الهيئـة السعوديـة للمواصفـات والمقاييس والجـودة

Saudi Standards, Metrology and Quality Org
(SASO)

SASO 2892:2025

الثلاجات والثلاجات مع مجمد والمجمدات – متطلبات الأداء للطاقة ومتطلبات البطاقات

Refrigerators, Refrigerator- Freezers and Freezers, Energy Performance, Testing and Labeling Requirements

ICS: 97.030

مقدمة

قامت الهيئة السعودية للمواصفات والمقاييس والجودة بإعداد المواصفة القياسية السعودية رقم (SASO 2892) بعنوان " الثلاجات والثلاجات مع مجمد والمجمدات – متطلبات الأداء للطاقة ومتطلبات البطاقات" بعد استعراض المواصفات القياسية الدولية والمؤلفات المرجعية ذات الصلة.

Foreword

Saudi Standards, Metrology and Quality Organization (SASO) has prepared the Saudi Standard (SASO 2892) " Refrigerators, Refrigerator-Freezers and Freezers, Energy Performance, Testing and Labeling Requirements" based on relevant International and National foreign Standards and references.

CONTENTS

1. SCOPE

This standard specifies the Minimum Energy Performance Standard (MEPS) and testing requirements of electric mains-operated refrigerators, refrigerator-freezers and freezers with a volume of more than 10 liters and less than or equal to 1500 liters.

It shall apply to appliances that operate in AC single-phase circuits of 230V with a frequency of 60 Hz according to SASO GSO 1899.

This Standard shall not apply to:

(a) Refrigerators employing an absorption refrigeration system

(b) Low noise refrigerating appliance

(c) Refrigerating appliances that are primarily powered by energy sources other than electricity, such as liquefied petroleum gas (LPG), kerosene and bio-diesel fuels

(d) Professional refrigerated storage cabinets and blast cabinets, with the exception of professional chest freezers.

(e) Refrigerating appliances with a direct sales function.

(f) Mobile refrigerating appliances.

(g) Battery-operated refrigerating appliances that can be connected to the mains through an AC/DC converter, purchased separately.

(h) Appliances where the primary function is not the storage of foodstuffs through refrigeration, such as stand-alone icemakers or chilled drinks dispensers.

2. NORMATIVE REFERENCES

The following normative reference standards apply. However, this standard supersedes the below reference standards in case of conflicting requirements.

- SASO GSO 1899: 2016 "GCC Standard Voltages and Frequencies for Alternating Current Distribution Systems"
- IEC 62552-1:2015/AMD1:2020 “Household refrigerating appliances - Characteristics and test methods - Part 1: General requirements"
- IEC 62552-2:2015/AMD1:2020 “Household refrigerating appliances - Characteristics and test methods - Part 2: Performance requirements"
- IEC 62552-3:2015/AMD1:2020 “Household refrigerating appliances - Characteristics and test methods - Part 3: Energy consumption and volume”

3. TERMS AND DEFINITIONS

For the purposes of this standard, the following terms and definitions shall apply:

3.1 2-star section

A part of a 3-star or 4-star compartment which does not have its own individual access door or lid and with target temperature and storage conditions of - 12°C.

3.2 Airborne acoustical noise emission

The sound power level of a refrigerating appliance, expressed in dB(A) re 1 pW (A-weighted).

3.3 Ambient controlled anti-condensation heater

An anti-condensation heater where the heating capacity depends on either the ambient temperature or the ambient humidity or both.

3.4 Annual energy consumption (AEC)

The average daily energy consumption multiplied by 365 (days per year), expressed in kilowatt hour per year (kWh/year).

3.5 Anti-condensation heater

A heater which prevents condensation on the refrigeration appliance.

3.6 Auto-defrost

A feature by which compartments are defrosted without user intervention to initiate the removal of frost accumulation at all temperature-control settings or to restore normal operation, and the disposal of the defrost water is automatic.

3.7 Blast cabinet

An insulated refrigerating appliance primarily intended to rapidly cool hot foodstuffs to below 10 °C in the case of chilling and below - 18°C in the case of freezing.

3.8 Built-in appliance

A refrigerating appliance that is designed, tested and marketed exclusively:

- to be installed in cabinetry or encased (top, bottom and sides) by panels.
- to be securely fastened to the sides, top or floor of the cabinetry or panels.
- to be equipped with an integral factory-finished face or to be fitted with a custom front panel.

