

BS EN 62552:2013



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# Household refrigerating appliances — Characteristics and test methods

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## National foreword

This British Standard is the UK implementation of EN 62552:2013. It is derived from IEC 62552:2007, incorporating corrigendum March 2008. It supersedes BS EN 153:2006 and BS EN ISO 15502:2005, which are withdrawn.

The start and finish of text introduced or altered by corrigendum is indicated in the text by tags. Text altered by IEC corrigendum March 2008 is indicated in the text by AC1 AC1.

The CENELEC common modifications have been implemented at the appropriate places in the text. The start and finish of each common modification is indicated in the text by tags C C.

The UK participation in its preparation was entrusted by Technical Committee CPL/59, Performance of household electrical appliances, to Subcommittee CPL/59/13, Performance of refrigeration.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

# EN 62552

March 2013

ICS 97.030

English version

**Household refrigerating appliances -  
Characteristics and test methods**  
(IEC 62552:2007, modified + corrigendum Mar. 2008)

Appareils de réfrigération à usage  
ménager -  
Caractéristiques et méthodes d'essai  
(CEI 62552:2007, modifiée + corrigendum  
Mar. 2008)

Haushalt-Kühl-/Gefriergeräte -  
Eigenschaften und Prüfverfahren  
(IEC 62552:2007, modifiziert +  
corrigendum Mar. 2008)

This European Standard was approved by CENELEC on 2012-10-22. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

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## CENELEC

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

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## Foreword

This document (EN 62552:2013) consists of the text of IEC 62552:2007 + corrigendum 2008 prepared by IEC/TC 59 "Performance of household and similar electrical appliances", together with the common modifications prepared by CLC/TC 59X "Performance of household and similar electrical appliances".

The following dates are fixed:

- latest date by which this document has to be implemented (dop) 2013-10-22  
at national level by publication of an identical national standard or by endorsement
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2015-10-22

This document supersedes EN 153:2006 and EN ISO 15502:2005 + AC:2007.

EN 62552:2013 includes the following significant technical changes with respect to EN 153:2006 and EN ISO 15502:2005:

- new compartment: zero star;
- new compartment: wine storage, combined with requirements for vibration, temperature fluctuation and humidity;
- new compartment: pantry;
- new compartment: multi-use;
- new compartment: through-the-door-devices;
- requirements for circumvention.

EN ISO 15502:2005 + AC:2007, *Household refrigerating appliances – Characteristics and test methods*, is based on ISO 15502:2005 and its corrigendum Cor 1:2007; this International Standard, prepared by subcommittee 5: Testing and rating of household refrigeration appliances of ISO technical committee 86, Refrigeration and air-conditioning, was transferred to the IEC subsequent to IEC SMB decision 127/11. ISO 15502:2005 and its corrigendum are superseded by IEC 62552:2007.

EN 153:2006, *Methods of measuring the energy consumption of electric mains operated household refrigerators, frozen food storage cabinets, food freezers and their combinations, together with associated characteristics*, was prepared by CEN/TC 44, Household refrigerating appliances and commercial refrigeration equipment.

Clauses, subclauses, notes, tables, figures and annexes which are additional to those in IEC 62552:2007 are prefixed "Z".

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association.

## Endorsement notice

The text of the International Standard IEC 62552:2007 + corrigendum 2008 was approved by CENELEC as a European Standard with the following common modifications.

## Annex ZA (normative)

### Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

| <u>Publication</u> | <u>Year</u> | <u>Title</u>                                                                    | <u>EN/HD</u> | <u>Year</u> |
|--------------------|-------------|---------------------------------------------------------------------------------|--------------|-------------|
| ISO 534            | -           | Paper and board -<br>Determination of thickness, density and<br>specific volume | EN ISO 534   | -           |

Annex ZB  
(normative)

## Final test report layout

|                                                                                                                             |                                                                                |                 |                                                      |
|-----------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|-----------------|------------------------------------------------------|
| <b>Test report –<br/>Household<br/>refrigeration<br/>appliance</b><br><br>(Requirements from<br>EN 62552 and<br>2010/30/EU) | Date: mm / dd / yyyy                                                           | Appliance type: | SomeFreezer SF1234                                   |
|                                                                                                                             | Testing Institute:<br>Science Lab Ltd.<br>Anywhere<br>Outinavillage<br>Country | Manufacturer:   | Man-U-Fact Ltd.<br>Somewhere<br>Inthecity<br>Country |
|                                                                                                                             |                                                                                | Tested by:      | xyz                                                  |

|                                  |                    |
|----------------------------------|--------------------|
| Supplier name:                   | Man-U-Fact Ltd.    |
| Appliance model:                 | SomeFreezer SF1234 |
| Category <sup>1)</sup> :         | 7                  |
| Efficiency class <sup>2)</sup> : | A+++               |
| Built-in Appliance:              | yes/no             |
| Eco-label award (1980/2000 EC):  | n.a.               |
| Climate Class <sup>3)</sup> :    | SN-ST              |

|                                                   |      |   |      |   |      |
|---------------------------------------------------|------|---|------|---|------|
| Overall dimensions <sup>4)</sup> [mm]:            | 1234 | x | 1234 | x | 1234 |
| Overall space required in use <sup>4)</sup> [mm]: | 2345 | x | 2345 | x | 2345 |

| ALL APPLIANCES:                        | Decl. | Tested | WINE COOLERS:                  | Decl. | Tested |
|----------------------------------------|-------|--------|--------------------------------|-------|--------|
| Total gross volume [L]:                | 1234  | 1234   | Bottle capacity [pcs]:         | n.a.  | 1234   |
| Total storage volume [L]:              | 2345  | 2345   | Temp. fluctuation test passed: |       | yes/no |
| Storage shelf area [cm <sup>2</sup> ]: | 3456  | 3456   | Humidity range test passed:    |       | yes/no |

