SLOVENSKI STANDARD
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Gospodinjski hladilni aparati - Značilnosti in preskusne metode - 2. del: Zahtevane lastnosti

Household refrigerating appliances - Characteristics and test methods - Part 2: Performance requirements

Haushaltskühlgeräte - Eigenschaften und Prüfverfahren - Teil 2: Leistungsanforderungen

Appareils de réfrigération à usage ménager - Caractéristiques et méthodes d'essai - Partie 2: Exigences de performances

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 62552-2

April 2020

Supersedes EN 62552:2013 (partially) and all of its amendments and corrigenda (if any)

English Version

Household refrigerating appliances - Characteristics and test methods - Part 2: Performance requirements (IEC 62552-2:2015 , modified)

Appareils de réfrigération à usage ménager -
Caractéristiques et méthodes d'essai - Partie 2: Exigences
de performances
(IEC 62552-2:2015 , modifiée)

Haushaltskühlgeräte - Eigenschaften und Prüfverfahren -
Teil 2: Leistungsanforderungen
(IEC 62552-2:2015 , modifiziert)

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European Committee for Electrotechnical Standardization
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European foreword

This document (EN 62552-2:2020) consists of the text of IEC 62552-2:2015 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 at national level by publication of an identical national standard or by endorsement	(dop)	2021-02-24
•	latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	2023-02-24

This standard in combination with standards EN 62552-1:2020 and EN 62552-3:2020 will supersede EN 62552:2013.

This standard shall be read in combination with standards EN 62552-1:2020 and EN 62552-3:2020

EN 62552-2:2020 includes the following significant technical changes:

a) scope is enlarged with respect to similar refrigerating appliances;

b) Table 1 and Clauses 6.3.2.1 and Clause 8 were modified completely;

c) Clause Z1 on airborne acoustical noise was added.

Clauses, subclauses, notes, tables, figures and annexes which are additional to those in IEC 62552-2:2015 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 shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under Standardization Request M/459 given to CENELEC by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

Endorsement notice

The text of IEC 62552-2:2015 was approved by CENELEC as a European Standard with agreed common modifications.

EN 62552-2:2020 (E)

1 Modification to the Introduction

Add the following paragraph:

"This standard was developed in relationship with Regulations (EU) 2019/2016 of 11.3.2019 on energy labelling and (EU) 2019/2019 of 1.10.2019 on ecodesign for refrigerating appliances"

2 Modification to Clause 1, "Scope"

Replace the first paragraph with the following:

"This part of EN 62552 specifies the essential characteristics of household and similar **refrigerating appliances** cooled by internal natural convection or forced air circulation, and establishes test methods for checking these characteristics"

3 Modification to Clause 2, "Normative references"

Add the following reference:

"EN 60704-2-14, *Household and similar electrical appliances — Test code for the determination of airborne acoustical noise — Part 2-14: Particular requirements for refrigerators, frozen food storage cabinets and food freezers*"

4 Modifications to Clause 4, "Performance requirements and tests covered in this standard"

In 4.7, "Test summary", Replace Table 1 with the following:

"

Table 1 — Performance test summary

Clause / Annex and Test	Ambient		Pantry and cellar	Fresh food	Chill	zero star	1 and 2 star	3 and 4 star	Temperature requirements after test has started
Clause 6 **Storage**	Various	Packages	No		Type b	No	1 star: Type a Other: Type a or b		To hold initial values
		Initial temp	Mean		Instant	Mean	Max		
Clause 7 **Cooling capacity**	25 °C	Packages	No	Type b	No	No	No		For test load final only
		Initial temp	Table 2	+4 °C ± 0,5 K	Table 2	Maximum/ minimum	Average/ minimum		
Clause 8 **Freezing capacity**	25 °C	Packages	M-packages only Type b		Type b	No	Type a		Yes excursion and final
		Initial temp	Table 2		Not measured	Maximum/minimum			

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Clause / Annex and Test	Ambient		Pantry and cellar	Fresh food	Chill	zero star	1 and 2 star	3 and 4 star	Temperature requirements after test has started
Clause 9 **Auto ice-making**	25 °C	Packages	No						No
		Initial temp	As for Table 2			Maximum/minimum			
Annex A **Pull-down**	Max	Packages	No						Final only
		Initial temp	Maximum temperature according climate class rating						
Annex C **Temp rise**	25 °C	Packages	No		Type b	No	Type a		For –18 °C **compartments** only
		Initial temp	Not specified					–18 °C	
Annex D **Conden-sation**	25 °C for SN and N 32 °C for ST and T	Packages	No						To hold initial values
		Initial temp	≤ energy test temperatures as in Table 1 in IEC 62552-3:2015						
NOTE 1 For definitions of symbols, see 3.7 in EN 62552-1.									
NOTE 2 In the event of any discrepancy between data in this Table and the individual test procedures, the test procedures take precedence.									
NOTE 3 Wine storage test parameters are specified in Annex B.									