3.9 Built-in factor (B_c)

A compensation factor that takes into account whether the refrigerating appliance is built-in or freestanding, with values as set out in Table 7.

3.10 Chill compartment

a compartment which is able to control its average temperature within a certain range without user-adjustments of its control, with a target temperature equal to 2°C, and storage conditions ranging from - 3°C to 3°C, as set out in Table 5.

3.11 Climate class

The range of ambient temperatures, as set out in Table 4, in which the refrigerating appliances are intended to be used, and for which the required storage conditions specified, Table 5 are met simultaneously in all compartments.

3.12 Combi appliance

A refrigerating appliance that has more than one compartment type of which at least one unfrozen compartment.

3.13 Combi parameter (C)

A modelling parameter that takes into account the synergy effect when different compartment types are combined in one appliance, with values as set out in Table 6.

3.14 Compartment

An enclosed space within a refrigerating appliance, separated from other compartment(s) by a partition, container, or similar construction, which is directly accessible through one or more external doors and may itself be divided into sub-compartments. For the purpose of this Regulation, unless specified otherwise, compartment refers to both compartments and sub-compartments.

3.15 Compartment type

The declared compartment type in accordance with the refrigerating performance parameters T_{min}, T_{max}, Tc and others set out in Table 5.

3.16 Compartment volume (V_c)

The volume of the space within the inside liner of the compartment, expressed in liters.

3.17 Daily energy consumption (E_{daily})

The electricity used by a refrigerating appliance over 24 hours at reference conditions, expressed in kilowatt hour per 24 hours (kWh/24h).

3.18 Declared values

The values provided by the supplier for the stated, calculated or measured technical parameters.

3.19 Dedicated refrigerating appliance

A refrigerating appliance with only one type of compartment.

3.20 Defrost and recovery period

The period from the initiation of a defrost control cycle until stable operating conditions are re-established.

3.21 Defrost factor (A_c)

A compensation factor that takes into account whether the refrigerating appliance has an auto-defrost or a manual defrost, with values as set out in Table 7.

3.22 Defrost interval (t_{d-f})

The representative average interval, expressed in hour (h), between one time of activation of the defrost heater and the next in two subsequent defrost and recovery cycle; or if there is no defrost heater one time of deactivation of the compressor and the next in two subsequent defrost and recovery cycles.

3.23 Defrosting type

The method to remove frost accumulation on the evaporator(s) of a refrigerating appliance; that is auto-defrost or manual defrost.

3.24 Display mechanism

Any screen, including tactile screen, or other visual technology used for displaying internet content to users.

3.25 Dispenser

A device that dispenses chilled or frozen loads on demand from a refrigerating appliance, such as ice-cube dispensers or chilled water dispensers.

3.26 Door heat loss factor (D)

A compensation factor for combi appliances according to the number of different temperature compartments or the number of external doors, whichever is lower and as set out in Table 7. For this factor, 'compartment' does not refer to sub-compartment.

3.27 Energy efficiency index (EEI)

An index number for the relative energy efficiency of a refrigeration appliance, expressed in percentage.

3.28 External door

The part of a cabinet that can be moved or removed to at least allow the load to be moved from the exterior to the interior or from the interior to the exterior of the cabinet.

3.29 Fast freeze

A feature that can be activated by the end-user according to the supplier's instructions, which decreases the storage temperature of the freezer compartment(s) to achieve a faster freezing of unfrozen foodstuffs.

3.30 Foodstuffs

Means food, ingredients, beverages, including Specific beverage (1), and other items primarily used for consumption which require refrigeration at specified temperatures.

3.31 Freezer

A refrigerating appliance with only 4-star compartments.

3.32 Freezing capacity

The amount of fresh foodstuffs that can be frozen in a freezer compartment in 24 h, it shall not be lower than 4.5 kg per 24 h per 100 liters of volume of the freezer compartment, with a minimum of 2.0 kg/24h.

3.33 Freestanding appliance

A refrigerating appliance that is not a built-in appliance.

3.34 Fresh food compartment

An unfrozen compartment with a target temperature of 4 °C and storage conditions ranging from 0°C and 8°C, as set out in Table 5.

3.35 Frozen compartment

A compartment type with a target temperature equal to or below 0°C; that is a 0-star, 1-star, 2-star, 3-star or 4-star compartment, as set out in Table 5.