| Com-part-ments | Type           | Frost Free | Star rating | Vol. [L]: | Target storage temp. [°C] | Storage test passed? |           | Ope-ning forceTest passed? | Air-tight-ness test passed? | Durab-ility test passed? | Mech. Strength test passed? |
|----------------|----------------|------------|-------------|-----------|---------------------------|----------------------|-----------|----------------------------|-----------------------------|--------------------------|-----------------------------|
|                |                |            |             |           |                           | High temp.           | Low temp. |                            |                             |                          |                             |
| 1              | (***)*-Freezer | No         | 4           | 123       | ≤ -18                     | yes                  | Yes       | yes/no                     | yes/no                      | yes/no                   | yes/no                      |
| 2              | ***-Freezer    | Yes        | 3           | 123       | ≤ -18                     | yes                  | no        | yes/no                     | yes/no                      | yes/no                   | yes/no                      |
| 3              | **-Freezer     | Yes        | 2           | 123       | ≤ -12                     |                      |           | yes/no                     | yes/no                      | yes/no                   | yes/no                      |
| 4              | *-Freezer      | No         | 1           | 123       | ≤ -6                      |                      |           | yes/no                     | yes/no                      | yes/no                   | yes/no                      |
| 5              | 0-star         | n.a.       | n.a.        | n.a.      | -6 ≤ 0                    |                      |           | yes/no                     | yes/no                      | yes/no                   | yes/no                      |
| 6              | Chill          | n.a.       | n.a.        | n.a.      | -2 ≤ 3                    |                      |           | yes/no                     | yes/no                      | yes/no                   | yes/no                      |
| 7              | Fresh Food     | n.a.       | n.a.        | n.a.      | 0 ≤ +4                    |                      |           | yes/no                     | yes/no                      | yes/no                   | yes/no                      |
| 8              | Wine           | n.a.       | n.a.        | n.a.      | +5 ≤ 20                   |                      |           | yes/no                     | yes/no                      | yes/no                   | yes/no                      |
| 9              | Cellar         | n.a.       | n.a.        | n.a.      | +8 ≤ +14                  |                      |           | yes/no                     | yes/no                      | yes/no                   | yes/no                      |
| 10             | Pantry         | n.a.       | n.a.        | n.a.      | +14 ≤ +20                 |                      |           | yes/no                     | yes/no                      | yes/no                   | yes/no                      |

Energy consumption 24h [kWh]  
 Energy consumption 365d [kWh]  
 Energy efficiency index [%]  
 Energy efficiency class  
 Ice production in 24h [kg]  
 Circumvention measures found?

| Tested  | Passed? |
|---------|---------|
| 12,345  | yes/no  |
| 123,456 | yes/no  |
| 123     | yes/no  |
| A+++    | yes/no  |
| n.a.    | yes/no  |
|         | yes/no* |

Temperature rise time [h]  
 Freezing capacity 24h [kg]  
 Lowest ambient temp. [°C]  
 Noise [dB(A)]

| Tested | Passed |
|--------|--------|
| 12     | yes/no |
| 1      | yes/no |
| 123    | yes/no |
| 12,3   | yes/no |

Every field has to be filled, either with data or "n.a."

## Annex ZZ (informative)

### **Coverage of requirements of commission regulation (EC) No 643/2009 implementing Directive 2005/32/EC of the European Parliament and of the Council with regard to ecodesign requirements for household refrigerating appliances.**

This European Standard has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and within its scope the standard covers all relevant requirements as given in Commission Regulation (EC) No 643/2009 of 22 July 2009, implementing Directive 2005/32/EC of the European Parliament and of the Council with regard to ecodesign requirements for household refrigerating appliances and Commission Delegated Regulation (EU) No 1060/2010 from 28 September 2010, supplementing Directive 2010/30/EU of the European Parliament and of the Council with regard to ecodesign requirements for refrigeration appliances especially:

- ensuring that the prospective harmonized standard provides, where appropriate, revised and/or new definitions, characteristics and necessary parameters included in Regulation 643/2009 and in the Draft Labeling Directive, in particular for appliances and compartments to be used exclusively for wine storage, or with internal temperature between +14 °C and +20 °C, as well as for compartments with internal temperature between 0 °C and -6 °C;
- ensuring that the prospective harmonized standard(s) provides procedures and methods to measure at least the linear dimensions, areas and volumes, energy consumption, storage temperatures, compartments start ratings, freezing capacity, temperature rise time of free-standing and built-in household refrigerating appliances included in Regulation 643/2009 and the Draft Labeling Directive;
- ensuring that, for the purpose of Regulation 643/2009 appliances equipped for operation on different power supplies, but that can be operated at a rated voltage within the range between 220 V and 240 V, are tested only at 230 V  $\pm 1$  % with a frequency of 50 Hz  $\pm 1$  %;
- ensuring that the prospective harmonized standard includes a procedure that avoids an appliance being programmed to recognize the test conditions and reacting specifically to them;
- ensuring that the prospective harmonized standard takes into account improved test conditions, test materials, new appliance types and the state of the art at European and international level and better reflects the user behavior;
- defining a template for a test report indicating the information to be declared by the manufacturers to fulfill at least the ecodesign requirements set out in Regulation 643/2009 and in the Draft Labeling Directive.

**WARNING: Other requirements and other EC Directives or Commission Regulations may be applicable to the products falling within the scope of this standard.**

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# HOUSEHOLD REFRIGERATING APPLIANCES – CHARACTERISTICS AND TEST METHODS

## 1 Scope

This International Standard specifies the essential characteristics of household refrigerating appliances, factory-assembled and cooled by internal natural convection or forced air circulation, and establishes test methods for checking the characteristics. These are type tests, and because of this, when verification of the performance of a refrigerating appliance of a given type in relation to this standard is necessary, it is preferable, wherever practicable, that all the tests specified be applied to a single unit. The tests can also be made individually for the study of a particular characteristic.

NOTE For the safety requirements applicable to household refrigerating appliances, see IEC 60335-2-24; for noise requirements applicable to household refrigerators and freezers, see ISO 8960; and for additional safety requirements applicable to the refrigerating systems of household refrigerating appliances, see ISO 5149.

## 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 534, *Paper and board – Determination of thickness, density and specific volume*

☐ text deleted ☐

☐ text deleted ☐

## 3 Terms, definitions and symbols

For the purposes of this document, the following terms, definitions and symbols apply.

### 3.1

#### **refrigerating appliance**

factory-assembled insulated cabinet with one or more compartments and of suitable volume and equipment for household use, cooled by natural convection or a frost-free system whereby the cooling is obtained by one or more energy-consuming means

NOTE From the point of view of installation, there are various types of household refrigerating appliance (free-standing, wall-mounted, built-in, etc.).

### 3.1.1

#### **compression-type refrigerating appliance**

refrigerating appliance in which refrigeration is effected by means of a motor-driven compressor

### 3.1.2

#### **absorption-type refrigerating appliance**

refrigerating appliance in which refrigeration is effected by an absorption process using heat as energy source

### 3.1.3

#### **refrigerator**

refrigerating appliance intended for the preservation of food, one of whose compartments is suitable for the storage of fresh food

### 3.1.3.1

#### **frost-free refrigerator**

refrigerator in which all compartments are automatically defrosted with automatic disposal of the defrosted water and at least one compartment is cooled by a frost-free system and at least one is a “frozen-food storage” compartment

NOTE A single-compartment refrigerator using a frost-free system cannot be called a frost-free refrigerator.

