

7.3.1.5 Door shelves

The area shall be the product of the width and depth. These two dimensions shall be determined by analogy with 7.3.1.1, as follows.

— Width: mean distance between the inner surfaces of the side walls of the door compartment or between the side edges of the retainer bar.

— Depth: mean distance between the surface of the door wall and the vertical plane tangential to the inner front surface of the shelf or retainer bar [see figure 12 c)].

7.3.1.6 Baskets and containers

The area shall be the product of the two mean horizontal dimensions [see figure 13 a)].

7.3.1.7 Particular cases

The bottom of the enclosed space of the cabinet shall be considered as a shelf.

When an inner wall is not vertical, the dimension of the shelf shall be measured at the mid-height between the shelf under consideration and the shelf or horizontal surface immediately above.

Any part of full shelves, baskets or of the bottom of a "three star" cabinet or freezer having less than 52 mm vertical clearance above, when all the shelves and baskets are in position, shall be excluded when calculating the storage area [see figure 13 b)].

For an ice-making compartment, the minimum vertical clearance dimension shall be not less than 40 mm.

8 General test conditions

The order of carrying out the tests need not necessarily follow the sequence of the clauses given in this International Standard.

The results of the tests shall appear in a test report. When necessary, particular information to be noted in this report is mentioned as a special item of the subclause concerning the test.

The manufacturer's storage plans shall be used, provided that they are in accordance with this International Standard (see 13.1.2).

8.1 Test room

The appliance shall be set up in a test room as specified in 8.1.3.

8.1.1 Ambient temperature

Tests shall be carried out under the following conditions of ambient temperature.

a) For checking the storage temperatures:

+ 32 °C for class SN and class N appliances;

+ 38 °C for class ST appliances;

+ 43 °C for class T appliances.

NOTE 4 The purpose of this test is to verify the storage temperature limits for the whole ambient temperature range for the relevant class. It is considered that testing at the highest ambient temperature value in the class is sufficient.

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b) For checking the energy consumption, temperature rise time and freezing capacity[2]:

+ 25 °C for class SN, class N and class ST appliances;

+ 32 °C for class T appliances.

c) For all other tests, at the temperature stated in the test specifications.

The temperature at each measurement point (see 3.4.10) shall be kept constant within ± 0,5 K of the nominal ambient temperature both during the periods required for obtaining stable operating conditions and during the tests.

The vertical ambient temperature gradient from the platform specified in 8.1.3 to a height of 2 m shall not exceed 2 K/m.

8.1.2 Humidity

Unless otherwise specified, relative humidity shall be kept between 45 % and 75 %.

8.1.3 Installation of appliances

Each appliance shall be placed on a wooden solid-top platform, painted dull black, open for free air circulation under the platform. The top of the platform shall be 0,3 m above the test room floor and shall extend at least 0,3 m, but not more than 0,6 m, beyond all sides of the appliance, except at the rear where it shall extend to the vertical partition.

Circulation of air around the appliance shall be restricted by surrounding the appliance by three vertical partitions, painted dull black, arranged as follows:

a) one of the partitions shall be placed parallel to the rear of the appliance, against the stops or at the distance specified by the manufacturer in connection with the required overall space;

b) the two other partitions shall be parallel to the sides of the cabinet, and shall be fixed on the platform 0,3 m from the sides of the cabinet; they shall be 0,3 m wide.

The whole partition structure shall have the form and dimensions shown in figure 2.

Dimensions in metres

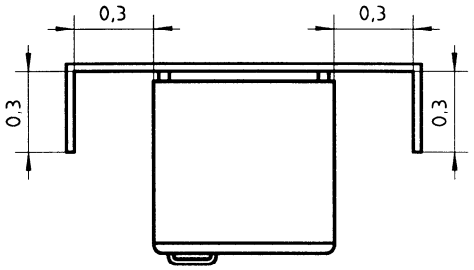

Figure 2 — Partitions to restrict air circulation
(plan view)

The vertical partitions shall present no discontinuity. They shall be of such a height that they extend at least 0,3 m above the top of the appliance.

The appliance shall be so placed or shielded as to prevent direct radiation to or from the space cooling or heating equipment in the test room, and shall be placed far enough away from all other objects in the test room to eliminate any possibility of any point in the space in which it is situated being at a temperature other than ambient.

Air circulation in the test room shall be such that the specified ambient temperatures are obtained within the limits of the specified tolerances. The appliance under test shall be shielded from any air currents of velocity above 0,25 m/s.

The air circulation in the test room shall not interfere with the normal air circulation created by the appliance.

Appliances intended to be built-in shall be built in according to the manufacturer's instructions.

Built-in appliances intended to be combined with appliances other than refrigerating appliances shall be subjected to the tests while they are combined, but with the other appliance not functioning.

8.2 Test packages

When tests are carried out with a loaded appliance, test packages in the form of right parallelepipeds shall be used.

8.2.1 Dimensions and tolerances

Their size, prior to freezing, and their mass, packaging included, shall be as specified in table 3.

2) See annex A for particular conditions.

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