- **0-star compartment and ice-making compartment**: frozen compartment with a target temperature and storage conditions of 0°C, as set out in Table 5.
- **1-star compartment**: frozen compartment with a target temperature and storage conditions of - 6°C, as set out in Table 5.
- **2-star compartment**: frozen compartment with a target temperature and storage conditions of - 12°C, as set out in Table 5
- **3-star compartment**: frozen compartment with a target temperature and storage conditions of - 18°C, as set out in Table 5.
- **4-star compartment or Freezer compartment:** frozen compartment with a target temperature and storage conditions of - 18°C, as set out in Table 5 and fulfils the requirements for the freezing capacity.

3.36 Load factor (L)

A factor accounting for the extra (beyond what is already anticipated through the higher average ambient temperature for testing) cooling load from introducing warm foodstuffs.

3.37 Low noise refrigerating appliance

A refrigerating appliance without vapor compression and with an airborne acoustical noise emission lower than 27 A-weighted decibels referred to 1 picowatt (dB(A) re 1 pW).

3.38 Manual defrost

Not having an auto-defrost function.

3.39 Maximum temperature (T_{max})

The maximum temperature inside a compartment during storage testing, as set out in Table 5.

3.40 Mc and Nc

Modelling parameters that take into account the volume-dependence of the energy use, with values as set out in Table 6.

3.41 Minimum temperature (T_{min})

The minimum temperature inside a compartment during storage testing, as set out in Table 5.

3.42 Mobile refrigerating appliance

A refrigerating appliance that can be used where there is no access to the mains electricity grid and that uses extra low-voltage electricity (< 120 V DC) or fuel or both as the energy source for the refrigeration functionality, including a refrigerating appliance that, in addition to extra low voltage electricity or fuel, or both, can be electric mains operated via an external AC/DC converter to be purchased separately. An appliance placed on the market with an AC/DC converter is not a mobile refrigerating appliance.

3.43 Network

A communication infrastructure with a topology of links, an architecture, including the physical components, organizational principles, communication procedures and formats (protocols).

3.44 Overall dimensions

The space taken up by the refrigerating appliance (height, width and depth) with doors or lids closed, expressed in millimeters (mm).

3.45 Pantry compartment

An unfrozen compartment with a target temperature of 17°C and storage conditions ranging from 14°C to 20°C, as set out in Table 5.

3.46 Quick response code (QR)

A matrix barcode included on the energy label of a product model that links to that model's information in the public part of the product database.

3.47 Refrigerating appliance

An insulated cabinet with one or more compartments that are controlled at specific temperatures, cooled by natural or forced convection whereby the cooling is obtained by one or more energy consuming means.

3.48 Specific beverage (1) compartment

An unfrozen compartment with a target temperature of 12°C, an internal humidity range from 50% to 80% and storage conditions ranging from 5°C to 20°C, as defined in Table 5.

3.49 Specific beverage (2) compartment

A compartment means an unfrozen compartment with a target temperature of 12°C and storage conditions ranging from 2°C to 14°C, as set out in Table 5.

3.50 Standard annual energy consumption (SAEC)

The reference annual energy consumption of a refrigerating appliance, expressed in kilowatt hour per year (kWh/year).

3.51 Sub-compartment

An enclosed space in a compartment having a different operating temperature range from the compartment in which it is located.

3.52 Target temperature (T_c)

The reference temperature inside a compartment during testing, as set out in Table 5, and is the temperature for testing energy consumption expressed as the average over time and over a set of sensors.

3.53 Temperature rise time

The time taken, after the operation of the refrigerated system has been interrupted, for the temperature in a 3- or 4-star compartment to increase from -18°C to - 9°C expressed in hours (h).

3.54 Thermodynamic parameter (r_c)

A modelling parameter which corrects the standard annual energy consumption to an ambient temperature of 24°C, with values as set out in Table 6.

3.55 Total volume (V)

The volume of the space within the inside liner of the refrigerating appliance, equal to the sum of the compartment volumes, expressed in ft^3 or liters.

3.56 Unfrozen compartment

A compartment type with a target temperature equal to or above 4°C; that is a pantry, Specific beverage (1) storage, Specific beverage (2) or fresh food compartment with storage conditions and target temperatures, as set out in Table 5.