### 3.1.4

#### **refrigerator-freezer**

refrigerating appliance having at least one compartment suitable for the storage of fresh food (the fresh-food storage compartment) and at least one other (the food freezer compartment) suitable for the freezing of fresh food and the storage of frozen food under three-star storage conditions

### 3.1.4.1

#### **frost-free refrigerator-freezer**

refrigerator-freezer in which all compartments are automatically defrosted with automatic disposal of the defrosted water and at least one compartment is cooled by a frost-free system

### 3.1.5

#### **frozen-food storage cabinet**

refrigerating appliance having one or more compartments suitable for the storage of frozen food

### 3.1.5.1

#### **frost-free frozen-food storage cabinet**

frozen-food storage cabinet in which all compartments are automatically defrosted with automatic disposal of the defrosted water and which is cooled by a frost-free system

### 3.1.6

#### **food freezer**

refrigerating appliance having one or more compartments suitable for freezing foodstuffs from ambient temperature down to a temperature of  $-18\text{ }^{\circ}\text{C}$  and which is also suitable for the storage of frozen food under three-star storage conditions

NOTE In certain instances, two-star sections and/or compartments are permitted within the compartment or cabinet (see 7.2.8).

### 3.1.6.1

#### **frost-free food freezer**

food freezer in which all compartments are automatically defrosted with automatic disposal of the defrosted water and at least one compartment is cooled by a frost-free system

### 3.1.7

#### **built-in appliance**

fixed refrigerating appliance intended to be installed in a cabinet, in a prepared recess in a wall or similar location

### 3.1.Z1

#### **wine storage appliance**

refrigerating appliance having one or more and only compartments exclusively designed for storage of wine

Note 1 to entry: An appliance containing compartment(s) which does not fulfil all requirements as specified for wine storage compartments cannot be called wine storage appliance.

### 3.1.Z2

#### **multi door or other appliances**

refrigerating appliance having two or more compartments, each one specified according to one of specifications as to Table 2 and being not covered by definitions as to 3.1.1 till 3.1.Z1 

**[C] 3.1.Z3**

**thermoelectric refrigerating appliance**

refrigerating appliance where the cooling uses the Peltier effect

**3.1.Z4**

**Mobile refrigerating appliance**

appliance that is primarily intended to be used at different locations, having a mass of less than 18 kg

Note 1 to entry: While being moved, the appliance does not necessarily need to be operating. **[C]**

**3.2**

**frost-free system**

system automatically operated to prevent the permanent formation of frost, in which cooling is provided by forced air circulation, the evaporator or evaporators are defrosted by an automatic defrost system and the water from defrosting is disposed of automatically

**3.3 Compartments and sections**

**3.3.1**

**fresh-food storage compartment**

compartment intended for the storage of unfrozen food, which may itself be divided into sub-compartments

NOTE The storage temperatures can be maintained according to Clause 6.

**3.3.2**

**cellar compartment**

compartment intended for the storage of particular foods or beverages at a temperature warmer than that of the fresh-food storage compartment

NOTE The storage temperatures can be maintained according to Clause 6.

**3.3.3**

**chill compartment**

compartment intended specifically for the storage of highly perishable foodstuffs whose volume is capable of containing at least 2 M packages

NOTE The storage temperatures can be maintained according to Clause 6.

**[C] 3.3.Z1**

**zero-star compartment**

low-temperature compartment intended for the freezing and storage of ice and for short time storage of frozen food in which the temperature is not warmer than 0 °C

**3.3.5.Z2**

**wine storage compartment**

compartment exclusively designed either for short-term wine storage to bring wine to the ideal drinking temperature or for long-term storage of wine, with the following features:

- a storage temperature range, either pre-set or set manually according to the manufacturer's instructions, in the range from +5 °C to +20 °C, each compartment providing  $t_{wma} \leq +12$  °C;

Note 1 to entry: The range from +5 °C to +20 °C indicates the maximum allowed range, no target values. If there is more than one wine storage compartment in one appliance, the temperature setting range can also be subdivided covering only part of the temperature range by each wine storage compartment.

- measured storage temperature(s) within a variation over time of less than 0,5 K at each declared ambient temperature specified by the climate class for household refrigerating appliances (see 8.Z1);
- active or passive control of the compartment humidity within a range from 50 % to 80 % relative humidity;
- constructed to reduce the transmission of vibration to the compartment, whether from the refrigerator compressor or from any external source **[C]**

### **3.3.5.Z3**

#### **pantry compartment**

compartment intended for the storage of particular foods or beverages at a temperature warmer than that of the cellar compartment

### **3.3.5.Z4**

#### **multi-use-compartment**

compartment intended for use at two or more of the temperatures of the compartment types in Table 2, capable of being set by the user to remain at the operating temperature range applicable to each compartment type

Note 1 to entry: Where temperatures can shift to a different operating range for a period of limited duration only, the compartment is not a "multi-use compartment".

### **3.3.5.Z5**

#### **low ambient switch**

device activated at the low ambient temperatures, automatically or manually, to balance the temperatures in different compartment types used in combination if applicable

### **3.3.5.Z6**

#### **thermal accumulator**

device with thermal capacity provided by manufacturer 

### **3.3.4**

#### **ice-making compartment**

low-temperature compartment intended specifically for the freezing and storage of ice

### **3.3.5**

#### **frozen-food storage compartment**

low-temperature compartment intended specifically for the storage of frozen food

NOTE Frozen-food storage compartments are classified according to temperature, see 3.3.5.1 to 3.3.5.5.

#### **3.3.5.1**

##### **one-star compartment**

frozen-food storage compartment in which the temperature is not warmer than -6 °C

#### **3.3.5.2**

##### **two-star compartment**

frozen-food storage compartment in which the temperature is not warmer than -12 °C

#### **3.3.5.3**

##### **three-star compartment**

frozen-food storage compartment in which the temperature is not warmer than -18 °C

#### **3.3.5.4**

##### **food freezer compartment**

##### **four-star compartment**

compartment suitable for freezing foodstuffs from ambient temperature down to -18 °C, and which is also suitable for the storage of frozen food under three-star storage conditions

NOTE Two-star sections and/or compartments are permitted within the compartment or cabinet (see 7.2.8).

#### **3.3.5.5**

##### **two-star section**

part of a food freezer compartment or cabinet, or three-star compartment or cabinet, which is not self-contained (i.e., does not have its own individual access door or lid) and in which the temperature is not warmer than -12 °C

### 3.4

#### **rated**

stated as a value (for example, a volume) by the manufacturer

## 3.5 Physical aspects and dimensions

### 3.5.1

#### **top-opening type**

refrigerating appliance in which the compartment(s) are accessible from the top

### 3.5.2

#### **upright type**

refrigerating appliance in which the compartment(s) are accessible from the front

### 3.5.3

#### **overall dimensions**

space – height, width and depth – with doors or lids closed

### 3.5.4

#### **overall space required in use**

total space – height, width and depth – with doors or lids open

### 3.5.5

#### **gross volume**

volume within the inside liner of the refrigerating appliance or of a compartment with an external door, in every case without internal fittings and with doors or lids closed

### 3.5.6

#### **storage volume**

part of the gross volume of any compartment that remains after deduction of the volume of components and spaces unusable for the storage of food

Note 1 to entry: See 7.2. 