"

Replace footnote b of Table 2 with the following:

"b During a **defrost and recovery period, these storage temperatures of frost-free refrigerating appliances** are permitted to rise by no more than 3 K with respect to the **storage temperature** during period S (see 6.4). The **storage temperature** is defined as the maximum temperature of any M-package during a given time period. (See Figure 3.)"

Add the NOTE Z1 in Table 2:

"NOTE Z1   Chill compartment shall be in compliance with the verification test available in Annex ZA "Chill compartment temperature control test" of EN 62552-3."

5   Modifications to Clause 6, "Storage test"

In 6.1, "Objective", replace the third paragraph with:

"To meet these test requirements, there shall be, for any **ambient temperature** between and including the minimum and maximum ambient temperature defined by the **rated** climate class, at least one control setting at which all **compartments** meet the specified internal temperatures. The control(s) however, may be adjusted for testing at different **ambient temperatures**."

In 6.2, "Preparation of refrigerating appliance", replace the sixth paragraph with:

"Thermal storage devices shall be placed in the dedicated positions in the respective **compartments**, according to the manufacturer's instructions and shall be independent of location of packages. Instructions for loose placement of thermal storage devices in the appliance do not define dedicated positions.

NOTE 1   Instructions without specific indication of location or placement of thermal storage device is an example of loose placement

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If dedicated positions are absent, the thermal storage devices shall be removed from the **compartment**.

The unloaded **refrigerating appliance** should be set up and operated until it has reached equilibrium at, or close to, the temperatures specified in Table 2.

The unloaded **refrigerating appliance** should be set up and operated until it has reached equilibrium at, or close to, the temperatures specified in Table 2."

Replace subclause 6.3.2.1, "General" with the following:

"All test packages and M-packages shall be as specified in Clause C.2 b) of EN 62552-1:2019.

For determining the **storage temperature** of any **chill compartment**, the storage load shall be in accordance with 6.3.2.2.

The temperatures of the **chill compartment** T_{CCi} are the instantaneous temperatures of each M-package in that compartment. The temperatures and conditions specified in Table 2 shall apply.

All test packages and M-packages shall be positioned or suspended so that their largest surface is horizontal. They may be positioned directly on the floor of the **compartment** or drawer but shall always be at least 25 mm away from all walls and ceilings and from the other packages of the test load. The test packages and M-packages shall be positioned as far as possible in the corners of the **compartment** and at two vertical levels:

A) Bottom level, which is the lowest horizontal surface intended for storage

B) Top level, where the packages have 25 mm clearance from the **compartment** ceiling. Supports can be used to position the packages.

Loading of packages shall be in the following order:

1. Front left corner of the bottom level

2. Back right corner of the top level

3. Front right corner of the top level

4. Left back corner of the bottom level

5. Front left corner of the top level

6. Back right corner of the bottom level

7. Front right corner of the bottom level

8. Left back corner of the top level

9. Centre of the bottom level

10. Centre of the top level

Loading shall start using M-packages, up to the amount specified in Table 3. After the last M-package, normal test packages shall be loaded until the total number of packages is reached.

If a package cannot be placed according to the required order, its position shall be skipped and the number of packages shall be reduced. The number of M-packages shall not be reduced.

In the case of a **compartment** with special subdivisions (**shelves**, etc.) which are part of the design, if the dimensions are too small to allow the horizontal positioning of the M-packages, it is permissible to position them vertically.

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If the dimensions are too small to accommodate an M-package (for example in door shelves), a special support shall be used to position the M-package next to the shelf and as close as possible to the door liner."

Replace subclause 6.3.2.2, "Chill compartment storage load" with the following:

"The **compartment** shall be loaded with the number of packages specified in Table 3.