3.57 Variable temperature compartment

A compartment intended for use as two (or more) alternative compartment types (for example a compartment that can be either a fresh food compartment or freezer compartment) and which is capable of being set by a user to continuously maintain the operating temperature range

applicable for each declared compartment type. A compartment intended for use as a single compartment type that can also meet storage conditions of other compartment types (for example a chill compartment that may also fulfil 0-star requirements) is not a variable temperature compartment.

3.58 Specific beverage (1) storage appliance

A dedicated refrigerating appliance for the storage of Specific beverage (1), with precision temperature control for the storage conditions and target temperature of a Specific beverage (1) storage compartment, as defined in Table 5, and equipped with anti-vibration measures.

4. GENRAL REQUIREMENTS

4.1 Functional requirements

- Any fast freeze facility, or any similar function achieved through modification of the temperature settings in freezer compartments, shall, once activated by the end-user according to the manufacturer's, the importer's or authorized representative's instructions, automatically revert to the previous normal storage conditions after no more than 72 hours.
- Each compartment shall be marked with the appropriate identification symbol. For the frozen compartments this shall be the number of stars of the compartment. For the chill and unfrozen compartments, this shall be an indication, chosen by the manufacturer, the importer or authorized representative, of the type of food that should be stored in the compartment.
- If the refrigerating appliance contains vacuum insulation panels, the refrigerating appliance shall be labelled with the letters 'VIP' in a clearly visible and readable way.
- For 2-star sub-compartments or 2-star sections:
  - a 2-star sub-compartment or 2-star section is separated from the 3-star or 4-star volume by a partition, container, or similar construction.
  - the volume of the 2-star sub-compartment or 2-star section does not exceed 20% of the total volume of the containing compartment.
- For 4-star compartments, the freezing time to bring the temperature of the light load from +25°C to - 18°C at an ambient temperature of 25°C shall be such that the resulting freezing capacity complies with the requirement in clause 3.33

4.2 Declaration of rated values

- The declaration of the capacity shall be expressed in liters (L) as multiples of 1 liter.
- The declaration of the power shall be expressed in terms of watt (W) as multiples of 10 W.
- The declaration of the annual energy consumption as a multiple of 1 kWh.
- The declaration of the temperature rise time shall be expressed in hours (hh : 00).
- The declaration of the Freezing capacity shall be expressed in (kg/24 h) and rounded to one decimal place.

5. MINIMUM ENERGY PERFORMANCE STANDARD (MEPS)

The Minimum Energy Performance (MEPS) requirement is based on the Energy Efficiency Index (EEI- see annex B) according to Table 1:

Table 1 – MINIMUM ENERGY MINIMUM ENERGY PERFORMANCE STANDARD (MEPS)	
EEI	
Total Valume ≤ 500 liters	**Total Valume > 500 liters**
EEI ≤ 110	EEI ≤ 125

6. ACCEPTANCE CRITERIA FOR LABELLING AND MARKET SURVEILLANCE

The energy label shall be accepted as valid when a sample unit(s) tested meets the criteria specified in Table 2.

Table 2 – ACCEPTANCE CRITERIA	
Parameter	**Verification tolerances**
Tested volume	≥ 0.97 x rated value or 1 liter lower than rated value – whichever is greater.
Tested Freezing capacity	≥ 0.90 x rated value
Tested energy consumption at E_{16}, E_{32}	≤ 1.10 x rated value
Tested Annual energy consumption	≤ 1.10 x rated value
Temperature rise time	≤ 1.15 x rated value

7. LABEL AND CLASSIFICATION

7.1 Determining the energy efficiency class

The energy efficiency class for each product shall be determined based on the Energy Efficiency Index (EEI) as outlined in Table 3.

Table 3 –ENERGY EFFICIENCY INDEX (EEI) CLASSIFICATION			
Bar color	**Energy efficiency class (Arabic)**	**Energy efficiency class (English)**	**EEI**
Dark green	أ	A	EEI ≤ 50
Green	ب	B	50 < EEI ≤ 65
Light green	ج	C	65 < EEI ≤ 80
Yellow	د	D	80 < EEI ≤ 95
Orange	هـ	E	95 < EEI ≤ 110
Red	و	F	110 < EEI ≤ 125
Dark Red	ز	G	EEI > 125

7.2 Design and placement of the label

The label is generated automatically from Saudi Standards, Metrology, and Quality Organization (SASO) registration system, shall be printed as illustrated in Figure 1 and shall be 100 mm wide and 170 mm high.