### 3.5.7

#### **shelf**

horizontal surface (shelves, partitions, etc.) on which food can be placed

 *text deleted* 

### 3.5.8

#### **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

NOTE See 7.3.

### 3.5.9

#### **load limit**

surface enveloping a frozen-food storage volume

### 3.5.10

#### **load-limit line**

permanent mark indicating limit of three-star frozen-food storage volume

### 3.5.11

#### **storage plan**

arrangement of test packages within a refrigerating appliance

### 3.6 Definitions relating to performance characteristics

#### 3.6.1

##### **energy consumption**

energy consumed by a refrigerating appliance calculated over a period of 24 h when tested according to this standard

#### 3.6.2

##### **fresh-food storage temperature**

$t_{\text{ma}}$

mean temperature of the fresh-food storage compartment

#### 3.6.3

##### **frozen-food storage temperature**

$t^*$ ,  $t^{**}$ ,  $t^{***}$

maximum temperature of any M package during the test period

NOTE 1 The superscript attached to the symbol  $t$  corresponds to the one-star, two-star or three-star temperature.

NOTE 2 See 8.8.3.

#### 3.6.4

##### **cellar compartment storage temperature**

$t_{\text{cma}}$

mean temperature of the cellar compartment

#### 3.6.5

##### **chill compartment storage temperature**

$t_{\text{cc}}$

instantaneous storage temperature of the chill compartment

#### 3.6.6

##### **freezing capacity**

amount of food expressed in kilograms that can be frozen to a temperature of  $-18\text{ }^{\circ}\text{C}$  in 24 h when tested in accordance with Clause 17 of this standard

#### 3.6.7

##### **ice-making capacity**

quantity of ice the refrigerating appliance is capable of producing within 24 h in an automatic icemaker, and/or the time necessary for the freezing of the water in the ice tray(s) supplied with the refrigerating appliance

#### 3.6.8

##### **automatic defrost**

defrosting where no action is necessary by the user to initiate the removal of frost accumulation or to restore normal operation, and the disposal of the defrost water is automatic

#### 3.6.9

##### **semi-automatic defrost**

defrosting 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

#### 3.6.10

##### **semi-automatic defrost**

defrosting where no action is necessary by the user to initiate the removal of frost accumulation nor to restore normal operation, but the removal of the defrost water is manual

### 3.6.11

#### **manual defrost**

defrosting where an action is necessary by the user to initiate the removal of frost accumulation and where restoration to normal operation requires a further action by the user, the defrost water being removed manually or removed and disposed of automatically

### 3.6.12

#### **automatic disposal of defrost water**

removal and evaporation of the defrost water which does not require any action by the user

### 3.6.13

#### **manual removal of defrost water**

collection and removal of defrost water that requires actions by the user

### 3.6.14

#### **adaptive defrost**

form of automatic defrosting system where energy consumed in defrosting is reduced by an automatic process whereby the time intervals between successive defrosts are determined by an operating condition variable (or variables) other than, or in addition to, elapsed time or compressor run time.

### 3.6.15

#### **test package**

food simulant used as load when testing frozen food compartments and chill compartments and during freezing capacity testing in all compartments of refrigerator-freezers

### 3.6.16

#### **M-package**

test package fitted with a temperature sensor at its geometric centre

### 3.6.17

#### **operating cycle**

⟨frost-free systems⟩ period commencing at the initiation of an automatic defrosting cycle and terminating at the moment of initiation of the next automatic defrosting cycle

### 3.6.18

#### **operating cycle**

⟨systems designed to operate continuously⟩ period of 24 h under stable operating conditions

### 3.6.19

#### **operating cycle**

⟨other refrigerating appliances⟩ period between two successive stops of the refrigerating system, or part of the system, under stable operating conditions

### 3.6.20

#### **automatic defrosting cycle**

period between the moment when the means of defrosting the evaporator(s) is switched on and the moment when the refrigeration process is re-established

### 3.6.21

#### **stable operating conditions**

conditions in which a refrigerating appliance's mean temperatures and energy consumption are stable

### 3.6.22

#### **ambient temperature**

measured temperature in the space surrounding the refrigerating appliance under test

### 3.6.23

#### **temperature rise time**

time period needed to raise the temperature of food in the frozen food compartment from -18 °C to -9 °C after the operation of the refrigerated system has been interrupted

**[C] 3.6.Z1**

**wine compartment storage temperature**

$t_{wma}$

mean temperature of the wine storage compartment

**3.6.Z2**

**humidity wine compartment**

$RH_{wim}$

internal relative humidity in a wine storage compartment as integrated time average

**3.6.Z3**

**pantry compartment storage temperature**

$t_{pma}$

mean temperature of the pantry storage compartment [C]

**3.7 Definitions relating to refrigerating system**

**3.7.1**

**refrigerant**

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

**3.7.2**

**condenser**

heat exchanger in which vaporized refrigerant is liquefied by rejecting heat to an external cooling medium

**3.7.3**

**evaporator**

heat exchanger in which the liquid refrigerant is vaporized by absorbing heat from the medium to be refrigerated

**3.7.4**

**temperature control device**

device which automatically regulates the operation of a refrigerating system according to the temperature of an evaporator or of a compartment or cabinet

**[C] 3.7.Z1**

**humidity control device**

device which automatically regulates the humidity level inside a compartment

**3.7.Z2**

**ambient air exchange device**

device which allows to exchange the air in a refrigerating compartment with ambient air, either fix as to manufacturer design, or to be controlled automatically, or to be set manually by the user as to manufacturer's instructions

Note 1 to entry: The hole for defrosting water draining is not considered as an air exchange device. [C]

**3.8 Symbols**

**[C]**

$T_i, T_{ci}, T_{wi}, T_{ai}$  temperature measurement positions

$t_i$

instantaneous temperature value (fresh food compartment)

$t^{(*)}, t^*, t^{**}, t^{***}$

The temperatures of each compartment, cabinet or section is the maximum temperature of any M-package in that compartment, cabinet or section.