Table 3 — Chill compartment storage load

Volume, V, of chill compartment [l]	Total number of packages	M-packages
$V < 10$	2	2
$10 \leq V < 20$	3	2
$20 \leq V < 30$	4	2
$30 \leq V < 40$	5	3
$40 \leq V < 50$	6	3
$50 \leq V < 60$	7	4
$60 \leq V < 70$	8	4
$70 \leq V < 80$	9	5
$V \geq 80$	10	5

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In 6.3.3.3.1, "General" replace the last paragraph of bullet point c) with: (standards.iteh.ai)

"Surfaces intended for storage with ribs, depressions, slight inclinations (lower than 8 degree), etc. are treated as horizontal surfaces. If necessary, packers may be used to stabilize stacks.

NOTE 1   Inclinations of less than 15 mm per 100 mm, which equals the width or length of a test package, are considered slight inclinations."

In 6.4.2, "Details" replace Table 4 with:

"

Table 4 – Requirements for periods S and E

Item	Are there temperature control cycles?	Without defrost control cycles	With more than one defrost control cycles starting within a 24 h test	With only one defrost control cycle starting within a 24 h test
Length of periods S and E	No	Each period shall be at least 3 h long		
	Yes	Each period shall consist of the same integral number of **temperature control cycles** totalling not less than 3 h.		
Location of period S	No	Any convenient time	Period S ends just before a **defrost and recovery period** begins.	
	Yes			

Item	Are there temperature control cycles?	Without defrost control cycles	With more than one defrost control cycles starting within a 24 h test	With only one defrost control cycle starting within a 24 h test
Location of period E	No	Period E ends at least 24 h after period S begins	Period E ends just before the first **defrost and recovery period** that begins after 24 h after the start of period S	Period E ends at least 24 h after period S begins and before the beginning of the next **defrost and recovery period**
	Yes	Period E ends with the conclusion of a **temperature control cycle** that is in progress at least 24 h after the beginning of period S	Period E ends with the conclusion of the last temperature control cycle completed before the first defrost and recovery period that begins after 24 h after the start of period S	Period E ends with the conclusion of a **temperature control cycle** that is in progress at least 24 h after period S begins and before the beginning of the next **defrost and recovery period**

"

In 6.4.2, "Details" replace Figure 3 with:

"

Reference temperature = storage temperature

As short as possible

Temperature rise during defrost and recovery ≤ 3 K

Package A

Package B

Temperature

Period S
n control cycles ≥ 3 h

Time above reference

Period E
n control cycles ≥ 3 h

$$\overline{T}_{package.iE} \le \overline{T}_{package.iS} + 0.2\ K$$
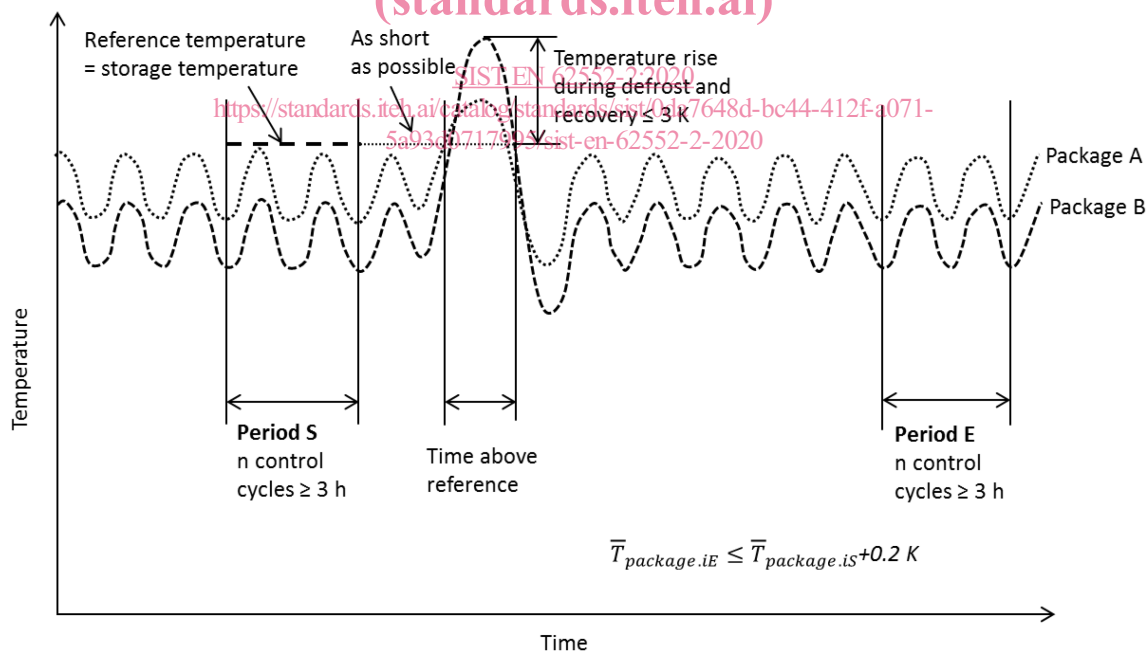
Time