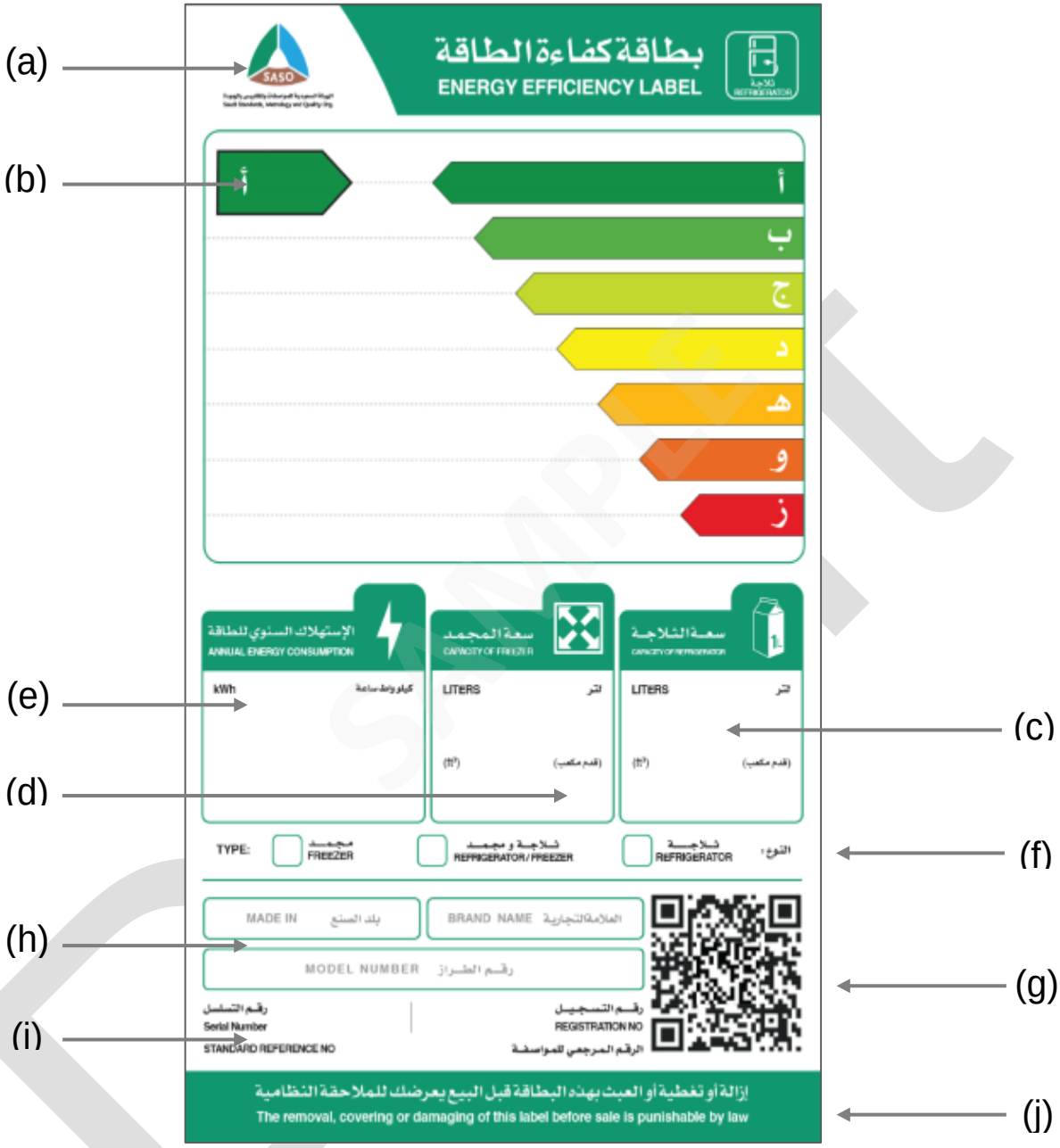
The label shall be visible and fixed on the most prominent part of the product. Also, another label shall be fixed and non-removable on the product packaging.