$t_{amb1}, t_{amb2}$

instantaneous ambient temperature value [C]

|                           |                                                                                                  |
|---------------------------|--------------------------------------------------------------------------------------------------|
| $t_{amb1.m} / t_{amb2.m}$ | integrated time average of $t_{amb1}/t_{amb2}$                                                   |
| $t_{amb.ma}$              | arithmetic average of $t_{amb1.m}$ and $t_{amb2.m}$                                              |
| $t_{ci}$                  | instantaneous temperature value (cellar compartment)                                             |
| $t_{cc}$                  | instantaneous temperature value (chill compartment)                                              |
| $t_{wi}$                  | instantaneous temperature value (wine storage compartment)                                       |
| $t_{pi}$                  | instantaneous temperature value (pantry compartment)                                             |
| $t_{im}$                  | integrated time average of $t_i$                                                                 |
| $t_{cim}$                 | integrated time average of $t_{ci}$                                                              |
| $t_{wvim}$                | integrated time average of $t_{wi}$                                                              |
| $t_{pvim}$                | integrated time average of $t_{pi}$                                                              |
| $t_{va}$                  | instantaneous arithmetic average of $t_1, t_2, t_3$                                              |
| $t_{ca}$                  | instantaneous arithmetic average of $t_{c1}, t_{c2}, t_{c3}$                                     |
| $t_{ma}$                  | arithmetic average of $t_{1m}, t_{2m}, t_{3m}$                                                   |
| $t_{cma}$                 | arithmetic average of $t_{c1m}, t_{c2m}, t_{c3m}$                                                |
| $t_{wma}$                 | arithmetic average of $t_{w1m}, t_{w2m}, t_{w3m}$                                                |
| $t_{pma}$                 | arithmetic average of $t_{p1m}, t_{p2m}, t_{p3m}$                                                |
| $RH_{wi}$                 | instantaneous relative humidity (wine storage compartment)                                       |
| $RH_{wim}$                | integrated time average of $RH_{wi}$                                                             |
| $E_{24h}$                 | energy consumption of household refrigerating appliance in kWh/24 h (conditions as in Table 5)   |
| $i$                       | subscript representing 1, 2 or 3 <span style="border: 1px solid black; padding: 0 2px;">C</span> |

## 4 Classification

**4.1** Refrigerating appliances conforming to this standard are classified into four climate classes or into a range of classes, see Table 1. The range of ambient temperatures in which the appliances are intended to be used, and for which the required storage temperatures are to be met (see Clause 6), shall be as specified in Table 1.

**Table 1 – Climate classes**

| Class              | Symbol | Ambient temperature range<br>°C |
|--------------------|--------|---------------------------------|
| Extended temperate | SN     | + 10 to + 32                    |
| Temperate          | N      | + 16 to + 32                    |
| Subtropical        | ST     | + 16 to + 38                    |
| Tropical           | T      | + 16 to + 43                    |

☐ If the lowest declared temperature is not within standard climate classes, the lowest ambient temperature is the temperature where the appliance can be used fulfilling the storage test requirements. This temperature shall be indicated in the user manual and the test report. ☐

**4.2** Refrigerator-freezers conforming to this standard are classified into the following two types:

- a) refrigerator-freezer type I – having a single, user-adjustable temperature control device for regulating the temperatures of the fresh-food storage compartment and of the food freezer compartments;
- b) refrigerator-freezer type II – having user-adjustable means for the separate regulation of the temperatures of the fresh-food storage compartment and of the food freezer compartments.

NOTE Where there is another kind of compartment, there can be additional means of regulating that compartment's temperature.

## 5 Materials, design and manufacture

### 5.1 General

Refrigerating appliances 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, which shall be recorded in the final test report (see Clause 19).

### 5.2 Materials and finishes

Materials used inside refrigerating appliances shall not transmit odours or taste to food. A test procedure for guidance is given in Annex C.

Materials used inside refrigerating appliances 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 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 air-tightness

The thermal insulation of the refrigerating appliances shall be efficient. 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 refrigerating appliance 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. Compliance is checked by the test specified in Clause 9.

### 5.4 Doors, lids, drawers and fittings

External doors, lids and drawers of refrigerating appliances shall withstand opening and closing without deterioration which could be prejudicial to their air-tightness. Fittings shall be capable of maintaining their proper function. Compliance is checked by the test specified in Clause 11.

It shall be possible to open an external door, lid or drawer on a refrigerating appliance from the inside. Compliance is checked by the test given in Clause 10.

## 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 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 shall be easily removable.

## 5.6 Collection and disposal of defrost water

**5.6.1** For refrigerating appliances with automatic disposal of defrost water, means shall be provided for collecting completely the defrost water either in a removable internal drip tray, or in an external receptacle wherein the defrost water is evaporated, or by other means. For frost-free refrigerating appliances or compartments, defrost water shall only be collected into external receptacles.

The drip tray or other defrost water receptacle should have adequate volume and, additionally, external drip trays should have adequate evaporating means.

The volume of drip trays of evaporators which are semi-automatically or manually defrosted shall be at least equal to the volume for the related evaporator(s), calculated by multiplying by 1 mm their total surface area on which ice can form.

Any drainage system shall be designed to ensure its proper function. It shall be easily accessible for the clearing of any blockage, and shall be designed so as to prevent any undue ingress of air into the food storage compartment(s).

**5.6.2** For refrigerating appliances with manual removal of defrost water, means or instructions shall be provided to enable the collection of defrost water in such a way as to prevent water from flooding the floor beneath the refrigerating appliance and/or damaging foodstuffs that may remain in the refrigerating appliance during defrosting.

The volume of drip trays of evaporators with semi-automatic or manual defrost shall be at least equal to the volume for the related evaporator(s), calculated by multiplying by 1 mm their total surface area on which ice can form.

Any drainage system shall be designed to ensure its proper function. It shall be easily accessible for the clearing of any blockage, and shall be designed so as to prevent any undue ingress of air into the food storage compartment(s).

## 5.7 Refrigerating system

**5.7.1** The mechanical operation of the refrigerating appliance should not give rise to undue noise or vibration.

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

**5.7.3** The evaporator should be so designed or protected so that it will not suffer any damage during the normal use of the refrigerating 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 alternating frosting and defrosting.

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

**5.7.5** Pipes and connections to moving or resiliently mounted parts should be arranged so as not to generate noise, nor to touch or 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.

**5.7.6** 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 refrigeration appliance and its surroundings.

**5.7.Z1** Wine storage appliances and wine storage compartments shall be constructed by using suitable means to reduce transmission of vibration to the compartment(s), whether from the refrigerating system or from any external source.