Figure 3 — Storage test sequence illustration

"

6   Modification to Clause 8, "Freezing capacity test"

Replace all of Clause 8 with the following:

8

"8.1 Objective

The purpose of this test is to measure the **freezing capacity** of **freezer compartment(s)** by adding warm test packages (the **light load**) into the **compartment**. If the **freezing capacity** is greater than, or equal to, the specified minimum capacity (see 8.4.3), the **compartment(s)** may be rated as a **four-star compartment(s).**

8.2 Method overview

Apart from space for the **light load**, ballast packages are loaded into the **frozen compartment(s)** as for the storage test (Clause 6). The **refrigerating appliance** is operated until temperatures are stable and in compliance with Table 2. Then a load of packages at +25 °C is added. This is the so-called **light load** representing a food load to be processed. The time to freeze this load to –18 °C is measured. When this can be achieved in no more than 24 h and other maximum temperature-excursion conditions are met, a **four-star compartment** rating may be claimed.

NOTE 1   Because the **frozen compartment** loading is largely the same as for the storage test, there might be an advantage in doing these tests consecutively.

8.3 Set-up procedure

8.3.1 Ambient temperature

The **ambient temperature** shall be 25 °C (see A.3.2.3 of EN 62552-1:2019).

8.3.2 Preparation of the refrigerating appliance

8.3.2.1 General

The **refrigerating appliance** shall be installed according to Annex B of EN 62552-1:2019.

If the configuration of the **refrigerating appliance** can be changed by the user the configuration with the greatest volume at the lowest temperatures shall be used for this test.

Refrigerating appliances with anti-condensation heater(s) which are permanently on during **normal use** shall be tested with the heater(s) operating.

Anti-condensation heaters which can be manually controlled by the user shall be switched on and, if adjustable, they shall be set at their maximum heating rate.

Anti-condensation heaters which are automatically controlled shall be allowed to operate normally.

Thermal storage devices shall be placed in the dedicated positions in the respective **compartments**, according to the manufacturer's instructions and shall be independent of location of packages. Instructions for loose placement of thermal storage devices in the appliance do not define dedicated positions.

NOTE Z1   Instructions without specific indication of location or placement of thermal storage device is an example of loose placement.

If dedicated positions are absent, the thermal storage devices shall be removed from the **compartment**.

The unloaded **refrigerating appliance** should be set up and operated until it has reached equilibrium at, or close to, the temperatures specified in Table 2.

8.3.2.2 Measurement of temperature of chill compartment and all compartments operating above 0 °C

During the test, the **chill compartment** temperature is not measured, but it shall be loaded with test packages as for the **storage temperature** measurement (see 6.3.2). For determining the **storage temperature** of the **compartments** normally operating above 0 °C, measurement points shall be as per Annex D of EN 62552-1:2019 but with M-packages used instead of cylinders.

8.3.3 Loading of refrigerating appliance

8.3.3.1 Frozen compartment(s) – ballast load

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8.3.3.1.1 General

Apart from space for the **light load** in the appropriate −18 °C **compartment(s)**, ballast packages are brought to the approximate **compartment** temperatures and loaded into the **frozen compartment(s)** as for the storage test (Clause 6).

A load stack comprises one or more load packages.

In the −18 °C **compartment(s)**, ballast load may be removed to accommodate the **light load** with the following constraints:

a) The minimum amount of stacks shall be removed

b) The height of a light load stack shall be 2 packages with the following exceptions:

1. if the light load is to be composed of an odd number of packages, then one light load stack of 1 package is allowed;

2. if the ballast load to be removed only exists out of stacks of 1 package, these shall be replaced with light load stacks of 1 package;

3. if the ballast load stack to be removed contains 6 or more packages, then it shall be replaced with a light load stack of half the number of packages in the ballast load stack (rounded down).

c) The minimum ballast load is 1 M-package

d) Light load packages shall be placed flat

e) Light load positioning shall take into account the instructions regarding the location to be used for freezing. If no instructions are given, the packages shall be placed such that they are likely to be frozen as rapidly as possible.

f) Light load packages shall be separated by at least 15 mm from ballast load packages. The use of spacers between adjacent stacks of packages is permitted, but other spacing methods are not (see 6.3.3.2).