7.3 Information and values contained on the label

The fields (a) to (j) shall comply with the following requirements:

- **Field (a):** this field shall display the logo of the Saudi Standards, Metrology and Quality Organization (SASO).
- **Field (b):** this field shall reflect the energy efficiency class, which the product attained.
- **Field (c):** the sum of the volumes of the frozen compartment(s).
- **Field (d):** the sum of the volumes of the chill compartment(s) and the unfrozen compartment(s)
- **Field (e):** this field identifies the annual energy consumption of the appliance.
- **Field (f):** this field identifies the category of product.

- **Field (g):** this field shall have a QR code representing the main characteristics of product, this may include the following items based on the data provided in the registration form:
- Manufacturer name
- Model number
- Country of origin
- Product category (Refrigerator, Refrigerator/freezer, freezer)
- Rated power (W)
- Rated voltage (V)
- Rated capacity as expressed in (field c)
- Rated capacity as expressed in (field d)
- Climate class: SN, N, ST or T (could be one or more classes)
- Annual energy consumption (AEC) in kWh
- Classification (unit-less)
- **Field (h):** this field identifies the general product information: brand name, country of origin and model number.
- **Field (i):** this field identifies the standard applicable.
- **Field (j):** this field identifies the legal statement.



8. MARKING AND INSTRUCTIONS

8.1 General information

The following information shall be marked on the nameplate of the refrigerator, refrigerator- freezer or freezer in (English) or (Arabic and English). The marking shall not be on a detachable part of the unit and shall be indelible, durable and easily legible.

Any information related to energy performance added on any part of the refrigerator, refrigerator- freezer or freezer unit or packaging shall not have any ambiguity or lead to misunderstanding of the performance of the unit.

8.2 Nameplate information

The nameplate information shall include, for conformity to this standard the following information:

- Manufacturer name
- Model number
- Country of origin
- Product category (Refrigerator, Refrigerator/freezer, freezer)
- Rated power (W)
- Rated voltage (V)
- Rated capacity of the unfrozen compartment(s) in (liters and cubic feet)
- Rated capacity of the frozen compartment(s) in (liters and cubic feet)
- Climate class: SN, N, ST or T (could be one or more classes)
- Annual energy consumption (AEC) in kWh

8.3 Instruction sheet

An instruction sheet or manual in (Arabic) or (Arabic and English) shall be delivered with each refrigerator, refrigerator- freezer or freezer. Tables, drawings and circuit diagrams may be depicted in English only.

The instruction sheet or manual shall include the following information as a minimum

The information in the product fiche shall be provided in the following order and shall be included in the product brochure or other literature provided with the type of product.

a) The information specified in clause 8.2 except 'Country of origin' and 'serial number'
b) Storage volume of each compartment in accordance with Table 5, if any.
c) The mention ‘auto-defrost’ for the relevant compartment(s).
d) If the model is intended to be a built-in appliance, an indication to this effect.

One instruction sheet may cover a number of refrigerating appliances models supplied by the same supplier.

9. REGISTRATION REQUIREMENTS

Product registration is mandatory, whereby information about registration requirements shall be available in the Saudi Standards, Metrology, and Quality Organization (SASO) website, and reference shall be made to the separate SASO registration forms and requirements.

ANNEX A – TESTING REQUIREMNTS

A.1 General conditions for testing

- Refrigerating appliances with anti-condensation heaters that can be switched on and off by the end-user, the anti-condensation heaters shall be switched on and — if adjustable — set at maximum heating and included in the annual energy consumption (AEC) as daily energy consumption (E_{daily}).

- Refrigerating appliances with ambient controlled anti-condensation heaters, the ambient controlled electric anti-condensation heaters shall be switched off or otherwise disabled, where possible, during the measurement of energy consumption.

- Refrigerating appliances with dispensers that can be switched on and off by the end-user, the dispensers shall be switched on during the energy consumption test but not operating.

- The measurement of energy consumption, variable temperature compartments shall operate at the lowest temperature that can be set by the end-user to continuously maintain the temperature range, as set out in Table 5, of the compartment type which has the lowest temperature.

- Refrigerating appliances that can be connected to a network, the communication module shall be activated but there is no need to have a specific type of communication or data exchange or both during the energy consumption test. During the energy consumption test it has to be ensured that the unit is connected to a network.

- For the performance of chill compartments:

– for a variable temperature compartment rated as a fresh food and/or chill compartment, the energy efficiency index (EEI) shall be determined for each temperature condition and the highest value shall be applied.