## **6 Storage temperatures**

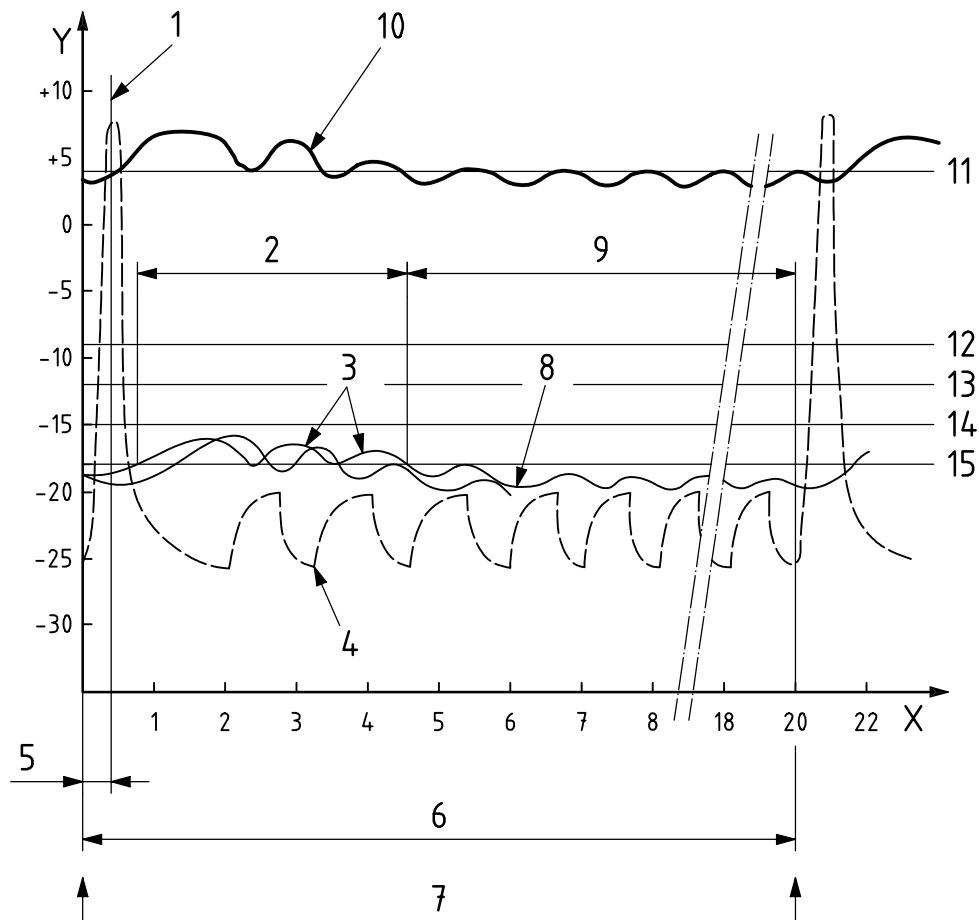
Under the conditions specified in Clause 13, the refrigerating appliance shall be capable of maintaining, simultaneously, the required storage temperatures in the different compartments and the permitted temperature deviations (during the defrost cycle) as given in Table 2 for the different types of refrigerating appliances and for the appropriate climate classes.

**NOTE** Table 5 gives the storage temperature applicable to the water condensation test specified in Clause 14, the energy consumption test given in Clause 15 and the temperature rise test according to Clause 16.

Table 2 – Storage temperatures

| °C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |                                                 |                              |                      |                           |                          |                                                  |                       |                       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-------------------------------------------------|------------------------------|----------------------|---------------------------|--------------------------|--------------------------------------------------|-----------------------|-----------------------|
| Fresh-food storage compartment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |           | Food freezer and three-star compartment/cabinet | Two-star compartment/section | One-star compartment | Cellar compartment        | Chill compartment        | Wine compartment                                 | Zero-star compartment | Pantry compartment    |
| $t_{1m}, t_{2m}, t_{3m}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | $t_{ma}$  | $t^{***}$                                       | $t^{**}$                     | $t^*$                | $t_{cm}$                  | $t_{cc}$                 | $t_{wma}^{a, b}$                                 | $t^{(*)}$             | $t_{pma}$             |
| $0 \leq t_{1m}, t_{2m}, t_{3m} \leq 8$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | $\leq +4$ | $\leq -18^a$                                    | $\leq -12^a$                 | $\leq -6$            | $+8 \leq t_{cm} \leq +14$ | $-2 \leq t_{cc} \leq +3$ | $+5 \leq t_{wma} \leq +20$<br>$t_{wma} \leq +12$ | $t^{(*)} \leq 0$      | $+14 < t_{pma} < +20$ |
| <sup>a</sup> As a result of a defrost cycle, the storage temperatures of frost free and/or adaptive defrost refrigerating appliances are permitted to rise by no more than 3 K during a period not greater than 4 h or 20 % of the duration of the operating cycle, whichever is the shorter. An example of an operating cycle for a frost-free refrigerator-freezer is given in Figure 1. For wine storage compartments applies that the maximum temperature $t_{wim}$ shall not be more than 1,5 K above integrated time average temperature $t_{wim}$ for each measuring point. |           |                                                 |                              |                      |                           |                          |                                                  |                       |                       |
| <sup>b</sup> The range +5 °C to +20 °C indicates the maximum allowed range, no target values. If there are more than one wine storage compartment in one appliance the temperature setting range can also be subdivided covering only part of the temperature range by each wine storage compartment. Each compartment shall provide $t_{wma} \leq +12$ °C.                                                                                                                                                                                                                        |           |                                                 |                              |                      |                           |                          |                                                  |                       |                       |





### Key

- X time, h
- Y temperature, °C
- 1 start of the refrigerating process
- 2 period of 20 % of the operating cycle of max. 4 h when elevated temperatures are allowed for M-packages in the freezer compartment
- 3 instantaneous temperatures of different M-packages
- 4 temperature of evaporator
- 5 automatic defrosting cycle
- 6 operating cycle
- 7 moments when the means of defrosting is switched on
- 8 instantaneous temperature of the warmest M-package
- 9 period under which the conditions in Table 2 should apply, with the exception of footnote a)
- 10  $t_a$
- 11  $t_{ma}$
- 12  $t^{**} + 3 \text{ K}$
- 13  $t^{**}$
- 14  $t^{***} + 3 \text{ K}$
- 15  $t^{***}$

Figure 1 – Example of operating cycle for frost-free refrigerator-freezer

## 7 Determination of linear dimensions, volumes and areas

### 7.1 Determination of linear dimensions

Linear dimensions shall be measured to the nearest millimetre.

Ⓒ The measurement shall be carried out on the refrigerating appliance in its final condition for use (i.e. all external fittings supplied with the appliance for installation by the user). Ⓒ If there is a cellar compartment, the volume of which is adjustable, measurements shall be made with this compartment adjusted to both its minimum and maximum volumes.

The overall dimensions shall be measured as the height, width and depth of the rectangular parallelepiped, whose base is horizontal, within which the refrigerating appliance is inscribed to include the complete appliance except for the handle – the protrusion of which, if any, is to be specified separately. Ⓒ If there is a difference between the delivery status and the final condition for use this information shall be made available to the user at the point of sale. Ⓒ

The overall space required in use shall be measured as the height, width and depth, including the handle, increased by the space necessary for free circulation of the cooling air when the refrigerating 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 a drip tray that has to be removed and any water that has to be emptied manually (see Figure 2).