If the instructions indicate that there is a separate section for freezing food, this section shall be used for the **light load**.

8.3.3.1.2 M-package placement in the ballast load to accommodate the light load

The M-packages in the **ballast load** shall be located as for the storage test apart from any locations that are disrupted by the need to leave space for the **light load**. In that case, the M-packages shall be placed in the nearest equivalent position to that specified for the storage test and the new positions recorded. If there are stacks of **ballast load** packages beside the **light load** an M-package shall also replace the top test package in at least one of those stacks on each side of the **light load**. If there is **ballast load** above the **light load** an M-package shall replace a test package in the centre of the layer immediately above the **light load**. If there is **ballast load** below the **light load** an M-package may replace a test package in the centre of the layer immediately below the **light load.**

8.3.3.2 Refrigerating appliances with separate three-star compartment

If a **refrigerating appliance** has a separate **three-star compartment** with its own external access door or lid, and the instructions recommend that, before freezing, frozen food already in storage be placed in that **compartment** while leaving space in the **freezer compartment** to receive the load for freezing (i.e. the **three-star compartment** is to be regarded as an extension of the **freezer compartment**), a **freezing time** claim based upon this method of use is permissible, provided that:

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a) when tested according to this method of use, the claimed **freezing time** is confirmed and the temperature requirements for the other **compartments** (see 8.5 a) to g)), if applicable, are fulfilled during the **freezing capacity test,** and

b) the **light load** used in the **freezer compartment** is at least equivalent to 3,5 kg/100 l of the combined **volumes** of the **freezer compartment** and **three-star compartment**.

8.4 Test procedure

8.4.1 Starting conditions

After all relevant control devices have been adjusted as required, the loaded **refrigerating appliance** is left to run until **stable operating conditions** are reached.

After **stable operating conditions** have been attained, internal temperature(s) shall be in accordance with Table 2 except that the starting temperature of any **compartment(s)** with no lower temperature limit(s) specified in that table shall be no more than 2 K below the **target temperature.**

In the case of a **refrigerating appliance** where the **compartment** temperatures cannot be adjusted independently, if such a setting is not possible, the non-complying **compartments** below the bottom limit shall be set to be as warm as possible.

The temperature indication succession from left to right in Table 2 also indicates the order of precedence in the case of several temperature possibilities.

In some circumstances it might be unnecessary to carry out the stabilization specified here before the stabilization specified in 8.4.2.

8.4.2 Setting of control devices

If the **refrigerating appliance** is provided with means for a pre-freezing (fast-freezing or quick-freezing) operation, after **stable operating conditions** in accordance with 8.4.1 have been attained, the **refrigerating appliance** shall be set in operation in the pre-freezing condition according to the instructions. The procedure specified in 8.4.3 shall then be carried out.

If there are no special instructions for pre-freezing, the procedure according to 8.4.3 shall be carried out after the **refrigerating appliance** has reached **stable operating conditions** in accordance with the temperature requirements of 8.4.1.

8.4.3 Freezing of the light load

After the conditions specified in 8.4.2 have been attained, the **light load** shall be introduced. For models with **defrost control cycles**, the **light load** should be added when stability has been regained and temperature criteria met after a **defrost and recovery period**. This test should not overlap a **defrost and recovery period**. When stability has been achieved prior to the introduction of the **light load**, apart from as in 8.4.2, changes of setting of manually adjustable controls are no longer permitted.

The **light load** shall be 3,5 kg/100 l of the total volume of all **compartments** operating at −18 °C **(three** and **four stars).** The calculated load shall be rounded up to the nearest 0,5 kg, except that in no case shall it be less than 2,0 kg.

The **light load** is made from packages which have previously been brought to a temperature of +25 °C ± 1 K.

The **light load** packages shall be placed flat and positioned taking into account the instructions and the requirements of the loading **storage plan** (see Clause 6). If no instructions are given, the packages shall be placed such that they are likely to be frozen as rapidly as possible.

Light load packages shall be separated by at least 15 mm from **ballast load packages**. The use of spacers between adjacent stacks of packages is permitted, but other spacing methods are not (see 6.3.3.2).