– a chill compartment shall be able to control its average temperature within a certain range without user-adjustments of its control, this can be verified during the energy consumption tests at 16°C and 32°C ambient temperature.

- For adjustable volume compartments, when the volumes of two compartments are adjustable relative to one another by the end-user, the energy consumption and the volume shall be tested when the volume of the compartment with the higher target temperature is adjusted to its minimum volume.

- The freezing capacity of a compartment is calculated as 24 times the light load weight of that compartment, divided by the freezing time to bring the temperature of the light load from +25°C to – 18°C at an ambient temperature of 25°C expressed in kg/24h and rounded to one decimal place.

- For 4-star compartments, the freezing time to bring the temperature of the light load from +25°C to – 18°C at an ambient temperature of 25 °C shall be such that the resulting freezing capacity complies with the requirement in point 3.33.
- light load weight for each 4-star compartment shall be:

– 3.5 kg/100 Liter of the volume of the 4-star compartment evaluated, rounded up to the nearest 0.5 kg

– 2 kg for a total volume of all 4- and 3-star compartments for which 3.5 kg/100 Liter leads to a value lower than 2 kg.

in the case that the refrigerating appliance includes a combination of 3- and 4-star compartments, the sum of the light load weights shall be increased so that the sum of the light load weights for all the 4-star compartments shall be:

– 3.5 kg/100 Liter of the total volume of all 4- and 3-star compartments, rounded up to the nearest 0.5 kg

– 2 kg for a total volume of all 4- and 3-star compartments for which 3.5 kg/100 l leads to a value lower than 2 kg.

- for the determination of the climate classes, the acronym for the ambient temperature range, that is SN, N, ST or T:

Table 4 – CLIMATE CLASSES

Class	Symbol	Ambient average temperature (^{0}C)
Extended temperate	SN	+10 to +32
Temperate	N	+16 to +32
Subtropical	ST	+16 to +38
Tropical	T	+16 to +43

A.2 Storage conditions and target temperatures requirements

Table 5 sets out the storage conditions and target temperature per compartment type:

Table 5 – STORAGE CONDITIONS AND TARGET TEMPERATURES PER COMPARTMENT TYPE

Group	Compartment type	Note	Storage conditions		T_c
			T_{min}	T_{max}	
Name	**Name**	**no.**	°C	°C	°C
Unfrozen compartments	Pantry	(1)	+14	+20	+17
	Specific beverage (1)	(2) (6)	+5	+20	+12
	Specific beverage (2)	(1)	+2	+14	+12
	Fresh food	(1)	0	+8	+4
Chill compartment	Chill	(3)	-3	+3	+2
Frozen compartments	0-star & ice-making	(4)	N/A	0	0
	1-star	(4)	N/A	-6	-6
	2-star	(4) (5)	N/A	-12	-12
	3-star	(4) (5)	N/A	-18	-18
	freezer (4-star)	(4) (5)	N/A	-18	-18

([1]): **T_{min}** and **T_{max}** are the average values measured over the test period (average over time and over a set of sensors).

([2]): The average temperature variation over the test period for each sensor shall be no more than ±0.5 kelvin (K). During a defrost and recovery period the average of all sensors is not permitted to rise more than 1.5 K above the average value of the compartment.

([3]): **T_{min}** and **T_{max}** are the instantaneous values during the test period.

([4]): **T_{max}** is the maximum value measured over the test period (maximum over time and over a set of sensors).

([5]): If the compartment is of the auto-defrosting type, the temperature (defined as the maximum of all sensors) is not permitted to rise more than 3.0 K during a defrost and recovery period.

([6]): **T_{min}** and **T_{max}** are the average values measured over the test period (average over time for each sensor) and define the maximum allowed temperature operating range.

N/A: Not applicable

ANNEX B – CALCULATION OF THE ENERGY EFFICIENCY INDEX (EEI) AND ANNUAL ENERGY CONSUMPTION (AEC)

B.1 Determination of the Energy Efficiency Index (EEI)

For the calculation of the Energy Efficiency Index (EEI), of refrigerating appliance model, the Annual Energy Consumption of refrigerating appliance is compared to its Standard Annual Energy Consumption.