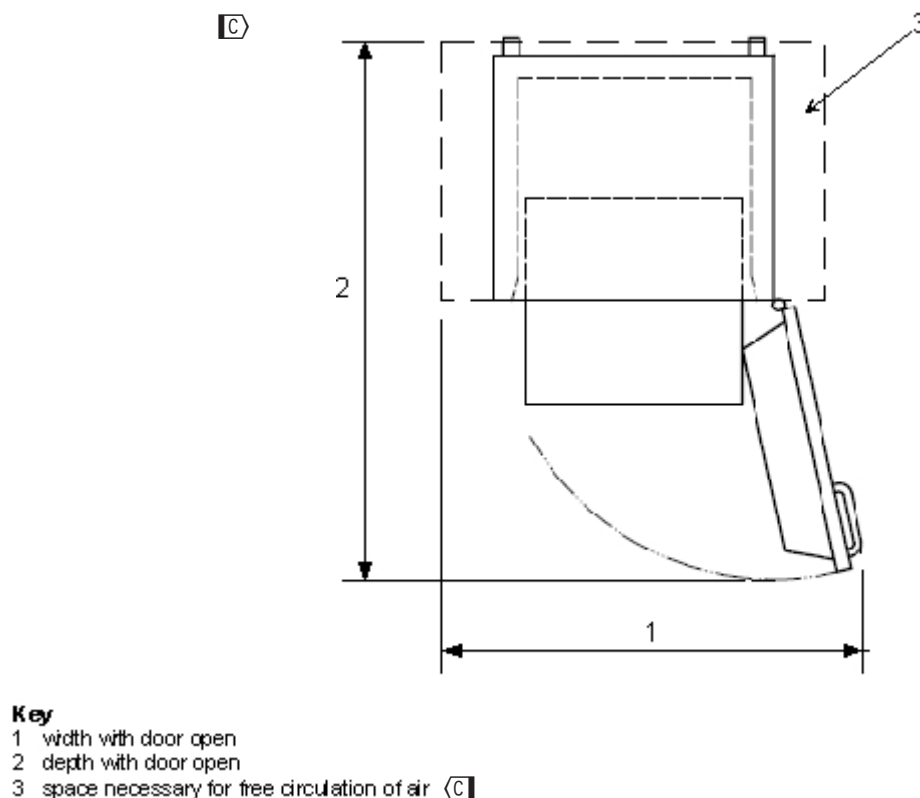


Figure 2 – Overall space required in use (upright type)

### 7.2 Determination of volumes

#### 7.2.1 General

Calculated volumes shall be expressed to the nearest whole number of cubic decimetres or of litres.

## 7.2.2 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, temperature control devices 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 an example, see Figure 22 a), b), c), d).

## 7.2.3 Determination of the total storage volume

The total storage volume 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 7.2.2.

## ☐ 7.2.4 Storage volume of fresh-food storage, chill, cellar, pantry and wine storage compartments

The storage volume of the fresh-food storage, chill, cellar, pantry and wine storage compartment shall be the gross volume of the compartment minus

- the volume of the evaporator space,
- the volume of any housings (such as those for interior lights, temperature-control devices and other devices e.g. non removable telescopic guides),
- the volume of shelves, partitions, retainers and other accessories whose wall thickness is greater than 13 mm according to 7.2.9.1,
- the space between the inner door protrusion and the inner liner of the fresh-food storage compartment, chill, cellar pantry and wine storage compartment, unless it is intended for the storage of food.

Where the volumes of the cellar compartment, pantry and wine storage compartment and fresh-food storage compartment are adjustable relative to one another by the user, the storage volumes of these compartments shall be determined with the cellar compartment, pantry or/and wine storage compartment adjusted to its minimum and maximum volumes. ☐

## 7.2.5 Volume of evaporator space

### 7.2.5.1 Volume

The volume of the evaporator space shall be the product of the depth, width and height.

### 7.2.5.2 Depth

The depth of the evaporator space shall be the mean horizontal distance between the front and rear surfaces of the enclosed space of the cabinet, measured at the level of the evaporator, unless there is a space provided in front of the evaporator for food storage.

Where a storage space is located in front of the evaporator, the depth of the evaporator space shall be taken as the mean horizontal distance from the inner surface of the rear of the enclosed space of the cabinet to the foremost part of the evaporator, or of the evaporator door if fitted.

☐ Where the evaporator is covered by fix means, the depth of the evaporator space shall be taken as the mean horizontal distance to the foremost part of the protection cover. ☐

### 7.2.5.3 Width

Ⓒ The width of the evaporator space shall be the overall horizontal width of the evaporator itself or the protection or cover where applicable (neglecting suction headers near the top of the evaporator) or, if side ribs are used, the overall width including the ribs.

If there is less than 70 mm horizontal distance between the evaporator or the ribs or the protection or cover where applicable and an inside wall of the enclosed space of the cabinet, such space shall be considered as part of the evaporator space. Ⓒ

### 7.2.5.4 Height

Ⓒ The height of the evaporator space shall be the mean vertical distance between the lower limit of the evaporator or the protection or cover where applicable and the upper partition of the food storage compartment.

If the free space between the upper surface or top of the evaporator or the protection or cover where applicable and the upper partition of the food storage compartment exceeds 40 mm, it shall be added to the storage volume of the fresh-food storage compartment.

The evaporator height shall include any internal drip tray and/or drip collector, except in the case when the storage height of the drip tray is greater than 40 mm and a definite manual operation is also needed to initiate defrosting. Ⓒ

### 7.2.6 Storage volume of ice-making compartments

The storage volume of the ice-making compartments shall be the sum of the volumes of all the compartments of this type in the refrigerating appliance.

The volumes of these compartments shall be determined in a similar manner to that specified in 7.2.3 and 7.2.4, as appropriate.

### 7.2.7 Storage volume of food freezer compartments/cabinets and frozen-food storage compartments/cabinets

For the determination of the storage volume, the total volume which is unsuitable for storage shall be determined and then deducted from the gross volume determined according to 7.2.2.

The total volume to be deducted shall comprise the following (for examples, see Figure 24):

- 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 refrigerating 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 13.3.2.2) 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;
- e) the volume of spaces which are to be kept free for the satisfactory performance of the refrigerating system;
- f) the volume of all removable parts which are stated by the manufacturer as necessary for the proper functioning of the refrigerating appliance, except shelves and partitions whose thickness is not greater than 13 mm (see 7.2.9.1);

- g) the volume rendered unusable by the use of removable parts (for example, baskets, shelves) necessary for obtaining satisfactory thermal and mechanical characteristics (see also 8.6.4);
- h) any volume where the vertical clearance is less than 52 mm;
- i) any volume where it is impossible to place an M-package of nominal dimensions in any position;
- j) the storage volume of any two-star section(s).