M-packages shall be uniformly distributed throughout the **light load** with at least one as close as practicable to its geometric centre. The number of M-packages to apply is given in the table below:

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Light load [kg]	Number of M-packages inside the light load
2	2
2,5 or 3	3
3,5 or 4	4
4,5 or 5	5
> 5	6

8.4.4 Intermediate test data to be recorded

The temperatures of the M-packages in the **ballast load** and in the **light load** shall be recorded, together with those of the M-packages in the other **compartment(s)**, if any. This shall be done until the arithmetic mean of the instantaneous temperatures of all the M-packages in the **light load** reaches ≤ –18 °C and all other criteria in 8.5 are satisfied. The time necessary for reaching this condition shall be noted.

If during the test an M-package exhibits a supercooling effect, the test is invalid and shall be repeated, possibly with a replaced M-package.

Supercooling, also known as undercooling, is the process of lowering the temperature of a liquid below its freezing point without it becoming a solid. It can be observed during the test as a rapid increase of the temperature in an M package. Only in case the increase is more than 3 K, the test shall be considered invalid.

Z8.5 Determination of the freezing time and freezing capacity and four-star rating

The freezing time ends when the arithmetic mean of the instantaneous temperatures of all the M-packages in the **light load** reaches ≤ –18 °C and the following conditions are met:

a) unless a **defrost and recovery** period overlaps the test, the maximum temperature of any M-packages of the **ballast load** remains ≤ –15 °C and at the end of the test the maximum temperature of the warmest M-package of the **ballast load** is ≤ –18 °C;

b) if a **defrost and recovery period** does overlap the test, the maximum temperature of any M-packages of the **ballast load** remains ≤ –12 °C during the **defrost and recovery period** and at the end of the test the maximum temperature of the warmest M-package of the **ballast load** is ≤ –18 °C;

c) the maximum temperature of the warmest M-package in any separate **three-star compartment** not used for ballast in accordance with 8.3.3.2 remains ≤ –18 °C (plus the allowed excursions during any **defrost and recovery period** as specified in Table 2);

d) the maximum temperature of the warmest M-package in any **two-star section** or **two-star compartment** remains ≤ –12 °C (plus the allowed excursions during **a defrost and recovery period** as specified in Table 2);

e) the maximum temperature of the warmest M-package in any **one-star compartment** remains ≤ –6 °C;

f) the instantaneous **compartment** average temperature T_a of the **fresh food compartment** during the test does not exceed +7 °C, with $T1$, $T2$, $T3$ each remaining between –1 °C and +10 °C;

g) the instantaneous temperatures $Tc1$, $Tc2$, $Tc3$ as appropriate of the **cellar compartment** do not drop below 0 °C.

The **freezing capacity** is: $\dfrac{M_l}{\Delta t_f} \times 24$ in kg/24 h

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where

M_l is the **light load** in kg;

Δt_f is the **freezing time** in h.

In order to meet the four stars rating the freezing capacity shall be at least 4,5 kg per 24 h per 100 l of the total volume of all **compartments** operating at −18 °C with a minimum of 2 kg per 24 h.

Z 8.6 Data to be recorded

a)   the mass in kg of the **ballast load**;

b)   the mass in kg of the **light load**;

c)   the **freezing time** in h of the **light load**;

d)   the **volume** of the relevant **compartments**;

e)   the warmest temperature measured in the M-packages in the **ballast load** stored during the **light-load freezing capacity test**, together with the warmest temperature measured in the M-packages in any **three-star compartment**, **two-star section** or **compartment** and in any **one-star compartment** and the duration of the temperature deviation above –18 °C (or –12 °C as appropriate) and the duration of any **defrost control cycle** (see Table 2);

f)   the highest and lowest values of $T1$, $T2$, $T3$ and $Tc1$, $Tc2$, $Tc3$, if applicable;

g)   the settings of all **temperature control** devices, including timer(s), if any;

h)   a diagram of the **storage plan** for the **refrigerating appliance** showing the location of the M-packages and the location of the warmest M-package(s) for both the **ballast load** and the **light load**;

i)   if the **refrigerating appliance** is fitted with a device intended to set the refrigeration of the **freezer compartment** into continuous operation when freezing and then to revert to thermostatic operation automatically, the time which elapsed before it reverted to normal thermostatically controlled operation;

j)   whether the time to freeze the **light load** is achieved in no more than 24 h;

k)   The specific **freezing capacity** is: $\dfrac{M_l}{\Delta t_f} \times 12$ in kg/12 h

where

M_l is the **light load** in kg;

Δt_f is the **freezing time** in h.

"

7   Addition of new Clause Z1 "Airborne acoustical noise"

Add the following new Clause Z1:

"Z1 Airborne acoustical noise