The Energy Efficiency Index (EEI) is calculated and rounded to the first decimal place, as:

$$EEI = 100 \times \frac{AEC}{SAEC}$$ Formula (B.1)

Where:

- AEC = Annual Energy Consumption of the refrigerating appliance
- SAEC = Standard Annual Energy Consumption of the refrigerating appliance.

B.2 Determination of the Annual Energy Consumption (AEC)

The energy consumption shall be determined by testing at an ambient temperature of 16°C and 32°C.

To determine the energy consumption, the average air temperatures in each compartment shall be equal to or below the target temperatures specified in Table 5 for each compartment type claimed by the supplier. Values above and below target temperatures may be used to estimate the energy consumption at the target temperature for each relevant compartment by interpolation, as appropriate.

AEC, expressed in kWh/year as a multiple of 1 kWh, shall be calculated as follows:

$$AEC = 365 \times (E_{daily} / L)$$ Formula (B.2)

Where:

L= The load factor (L = 0.9) for refrigerating appliances with only frozen compartments and (L = 1.0) for all other appliances.

E_{daily} = expressed in kWh/24h and rounded to three decimal places calculated from E_T at an ambient temperature of 16°C (E_{16}) and at an ambient temperature of 32°C (E_{32}) as follows:

$$E_{daily} = 0.5 \times (E_{16} + E_{32})$$ Formula (B.3)

where E_{16} and E_{32} are derived by interpolation of the energy test at the target temperatures set out in Table 5.

B.3 Determination of the Standard Annual Energy Consumption (SAEC)

$$SAEC = C \times D \times \sum_{c=1}^{n} A_c \times B_c \times \left[{}^{V_c}/_{V} \right] \times (N_c + V \times r_c \times M_c)$$ Formula (B.4)

Where:

c = the index number for a compartment type ranging from 1 to n, with n the total number of compartment types

V_c= compartment volume expressed in liters and rounded to the first decimal place

V= total volume expressed in liters and rounded to the nearest integer

$$V \leq \sum_{c=1}^{n} V_c$$ Formula (B.5)

r_c, ,N_c, M_c and C= the modelling parameters specific to each compartment with values as set out in Table 6

A_c,B_c, and D = the compensation factors with values as set out in Table 7.

When carrying out the calculations above, for the variable temperature compartments, the compartment type with the lowest target temperature for which it is declared suitable is chosen.

Modelling parameters per compartment type for the calculation of SAE:

The modelling parameters are set out in Table 6.

TABLE 6 –THE VALUES OF THE MODELLING PARAMETERS PER COMPARTMENT TYPE

compartment type	r_c (1)	N_c	M_c	C
Pantry	0.35	75	0.12	between 1.15 and 1.56 for combi appliances with 3-star or 4-star compartments (2) 1.15 for other combi appliances 1.00 for other refrigerating appliances
Specific beverage (1)	0.60			
Specific beverage (2)	0.60			
Fresh food	1.00			

Chill	1.10	138	0.12	
0-star & ice-making	1.20	138	0.15	
1-star	1.50			
2-star	1.80			
3-star	2.10			
Freezer (4-star)	2.10			

([1]) $r_c = \frac{(T_a - T_c)}{20}$ with T_a = 24 °C and T_c with values as set out in Table 5.

([2]) C for combi appliances with 3-star or 4-star compartments is determined as follows:

where frzf is the 3-star or 4-star compartment volume V_{fr} as a fraction of V with frzf $= \frac{V_{fr}}{V}$:

- if frzf ≤ 0.3, then C =1.3 + 0.87 × frzf
- if $0.3 < \text{frzf} < 0.7$, then $C = 1.87 - 1.0275 \times \text{frzf}$
- else $C = 1.15$.

Compensation factors per compartment type in the calculation of SAE:

The compensation factors are set out in Table 7.

TABLE 7 – THE VALUES OF THE COMPENSATION FACTORS PER COMPARTMENT TYPE

Compartment type	A_c		Bc		D[(1)]			
	Manual defrost	Auto-defrost	Freestanding appliance	Built-in appliance	≤ 2	3	4	> 4
Pantry	1.00		1.00	1.02	1.00	1.02	1.035	1.05
Specific beverage (1)								
Specific beverage (2)								
Fresh food								
Chill				1.03				

0-star & ice-making	1.00	1.10		1.05				
1-star								
2-star								
3-star								
Freezer (4-star)								
(1) number of external doors or compartments, whichever is lowest.								