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 refrigerating 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.

### **7.2.8 Two-star sections and/or compartments in food freezer compartments/cabinets and in three-star compartments/cabinets**

Two-star sections and/or compartments are permitted both in the door and in the remaining storage volume when all the following conditions are met:

- a) the two-star section or compartment is marked with the appropriate identification symbol;
- b) the two-star section and/or compartment is separated from the three-star storage volume by a partition, container, or similar construction;
- c) the rated total two-star storage volume does not exceed 20 % of the three-star storage volume of the compartment (or cabinet);
- d) the instructions for use give clear guidance regarding the two-star section and/or compartment;
- e) the storage volume of the two-star section and/or compartment is stated separately and is not included in the three-star storage volume.

### **7.2.9 Volumes of shelves and partitions (for examples, see Figure 25)**

#### **7.2.9.1 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 apexes of the corrugations or pipes, unless the distance between adjacent corrugations or pipes is greater than 100 mm.

#### **7.2.9.2 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.

#### **7.2.9.3 Fractional shelves and partitions**

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.

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.

### 7.3 Determination of storage shelf area

#### 7.3.1 General

The area shall be expressed in square decimetres or square metres.

#### 7.3.2 Determination of shelf area

##### 7.3.2.1 Full shelf composed of 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.

**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 18 a)).

**Depth:** mean distance measured parallel to the surface of the shelf (or of the bottom of the refrigerating 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 18 b)). When the door of an upright-type refrigerating appliance is provided with shelves, this distance shall be determined by analogy (see Figure 18 c) and d)).

##### 7.3.2.2 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, but taking into account Figure 18 e).

##### 7.3.2.3 Cut-away shelves

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

##### 7.3.2.4 Juxtaposed shelves

In the case of juxtaposed shelves, the depth shall be determined in accordance with Figure 18 d).

##### 7.3.2.5 Door shelves

The area shall be the product of the width and depth. These two dimensions shall be determined by analogy with 7.3.2.1, 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 18 c)).

##### 7.3.2.6 Baskets and containers

The area shall be the product of the two mean horizontal dimensions (see Figure 19 a)).

### 7.3.2.7 Particular cases

#### 7.3.2.7.1 General

The bottom of the enclosed space of the compartment 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.

#### 7.3.2.7.2 Fresh-food storage compartment, chill, cellar pantry and wine storage compartments

Any part of a full shelf, basket or the bottom of a compartment having less than 100 mm vertical clearance above, when all the shelves and baskets are in position, shall be excluded when calculating the storage area. However, it is admissible that for one full shelf or basket the vertical clearance may be reduced to not less than 80 mm (see Figure 19 b)).

For specific shelves as bottles shelves used in e.g. wine storage compartments, no vertical clearance requirement applies. 

#### 7.3.2.7.3 Food freezer compartment/cabinet and low-temperature compartment/cabinet

Any part of a full shelf, basket or the bottom of a food freezer compartment, or cabinet, or frozen-food storage compartment or cabinet, 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 19 b)).

In the case of an ice-making compartment, the minimum vertical clearance shall not be less than 40 mm.

### 7.3.3 Drip tray

Whenever the space occupied by the drip trays is included in the storage volume, the part of the shelf supporting the drip tray or the bottom of the drip tray shall be considered as part of the storage shelf area, provided that a definite manual operation is needed to initiate defrosting.

### 7.3.4 Suspended containers

#### 7.3.4.1 Fresh-food storage compartment, chill, cellar and wine storage compartments

The area of the interior surface of the bottom of a suspended container and the area of the shelf immediately below shall not both be counted, unless the vertical clearance between this shelf and the exterior surface of the bottom of the container is at least 100 mm. For specific shelves as bottles shelves used in e.g. wine storage compartments, no vertical clearance requirement applies.

Nevertheless, in the case of one container – and one only – this minimum clearance may be reduced to 80 mm to the extent where this possibility has not been applied for the shelves.

If the minimum vertical clearance within a suspended container, as measured between the interior surface of the bottom and the cover, or to the shelf immediately above, is less than 40 mm, the bottom area of the container shall not be added. 

#### 7.3.4.2 Food freezer compartment/cabinet and low-temperature compartment/cabinet

For a food-freezer compartment or cabinet, or frozen-food storage compartment or cabinet, the dimension of the minimum vertical clearances specified in 7.3.4.1 shall be 52 mm in all cases.

For an ice-making compartment, the minimum vertical clearance dimension shall be 40 mm in all cases.

### **7.3.4.Z1 Evaluation of bottle capacity for wine storage compartments**

For the evaluation of the rated capacity of bottles 0,75 l bottles or equivalent substitution with dimension as specified in Figure Z1 shall be used.

Bottles to be filled with water to provide a total weight of each bottle of  $1\,200\text{ g} \pm 50\text{ g}$  to consider the deformation of shelves.

Removable parts which are stated by the manufacturer as necessary for the proper thermal and mechanical functioning of the wine storage compartment have to be placed in its intended position as to manufacturer's instructions.

Bottles will be stacked on each area intended to carry bottles in normal usage as to following rules:

- clearance to wall/back/door as to manufacturer's instructions;
- in the absence of instructions the rear end of shelves and 5 mm clearance to door are considered as limit, proper cooling function has to be ensured;
- bottles placed in door shelves may touch door liner;
- if evaporator is covered by fix means for protection bottles can stack till the protection, proper cooling function has to be ensured;
- bottles can be placed reverse and interleave;
- bottles can be in touch with side walls if nothing else stated by manufacturer;
- bottles can be placed horizontal or vertical, inclined if fixed means provide incline position;
- movable parts like telescopic shelves have to be kept movable and accessible under loading conditions.

A sketch of the bottle loading plan showing the location of bottles for evaluation of the bottle capacity for wine storage compartments shall be included in test report. 

## **8 General test conditions**

### **8.1 General**

The order of carrying out the tests need not necessarily follow the sequence of the clauses. 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 13.3.

Tolerances on linear dimensions shall be  $\pm 5\%$  unless otherwise stated.

### **8.2 Ambient temperatures**

-  Local ambient temperatures  $t_{amb1}$  and  $t_{amb2}$  are measured at two points  $T_{a1}$  and  $T_{a2}$ , located at the vertical and horizontal centreline of the sides of the refrigerating appliance and at a distance of 350 mm from the refrigerating appliance (see Figure 3).

The overall ambient temperature  $t_{amb.ma}$  for a single appliance is the arithmetical average of the time-integrated temperatures  $t_{amb1.m}$  and  $t_{amb2.m}$ . It is the value used for the tests.

Ambient temperatures are measured using copper or brass cylinders (see 8.7) at each of the two measurement points. 